3.10 Air Quality

3.10.1 Affected Environment

The study area for air quality encompasses the ***area within the*** proposed project boundary and the area within 10 kilometers (km) (6.2 miles) of the proposed project. The cumulative effects study area encompasses the Crescent Valley and Grass Valley hydrographic basins.

Nevada lies within the Basin and Range Physiographic Province, which is characterized by a series of north-south trending mountain ranges and intervening basins. This varied and rugged topography (including mountain ranges and narrow valleys) ranges in elevation from approximately 1,500 to more than 10,000 feet amsl. Nevada has climatic diversity ranging from scorching lowland desert in the south to cool mountain forests in the north. Large local variations of temperature and rainfall are common. The principal climatic features are bright sunshine, low annual precipitation (averaging 9 inches in the valleys and deserts), heavy snowfall in the higher mountains, clean dry air, and exceptionally large daily ranges of temperature.

Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that influences the climate of the state. One of the greatest contrasts in precipitation found within a short distance in the U.S. occurs between the western slopes of the Sierras in California and the valleys just to the east of this range. The prevailing winds are from the west. As the warm moist air from the Pacific Ocean ascends the western slopes of the Sierra Range, the air cools, condensation takes place, and most of the moisture falls as precipitation. Descending the eastern slope, the air is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the western portions of Nevada, but throughout the state, with the result that the lowlands are largely desert or steppes.

The proposed Cortez Hills Expansion Project is located near the east-central portion of the Great Basin. The surrounding terrain consists of alternating mountain ranges and sagebrush-covered valleys, with the proposed project situated in the Basin and Range physiographic province. The proposed project lies on the western slopes of the Cortez Mountains. The higher elevations in the Cortez Mountains lie north of the mine site, with the highest peaks reaching elevations over 9,000 feet amsl. Elevations in the study area range from approximately 6,000 to 8,000 feet amsl.

Meteorology, air quality, and dispersion conditions in the study area were characterized from data records from climate monitoring stations at Elko and at Beowawe University of Nevada Ranch observation sites. Elko weather represents the regional climate for upper air winds and mixing heights used to characterize dispersion conditions. The Beowawe University of Nevada Ranch site is more representative of the local temperature and rainfall in the vicinity of the proposed project. The climate in the project region is classified as arid, with elevations below 6,500 feet amsl receiving the least amount of precipitation (5 to 9 inches per year is common) while the mountainous areas are substantially wetter (receiving 11 to over 16 inches of precipitation annually). An arid climate is characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges.

3.10.1.1 Climate and Meteorology

Three important meteorological factors influence the dispersion of pollutants in the atmosphere: mixing height, wind (speed and direction), and stability. Mixing height is the height above ground within which rising warm air from the surface will mix by convection and turbulence. Local atmospheric conditions, terrain configuration, and source location determine dilution of pollutants in this mixed layer. Mixing heights vary diurnally, with the passage of weather systems, and with the season. For the study area, the mean annual morning mixing height is estimated to be approximately 300 meters; however, during the winter months the mean morning mixing height is approximately 220 meters (Holzworth 1972). The mean annual afternoon mixing height exceeds 2,400 meters.

Morning atmospheric stability conditions tend to be stable due to the rapid cooling of the layers of air nearest the ground. Afternoon conditions, especially during the warmer months, tend to be neutral to unstable because of the rapid heating of the surface under clear skies. During the winter, periods of stable afternoon conditions may persist for several days in the absence of synoptic (continental scale) storm systems to generate higher winds with more turbulence and mixing. A high frequency of inversions at lower elevations during the winter can be attributed to the nighttime cooling and sinking air flowing from higher elevations to the low lying areas in the basins. Although winter inversions generally are quite shallow, they tend to be more stable due to reduced surface heating. In the study area, episodes with stagnant conditions resulting in periods with higher concentrations of air pollutants may occur.

Elko, Nevada, is located approximately 45 miles northeast of the study area. The wind rose for Elko is representative of the regional wind climatology (**Figure 3.10-1**). The Elko wind rose indicates that winds are predominantly from the west; however, it also shows that there is a secondary maximum of wind occurrences from the south. Wind speed has an important effect on area ventilation and the dilution of pollutant concentrations from individual sources. Light winds, in conjunction with large source emissions, may lead to an accumulation of pollutants that can stagnate or move slowly to downwind areas. During stable conditions, downwind usually means down valley or toward lower elevations. Climate data from Elko indicate that the potential for air pollution episodes to last 5 or more days is nearly zero (Holzworth 1972). A potential air pollution episode is defined as a period of time with wind speeds less than 2 meters per second and mixing heights less than 1,000 meters.

The Beowawe University of Nevada Ranch observation site is located within approximately 15 miles of the proposed project at approximately the same elevation; therefore, it is considered representative of the climate in the study area. Average temperatures at the Beowawe University of Nevada Ranch range from the upper 20s (in °F) in January to the upper 60s in July. **Table 3.10-1** shows the maximum, average, and minimum temperatures at the observation site during the 30-year period 1972 through 2001. Summers typically are hot and dry except in the higher mountain ranges. Although precipitation is spread throughout the year, most of the annual precipitation falls as snow during the winter months. The average annual precipitation is approximately 9.5 inches at Elko and approximately 11 inches at the Beowawe University of Nevada Ranch site. Precipitation totals by month for the Beowawe University of Nevada Ranch site are

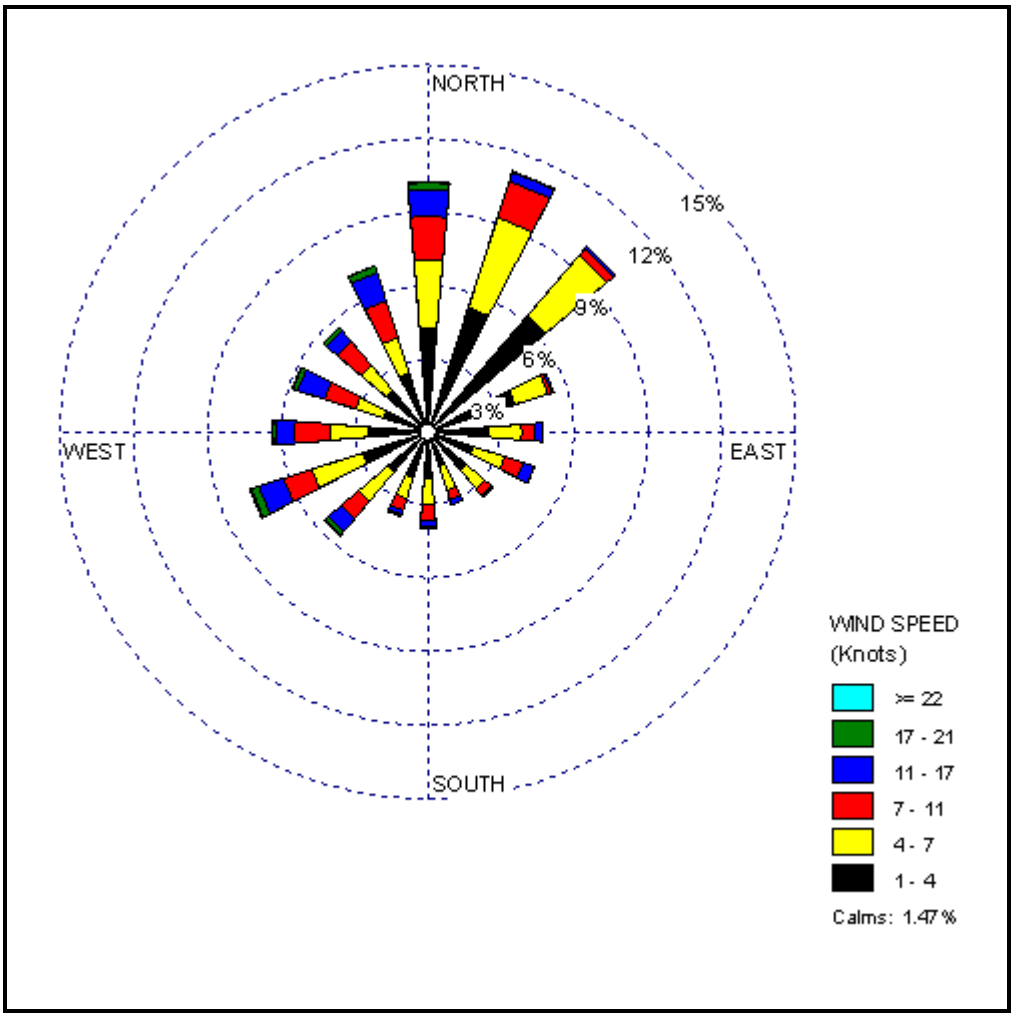


Figure 3.10-1. Wind Rose for Elko, Nevada

Table 3.10-1
Monthly Climate Summary[1]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Maximum Temperature (°F)	40.4	46.0	51.5	59.0	68.2	78.5	87.4	85.7	77.6	66.1	51.1	42.3	62.8
Average Minimum Temperature (°F)	13.7	19.8	25.5	29.6	36.3	43.2	49.3	47.4	39.0	29.1	21.2	14.4	30.7
Average Total Precipitation (inches)	1.03	0.75	1.30	1.11	1.39	0.84	0.49	0.55	0.79	0.94	0.96	0.80	11.0
Average Total Snow Fall (inches)	8.2	4.9	6.1	4.0	1.6	0.0	0.0	0.0	0.1	0.6	2.6	5.3	33.3
Average Snow Depth (inches)	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1] Data from the Beowawe University of Nevada Ranch Station (260800-2) for the period of September 1, 1972, to December 31, 2001.

Source: National Climatic Data Center – National Weather Service Cooperative Network 2006.

presented in **Table 3.10-1**. Average relative humidity ranges from a low of 17 percent in the summer during the day to a high of 77 percent in spring during the night (National Oceanic and Atmospheric Administration [NOAA] 1990). Net evaporation exceeds precipitation in the study area.

CGM currently monitors meteorological data at the Cortez station, which is located just north of the existing Pipeline Waste Rock Facility. Based on meteorological monitoring data collected from the Cortez station over the period of 1997 through 2001, the average temperature was 52.8°F, with temperatures ranging from 104 to -8°F. Annual precipitation in the proposed project vicinity during the same period (1999 excluded due to missing data) ranged from 6.34 to 10.84 inches (Enviroscientists 2006).

The proposed project is at a latitude that places it within the belt of prevailing westerly winds that circle the globe around the earth's northern hemisphere. However, the project would be located in complex terrain where the winds are affected by local topographic features.

Due to the typically dry atmosphere, bright sunny days and clear nights frequently occur. This in turn allows rapid heating of the ground surface during daylight hours and rapid cooling at night. Since heated air rises, and cooled air sinks, winds tend to blow uphill during the daytime and down slope at night. This up slope and down slope cycle generally occurs in all the geographical features, including mountain range slopes and river courses. The larger the horizontal extent of the feature, the greater the volume of air that moves in the cycle. The complexity of terrain features causes complex movements in the cyclic air patterns, with thin layers of moving air embedded within the larger scale motions. The lower level, thermally driven winds also are embedded within larger scale upper wind systems (synoptic winds). Synoptic winds in the region are predominantly west to east, are characterized by daily weather variations that enhance or diminish the boundary layer winds, and are substantially channeled by regional and local topography.

Atmospheric dispersion is influenced by several parameters, including wind speed, temperature inversions (mixing heights), and atmospheric stability. Based on the 2001 meteorological data, prevailing winds at the Cortez station were from the west, with average annual wind speeds at 6.9 miles per hour (mph).

Month-to-month variations were small, with average wind speeds ranging from 4.9 to 8.8 mph (Gelhaus 2002). These wind speeds tend to promote atmospheric mixing, and generally transport locally generated air emissions away from the area. Inversions restrict vertical movement of the air in the lower atmosphere, thereby preventing atmospheric pollutants from mixing with the air above the inversion layer.

3.10.1.2 Air Quality

Air quality is defined by the concentration of various pollutants and their interactions in the atmosphere. Pollution effects on receptors have been used to establish a definition of air quality. Measurement of pollutants in the atmosphere is expressed in units of ppm or micrograms per cubic meter ($\mu g/m^3$). Both long-term climatic factors and short-term weather fluctuations are considered part of the air quality resource, because they control dispersion and affect concentrations. Physical effects of air quality depend on the characteristics of the receptors and the type, amount, and duration of exposure. Air quality standards specify acceptable upper limits of pollutant concentrations and duration of exposure. Air pollutant concentrations within the standards generally are not considered to be detrimental to public health and welfare.

The relative importance of pollutant concentrations can be determined by comparison with appropriate National and/or state Ambient Air Quality Standards (AAQS). National and state AAQS are presented in **Table 3.10-2**. An area is designated by the USEPA as being in attainment for a pollutant if ambient concentrations of that pollutant are below the NAAQS. An area is not in attainment if violations of NAAQS for that pollutant occur. Areas where insufficient data are available to make an attainment status designation are listed as unclassifiable and are treated as being in attainment for regulatory purposes.

The existing air quality of the study area is typical of the largely undeveloped regions of the western U.S. For the purposes of statewide regulatory planning, this area has been designated as in attainment for all pollutants that have an AAQS. Current sources of air pollutants in the region include several precious metals mines that are sources for PM_{10} and $PM_{2.5}$.

CGM has operated PM_{10} monitors at the mine in the past, and results of this monitoring program are presented and discussed in the following section.

3.10.2 Environmental Consequences

Issues related to air quality include potential impacts associated with project-generated air emissions.

Environmental impacts to air resources would be significant if the Proposed Action or other action alternatives result in any of the following:

- Exceedance of National or state AAQS.
- Exposure of sensitive receptors to substantial pollutant concentrations.

Table 3.10-2
National and State of Nevada Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada AAQS[1,3] ($\mu g/m^3$)	NAAQS[2,3] Primary[4] ($\mu g/m^3$)	NAAQS[2,3] Secondary[5] ($\mu g/m^3$)
O_3	***1***-hour	***365***	**--**	**--**
	8-hour	**--**	157	157
CO	1-hour	40,000	40,000	40,000
CO less than 5,000 feet amsl	8-hour	10,000	10,000	10,000
CO at or greater than 5,000 feet amsl	8-hour	6,670		
SO_2	3-hour	1,300	None	1,300
	24-hour	365	365	None
	Annual average	80	80	None
NO_2	Annual average	100	100	100
Lead	Quarterly arithmetic mean	1.5	1.5	1.5
Visibility	Observation	Insufficient amount to reduce the prevailing visibility[6] to less than 30 miles when humidity is less than 70 percent.	--	--
Hydrogen Sulfide	1 hour	112[7]	--	--
PM_{10}	24-hour	150	150	150
	Annual average	50	None	None
$PM_{2.5}$	24-hour	**--**	***35***	***35***
	Annual average	**--**	15	15

[1] These standards must not be exceeded in areas where the general public has access.
[2] These standards, other than for O_3, PM, and those based on annual averages, must not be exceeded more than once per year. The PM_{10} 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above the standard, rounded to the nearest 10 $\mu g/m^3$, is equal to or less than one. The expected number of days per calendar year generally is based on an average of the number of times the standard has been exceeded per year for the last 3 years.
[3] All measurements of air quality that are expressed as mass per unit volume, such as $\mu g/m^3$, must be corrected to a reference temperature of 25 degrees Celsius and a reference pressure of 760 millimeters of mercury (1,013.2 millibars).
[4] National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[5] National secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a regulated air pollutant.
[6] For the purposes of this section, prevailing visibility means the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.
[7] The ambient air quality standard for hydrogen sulfide does not include naturally occurring background concentrations.

Source: NAC 445B.22097 Standards of Quality for Ambient Air (NRS 445B.210, 445B.300)***; USEPA 2007***.

The significance criteria for air resources have been established for this EIS at levels ***consistent with the national and state AAQS***. For criteria pollutants, these levels have been established through the National and state AAQS. The AAQS are concentrations set by law designed to protect public health and welfare from air pollutants (see **Table 3.10-2**).

3.10.2.1 Proposed Action

Construction, mining, and ore-processing activities associated with the proposed project would be sources of PM_{10}. Ore processing operations combustion sources (e.g., boilers) and gasoline- and diesel-powered vehicles and equipment would be primary sources of gaseous pollutants (e.g., SO_2, NO_2, CO, and volatile organic compounds [VOCs]).

The air quality impact of a fugitive dust source depends on the quantity and dispersion potential of the dust particles released into the atmosphere. The larger dust particles settle out near the source, while finer particles are dispersed over much greater distances. Theoretical drift distances, as a function of particulate diameter and mean wind speed, have been computed for fugitive dust emissions. For a typical wind speed of 10 miles per hour, particles larger than 100 micrometers (µm) are likely to settle out within 20 to 30 feet from the source. (For comparison, a human hair has a thickness of about 100 µm.) Particles 30 to 100 µm are likely to settle within a few hundred feet, depending on the extent of atmospheric turbulence. Dust particles smaller than 30 µm generally are recognized as emissions that may remain suspended indefinitely.

Air quality in the study area would be affected by both construction and operation of mining facilities. Construction activities associated with mine development would cause an increase in fugitive and gaseous emissions in the local area. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream (e.g., stack, chimney, or vent). Increases in local fugitive dust levels would result in temporary localized air quality impacts.

Air quality impacts due to emissions from mining operations would occur throughout the operational phase of the project. The primary pollutant would be fugitive dust particulates (total suspended particulates and PM_{10}) generated by the crushers, screens, conveyors, other processes, and from disturbance areas. As discussed in Section 2.4.11, Applicant-committed Environmental Protection Measures, CGM would implement measures to minimize fugitive dust emissions. The measures would include the application of water and chemical dust suppressants on roadways and other disturbances, concurrent reclamation practices, and a control system for the crusher/conveyor including the use of shielding and fogging water sprays. In addition, air quality permits issued for the project by NDEP would require CGM to control emissions, including fugitive emissions, from the mine site. Other pollutants would include NO_2, CO, and SO_2 in exhaust emissions from the electrical generators, vehicles, and other fuel burning equipment. VOCs also would be emitted from fuel storage tanks.

The activities associated with the Proposed Action that would have the potential to impact air quality consist of the following:

- Development of the Cortez Hills Pit and associated heap leach, waste rock, and crushing facilities;
- Additional mining in the Cortez Pit and development or expansion of associated waste rock and heap leach facilities;

- Surface support operations for underground mining and associated waste rock and ore transport/placement;
- Development of the North Gap Pit expansion and associated waste rock and ore transport/placement;
- Delivery of mill-grade ore from the Cortez Hills Pit to the Pipeline Mill; and
- An increase in the processing rate of the Pipeline Mill.

No change in the currently permitted mining rate for the Pipeline Pit is proposed in association with North Gap Pit expansion. The proposed daily mining rate in the Cortez Hills Pit would average between 300,000 and 350,000 tpd, with a maximum rate of 500,000 tpd. Mining in the Cortez Pit would be conducted at a rate up to 40,000 tpd.

Regulatory Framework and Associated Impacts

Ambient air quality and the emission of air pollutants are regulated under both federal and State of Nevada laws and regulations as discussed below.

Federal Clean Air Act. The Federal Clean Air Act (CAA), and the subsequent Federal Clean Air Act Amendments of 1990 (CAAA), require the USEPA to identify NAAQS to protect public health and welfare. The CAA and the CAAA established NAAQS for seven pollutants, known as "criteria" pollutants. The ambient standards set for these pollutants satisfy "criteria" specified in the CAA. A list of the criteria pollutants regulated under the CAA, and their currently applicable NAAQS set by the USEPA for each, are listed in **Table 3.10-2**.

The USEPA has developed classifications for distinct geographic regions. An area is classified as in "attainment" if the area has "attained" compliance with the NAAQS for that pollutant. It is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant. If the monitored pollutants have fallen from non-attainment levels to attainment levels, it is classified as “maintenance.” Areas for which sufficient ambient monitoring data are not available are designated as "unclassified" for those particular pollutants.

In addition to the designations relative to attainment of conformance with the NAAQS, the CAA requires the USEPA to place selected areas within the U.S. into one of three classes, which are designed to limit the deterioration of air quality when it is “better than” the NAAQS. Class I is the most restrictive air quality category. It was created by Congress to prevent further deterioration of air quality in National Parks and Wilderness Areas of a given size, which were in existence prior to 1977, or those additional areas that have since been designated Class I under federal regulations (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II areas, which allow a relatively greater deterioration of air quality, although still below NAAQS. No Class III areas have been designated.

Federal PSD regulations limit the maximum allowable increase in ambient particulate matter in a Class I area resulting from a major or minor stationary source to ***4*** μg/m^3 (annual geometric mean) and ***8*** μg/m^3 (24-hour average). Increases in other criteria pollutants are similarly limited. Specific types of facilities (listed facilities) that emit, or have the potential to emit, 100 tpy or more of total PM, PM_{10}, or other criteria air pollutants, or any facility that emits, or has the potential to emit, 250 tpy or more of total PM, PM_{10}, or other criteria air pollutants, are considered major stationary sources. ***USEPA/NDEP*** are to notify ***BLM of source modifications that may affect a*** Class I area. There are no Class I areas within 100 km of the study area. The nearest Class I planning area to the study area, the Jarbidge Wilderness Area, is located approximately 190 km (118 miles) northeast of the study area (BLM 1996a). Neither the existing Pipeline/South Pipeline Project air pollutant emission sources, nor the Proposed Action emission sources, are or would be major stationary sources subject to PSD regulatory requirements.

The Class II pollution concentration limits are triggered for a planning area when an application for a major source affecting that planning area has been deemed complete by the regulatory authority (40 CFR 52.21[b][14]). The closest triggered Class II planning area (Air Pollution Control Region [APCR] 64) is located approximately 70 miles northwest of the project boundary. The planning area in which the proposed project would be located has not been triggered for any pollutant.

New Source Performance Standards (NSPSs), also required under the CAA, are set by the USEPA for specific types of new or modified stationary sources. NSPSs set fixed emission limits for classes of sources to prevent deterioration of air quality from the construction of new sources and to reduce control costs by building pollution controls into the initial design of sources. In establishing NSPSs, USEPA is required to consider cost, non-air impacts, and energy requirements. Certain project components used to process metallic minerals are subject to the NSPSs found in 40 CFR Part 60, Subpart LL (Standards of Performance for Metallic Mineral Processing Plants).

The CAAA introduced a new facility-wide permitting program known as the Federal Operating Permit, or "Title V," program. The program requires facilities with the potential to emit more than 100 tpy of any regulated pollutant (excluding PM), 10 tpy of any single HAP, or 25 tpy or more of any combination of HAPs, to submit a Federal Operating Permit application.

The CAA directs the USEPA to delegate primary responsibility for air pollution control to state governments, which comply with certain minimum requirements. State governments, in turn, often delegate this responsibility to local or regional governmental organizations. The State Implementation Plan (SIP) was originally the mechanism by which a state set emission limits and allocated pollution control responsibility to meet the NAAQS. The function of a SIP broadened after passage of the CAAA and now includes the implementation of specific technology-based emission standards, permitting of sources, collection of fees, coordination of air quality planning, and prevention of significant deterioration of air quality within regional planning areas and statewide. Section 176 of the CAA, as amended, requires that federal agencies must not engage in, approve, or support in any way any action that does not conform to a SIP for the purpose of attaining AAQS (Wooley 1998).

Nevada State Air Quality Program. The Bureau of Air Pollution Control (BAPC) is the agency in the State of Nevada that has been delegated the responsibility for implementing a SIP (excluding Washoe and Clark counties, which have their own SIP). Included in the SIP are the State of Nevada air quality permit programs (NAC 445B.001 through 445B.3497, inclusive). The Nevada AAQS also are part of the SIP. The Nevada AAQS generally are identical to the NAAQS, with the exception of the following: 1) an additional standard for CO in areas with an elevation in excess of 5,000 feet amsl; 2) the recently promulgated NAAQS for $PM_{2.5}$ (Nevada has yet to adopt the new standards); 3) the revised NAAQS for PM_{10}; 4) O_3 (Nevada has yet to adopt the new and revised standards); and 5) a violation of a state standard occurs with the first annual exceedance of an ambient standard, while federal standards generally are not violated until the second annual exceedance. In addition to establishing the Nevada AAQS, the BAPC is responsible for permit and enforcement activities throughout the State of Nevada.

The BAPC permitting program implements the Title V Federal Operating Permit program, as well as the minor source permitting program for facilities that emit less than 100 tpy of all criteria pollutants and are not a major source of HAPs. CGM's current operations in Crescent Valley are regulated by two air quality operating permits. Operations at the existing Pipeline/South Pipeline Project are permitted under BAPC's minor source permitting program via air quality operating permit AP1041-0619. Currently, the Cortez Mill is permitted under air quality operating permit AP1041-1500. The construction of the proposed overland conveyor system from the Cortez Hills Complex to the existing Pipeline Mill would require combining all operations under a single Title V operating permit; CGM submitted this permit application in April 2006.

CGM, in concert with the BAPC, USEPA, and three other mining companies, participated in the Voluntary Mercury Reduction Program (VMRP) from 2001 to 2005. From 2004 to 2005, mercury emissions at CGM's Crescent Valley Operations Area were reduced by approximately 40 percent (CGM 2006d). Using the data collected from the VMRP, BAPC implemented the Nevada Mercury Control Program (NMCP) in March 2006. The NMCP is designed to control mercury emissions from thermal units located at precious metal mines and mills. In the initial phase of the NMCP, data on thermal units and their controls are being collected throughout Nevada. This will be followed by the development of Maximum Achievable Control Technology (MACT) standards for each type of thermal unit. The installation of MACT control devices will be the minimum requirement of the ensuing mercury permitting program under the NMCP.

Air Quality Modeling

The USEPA's designation of AERMOD as the preferred air dispersion model became effective on December 9, 2005. Therefore, AERMOD was selected for analysis of the proposed project. The AERMOD model used in this analysis included the Plume Rise Model Enhancement (PRIME) downwash algorithms that are used to calculate plume downwash from stack emissions caused by wind flowing over and around nearby buildings. Air quality modeling for the project was conducted by Enviroscientists (2006).

Dispersion models simulate the transport and diffusion of emitted pollutants within the atmosphere and can calculate air pollutant concentrations at any discrete location. Air pollutant emissions may be from point sources (such as stacks or vents); volume sources (such as buildings or elevated conveyors); area sources (regions with a distinct square footage and little or no vertical velocity, such as a lagoon or heap); or open-pit

sources (below-grade operations such as an open-pit mine). Non-reactive gases or particles such as PM_{10} that behave like gases emitted from these sources are modeled based on a Gaussian distribution.

In addition to the normal receptor grid, discrete receptor points were used to assess the potential impact of the proposed project on specific sensitive receptors. For the purpose of this assessment, these receptors were defined as areas that frequently are visited by the public (e.g., schools), nearby residences, and the nearest Class I planning area. The selected sensitive receptors include:

- Historic Cortez townsite
- Filippini Ranch
- Tenabo Ranch
- Wintle Ranch
- Dean Ranch
- Dann Ranch
- Crescent Valley School
- Beowawe School
- Jarbidge Wilderness (the nearest Class 1 planning area)

Modeled Pollutants and Assumptions. Dispersion modeling was conducted for four of the criteria air pollutants (i.e., PM_{10}, CO, NO_2, and SO_2). The proposed project would not directly produce O_3, rather O_3 would be produced by photo-chemical reactions involving certain VOCs and oxides of nitrogen (NO_X). The emissions of these compounds were calculated and used in the Scheffe screening model to evaluate potential O_3 generation and to demonstrate compliance with the 1-hour O_3 standard.

Modeling was not performed for the criteria pollutants $PM_{2.5}$, lead, or O_3 (for the 8-hour standard). O_3 would not be directly emitted as a pollutant by the facility; however, it was modeled using the Scheffe screening model. The potential for lead emissions from the proposed project are considered to be negligible; therefore, no analyses were performed with respect to lead. $PM_{2.5}$ typically is not modeled for near-field impacts due to secondary formation of $PM_{2.5}$.

The closest PM_{10} monitoring station is located adjacent to the existing Pipeline tailings impoundment, approximately 10 miles northwest of the Cortez Mill. CGM has operated two co-located PM_{10} samplers in this location (Sites 1A and 1B) just outside the fence. Annual average PM_{10} concentrations for 1997 through 2001 are presented in **Table 3.10-3**. Monitor site 2A is located inside the mine fence and does not represent air quality at locations accessible to the public. All data from 1997 is markedly higher than the data for the other 4 years. That year's data may have been impacted by fugitive dust from transient construction activities. For this impact analysis, the highest annual average from Site 1B from 1998 through 2001 (16 $\mu g/m^3$) was used as the PM_{10} background value for both the 24-hour and annual time frames.

Monitoring has not been performed within Crescent Valley for ambient concentrations of CO, NO_2, O_3, or SO_2, nor does the BAPC specify background concentrations for these pollutants. Most air pollutant monitoring is conducted in locations with a relatively high population density where high pollutant levels

might be expected. Monitoring data from locations as remote and undeveloped as southern Crescent Valley are not readily available. Almost all of the monitoring conducted by the State of Nevada is done in the Reno/Carson City or Las Vegas areas.

Table 3.10-3
Annual Average PM_{10} Concentrations from 1997 through 2001
($\mu g/m^3$)

Year	Site 1A	Site 1B	Site 2A	Maximum
1997	23	25	22	119
1998	12	12	13	72
1999	13	14	17	69
2000	14	14	16	83
2001	16	16	19	63
Average	15.6	16.0	17.5	---

For purposes of this analysis, monitoring data from most of the western states were reviewed, and the most suitable surrogates considered for each pollutant. Not all monitoring sites monitor for all of the criteria pollutants. **Table 3.10-4** lists the pollutant, timeframe, monitor location, years of data reviewed, and background value selected for use in the modeling effort.

Table 3.10-4
Background Values for Criteria Pollutants

Pollutant and Averaging Time		Monitor Location	Years of Data Reviewed	Standard ($\mu g/m^3$)	Background Value ($\mu g/m^3$)
PM_{10}	24-hour	Cortez	1997-2001	150	16
	Annual	Cortez	1997-2001	50	16
CO	1-hour	Barstow, California	2002-2005	40,000	3,771
	8-hour	Barstow, California	2002-2005	10,000	1,666
NO_2	Annual	Trona, California	2002-2005	100	9.43
SO_2	3-hour	Trona, California	2002-2005	1,300	28.6
	24-hour	Trona, California	2002-2005	365	18.3
	Annual	Trona, California	2002-2005	80	5.3
O_3	1-hour	Craters of the Moon National Monument, Idaho	2002-2005	235	141

Rural background values recommended by BAPC were selected for PM_{10}. BAPC considers these values appropriate for remote mining facilities. Trona, California, was chosen for background values for SO_2 and NO_2. Trona is a small desert town in southern California. As the monitoring at Trona does not include CO, Barstow, California, was chosen for the CO background value. This southern California town is located at the junction of two interstates and is a major railroad center. As a result, monitored combustion emissions would be expected to be higher in Barstow than in Crescent Valley. Ozone monitoring stations in southern California record very high O_3 values. These values probably reflect local combustion sources, down-wind transport of pollutants from the Los Angeles basin, and persistent warm, sunny weather ideal for the creation of O_3. As a result, Craters of the Moon National Monument in Idaho was chosen for the background

value for the 1-hour O_3 standard. The monument is remote, and in a sagebrush dominated landscape similar to Crescent Valley.

Air Pollution Emission Sources and Emission Inventory. The existing facilities and the proposed project contain, or would contain, numerous sources of air pollutants. The air quality analysis took into account:

- Facility configuration
- Future haul road locations
- Quantities of material processed and/or handled at certain locations

The analysis quantified the emissions of the applicable criteria pollutants related to the processing of ore under the Proposed Action and the alternatives. Air emission estimates were made based on the following factors: 1) maximum material throughput; 2) USEPA-approved emission factors obtained from USEPA's Compilation of Air Pollution Emission Factors (5th edition), otherwise known as EPA AP-42; 3) existing air quality permits and past air quality permit applications for both the existing Pipeline/South Pipeline Project and the existing Cortez Mill; 4) facility descriptions in CGM's Plan of Operations; and 5) information provided by CGM. A comprehensive list of identified individual potential sources of project-related air pollutant emissions (emission units), organized into "emission groups" of similar activities (e.g., mining, heap leaching, etc.), are presented in Enviroscientists report (Enviroscientists 2006). In all, 264 activities and sources were considered for their pollutant emission potential. The report also contains an example emissions inventory of the Proposed Action for the 24-hour modeling period and an example emissions inventory of the alternatives for the 24-hour modeling period.

For most pollutants, air pollution emissions for the Proposed Action and alternatives were based on the projected daily maximum mining rate of 500,000 tpd in the Cortez Hills Pit. An annual average mining rate of 330,000 tpd was used to evaluate the impacts of the Proposed Action and alternatives relative to the annual NO_2 standard, because no short-term standard exists for NO_2. The use of the higher short-term rate for the annual PM_{10} and SO_2 calculations is conservative since the resulting long-term production rate is overestimated by 42 percent. Emissions from processing of ore at the Pipeline Mill were based on the proposed daily average processing rate of 15,000 tpd. **Table 3.10-5** provides a summary of air emissions from the three classes of sources at the mine. Point sources are those where emissions are associated with a particular piece of equipment or stack (e.g., crusher, boiler, or baghouse). Area sources include roads, material stockpiles, and similar sources not associated with a single point. Conveyor transfer points, hoppers, and other material handling sources usually are modeled as volume sources.

Table 3.10-5
Summary of Air Emissions
(tpy)

	Type of Source		
Pollutant	**Point**	**Area**	**Volume**
NO_2	101.4	1,831.7	NA
SO_2	9.3	70.4	NA
CO	16.5	2,946.2	NA
PM_{10}	18.9	795.9	72.1

The dispersion modeling assumed an operational and facility configuration that simulated a realistic maximum operational scenario. In addition to the assumptions made to calculate the applicable emission rates (that the Cortez Hills Pit would be in full production of 500,000 tons mined per day), the heap leach and waste rock facilities were assumed to be built to one-half of their full proposed heights and the open pits were assumed to be at their full depth. As a result, maximum potential emissions from the haul trucks were modeled.

Modeling Results. The results of the dispersion modeling and the Scheffe screening model run for the Proposed Action are presented in **Table 3.10-6**. This table shows the highest modeled results at any point of public access for all eight pollutant-averaging time combinations and the lowest applicable standard (Nevada AAQS or NAAQS) for each of the eight pollutant-averaging time combinations. **Table 3.10-6** shows that for all pollutant-averaging time combinations, the modeled ambient concentrations under the Proposed Action are below the applicable ambient standards at any modeled point of public access, even with the addition of the background concentrations. Modeled impacts associated with conveyor transport of mill-grade ore from the Cortez Hills Complex to the Pipeline mill were nearly identical to modeled impacts associated with truck transport. Based on the modeling results, the Proposed Action would not cause or contribute to a violation of a Nevada AAQS or NAAQS for PM_{10}, SO_2, CO, NO_2, or O_3.

Table 3.10-6
Highest Modeled Air Pollutant Concentrations Under the Proposed Action

Pollutant	Averaging Time	Modeling Results Including Background Concentrations[1] ($\mu g/m^3$)	Lowest Applicable AAQS[2] ($\mu g/m^3$)
PM_{10}	24-hour	106	150
	Annual	38.6	50
SO_2	3-hour	202	1,300
	24-hour	58	365
	Annual	10.4	80
CO	1-hour	19,622	40,000
	8-hour (less than 5,000 feet)	3,659	10,000
	8-hour (greater than 5,000 feet)	3,659	6,667
O_3	1-hour	197	235
NO_2	Annual	86.2	100

[1] Based on modeling conducted by Enviroscientists (2006).
[2] Refers to lowest applicable standard under the Nevada AAQS or NAAQS.

Sensitive Receptor Modeling. An assessment also was made to estimate the potential impact of the Proposed Action on selected sensitive receptors. Separate model runs were made for each of the eight pollutant-averaging time combinations using only the defined sensitive receptors. The modeling results are presented in **Table 3.10-7**. The modeled concentrations in **Table 3.10-7** include background values.

Table 3.10-7
Highest Modeled Impacts at Sensitive Receptors Under the Proposed Action

Pollutant	Averaging Time	Modeling Results with Background Values ($\mu g/m^3$)				Lowest Applicable AAQS ($\mu g/m^3$)[2]
		Jarbidge Wilderness		Other Sensitive Receptors[1]		
PM_{10}	24-hour	0.409	16.4	13.67	30.0	150
	Annual	0.021	16.02	1.93	17.9	50
SO_2	3-hour	0.187	28.7	26.9	55.5	1,300
	24-hour	0.048	18.3	0.427	18.7	365
	Annual	0.003	5.3	0.740	6.0	80
CO	1-hour	7.88	3,779	1,788	5,559	40,000
	8-hour (less than 5,000 feet)	1.19	1,667	228	1,894	10,000
	8-hour (less than 5,000 feet)	1.19	1,667	228	1,894	6,667
NO_2	Annual	0.036	9.4	10.2	19.6	100

[1] Highlighted modeled concentration at any receptor.
[2] Refers to lowest applicable standard under the Nevada AAQS or NAAQS.

The highest modeled 24-hour PM_{10} concentration from the projected project emissions at the defined sensitive receptors was 13.67 $\mu g/m^3$ at the Wintle Ranch, which is located northeast of the existing Cortez Mill. The highest modeled annual PM_{10} concentration was 1.93 $\mu g/m^3$ at the historic Cortez townsite.

Under the Proposed Action, the highest modeled 24-hour and annual PM_{10} concentrations at the Jarbidge Wilderness Area were 0.409 and 0.021 $\mu g/m^3$, respectively. Although the proposed project is not subject to limitations by the PSD Class I increments (8 $\mu g/m^3$ and 4 $\mu g/m^3$, 24-hour and annual averaging times, respectively), for comparison purposes, the modeled ambient concentration increases under the Proposed Action were far below the PSD Class I increments.

Results from modeling the various mine sources show that maximum concentrations of regulated pollutants would not exceed Nevada AAQS or NAAQS. Process and fugitive dust emissions from the facilities would be below the 250 tpy threshold requiring a PSD permit. The project would comply with existing air quality standards in Nevada.

HAPs Emissions

Annual project-related HAP emissions were calculated as part of the Title V air quality operating permit application for the Proposed Action (CGM 2006e) to determine if the project would constitute a major HAP source. The inventory considers all stationary sources, as well as the process fugitive emissions from mining and processing operations, and incorporates both the conveyor and no conveyor options for delivery of ore from the Cortez Hills Complex to the Pipeline Mill. HAP combustion emissions from mobile sources (e.g., haul vehicles) did not contribute to the HAP emission calculation for major source status and were not included. However, the fugitive dust from trucking, dumping, and blasting was included.

Sources of internal combustion HAP emissions would include diesel-engine driven generators. The external combustion emissions primarily would be derived from boiler and heater sources. For calculation

purposes, standard USEPA-approved HAP emission factors were used for all of these source types. Metallic HAP process fugitive emissions were calculated by totaling the annual particulate emissions and multiplying by the average metal concentration in the mined material. Other sources would include stationary refining sources, which have the potential to emit HAPs, and the calculated hydrogen cyanide emissions using the method approved by NDEP and the Nevada Mining Association for the heap leach pads, ponds, and oxide mills that would comprise the Proposed Action. As with the other emission inventories, this HAP emissions inventory assumed maximum operations of all systems over the course of a year.

Mercury is a naturally occurring element in many soils, volcanic rocks, and marine and geothermal water sources. It assumes many forms and can be found naturally in the environment as free metallic mercury, chemically combined with other elements in a number of soil or rock types, and in the form of methylmercury in plants and animals. Mercury is generally present in the atmosphere in one of three chemical forms: gaseous elemental mercury, gaseous reactive mercury, or particulate mercury.

Particulate mercury is present naturally in the soils, overburden, and ore at the mine; therefore, it would be present as a small fraction of all particulate emissions produced during the various mine processes. Material handling; primary, secondary, and tertiary crushing; conveying; and stacking are potential emission sources of particulate mercury. Controls would be applied to each of the processes to reduce overall particulate emissions. Mercury emissions from fugitive dust at the mine were estimated using an emission factor of 4.70 E-05 tons per ton of PM_{10} emissions (BLM 1996a). The estimated annual total emission of mercury would be 1,424 pounds (Enviroscientists 2006).

The sources of gaseous elemental mercury and gaseous reactive mercury primarily* are *associated with thermal components of mineral processing. Thermal sources of mercury emissions associated with the refining process include the refining furnaces, the carbon kilns, a retort, and the electrowinning cells. All refining for the Proposed Action would occur at the existing Pipeline Mill refining circuit. Mercury emissions currently are, and would continue to be, controlled as described in **Table 3.10-8**. Current controls include the baghouse on the refining furnaces and the wet scrubber on the carbon kilns. ***Therefore, although technically a mercury source, the retort and carbon columns would begin to be installed in 2008 to act as a control on furnace emissions by removing mercury from the process material before it is transferred to the furnace.***

Table 3.10-8
Mercury Emissions Controls on Thermal Sources at the Existing Pipeline Mill

Thermal Source	Control[1]
Refinery furnace	Baghouse followed by carbon column
Carbon kilns	Wet scrubber followed by carbon column
Retort	***Chiller and c***arbon column
Electrowinning cells	Carbon column

[1] Existing controls that would continue to be used during processing of mill-grade ore mined under the Proposed Action.

Gaseous elemental mercury is a relatively non-reactive chemical form that is not very soluble in water. This form of mercury travels the farthest and can be transported on wind currents for months to years if not oxidized, providing an opportunity for long-range transport and dispersion. Concentrations of mercury in the air are usually low and of little direct concern. However, atmospheric mercury falls to earth through rain or snow and enters lakes, rivers, and estuaries. Once there, it can transform to its most toxic form, methylmercury, and accumulate in fish and animal tissues.

Mercury accumulates most efficiently in aquatic species. Predatory species at the top of the food chain generally have higher mercury concentrations. Nearly all of the mercury that accumulates in fish tissue is methylmercury. Inorganic mercury, which is less efficiently absorbed and more readily eliminated from the body than methylmercury, does not tend to bio-accumulate.

Oxidized or reactive gaseous mercury has an average atmospheric residence time of days to weeks (less in the presence of precipitation or bromine compounds often present in saline water bodies). It is not easily volatilized and is very water-soluble. It is easily taken up in precipitation or adsorbed on small particles in the atmosphere and falls out as wet or dry deposition. This form of mercury has a higher potential to enter the food chain and result in concerns related to fish and waterfowl consumption. Oxidized or reactive gaseous mercury represents a small portion of the mercury emissions from mining sources.

Particulate mercury has an average atmospheric residence time of hours to days (depending on the presence or absence of precipitation and the particle size). It has low volatility and is easily taken up in precipitation or adsorbed on small particles, falling out relatively close to the emission source in the presence of precipitation, or as dry deposition that may be transported for longer distances if associated with very small particle sizes. Particle-bound mercury is relatively stable and is not easily converted to methylmercury (USEPA 1997).

When bound in mineral forms that typically appear in ore (e.g., cinnabar), mercury is a stable compound that remains in solid form. Ore processing has the potential to liberate mercury from these stable minerals by dissolving it in process solutions. Because it has a boiling point of 675°F, mercury has the potential to volatilize into a gaseous form when subjected to thermal processes in a recovery and refining circuit.

The site's "potential to emit" (PTE) is used for air permitting purposes to indicate potential emissions prior to installation of controls. Without the controls discussed below, the annual mercury emissions resulting from the maximum operations of all systems over the course of a year (i.e., PTE) would be approximately 1,424 pounds per year. The PTE is calculated as the sum of uncontrolled process fugitive emissions and emissions from other uncontrolled sources including stationary refining sources. The PTE process fugitive emissions were calculated by totaling the annual particulate emissions and multiplying by the average mercury concentration in the ore. Fugitive dust PTE emissions accounted for approximately 112 pounds per year of particle bound mercury PTE. Other uncontrolled sources accounted for approximately 1,312 pounds of PTE elemental or reactive mercury. Actual controlled emissions of mercury would be less than the PTE.

Prior to, and as part of, the USEPA's VMRP, CGM began reducing mercury emissions beginning in 1999. From 2004 to 2005, mercury air emissions were reduced by approximately 40 percent. Reductions from 849 pounds in 2005 to ***167*** pounds in 2006, as shown in **Table 3.10-9**, were achieved due to increased controls and fewer hours of operation. Operating hours for the carbon regeneration kilns were 7,160 and 3,698 hours in 2005 and 2006, respectively. Operating hours for the furnace were 808 and 513 hours in 2005 and 2006, respectively. Actual emissions of mercury released by source in 2006 are listed in **Table 3.10-10**. Mercury emissions likely would be further reduced beyond 2006 as CGM completes the installation of Nevada MACT mercury controls beginning in ***2008***.

Table 3.10-9
Actual Annual Mercury Emissions from the Existing Pipeline Mill
2002 through 2006

Year	Mercury (pounds)
2002	1,356
2003	1,381
2004	1,343
2005	849
2006	***167***

Source: CGM 2006f.

Table 3.10-10
Actual Annual Mercury Emissions by Source in 2006 from the Existing Pipeline Mill

Source[1]	Mercury (pounds)
Carbon re-activation kilns	92
Furnaces	56
Electrowinning cells	7
Laboratories	***11***
Total	***167***

[1] In addition to these sources, releases from the drying ovens in the assay laboratory were less than a pound.

Source: CGM 2006f.

The emissions from the various sources also were speciated to determine which forms of mercury were present. Of the total emissions from the existing operation, ***70*** percent were elemental mercury, ***28*** percent were reactive mercury, and 2 percent were particulate mercury. ***Annual mercury emissions reported by CGM to the BAPC in 2006 were 116.7 pounds elemental mercury and approximately 50 pounds of oxidized mercury and particulate mercury combined for a total of 166.7 pounds.*** **With the installation of all proposed Nevada MACT controls, annual mercury emissions are expected to be approximately 50 pounds. The proposed project would increase daily throughput of mill-grade ore from**

13,500 tons per day to 15,000 tons per day, resulting in a proportional increase of approximately 5 pounds of mercury emissions per year with all Nevada MACT mercury controls. ***In order to provide a more detailed analysis of mercury emissions from CGM's operations area and other regional sources and to compare the impact to those from longer range sources, reference is made to the USEPA Office of Water's Model-Based Analysis and Tracking of Airborne Mercury Emissions to Assist in Watershed Planning, Final Report (dated November 20, 2006). The report summarizes the application of the Regional Modeling System for Aerosols and Deposition (REMSAD) to analyze the sources of mercury and their contribution to deposition throughout the United States. The model results relative to source and deposition for Nevada were excerpted from REMSAD and applied on a hydrographic basin-by-basin basis to analyze future impacts from CGM's operations under the Proposed Action. The REMSAD model input used 265 pounds of total mercury and 60.3 pounds of oxidized mercury and particulate mercury, combined, from CGM. Mercury deposition is largely driven by emission rates of oxidized mercury and particulate mercury since these species tend to have an atmospheric residence time of hours to days, whereas elemental mercury has an atmospheric residence time of months to years.***

Figure 3.10-2 shows the mercury deposition contributions derived from REMSAD modeling results for the CGM mercury emissions as a percentage of the total deposition (including global background) to each watershed in Nevada. Figure 3.10-3 provides the modeled mercury deposition contributions from the mercury emissions from all Nevada gold mines to each watershed in Nevada. Figure 3.10-4 shows REMSAD modeling results for global background mercury on each watershed in Nevada. These results indicate that the mercury deposition contribution from CGM drops to less than 1 percent at two watersheds' distance from the mine site.

Considered together, the REMSAD analysis figures indicate that deposition from CGM is a relatively small percentage of total mercury deposition. For example, as a Tier I facility under the NMCP, CGM would be required to equip mercury sources at the existing operation with the Nevada MACT. CGM submitted an application to NDEP in August 2006 proposing the controls that it believed would meet Nevada MACT requirements, namely the retort and additional carbon columns. Those controls are ready for installation pending approval of a permit modification by NDEP.

No individual HAP (including mercury) would be emitted in a quantity greater than the major source limit of 10 tpy (**Table 3.10-11**). Also, the combined HAP emissions would be less than the major source limit of 25 tpy. Therefore, the project would not constitute a major HAP source.

3.10.2.2 Grass Valley Heap Leach Alternative

Under this alternative, the proposed Grass Valley Heap Leach Facility would be constructed approximately 1.5 miles south of the location identified for the Proposed Action. Placement of the heap leach facility in this location would result in an increased haul distance of 3 miles round trip. All other project facilities would be the same as described under the Proposed Action.

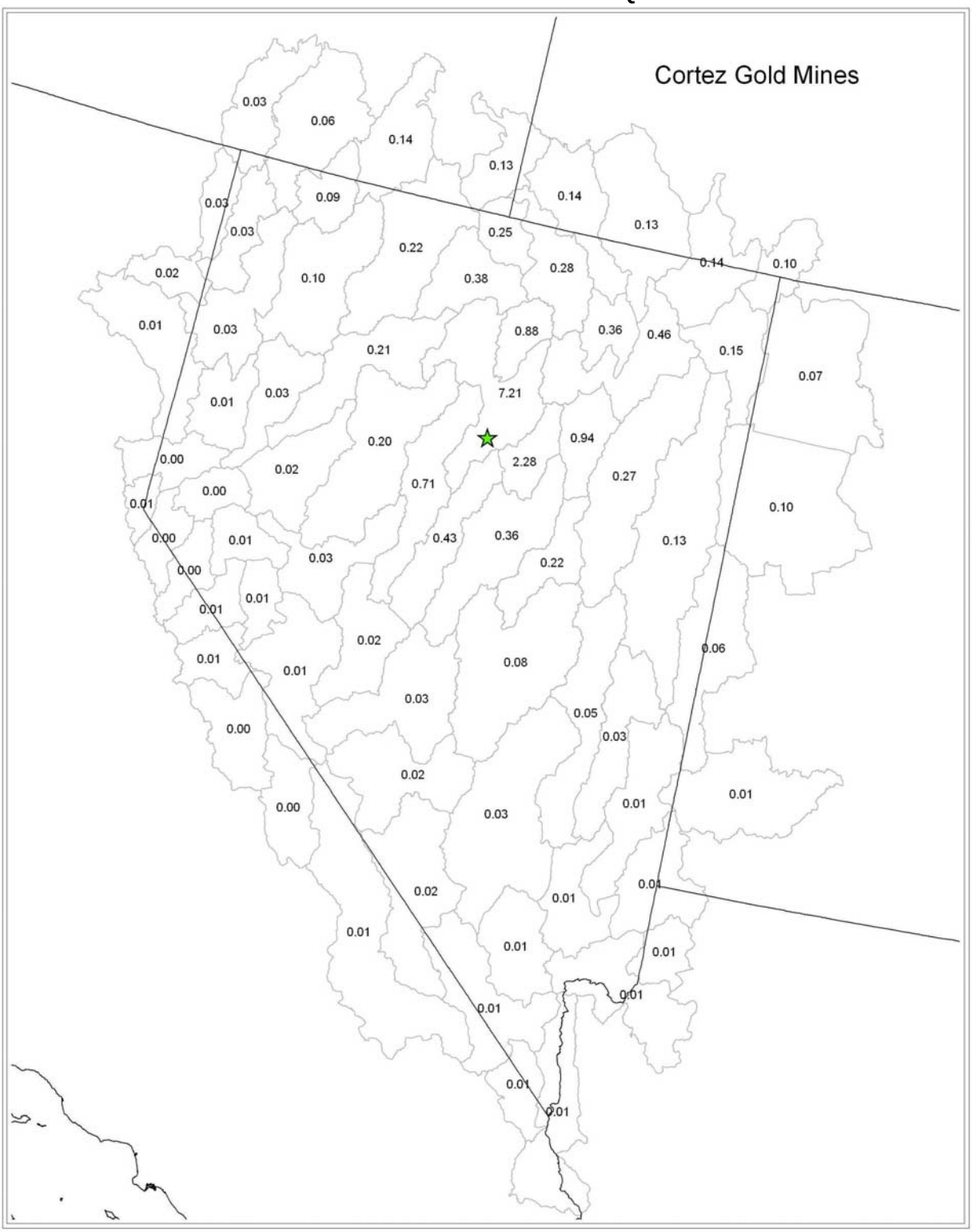


Figure 3.10-2. Mercury Deposition Contributions from CGM Operations (percent of total)

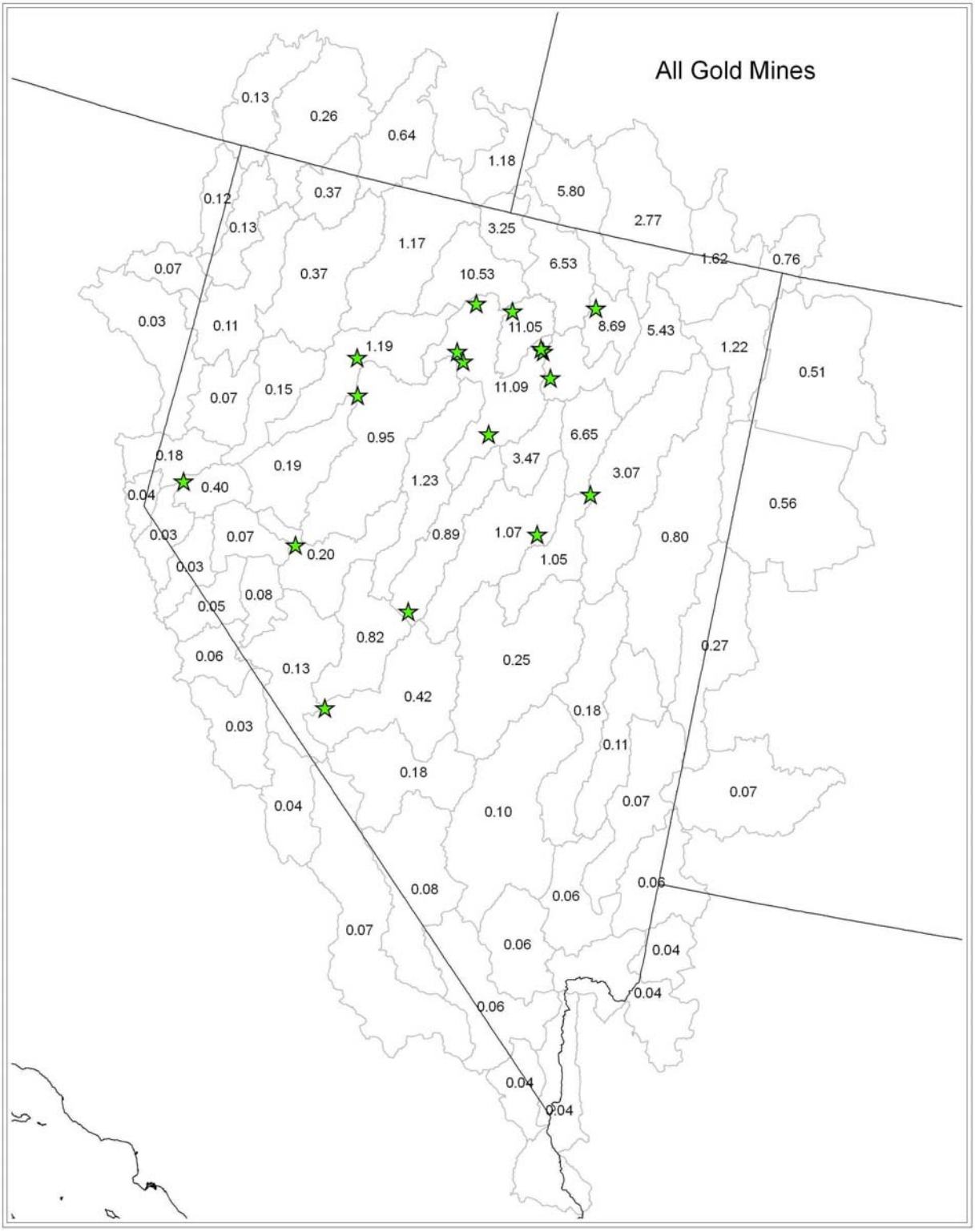


Figure 3.10-3. Mercury Deposition Contributions from All Nevada Gold Mines (percent of total)

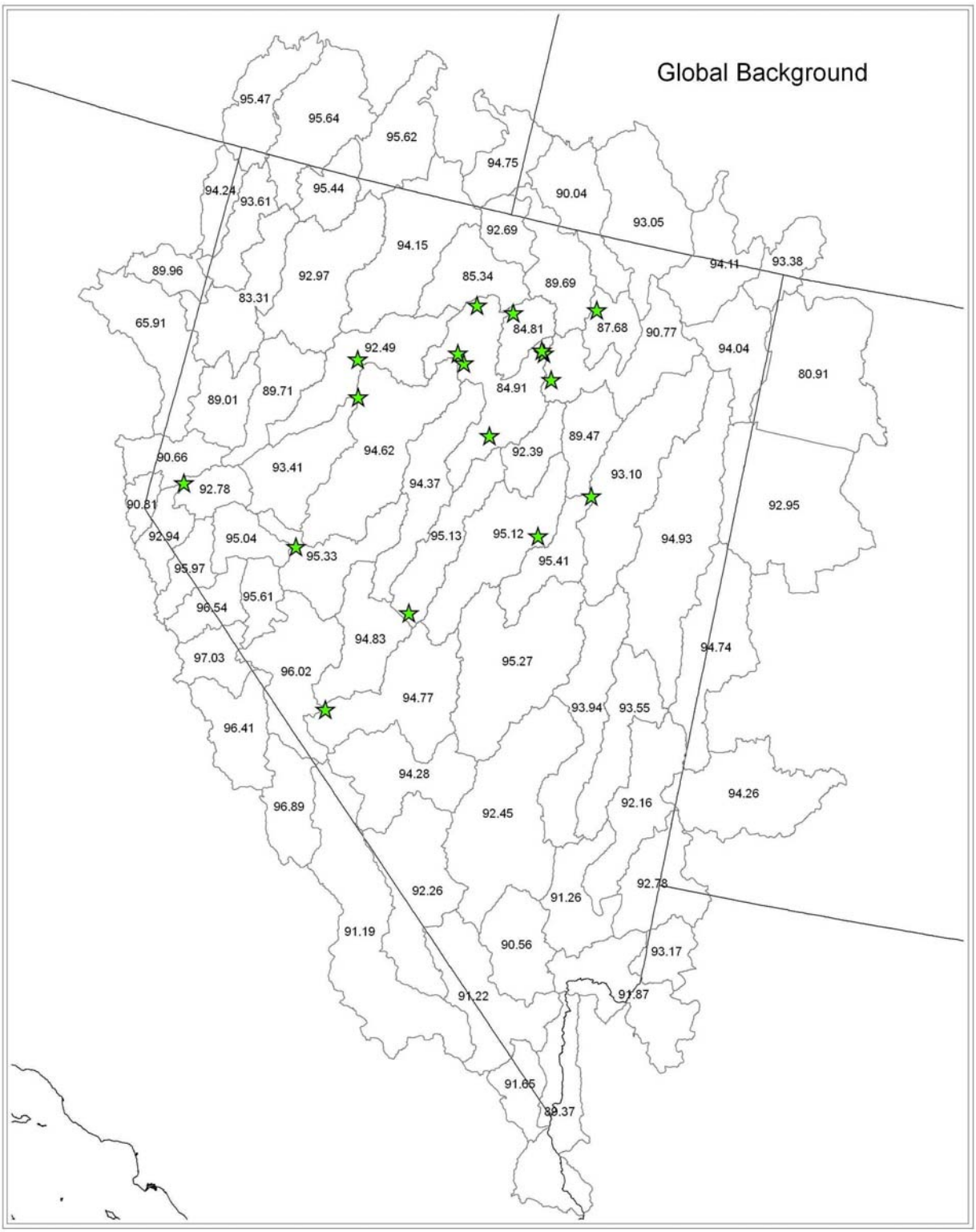


Figure 3.10-4. Mercury Deposition Contributions from Global Background (percent of total)

Table 3.10-11
Calculated HAP Emissions

HAP	Emissions Source (pounds per year)					
	Diesel Internal Combustion Emissions	Propane External Combustion Emissions	Process Fugitive Emissions	Other Sources	Total	Total (tpy)
Benzene	1.66E+01	6.88E-01	--	1.30E+03	1,317.56	0.659
Ethylbenzene	--	--	--	2.00E+02	200.00	0.100
Toluene	6.03E+00	1.11E+00	--	2.36E+03	2,367.51	1.184
Xylenes	4.14E+00	--	--	1.42E+03	1,424.14	0.712
Propylene	5.98E+01	--	--	--	59.85	0.030
Formaldehyde	1.69E+00	2.46E+01	--	--	34.41	0.017
Acetaldehyde	5.41E-01	--	--	--	0.54	0.000
Acrolein	1.69E-01	--	--	--	0.17	0.000
Naphthalene	--	2.70E-01	--	--	0.27	0.000
Dichlorobenzene	--	5.67E-01	--	--	0.57	0.000
Methyl tertiary butylether	--	--	--	4.00E+01	40.00	0.020
Hydrogen cyanide	--	--	--	18,783.0	18,783.0	9.392
Antimony	--	--	7.91E+01	--	79.10	0.040
Arsenic	8.58E-02	6.55E-02	3.27E+03	--	3,273.55	1.637
Beryllium	6.44E-02	1.44E+00	9.89E-01	--	2.58	0.001
Cadmium	6.44E-02	3.93E-03	8.89E+00	--	10.04	0.005
Chromium	6.44E-02	3.60E-01	1.04E+02	--	104.32	0.052
Cobalt	--	4.59E-01	2.11E+01	--	21.55	0.011
Lead	1.93E-01	--	5.47E+01	1.10E+03	1,154.90	0.577
Manganese	1.29E-01	8.52E-01	1.19E+03	--	1,194.07	0.597
Mercury	6.44E-02	8.52E-02	1.12E+02	1.31E+03	1,424	0.712
Nickel	6.44E-02	6.88E-01	1.43E+02	--	144.34	0.072
Selenium	3.22E-01	7.86E-03	6.59E+00	--	6.92	0.003
Total						**15.822**

Source: Enviroscientists 2006.

Potential air quality impacts under this alternative would be the same as described for the Proposed Action, with the following exceptions. Dispersion modeling for this alternative predicts exceedances of the applicable ambient air quality standards at points of public access for CO and NO_2. The predicted CO exceedances occur at the fenceline in two different areas. For NO_2, the modeled exceedance is located adjacent to CR 222 just southwest of the proposed Cortez Hills Pit.

3.10.2.3 Crescent Valley Waste Rock Alternative

Under this alternative, the proposed Crescent Valley Waste Rock Facility would be developed on the valley floor of Crescent Valley, to the south and west of the existing Cortez haul road; the Canyon Waste Rock Facility would not be constructed. Placement of the waste rock in this alternate location would result in increased haul distances. All other project facilities would be the same as described under the Proposed Action.

Potential air quality impacts under this alternative would be the same as described for the Proposed Action, with the following exceptions. Dispersion modeling for this alternative predicted exceedances of the applicable ambient air quality standards at points of public access for CO and NO_2. The predicted CO

exceedances occur at the fenceline in two different areas. For NO_2, the modeled exceedance is located adjacent to CR 222 just southwest of the proposed Cortez Hills Pit.

3.10.2.4 Cortez Hills Complex Underground Mine Alternative

Under this alternative, surface facilities would not be developed at the Cortez Hill Complex. Surface facilities associated with the underground operation would be located within existing disturbance areas at the Cortez Complex.

Dispersion modeling for this alternative predicted that maximum concentrations of regulated pollutants would not exceed Nevada AAQS or NAAQS. Based on the analysis, the modeled concentrations are a small fraction (less than 10 percent) of the applicable AAQS. For comparison purposes, the modeled process and fugitive dust emissions from the project facilities would be below the 250 tpy threshold requiring a PSD permit. The project would comply with all existing quality standards in Nevada.

3.10.2.5 Revised Cortez Hills Pit Design Alternative

Under this alternative, there would be no change in process emissions; therefore, there would be no change in air quality impacts related to processing. Impacts from fugitive dust emissions from the disturbed acreage would be slightly less than those analyzed for the Proposed Action due to a decrease of approximately 159 acres of disturbance.

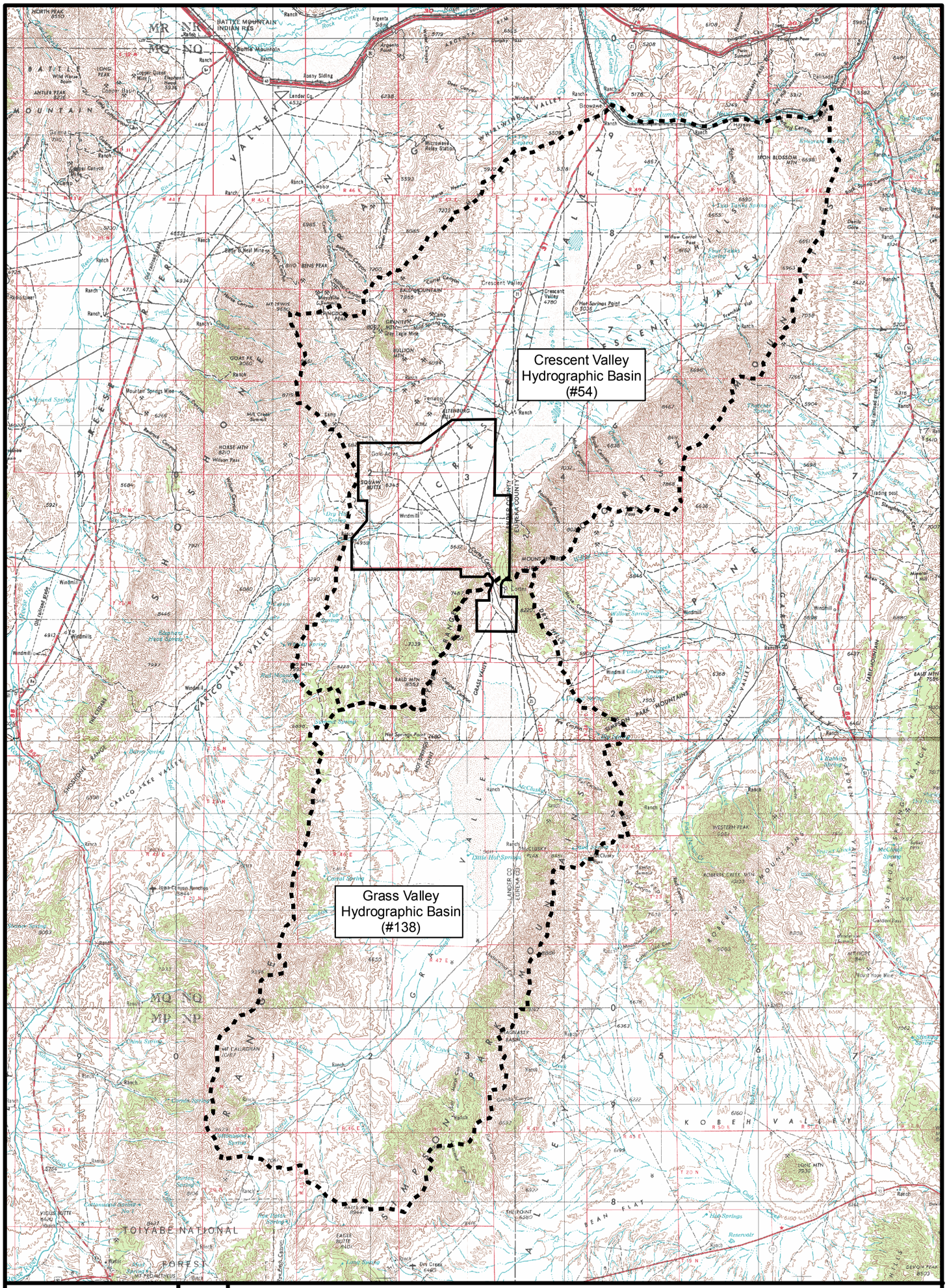
3.10.2.6 No Action Alternative

Under the No Action Alternative, the proposed Cortez Hills Expansion Project would not be developed, and the associated air quality impacts would not occur. However, under this alternative, the existing Pipeline/South Pipeline Project and Cortez Underground Exploration Project would continue to operate under current authorizations.

A quantitative analysis of potential air quality impacts associated with the existing operation was presented in Enviroscientists' 2003 report that was prepared for the Pipeline/South Pipeline Pit Expansion SEIS (BLM 2004e). Based on that analysis, the modeled concentrations are a small fraction (less than 10 percent) of the applicable ambient air quality standards, and in the case of Jarbidge Wilderness, much less than the PSD Class I increments.

3.10.3 Cumulative Impacts

The cumulative effects study area for air resources is shown in **Figure 3.10-*5***. Past and present actions and RFFAs are identified in **Table 2-*18*** and shown in **Figure 2-*26***. Cumulative impacts to air quality would include impacts from the proposed project emission sources in combination with impacts from background emission sources, which reflect emissions associated with the past and present actions (inclusive of the existing Pipeline/South Pipeline Project). Background values do not include RFFAs.



Legend

Project Boundary

Air Resources CESA (based on hydrographic basins)

N

0 2 4 6 8 Miles

Note: Hydrographic basin numbers from Rush 1968.

Cortez Hills Expansion Project

Figure 3.10-5

Air Resources CESA

05/01/2008

The predicted maximum annual concentration of particulates for the proposed project at the point of closest public access beyond the property boundary is 22.6 μg/m^3. Adding an assumed annual background of 16 μg/m^3, the total annual cumulative impact is predicted to be 38.6 μg/m^3. This would be below the Nevada AAQS of 50 μg/m^3. Adding the predicted maximum 24-hour concentration of 90 μg/m^3 to the assumed background of 16, the total cumulative 24-hour impact would be 106 μg/m^3, which would not exceed the Nevada 24-hour AAQS of 150 μg/m^3. Other permitted and non-permitted sources of air pollution are included in the background values. Cumulative air quality impacts in the vicinity of the proposed project would be very slight since the annual and 24-hour contributions from the proposed project sources would not cause the air quality in the region to degrade below National or state AAQS.

As discussed in Section 3.10.2.1, between 2002 and 2006, CGM reduced its emissions of mercury from 1,356 pounds per year to ***167*** pounds per year, respectively. Of the total emissions, ***70*** percent were gaseous elemental mercury, ***28*** percent were gaseous reactive mercury, and 2 percent were particulate mercury. CGM is in the process of installing additional controls, specifically carbon beds on the carbon regeneration kiln, electrowinning cells on the furnace, and retorts upstream of the furnace, with scrubber chillers and carbon filters to further reduce mercury emissions.

Mercury emissions from CGM would be added to background air mercury concentrations attributable to several different categories of sources: the global mercury pool, which includes anthropogenic sources and natural sources from around the world, North American natural sources, and North American anthropogenic sources. The main anthropogenic sources in the northern Nevada region are other gold mines and a coal-fired power plant.

CGM's mercury emissions would be less than 4 percent of the mercury emissions reported for 2006 from northern Nevada gold mining sources. CGM's emissions would be less that 1 percent of the annual 11 tons of natural mercury emissions from the Great Basin mercury belt, in which the mine is located (Gustin et al. 2003; Nacht and Gustin 2004; Zehner and Gustin 2002). Mercury emissions from U.S. anthropogenic sources and documented natural sources are in the range of 155 tons. CGM's emissions would be approximately 5/100 of 1 percent (0.05 percent) of current U.S. mercury emissions. Annual global mercury emissions are in the range of 5,500 tons per year (Jaffe et al. 2005; Seigneur et al. 2004). CGM's mercury emissions would be approximately 1/1000 of 1 percent (0.001 percent) of the global mercury emissions and thus are not expected to have a significant or measurable impact on the global mercury pool.

Figures 3.10-2, 3.10-3, and 3.10-4 show CGM's contribution to mercury deposition on a basin-by-basin basis. As indicated in Figure 3.10-2, CGM's largest contribution (7.21 percent) would be to the basin in which the **proposed project would be** ***located. CGM's contribution to cumulative mercury deposition would diminish rapidly with distance from the site.***

Cumulative ***mercury*** impacts under the Grass Valley Heap Leach, Crescent Valley Waste Rock, ***Revised Cortez Hills Pit Design,*** and Cortez Hills Complex Underground Mine alternatives would be the same as described for the Proposed Action.

3.10.4 Monitoring and Mitigation Measures

It is assumed that CGM would continue implementing the current meteorological monitoring programs at the Cortez Gold Mines Operations Area. No additional monitoring or mitigation measure have been identified, as no significant impacts to air quality would be anticipated as a result of the proposed project.

3.10.5 Residual Adverse Effects

There would be no residual adverse impacts to air quality from the proposed project since reclamation and revegetation would stabilize exposed soil and control fugitive dust emissions. As vegetation becomes established, particulate levels should return to what is typical for a dry desert environment. Once the disturbance ceases and wind erodible surfaces are reclaimed, the resource would return to approximately its pre-mining condition.

3.11 Land Use and Access

3.11.1 Affected Environment

The study area for land use encompasses the ***area within the*** proposed project boundary and the immediate area within approximately 2 miles of the project boundary. The study area for access encompasses the proposed project boundary and the primary access roads approaching the project boundary. The cumulative effects study area for both land use and access encompasses the past and present actions and RFFAs within a 30-mile radius of the proposed project, and for access, the primary access roads in the area.

3.11.1.1 Land Use

The proposed project is within the jurisdiction of the BLM Shoshone-Eureka RMP (BLM 1986b) and also is covered by several Lander County plans and regulations, including the Revised Policy Plan for Federally Administered Lands (Lander County 1999), the Lander County Master Plan (Lander County 1997), and Lander County Zoning Regulations (Lander County 1990). A small portion of the project boundary extends into Eureka County, where it falls under the administration of the BLM Elko RMP (BLM 1986a, 1987) administered by the BLM's Elko Field Office. Eureka County also has a Master Plan (Eureka County 1997), although it provides only general policy guidance and not site-specific control (Mears 2007).

The BLM Shoshone-Eureka RMP (BLM 1986b), which includes the vast majority of land within the project boundary, provides that the public lands therein will be open for mining and prospecting unless withdrawn or restricted from mineral entry (see Section 1.2, Relationship to BLM and Non-BLM Policies, Plans, and Programs). No such withdrawals or restrictions occur within the project boundary.

The Lander County 2005 Policy Plan for Federally Administered Lands emphasizes the county's support for, and dependence on, mineral resources development. Specifically, Policy 13-1 states, "Retain existing mining areas and promote the expansion of mining operations and areas" (Lander County 2005). The revised plan recommends that existing reclamation standards should be enforced and should be consistent with the "best possible post mine use for each specific area" (Lander County 2005, Policy 13-6).

The Cortez Hills Expansion Project boundary is zoned A-3, Farm and Ranch District, under Lander County's zoning code. The A-3 zone requires the proponent of a mining project to obtain a Special Use Permit from the County Planning Commission (Teske 2006). The county does not have a county-wide master plan addressing the study area; only urbanized areas are master planned (Teske 2006).

The Elko RMP (BLM 1986a) states that the objective for minerals is to, "maintain public lands open for exploration, development, and production of mineral resources while mitigating conflicts with wildlife, wild horses, recreation, and wilderness resources." To that end, the entire Elko Resource Area, including the proposed project boundary, was designated "... open to mineral entry for locatable minerals, except for an 11 acre administrative site in the City of Elko" (BLM 1987).

Mining constitutes the dominant land use in the Shoshone Range, the northern Toiyabe Range, and the Cortez Mountains surrounding the south end of Crescent Valley. In addition to CGM's existing operations, several other mining companies have operated mines in the area or conducted exploration activities, primarily in the Shoshone Range.

There are no Indian Reservations within the project boundary, although there is concern from local tribal members regarding culturally significant sites in the vicinity and uses of the area by local Native Americans and Indian tribes (see Section 3.9, Native American Traditional Values).

Livestock grazing is an established use in the area surrounding the study area, particularly in Crescent Valley and in some foothills areas (see Section 3.6, Range Resources). The land use study area is part of the Carico Lake, Grass Valley, and South Buckhorn allotments. There also is some hay production in Crescent Valley. Additionally, dispersed outdoor recreation, consisting of hunting, camping, limited OHV use, sightseeing, photography, hiking, rock climbing, and visiting old mining camps, occurs on a seasonal basis. The Cortez townsite, adjacent to the project boundary, is the nearest historic mining camp. Several residences, a cemetery, and the remnants of mining structures remain on the site. There are six WSAs within a 50-mile radius of the proposed project, one of which (the Roberts Mountain WSA) was recommended for wilderness status (see Section 3.12, Recreation and Wilderness). There are no prime or unique farmlands in the project boundary.

The proposed project boundary primarily is composed of public land administered by the BLM (94 percent); the remainder (6 percent) is private land owned by CGM. The historic Cortez townsite, lying adjacent to the southeastern edge of the project boundary, is private land comprising approximately 200 acres. In addition, an estimated 600 acres on the west face of Mount Tenabo and an estimated 200 acres on the north ridge of Mount Tenabo are privately owned. **Figure 1-2** depicts the ownership status of lands in the project boundary.

Existing ROWs and other land use authorizations in the project vicinity are summarized in **Table 3.11-1** and shown in **Figure 3.11-1**. Information on these authorizations was derived from BLM Master Title Plats. In addition to the listed ROWs, there is a gravel surfaced road traversing the study area in a north-south direction through Cortez Canyon. The road (CR 222) existed prior to passage of FLPMA in 1976, so it has no formal ROW authorization (Lane 2003). The road is maintained by Lander County (Shepherd 2003); see Section 3.11.1.2, Access, for additional information.

3.11.1.2 Access

The proposed Cortez Hills Expansion Project vicinity is served by a sparse network of roadways typical of rural Nevada. I-80 is the primary east-west traffic artery across northern Nevada, connecting northern Lander County with Reno, Nevada, to the west and Elko, Nevada, and Salt Lake City, Utah, to the east. I-80 is approximately 35 miles north of the proposed project site.

Table 3.11-1
Land Use Authorizations and Rights-of-Way in the Project Vicinity

Serial Number	Grantee	Description	Location			ROW Width (feet)
			Township	Range	Section	
N-48321	Sierra Pacific Power Company	60-kV power line and substation	27N 26N	48E 46E	7, 18, 49, 30, 31 6, 7, 17, 18, 19, 20	80
N-61182	Cortez Joint Venture	13.5-kV transmission line	28N 27N 27N	47E 47E 46E	28, 29, 30 6 1, 12, 13, 14, 22, 23	25
N-30650	Nevada Bell	Telephone line	27N 27N	46E 47E	13, 22, 23, 24 5, 7, 8, 18	10
N-2434	Sierra Pacific Power Company	Transmission line	28N 27N	47E 47E	24, 25, 36 1, 12, 13, 24	40
N-43670	Cortez Joint Venture	Gold Acres Haul Road	28N 27N	47E 47E	31 5, 6, 8, 9, 10, 14, 15, 23, 24	125
N-7803	Nevada Bell	Telephone line	28N 27N	47E 47E	31 5, 6, 8, 9, 10, 14, 15, 23, 24	20
N-58510	Lander County	CR 225	27N	47E	7, 8, 9, 10, 18	60
R-4269	N.A.	Windmill	27N	47E	8	N.A.
N-2615	Sierra Pacific Power Company	23-kV transmission line	28N	47E	13, 14, 23	25
NEV-0-44669	Nevada Department of Transportation	SR 306	28N	47E	15, 21, 22, 28, 29, 30	400
N-56088	Sierra Pacific Power Company	120-kV transmission line	28N	47E	28, 29, 30	80
N-2616	Nevada Bell	Telephone line	28N 27N 28N 29N	47E 48E 48E 48E	24 5, 8, 17, 18, 19 6, 18, 19, 20, 29, 32 20, 30	20
N-60542	Lander County	SR 306	28N	47E	28, 29 ,30	150
N-61283	Placer Dome	Geothermal lease	28N	47E	31, 32	N.A.
N-7348	Cortez Joint Venture	23-kV transmission line	28N	47E	13, 14, 22, 23, 27, 28, 31, 32, 33, 34	25
N-46805	Cortez Joint Venture	Road	27N	46E	22, 27, 34	60
N-54304	Nevada Bell	Buried fiber optic cable	27N	48E	19	10
N-54632	Sierra Pacific Power Company	60-kV transmission line	27N	48E	18	50
N-61689	WWC License Corporation dba Alltell Communications	Communications site	28N	47E	31	100 X 100
N-65729	Cortez Joint Venture	Water pipeline	28N	47E	14, 15, 21, 22, 27, 28, 32, 33	20
N-74768	Nevada Bell	Buried fiber optic cable	28N 27N 27N	47E 47E 46E	25, 36 1, 7, 8, 9, 10, 11, 12, 18 13, 22, 23, 24	20
N-73991	Cortez Joint Venture	Geothermal lease	27N	47E	31, 32	N.A.
0191	N.A.	Improved spring	27N	48E	19	N.A.
4410	N.A.	Fence	26N	48E	19	N.A.

SR 306 provides access to the project vicinity from I-80 through Beowawe and the Town of Crescent Valley. SR 306 is a paved, two-lane highway designated as a “rural major collector” by the NDOT (NDOT 2005). SR 306 ends in the northwest quadrant of the project boundary, at the existing CGM headquarters parking area.

The Cortez access road provides access into the center of the project boundary from SR 306. CR 222 connects with the Cortez access road approximately 1 mile west of the existing Cortez Mill, heading southerly via Cortez Canyon approximately 55 miles through Grass Valley to U.S. Highway 50 just east of Austin, Nevada. There also is county road access from Grass Valley east across Gardner Gate Pass connecting with SR 278. CR 225 heads southwesterly from the Cortez access road, along the southeastern side of the existing Pipeline Waste Rock Facility. CR 225 crosses Rocky Pass through the Filippini Ranch

into Carico Lake Valley. The county roads are gravel surfaced; although narrow in places through Cortez Canyon, they are generally 20 to 24 feet wide and in good to excellent condition elsewhere.

Existing traffic conditions on SR 306 near the proposed Cortez Hills Expansion Project turn-off are at level of service (LOS) "A." (See Section 3.11.2.1 for a discussion of LOS.) Traffic volumes on that section of roadway averaged 460 vehicles per day in 2004, which was 27 percent higher than the 10-year average and the highest level experienced since 1996 (NDOT 2005). Peak hour traffic volumes are estimated at less than 10 percent of hourly roadway capacity.

3.11.2 Environmental Consequences

The Proposed Action or alternatives could affect land use both directly and indirectly. Direct impacts may include the termination or modification of existing land uses or ROWs in the project boundary. Indirect impacts may result in altered land use patterns adjacent to or near the project boundary. Indirect impacts also would occur if the Proposed Action or alternatives stimulated or encouraged the development of land uses not presently anticipated, or conversely, precluded other planned or proposed uses.

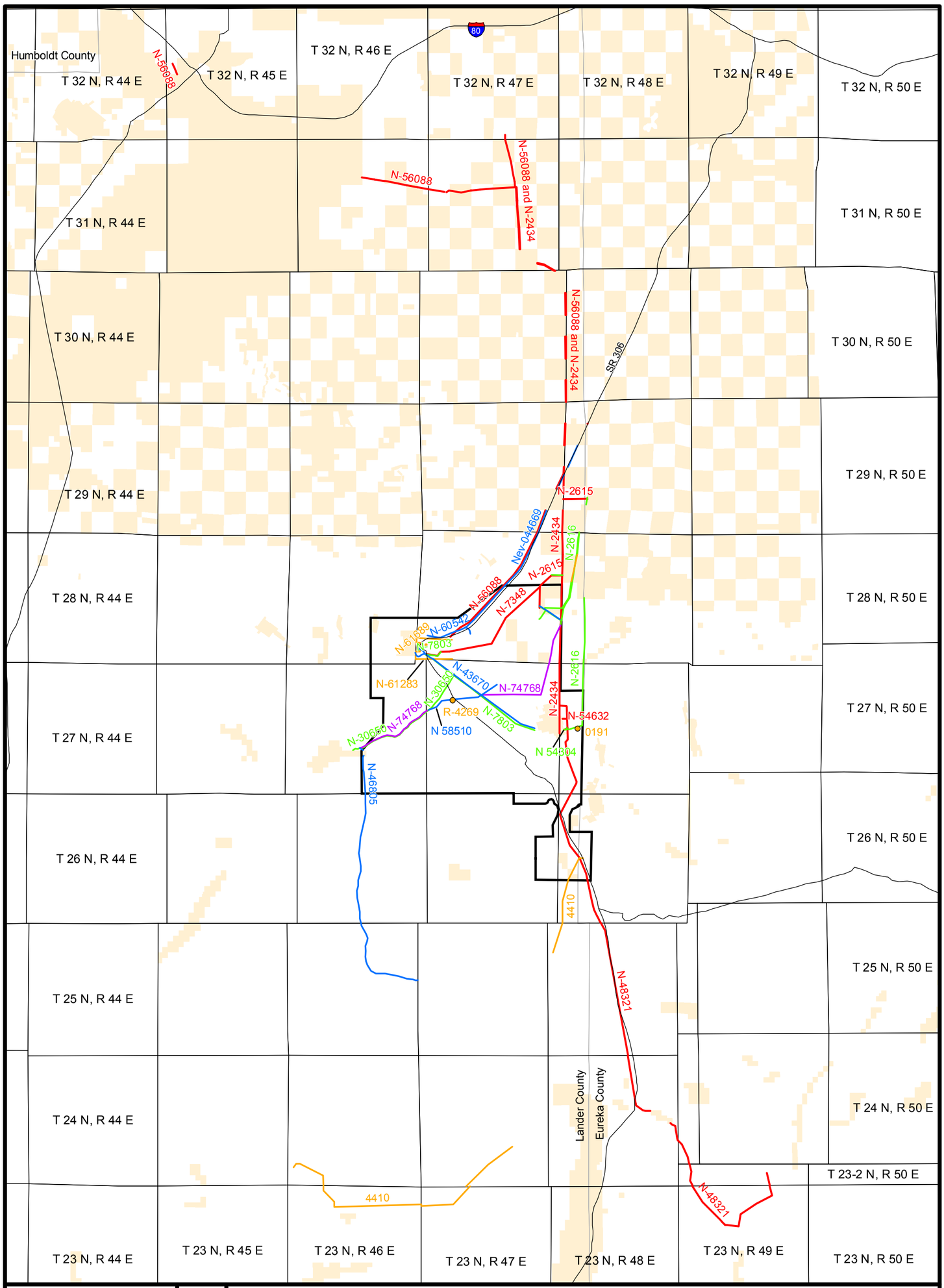
Environmental impacts to land use and access would be considered significant if the Proposed Action or other alternatives result in any of the following:

- Changes to land use patterns that would threaten the economic viability of existing private enterprises or uses of public lands (e.g., livestock grazing) operating under existing land use authorizations.
- Incompatibility or inconsistency with land use plans, regulations, or policies adopted by local, state, or federal governments.
- A substantial increase in traffic in relation to the existing traffic load and capacity of the roadway system, as measured by compliance with the LOS planning standard for rural highways of LOS C during peak hour periods.
- Elimination or severe restriction of public access on existing routes of travel.

3.11.2.1 Proposed Action

Land Use

The project boundary for the proposed Cortez Hills Expansion Project encompasses a total of approximately 57,058 acres, 53,790 acres (94 percent) of which are BLM managed public land and 3,268 acres (6 percent) are CGM owned private lands. As currently planned, total new surface disturbance would be approximately 6,792 acres, 6,571 acres (97 percent) of which would be on public land (see **Table 2-1**).



Legend

- Project Boundary
- Fiber Optic Cable
- Telephone Line
- Transmission Line
- Road
- Other
- Other
- Private Land

N

0 2 4 6 8 Miles

Source: BLM 2007.
Note: See **Table 3.11-1** for additional information.
GIS locations not available for N-61182, N-65729, or N-73991.

Cortez Hills Expansion Project

Figure 3.11-1
Land Use Authorizations

06/19/2007

The Proposed Action is consistent with BLM plans and policies that designate land use within the project boundary as open for mineral exploration and development, as articulated in the Shoshone-Eureka Resource Area RMP (BLM 1986b) and the Elko RMP (BLM 1986a). Although counties do not have jurisdiction to regulate land use on federal lands, the proposed project would be consistent with the Lander County's preference for continued mineral development expressed in the 2005 Policy Plan for Federally Administered Lands (Lander County 2005). Mining-related activities on private lands would be consistent with the Lander County Master Plan (Lander County 1997) and Zoning Ordinance (Lander County 1990), as well as with the Eureka County Master Plan (Eureka County 1997). The Proposed Action thus would comply with adopted plans and policies of potentially affected governmental entities.

Currently, there is little public use of the study area. As noted above, there is some grazing under the permit stipulations of the Carico Lake, Grass Valley, and South Buckhorn allotments, and there is a modest amount of dispersed recreation use, including visits to the remnants of the historic Cortez townsite. The Cortez cemetery, located ***within private land near*** the historic Cortez townsite, periodically is visited by family members of those buried there. ***There also is some use of roads within the study area by Native Americans for access to other areas for various purposes as discussed in Section 3.9, Native American Traditional Values.*** The largest numbers of public users are most likely travelers on CR 222 moving between I-80 and Grass Valley.

New project-related disturbance of 6,792 acres would reduce the amount of land available for livestock grazing and dispersed recreation, although the loss would be small in the context of the area. The specifics of the loss of access to public lands are addressed in Section 3.6, Range Resources, and Section 3.12, Recreation and Wilderness. None of the proposed surface disturbance would occur on currently irrigated crop land. As a result, there would be no loss of hay production under the Proposed Action.

The proposed project would require realignment of the 60-kV power line that currently runs north and south through the eastern portion of the project boundary. This would require a modification to the ROW permitted under Land Use Authorization N-48321 (**Table 3.11-1**). The realignment for the ROW would be required to avoid the North Waste Rock Facility, Cortez Hills Pit, and Grass Valley Heap Leach Facility. CGM proposes to include the realignment with development of the Proposed Action and to extend an existing 120-kV transmission line farther to the south to accommodate project needs. The change in ROW would not adversely affect land use or power availability in the area and would not be considered significant.

Post-reclamation land use of most of the disturbance area would be returned to open space, grazing, dispersed recreation, and wildlife habitat, as approximately 5,793 acres of the total new disturbance (approximately 6,792 acres) would be reclaimed. These uses would be consistent with local and BLM land use plans and guidelines. The Cortez Hills Pit and county road reroutes would remain unreclaimed, resulting in a permanent change from current uses (a reduction of approximately 999 acres available for post-mining uses). CGM has committed to constructing barriers around the unreclaimed pits for the safety of the public. They also have committed to developing post-mining land use plans that may foster long-term economic benefits to the area by making use of mine infrastructure.

Access

Three categories of traffic would be generated by the proposed Cortez Hills Expansion Project: worker commuting traffic, general company and contractor traffic, and material deliveries. Most workers living beyond Crescent Valley would commute in company contracted busses. General CGM and contractor traffic would predominantly consist of automobiles and pickup trucks. Material deliveries primarily would employ heavy trucks and tractor-trailer rigs.

Commuter traffic primarily would consist of four bus trips, two in-bound and two out-bound, during each of the morning and evening shift change hours, which for analysis purposes are assumed to occur concurrently with morning and afternoon peak traffic flow hours. General light traffic would entail approximately 480 trips per day. For purposes of analysis, it is assumed that approximately 15 percent (72 trips) of that traffic would occur during the morning and evening peak traffic hours. Heavy-load traffic generated by the Proposed Action would include two loads of fuel and one load of reagent per day for a total of six heavy vehicle trips. For analysis purposes, it is assumed that no more than two of those trips typically would occur during a peak traffic hour.

Highway traffic effects of the Proposed Action were analyzed using techniques promulgated in the Highway Capacity Manual (Transportation Research Board [TRB] 2000). The standard measure of traffic flow from the Highway Capacity Manual is the LOS for a given segment of roadway. LOS is a method of qualitatively measuring the operational conditions of traffic flows on roadways, and the perception of those conditions by motorists and passengers (TRB 2000). Levels of service are rated A through F; A generally represents free flowing traffic conditions with few restrictions and “F” represents a “forced or breakdown” flow with queues forming and traffic volumes exceeding theoretical capacity of the roadway (TRB 2000). Generally, level E represents traffic volumes at the capacity of the roadway.

Under the development scenario anticipated for the Proposed Action, peak hour traffic would continue to operate at LOS “A” on SR 306 north of the Cortez Hills Expansion Project turn-off. LOS “A” indicates traffic operates in a free-flowing condition allowing individual motorists considerable freedom to maneuver and to select their desired speed; LOS “A” provides ample opportunities for passing and entering or exiting the traffic flow safely (TRB 2000). LOS “A” is considerably better than the LOS “C” threshold of significance.

Transportation safety concerns related to highway traffic generated by the Proposed Action would be minimal. Lines of sight at intersections are unobstructed and sight distances are ample. Development of the proposed project would have no effect on the physical characteristics of the major intersections or the geometrics of SR 306. The increase in traffic would be modest, remaining well within the capacity of the roadway as noted above. The mix of heavy vehicles in the traffic stream would not change substantively. As such, any increase in the risk of traffic accidents would be minor and proportional to the overall increase in traffic.

If a conveyor system is used as the primary transport for most mill-grade ore between the Cortez Hills Complex and the Pipeline Mill, there would be minimal conflict between project-related haul traffic and non-project traffic on CR 222 and CR 225. If the conveyor is not constructed and the mill-grade ore is

transported via haul trucks along the upgraded cross-valley haul road, there would be a commensurate increase in potential conflicts between mine traffic and non-project surface traffic where the haul road and county roads intersect. Although traffic levels on the county roads would remain low, the haul truck traffic on the mine haul road would range from 15 to 30 round trips per day.

If the Cortez Heap Leach Facility is not constructed and the heap leach-grade ore from the Cortez Pit is transported via haul trucks along the upgraded cross-valley haul road to the existing Pipeline heap leach facilities, the haul road traffic could increase to 50 round trips per day (100 haul truck movements). An increase in cross-valley haul truck traffic would add to the potential for conflicts with non-project surface traffic on the county roads where the two intersect. There would be gaps in the truck movements (just over 4 per hour) for safe passage of surface traffic if adequate safety procedures are in place and adhered to.

Based on this analysis, development of the proposed Cortez Hills Expansion Project would not significantly affect highway traffic in the site vicinity. Roadway safety conditions would be degraded slightly; the degree would depend partially on the level of traffic on the cross valley haul road.

An additional access consideration related to the Cortez Hills Expansion Project would be the proposed realignments for CR 222 and CR 225. The proposed realignment of CR 225 would add approximately 2 miles to a trip from Carico Lake Valley to Crescent Valley and points north. The new roadway would be a high quality, gravel surface roadway 24 feet wide, similar to the existing road segment that it would replace (see Section 2.4.4.4, Access and Haul Roads). The increased distance would add from 3 to 4 minutes to travel time for most light traffic trips on the route. This would be a minor increase in the context of the long travel distances that are common in the region.

The proposed realignment of CR 222 would add approximately 2.5 miles to the travel distance from Grass Valley to Crescent Valley; however, the new alignment would be more circuitous than the existing route through Cortez Canyon. The increase in switchbacks on the route would be offset to some degree by the proposed wider, higher quality roadway. The increase in travel time likely would be on the order of an additional 5 to 6 minutes over the current time to travel through Cortez Canyon. Though more than the increase for CR 225, it still would be considered a minor addition to travel times. CGM has committed to maintaining public access for both CR 225 and CR 222 during construction of the realignment of both roads.

Based on the analysis and assumptions noted above, the effects of the proposed Cortez Hills Expansion Project on land use and access in the study area would be considered minor.

3.11.2.2 Grass Valley Heap Leach Alternative

Under the Grass Valley Heap Leach Facility Alternative, the heap leach facility would be located approximately 1.5 miles south-southeast of the proposed facility location, and the ancillary area would be expanded (**Figure 2-14**).

Land Use

The effects on land use would be the same as described for the Proposed Action with the following exception. Under this alternative, there would be approximately 787 acres of additional disturbance for a total of 7,579 acres of disturbance, approximately 97 percent of which would occur on public lands.

Access

Under this alternative, the potential effects to access through the study area due to reroutes of CR 225 and CR 222 would be the same as described for the Proposed Action. There would be an additional consideration, however, in that the longer haul road to the Grass Valley Heap Leach Facility would cross the public access road to the old Cortez townsite, which attracts some recreational activity and some visitation to the Cortez cemetery, which was reportedly still used for internments until recent times. As a result, there would be a commensurate increase in potential conflicts between mine traffic and non-project surface traffic. However, the low level of traffic on CR 222 suggests the likelihood of an accident still would be minor.

3.11.2.3 Crescent Valley Waste Rock Alternative

Under this alternative, the Crescent Valley Waste Rock Facility would be located in the valley between the Cortez Hills Complex and the Pipeline Complex, replacing the Canyon Waste Rock Facility included under the Proposed Action (**Figure 2-16**).

Land Use

Under this alternative, the relocation of the waste rock facility would result in approximately 38 acres of additional disturbance for a total of 6,830 acres, or less than 1 percent, of the total new disturbance. The effects on land use would be the same as described for the Proposed Action, with the following exception. Under this alternative, there would be no effects to Cortez Canyon; however, there would be additional effects to grazing on the valley floor until revegetation has been completed (see Section 3.6, Range).

Access

Under this alternative, the proposed realignment of CR 225 would add approximately 1.7 miles to the travel distance from Carico Lake Valley to Crescent Valley and points north. The increased distance would add approximately 3 minutes to travel time for most light traffic trips on the route. This would be slightly less than under the Proposed Action and would be a similarly minor increase in the context of the long travel distances that are common in the region.

The realignment of CR 222 under this alternative would add approximately 4 miles to the travel distance from Grass Valley to Crescent Valley. The existing Cortez Canyon road down to the floor of Crescent Valley would remain unchanged; however, it would deviate from the existing alignment in the valley. As a result, there would be no increase in switchbacks on the route. The increase in travel time under this alternative is

estimated at 6 to 8 minutes. Although it still would be considered a minor addition to travel times, it might be reaching the level where travelers could start to feel annoyed, especially during the early transition.

3.11.2.4 Cortez Hills Complex Underground Mine Alternative

Under this alternative, surface facilities at the Cortez Hills Complex would not be developed. Surface facilities associated with the underground mining operation would be located within currently approved disturbance areas (**Figure 2-18**).

Land Use

The Cortez Hills Complex Underground Mine Alternative would result in a substantial reduction in surface disturbance (5,002 fewer acres) as compared to the Proposed Action. As a result, the long-term loss of grazing land and wildlife habitat would be substantially less under this alternative.

Access

The relocation of CR 225 would follow the same alignment under the Cortez Hills Complex Underground Mine Alternative as under the Proposed Action. As a result, the effects on travel times would be the same as described above. Under this alternative, there would be no change in travel conditions for CR 222, which would not be relocated.

3.11.2.5 Revised Cortez Hills Pit Design Alternative

Under this alternative, the footprints for the Cortez Hills Pit and the Canyon, North, and South waste rock facilities would be reduced slightly, and the ancillary facilities areas would be expanded slightly for the Cortez Complex and the Cortez Hills Complex (Figure 2-22). There would be more underground mining than under the Proposed Action.

Land Use

The effects on land use under this alternative would be essentially the same as described for the Proposed Action, except that total surface disturbance would be reduced by approximately 159 acres. Compared with the Proposed Action, the change in disturbance area would not alter the effects on land use for the life of the mine or after completion of reclamation.

Access

Under this alternative, the potential effects to access through the study area due to reroutes of CR 225 and CR 222 would be the same as described for the Proposed Action.

3.11.2.6 No Action Alternative

Under the No Action Alternative, the Cortez Hills Expansion Project would not be developed; however, existing operations at the Pipeline/South Pipeline Project and Cortez Underground Exploration Project would continue as previously approved.

Land Use

Impacts of the existing operations were addressed most recently in the South Pipeline Project Final EIS (BLM 2000a), Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e), Cortez Underground Exploration EA (2006a), and associated authorizations (BLM 2006a, 2005a, 2000b). Under the No Action Alternative, 9,439 acres of disturbance have been approved. This disturbance is on-going and would continue. Most of the approved disturbance would be within, or adjacent to, the existing footprint of the complex and would have minimal, if any, effect on other land uses. Based on the prior approvals indicated, no conflicts with governmental regulations or policies would be expected under this alternative.

Access

Most, if not all, of the traffic associated with the No Action Alternative already is occurring on SR 306 and the local road network. It is being accommodated with no measurable adverse effect on the roads, and all roads are well within their capacities to handle traffic. No relocation of existing roads would occur under existing authorizations.

The effects of the No Action Alternative on land use and access in the study area would be considered minor.

3.11.3 Cumulative Impacts

The cumulative effects study area for land use and access is shown in **Figure 3.1-10**. The past and present actions and RFFAs are identified in **Table 2-*18***, and their locations are shown in **Figure 2-*26***.

Past and present actions in the cumulative effects study area have an associated surface disturbance of 123,832 acres. RFFAs would disturb an estimated additional 8,880 acres for a total of 132,912 acres of disturbance. Approval of the Proposed Action would add an increment of 6,792 acres to the disturbance for a total of 139,704 acres, an approximate 5 percent increase over past, present, and reasonably foreseeable disturbance. The total cumulative disturbance, which is predominantly related to mineral development and, to a lesser degree, agricultural development, would be consistent with Lander County and BLM plans, policies, and ordinances. The foreseeable increases in agricultural irrigation and livestock development activities would be expected to improve the economic viability of farming and ranching in the cumulative effects study area, partially or wholly offsetting the losses of grazing land from mineral development.

Traffic generation data from the approved and reasonably foreseeable mineral development activities are unknown. However, most of these actions previously have been approved or are affiliated with existing

mining operations. Consequently, it is assumed that most of the traffic that could be anticipated is currently on the road system. Based on this assumption and the substantial unused capacity on SR 306 and I-80, it is expected that cumulative effects on traffic flow and safety would not be significant.

Cumulative impacts to land use under the other action alternatives would be similar to cumulative impacts of the Proposed Action. The cumulative impacts associated with the Grass Valley Heap Leach ***and Crescent Valley Waste Rock a***lternative***s*** would be essentially the same***,*** with an incremental increase in cumulative land use disturbance of 787 acres ***and 38 acres, respectively***. Under the ***Revised Cortez Hills Pit Design*** Alternative, there would be a slight incremental ***decrease*** in cumulative land use disturbance of approximately ***159*** acres. There would be an incremental decrease in cumulative land use disturbance of approximately 5,002 acres associated with the Cortez Hills Complex Underground Mine Alternative. Cumulative impacts to access would be the same as described for the Proposed Action with the differences in direct impacts identified for the individual action alternatives.

3.11.4 Monitoring and Mitigation Measures

Issue: Potential conflict between mine haul truck traffic and non-project surface traffic where the cross-valley haul road crosses the county roads.

Mitigation Measure A1: CGM would monitor traffic conflicts at the intersections of the cross-valley haul road with CR 222 and CR 225 to ensure traffic controls at the intersections would be sufficient to protect public and project worker safety. Similarly, if the Grass Valley Heap Leach Alternative were approved, the intersection of the heap leach haul road and the Cortez townsite access road would be monitored to ensure safety procedures work effectively as planned.

Effectiveness: Monitoring of traffic controls would provide for early identification of potential problems and a basis for developing additional traffic controls to ensure worker and public safety.

3.11.5 Residual Adverse Effects

Residual adverse effects to land use would include the permanent loss of approximately 999 acres of grazing and wildlife habitat due to the permanent loss of forage and habitat associated with the Cortez Hills Pit, which would not be reclaimed. No residual adverse effects to access have been identified.

3.12 Recreation and Wilderness

3.12.1 Affected Environment

The study areas for recreation and wilderness issues are based on the anticipated potential extent of effects from the proposed Cortez Hills Expansion Project. For recreation, the study area is limited to the ***area within the*** proposed project boundary and the immediate surroundings, within approximately 2 miles of the project boundary. The cumulative effects study area for recreation encompasses an area that generally includes the southern portions of Crescent Valley and the Cortez Mountains, the northern portion of Grass Valley, and portions of the Shoshone and Toiyabe ranges. The study area for wilderness issues is the same for both project effects and cumulative effects, encompassing an area within a radius of 100 miles from the proposed project. (Note: The impact assessment focused on wilderness areas within 50 miles of the proposed project. As no impacts were identified, it was determined there would be no impacts to wilderness areas at a greater distance from the proposed project.)

3.12.1.1 Recreation

There are no developed recreation facilities in the project boundary or its immediate surroundings. The nearest developed BLM facility is the Mill Creek Recreation Area, a small camping, fishing, and picnicking area in the Reese River Valley, more than 35 air miles northwest of the proposed Cortez Hills Expansion Project. Crescent Valley has a park with tennis and basketball courts, a ball field, picnic areas, and a playground. Many current employees of CGM live in Elko, Carlin, and Battle Mountain, all of which provide park and recreation facilities for residents.

Dispersed outdoor recreation activities are the only recreation uses of the project vicinity. Uses in and near the proposed project boundary are likely limited to photography and sightseeing at the old Cortez townsite; hiking and camping; firewood collecting; rock collecting; OHV use; and hunting for chukar, sage grouse, and mule deer. The Nevada 2000 Off-road Race passed through the Cortez Hills Expansion Project vicinity in July 2000.

According to a phone survey taken in 1986 by the Nevada Division of State Parks (Nevada Department of Conservation and Natural Resources 1992), the three main recreational activities of Lander County residents are golfing, hunting, and fishing. The three main activities for Lander County visitors are hunting, fishing, and gambling. For nearby counties, the major recreational activities include hunting, fishing, camping, and water sports, as well as more urban activities, such as golf and softball.

Additional information on recreation activities and facilities in the general area around the study area is presented in the South Pipeline Project Final EIS (BLM 2000a).

3.12.1.2 Wilderness

In November 1980, the final inventory decision was made for most WSAs in Nevada. A total of 103 WSAs were identified and analyzed through the wilderness inventory. In October 1991, the BLM Nevada State

Office released the Nevada BLM Statewide Wilderness Report (BLM 1991a) documenting the rationale and recommendations for the WSAs. The criteria considered in developing the wilderness recommendations included naturalness, solitude, primitive and unconfined recreation, and special features. The report recommended wilderness designation of 1.9 million acres within 52 of the WSAs and release of 3.2 million acres from WSA management. The President sent the report to Congress in 1992. Congress passed the Black Rock Desert – High Rock Canyon Emigrant Trails National Conservation Area Act in December of 2000, which designated 10 new wilderness areas, primarily in the northwest corner of Nevada (BLM 2003c). There also have been subsequent actions in Lincoln and Clark counties, but none of the WSAs within 50 miles of the study area have been addressed to date (Smith 2006).

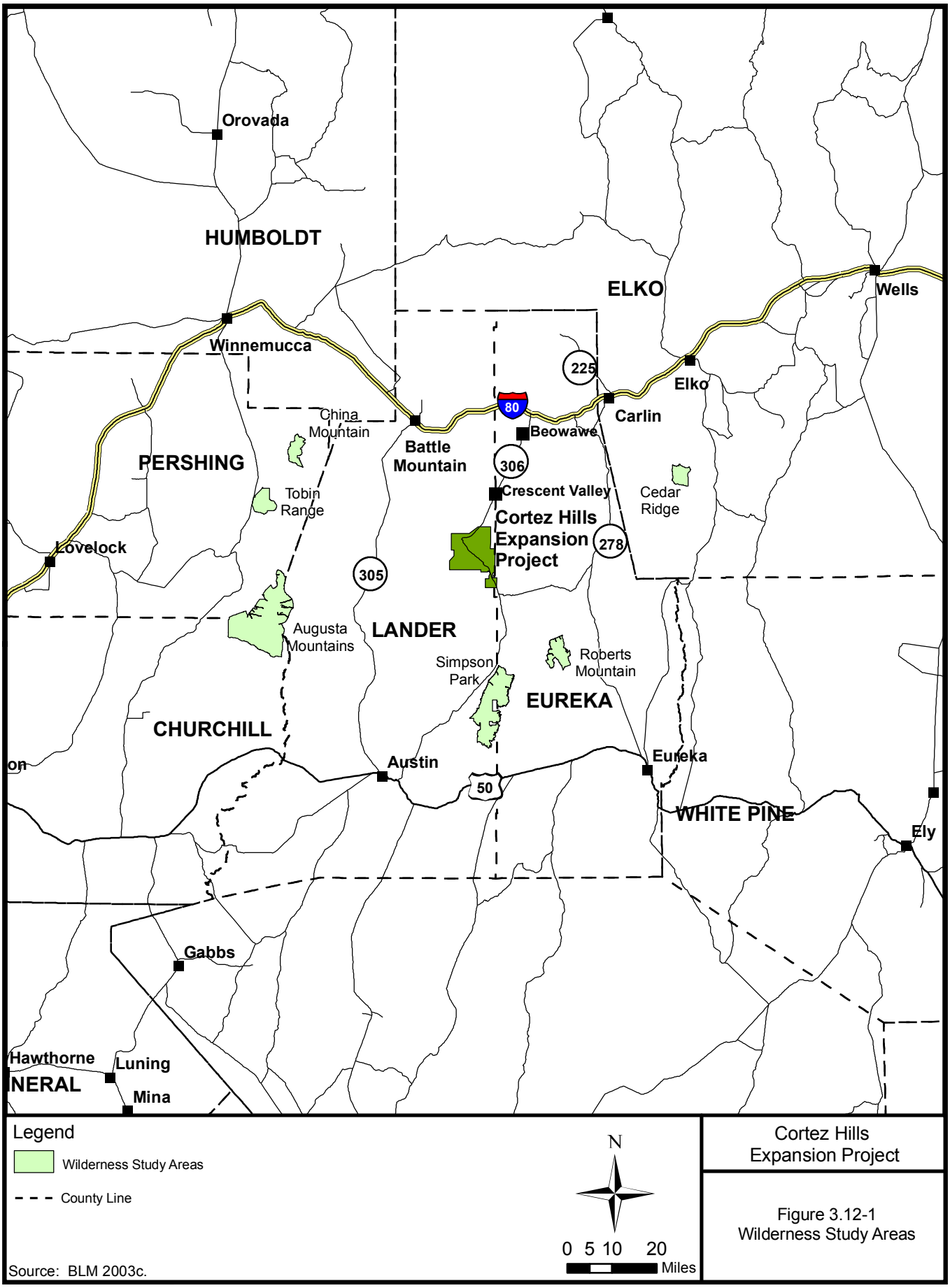
Six WSAs are located within a 50-mile radius of the proposed project: the Cedar Ridge WSA, China Mountain WSA, Tobin Range WSA, Augusta Mountains WSA, Simpson Park WSA, and Roberts Mountain WSA (**Figure 3.12-1**). The Roberts Mountain WSA was recommended for designation as wilderness in the Statewide Wilderness Report, but the then Secretary of Interior reversed the recommendation (see below) The other five areas were recommended for release from consideration for wilderness designation in the Statewide Wilderness Report (BLM 1991a).

The Cedar Ridge WSA (NV-010-088) encompasses 10,009 acres. It is located approximately 45 miles northeast of the study area. It has high woodland product values, high potential for oil and gas, and moderate potential for precious metals, uranium, and barite. Wilderness values are present, but not considered outstanding, and management for wilderness would be difficult. On balance, other values were considered more important than wilderness values in this WSA, and the entire acreage was recommended for release from wilderness consideration.

The China Mountain WSA (NV-020-406P) includes 10,358 acres surrounding 80 acres of private lands. The China Mountain WSA is located just under 50 miles northwest of the study area on the east slope of the Tobin Range. The Statewide Wilderness Report (BLM 1991a) recommendation for the China Mountain WSA was to release all 10,358 acres for uses other than wilderness. The mineral and geothermal potential were considered to outweigh the wilderness values. Implementation would require use of all practical means to avoid or minimize environmental impacts (BLM 1991a).

The Tobin Range WSA (NV-030-406Q) includes 13,107 acres of public lands surrounding 120 acres of private lands. This WSA is located approximately 50 miles west-northwest of the study area in eastern Pershing County. The recommendation for the Tobin Range WSA was to release all 13,107 acres for uses other than wilderness. Management emphasizing access to potential mineral resources was selected over management as designated wilderness because of energy and mineral resource potential. Implementation would require use of all practical means to avoid or minimize environmental impacts (BLM 1991a).

The Augusta Mountains WSA (NV-030-108) encompasses 89,372 acres of public lands with no state or private in-holdings. It is located approximately 45 miles west-southwest of the study area at the common junction of Pershing, Churchill, and Lander counties. The recommendation for the Augusta Mountains WSA was to release all 89,372 acres for uses other than wilderness (BLM 1991a). Management emphasizing



Cortez Hills Expansion Project

Figure 3.12-1
Wilderness Study Areas

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access to potential mineral resources was selected over management as designated wilderness because of energy and mineral resource potential. Implementation would require use of all practical means to avoid or minimize environmental impacts (BLM 1991a).

The Simpson Park WSA (NV-060-428) includes 49,670 acres surrounding 80 acres of private in-holdings. It is located approximately 20 miles due south of the study area in the Simpson Park Mountains straddling the Lander-Eureka County line. The Simpson Park WSA was recommended to be released in its entirety for uses other than wilderness because of known barite deposits and high potential for other minerals. In addition, there are numerous intrusions into the WSA including ROWs, spring developments, and the private in-holdings that would make management for wilderness difficult. Implementation of the proposed management recommendation would require use of all practical means to avoid or minimize environmental impacts.

The Roberts Mountain WSA (NV-060-541) encompasses 15,090 acres with no private in-holdings. The WSA is located in the Roberts Mountains 20 miles southeast of the study area; it is the closest WSA to the proposed project. The BLM recommended the entire 15,090 acres for designation as wilderness based on “outstanding wilderness values not common in central Nevada,” including naturalness, unusual vegetative communities, opportunities for primitive and unconfined recreation, prominent Roberts Mountain Thrust geologic features, and unique paleontological probability. Although the BLM recommendation was reversed by the Secretary of the Interior in 1992, a subsequent settlement of a lawsuit provided that this and all other candidate wilderness areas would receive a “fresh look” when Congress considers specific designation bills. The Roberts Mountain WSA is considered to be manageable for wilderness over the long term.

3.12.2 Environmental Consequences

The Proposed Action or alternatives potentially could affect recreation and wilderness resources both directly and indirectly. Direct impacts may include elimination or displacement of recreation resources in the project boundary, or degradation of the recreation experience for users of the resources due to noise, traffic, excessive dust or other emissions from the proposed Cortez Hills Expansion Project. Indirect impacts may result from changes in demand for limited recreation resources as a result of project related population growth.

Environmental impacts to recreation and wilderness would be considered significant if the Proposed Action or other alternatives result in any of the following:

- Displacement of dispersed recreational use from an area for which there are no reasonable substitutes as a result of decreases in game population, aesthetic experience, loss of access, or other reasons related to the proposed project.

- Nonconformance with the Wilderness Act of 1964 or the BLM Interim Wilderness Management Policy.

- Substantial degradation or reduction in the quantity or quality of the area available for existing or future recreational opportunities.

- Unmitigated loss of a unique recreational resource.

3.12.2.1 Proposed Action

Recreation

The project boundary of the proposed Cortez Hills Expansion Project encompasses a total of approximately 57,058 acres, 53,790 acres (94 percent) of which are BLM managed public land and 3,268 acres (6 percent) are CGM-owned private lands. Under the Proposed Action, total new surface disturbance would be approximately 6,792 acres, 6,571 acres (97 percent) of which would be on public land (see **Table 2-1**).

The proposed disturbance areas would be removed from public access for recreation purposes for the life of the project, as would an undetermined amount of additional acreage that would be fenced off for public safety purposes. However, most of this potentially restricted area receives very little recreational use at the present time because of currently permitted, on-going mineral exploration activity. Also, there is extensive public land in the immediately surrounding area that would accommodate migration of dispersed recreation activity from the proposed access-restricted area. An example of the likely movement of activity to surrounding areas during the life of the Proposed Action is mule deer hunting, which is one of the most popular recreation activities in the mountainous areas near the proposed project. During the initial development phase, it is likely that mule deer would move away from new areas of project activity and noise (see Section 3.5, Wildlife and Fisheries). As a result, hunters would follow the deer into surrounding areas. However, as potential effects on game species are anticipated to be low, the overall effect on recreational hunting would be minor.

Upon completion of mining, ore processing, closure, and reclamation, much of the disturbance area, except for the Cortez Hills and Cortez pits and county road reroutes, would be available for dispersed recreation use (see Section 2.4.12, Reclamation). Upon successful revegetation of disturbed areas, they would be expected to provide habitat for wildlife and presumably would attract hunters back to the project vicinity.

The principal recreation activity that may continue in the area throughout the life of the Proposed Action would be visits to the old townsite of Cortez to explore and photograph the remnants of the ghost town. The townsite would be outside the boundary of the Cortez Hills Expansion Project and would remain accessible via a short spur road from CR 222 near the southern edge of the Grass Valley Heap Leach Facility. The attractiveness of the townsite during the life of the Proposed Action would depend on the perspective of the potential visitors. Some may find the proximity to the Grass Valley Heap Leach Facility and other round-the-clock mining activities intrusive and would find the experience less enjoyable. Others may feel the continuation of mining in an area of historic mining activity would add to the ambience of the visit and would increase their enjoyment. Regardless of public perception, CGM would provide for continued access to the historic Cortez townsite and erect a marker at the townsite to provide historical information for visitors as

part of its applicant-committed environmental protection measures (see Section 2.4.11, Applicant-committed Environmental Protection Measures).

There may be a modest increase in regional population resulting from the Proposed Action (see Section 3.13, Social and Economic Values). The new residents would increase the demand for recreation resources and opportunities in the region, but the increase would be very small in the context of the existing population base. There is ample public land in the region to accommodate dispersed recreation needs of the population increase. Any adverse effects would be felt at parks and other developed recreation facilities in the communities where the population increment would reside, primarily Elko, Carlin, Battle Mountain, and Crescent Valley. Such effects would be expected to be minor.

Because there is an ample supply of alternative land for dispersed recreation activities in the vicinity of the Proposed Action, and because no unique recreation resources would be impacted as a result of the proposed project, effects on recreation resources would not be considered significant. Although some visitors may feel the quality of the recreation experience visiting the old Cortez townsite during the life of the project would be degraded, the quality of experience would return to existing conditions after successful reclamation of the project, in general, and the Grass Valley Heap Leach Facility, in particular.

Wilderness

There would be no direct effects, or measurable indirect effects (e.g., air quality) (see Section 3.10, Air Quality), from the proposed project on any of the six WSAs within 50 miles of the proposed project. The Proposed Action would conform to the Wilderness Act of 1964 and the BLM Interim Wilderness Management Policy.

Based on the analysis and assumptions noted above, the effects of the proposed project on recreation and wilderness resources in the study area would be considered minor.

3.12.2.2 Grass Valley Heap Leach Alternative

This alternative would be the same as the Proposed Action, except the Grass Valley Heap Leach Facility would be moved approximately 1.5 miles south-southeast of the location identified under the Proposed Action and the ancillary disturbance area would increase (**Figure 2-14**). It would result in approximately 787 acres of additional disturbance for a total of 7,579 acres of disturbance, a 10 percent increase.

Recreation

The effects on recreation resources under this alternative would be similar to those described for the Proposed Action. This alternative would reduce the potential degradation of the recreation experience for visitors to the old Cortez townsite, because the heap leach facility would not be immediately adjacent to the townsite, as it would be under the Proposed Action. Access to the townsite would be somewhat more difficult, however, because the access road would cross the mine haul road to the heap leach pad. This is the only alternative that would require crossing the haul road to reach the townsite.

Wilderness

There would be no direct effects, or measurable indirect effects, from the Grass Valley Heap Leach Alternative on any of the six WSAs within 50 miles of the proposed project, so the effects would be the same as described for the Proposed Action.

3.12.2.3 Crescent Valley Waste Rock Alternative

Under this alternative, the Canyon Waste Rock Facility would not be constructed. Alternately, a waste rock facility would be constructed in Crescent Valley (**Figure 2-16**).

Recreation

The Crescent Valley Waste Rock Alternative would reduce the potential effects of the proposed Cortez Hills Expansion Project on recreation compared with the Proposed Action, because it would leave most of Cortez Canyon (a scenic location) undisturbed. Other effects on recreation resources would be very similar to those under the Proposed Action. The valley area location of the waste rock facility has no special recreational value that would be lost as a result of development of the Crescent Valley Waste Rock Facility.

Wilderness

There would be no direct effects, or measurable indirect effects, under the Crescent Valley Waste Rock Alternative on any of the six WSAs within 50 miles of the proposed project, so the effects would be the same as described for the Proposed Action.

3.12.2.4 Cortez Hills Complex Underground Mine Alternative

Under this alternative, surface facilities would not be developed at the Cortez Hills Complex. Surface facilities associated with the underground mine would be located within existing disturbance areas at the Cortez Complex (**Figure 2-18**).

Recreation

The Cortez Hills Complex Underground Mine Alternative would have fewer effects on recreation than the Proposed Action. Because the surface disturbance to Cortez Canyon and the lower slopes of Mount Tenabo would be minimized, these areas, which are the most scenic in the study area, would remain open for recreation uses. The old Cortez townsite, cemetery, and related remnants of historic early mining activity in the area would be more readily accessible to the public. Displacement of dispersed recreation activities would be largely eliminated under this alternative.

Wilderness

Under this alternative, potential effects to the six WSAs within 50 miles of the proposed project would be the same as described under the Proposed Action.

3.12.2.5 Revised Cortez Hills Pit Design Alternative

This alternative would be the same as the Proposed Action, except that the footprints for the Cortez Hills Pit and the Canyon, North, and South waste rock facilities would be reduced slightly, and the ancillary facilities areas for the Cortez and Cortez Hills complexes would be expanded slightly (Figure 2-22). There would be more underground mining than under the Proposed Action. The result would be approximately 159 fewer acres of disturbance, a 3 percent reduction.

Recreation

The effects of this alternative on recreation resources would be essentially the same as those under the Proposed Action. The changes in disturbance area would be within the fenced boundary of the project and would not be accessible for recreation until mining was finished and reclamation completed.

Wilderness

There would be no direct effects, or measurable indirect effects, under this alternative on any of the six WSAs within 50 miles of the proposed project; therefore, the effects would be the same as under the Proposed Action.

3.12.2.6 No Action Alternative

Under the No Action Alternative, the proposed Cortez Hills Expansion Project would not be developed, and the associated impacts would not occur. Ongoing activities associated with the existing Pipeline/South Pipeline Project and Cortez Underground Exploration Project would continue under existing authorizations.

Recreation

The No Action Alternative would have similar effects on dispersed recreation opportunities as the Proposed Action, although to a slightly lesser degree. As the proposed Cortez Hills Expansion Project would not be developed, the disturbance area under this alternative would be smaller, so the displacement of dispersed recreation would not be as great. Also, the duration of the previously approved and on-going activities would be shorter than under the Proposed Action, so the displacement also would be shorter in duration. In addition, the disturbance area that would remain after reclamation (i.e., open pits) would be somewhat smaller than it would be under the Proposed Action. As a result of these differences, the effects of the No Action Alternative on recreation in the study area would be similar to and slightly less than those under the Proposed Action.

Wilderness

Under the No Action Alternative, there would be no direct effects or measurable indirect effects (e.g., air quality) on any of the six WSAs within 50 miles of the existing Cortez Gold Mines Operations Area. The No Action Alternative would conform to the Wilderness Act of 1964 and the BLM Interim Wilderness Management Policy.

3.12.3 Cumulative Impacts

The cumulative effects study areas for recreation and wilderness are shown in **Figures 3.8-1** and **3.12-2**, respectively. Past and present actions and RFFAs are identified in **Table 2-*18*** and shown in **Figure 2-*26*.**

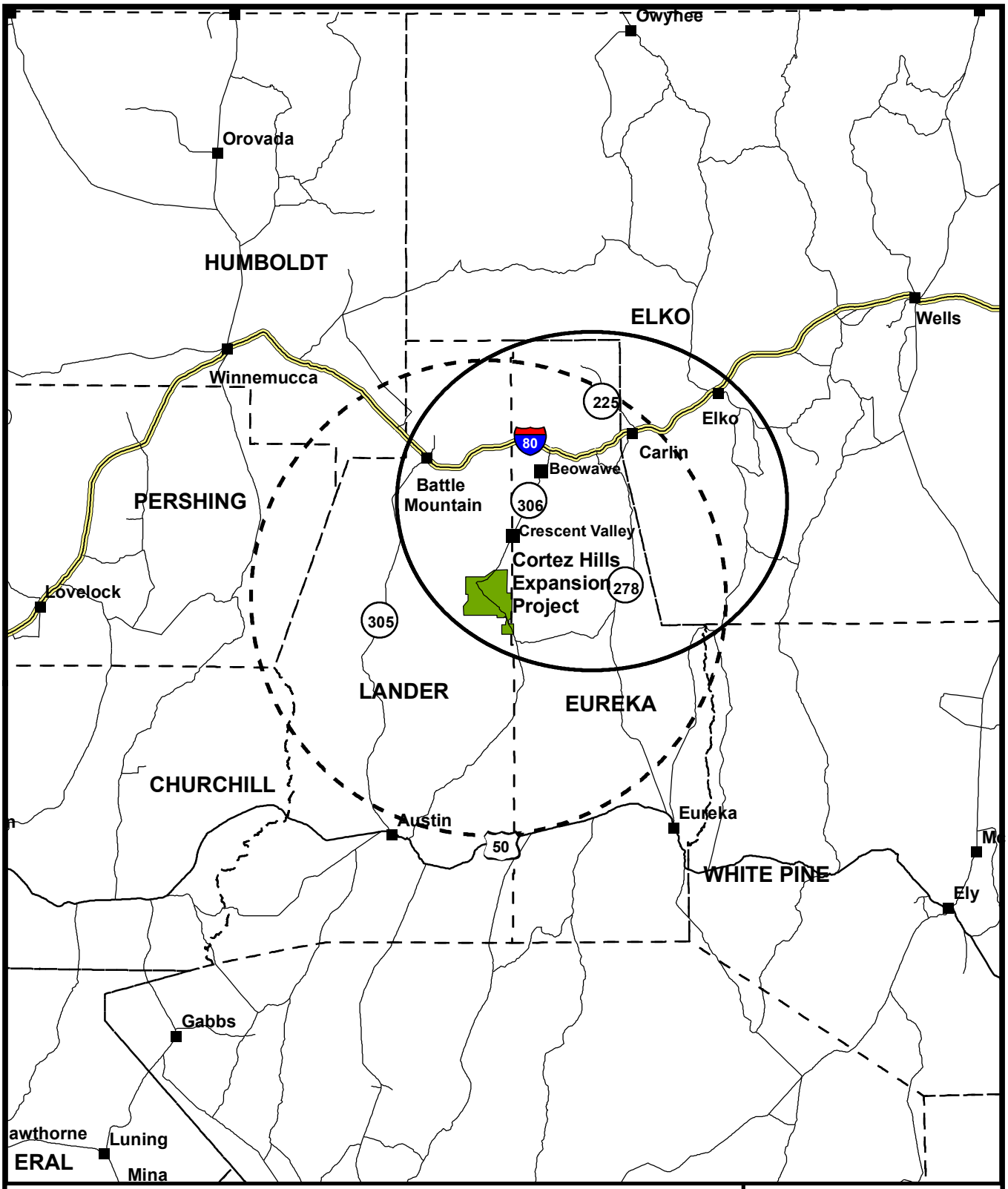
Recreation

Past and present actions in the cumulative effects study area have a total approved surface disturbance of approximately 123,832 acres. RFFAs would disturb an estimated additional 8,880 acres for a total of approximately 132,912 acres of disturbance. Approval of the Proposed Action incrementally would add 6,792 acres to the disturbance for a total of 139,704 acres, an approximate 5 percent increase over the total of past, present, and reasonably foreseeable disturbance. Although the cumulative surface disturbance would be considerably greater than the direct disturbance from the Cortez Hills Expansion Project, the vast acreage of public lands in the cumulative effects study area would be more than sufficient to accommodate dispersed recreation activities displaced by past and present projects and RFFAs in the cumulative effects study area. The cumulative unreclaimed disturbance area that would remain after completion of the past and present actions and RFFAs would be considerably greater than the unreclaimed pit areas of the Proposed Action. Nevertheless, the cumulative unreclaimed area would be a small fraction of the total land area available for dispersed recreation in the cumulative effects study area.

Cumulative impacts on recreation under the Grass Valley Heap Leach, Crescent Valley Waste Rock, and Cortez Hills Complex Underground Mine alternatives would be the same as the Proposed Action, with the following exceptions. The Crescent Valley Waste Rock and the Cortez Hills Complex Underground Mine alternatives incrementally would increase the total cumulative disturbance by 6 percent and 1 percent, respectively***, and the Revised Cortez Hills Pit Design Alternative would decrease the total cumulative disturbance by 3 percent***. The total cumulative disturbance and cumulative unreclaimed disturbance under the Cortez Hills Complex Underground Mine Alternative would be less than under the Proposed Action as surface facilities would not be developed at the Cortez Hills Complex. These acreages differences would be a small fraction of the total land available for dispersed recreation in the cumulative effects study area.

Wilderness

Past and present projects and RFFAs in the cumulative effects study area would have no direct or measurable indirect effect on WSAs within 50 miles of the proposed Cortez Hills Expansion Project.



Legend

- Social and Economic Values and Environmental Justice CESA
- Wilderness CESA
- County Line

N

0 5 10 20 Miles

Cortez Hills Expansion Project

Figure 3.12-2
Wilderness, Social and Economic Values, and Environmental Justice CESAs

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Cumulative impacts on WSAs under the Grass Valley Heap Leach, Crescent Valley Waste Rock, Cortez Hills Complex Underground Mine, and Revised Cortez Hills Pit Design alternatives would be the same as described for the Proposed Action.

3.12.4 Monitoring and Mitigation Measures

Based on the conclusions of the impact analysis, no monitoring or mitigation measures would be required for recreation or wilderness.

3.12.5 Residual Adverse Effects

There would be a permanent loss of approximately 1,000 acres of wildlife habitat and multiple use lands available for recreation associated with the Cortez Hills Pit and county road reroutes, which would not be reclaimed.

3.13 Social and Economic Values

3.13.1 Affected Environment

The study area and cumulative effects study area for social and economic values include portions of Elko, Eureka, and Lander counties. The rationale for the study area is that a majority of CGM's current work force (approximately 470 employees for open-pit operations) live in this area. Approximately 67 percent live in the Elko/Spring Creek area and 9 percent in Carlin, both in Elko County; 11 percent live in Crescent Valley/Beowawe (Eureka County); and 11 percent live in Battle Mountain (Lander County). This distribution results from a combination of housing availability, availability of an attractive combination of public and private services, and a willingness on the part of mining companies to provide commuter busses to attract and keep a qualified work force.

The existing social and economic conditions in the study area are described in the South Pipeline Project Final EIS (BLM 2000a) and the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). A summary of the existing conditions is presented below.

3.13.1.1 Population

Elko County is the largest of the three counties in the study area, with an estimated 2005 population of 47,586. It also was the fastest growing, increasing by an average of 3.1 percent per year from 1990 to 2000 and by an estimated 0.9 percent per year from 2000 to 2005. The City of Elko is the county's largest population center with an estimated 17,850 people in 2005, although Spring Creek, with 10,548 people (2000) grew faster both in percent and in actual numbers in the 1990s. (The State of Nevada does not estimate population for unincorporated places so a figure for 2005 is not available.) Carlin, at 2,261 people (2005) grew at an average annual rate of 0.9 percent from 2000 to 2005.

Eureka County lost population at an estimated average of 2.0 percent per year since 2000, declining to an estimated 1,384 people in 2005. At the same time, Crescent Valley is estimated to have grown from 253 people to 311, and the communities of Crescent Valley and Beowawe, combined, now have nearly half the county's population.

Lander County, with an estimated 2005 population of 5,509, continued to lose population at an estimated rate of 1.0 percent per year from the 2000 Census to the present and is down by over 12 percent since 1990. Battle Mountain, the county's largest community, followed a similar pattern, although estimates indicate there was a short-term boost in the population after the census.

While Elko County grew at a modest 0.9 percent annual rate from 2000 to 2005, and the smaller rural counties were declining, the State of Nevada was growing at a substantial 4.5 percent annual rate. Most of this growth took place in the urban population centers, especially Las Vegas. Nevada had an estimated 2,518,869 people in 2005.

Ethnically and racially, the study area counties are notably less diverse than the state as a whole, with substantially fewer black and Asian residents. The counties do have higher percentages of Native Americans than the state does, particularly in Elko and Lander counties with 5.2 percent and 4.6 percent, respectively, compared with 1.3 percent for the entire state (2005 estimates). People of Hispanic origin, of any race, are only about 9.8 percent of the Eureka County population, compared with 23.1 percent of the state; they make up 19.0 percent and 24.2 percent, respectively, of the Elko and Lander County populations (Nevada State Demographer's Office 2005).

3.13.1.2 Income

Per capita personal income in the study area continues to lag behind the state level. Census data from 1999 indicated a state average of $21,989, followed by Elko County at $18,482, Eureka County at $18,629, and Lander County at $16,998. Median earnings for males in full time, year-round jobs were notably higher in each of the counties than for the state as a whole, a pattern that reversed for women, which may be a reflection of the significant roll of mining in the study area economy and the dominance of males in the mining work force. By 2004, estimated per capita personal income had risen substantially in all three counties and the state, but the pattern of the counties trailing the state by over 15 percent continued. Estimates for 2004 were $33,787 for the state, $28,385 for Elko County, $28,827 for Eureka County, and $28,000 for Lander County.

Poverty rates in 2000 for all categories of the population were above state averages in Eureka and Lander counties, but below state averages in Elko County, except for individuals over 65. Poverty rates for persons over 65 ranged from 7.6 percent in Elko County to 12.9 percent in Lander County and 16.4 percent in Eureka County, compared with 7.1 percent statewide. By 2003, however, it was estimated that the trends had changed somewhat. Although the age breakdowns were not entirely consistent with 2000 census categories, the estimated percentages of all ages in poverty were 9.8 percent for Elko County, 10.6 percent for Eureka County, and 10.5 percent for Lander County, compared with 11.0 percent for the state. The differences were more pronounced for youth under 18, so there still may be higher levels of poverty for those over 65 in the three counties (U.S. Census Bureau 2005).

3.13.1.3 Employment

Employment averages for the third quarter of 2005 in the study area show a distinct difference between Elko County and Eureka and Lander counties. Elko County's economy is much more diverse, befitting its role as a trade center for northeast Nevada. Elko County has substantial numbers of workers in services, trade and government employment, and just under 10 percent in mining. Lander has 33 percent of its jobs in the mining industry and lesser but still sizable numbers working in government and trade jobs. Eureka County is an extreme case with over 91 percent of its employment coming from mining and under 5 percent in government jobs (Nevada Department of Employment, Training, and Rehabilitation [NDETR] 2006). Not surprisingly, three of the five largest employers in Lander and Eureka counties are mining companies, while no mining companies are in the top five in Elko County.

Unemployment rates for February 2006 for Elko, Eureka, and Lander counties were 4.2, 4.9, and 4.9 percent, respectively, compared with 3.8 percent for Nevada as a whole (NDETR 2006). Total unemployment in the study area was estimated at 1,290 for the month. The unemployment rates were down by 0.6 percent and 0.8 percent for Elko and Lander counties, respectively, but up by 0.2 percent for Eureka County (NDETR 2006).

3.13.1.4 Housing

Declines in the mining industry over the years have led to excess housing in many parts of rural Nevada. At the time of the 2000 Census, vacancy rates were very high in most of the study area, except for Spring Creek and Elko. In comparison with a Nevada average of 9 percent, Elko County had a 15 percent rate, Eureka County's rate was 35 percent, and Lander County's rate was 25 percent. The City of Elko's rate was 11 percent and Spring Creek's rate was 7 percent. Current vacancy rates are not known, but the estimated 5 percent population increase in Elko County may have tightened the housing market there somewhat. The City of Elko estimated the vacancy rate for owner-occupied units was just 2.5 percent in 2001, but the rental vacancy rate was a sizable 16.3 percent (City of Elko 2006). Estimated population declines in Eureka and Lander counties have likely further softened the housing markets in those jurisdictions.

Temporary housing is available in numerous hotel/motels in Elko, Carlin, and Battle Mountain. Elko and Battle Mountain also have recreational vehicle (RV) parks.

3.13.1.5 Public Facilities and Services

Water

Municipal utilities provide water service to town residents in the study area. Most rural residents obtain water from wells or springs. Elko's peak usage approached its maximum daily production capacity for brief periods in the summer of 2005, although the utility maintained storage at approximately 80 percent of capacity throughout the high demand period (City of Elko 2006). The city does have mandatory watering restrictions during the summer months to restrain demand and treats waste water to "reclaim" it for use irrigating city parks and facilities. Spring Creek needed to upgrade its system as it had water restrictions in force as of 2002. Carlin, Crescent Valley, and Battle Mountain have excess capacity at present.

Wastewater Treatment

Carlin, Elko, and Battle Mountain have excess wastewater treatment capacity, or are in the process of upgrading. Spring Creek is at capacity, and Crescent Valley is working on obtaining a municipal system.

Solid Waste Disposal

There are public landfill operations in all three counties in the study area.

3.13.1.6 Emergency and Health Care Services

Generally speaking, law enforcement, fire protection, and ambulance services are adequate in the study area, with the following exceptions. The Elko jail is often over capacity on weekends. Elko fire equipment needs to be updated. Carlin's police chief is concerned that budget cuts are reducing the adequacy of the department (BLM 2004e). Crescent Valley's volunteer fire department is in need of additional staff to cover the large service area from Boulder Valley to Grass Valley.

Northeastern Nevada Regional Hospital in Elko serves all of northeast Nevada from a new hospital opened in 2001. Battle Mountain General Hospital serves north-central Nevada. There also are clinics in several communities, including Elko, Carlin, and Crescent Valley.

3.13.1.7 Public Education

Seven out of eleven public schools in the study area portion of the Elko County School District are at or over capacity, primarily in the elementary and junior high schools. Eureka County schools are operating below capacity. Lander County schools have a high school, a junior high, and an elementary school operating slightly over stated capacity. Other schools in the district have excess capacity.

3.13.1.8 Public Finance

Nevada county governments obtain revenues from both local and state shared sources. Local sources include ad valorem property taxes on real and personal property and on the net proceeds of mines in the county. They also collect revenues from fines, licenses and permits, and fees for services. State shared revenues include sales, motor vehicle, fuel, and gaming revenues. All three counties in the study area list intergovernmental transfers as their largest revenue source, followed by their own taxes. Tax revenues have been a particular concern in rural counties throughout Nevada as the mining industry contracted in past years. Assessed valuations in Eureka and Lander counties fell from fiscal year 2000-2001 through fiscal year 2003-2004, but rose in fiscal year 2004-2005; Elko County's valuations rose slightly. Taxable net proceeds from mining dropped substantially in all three counties from fiscal year 1999-2000 to fiscal year 2002-2003, but rebounded through fiscal year 2004-2005. Although the recovery in Elko County has not yet reached the fiscal year 1999-2000 level, both Eureka and Lander counties have exceeded previous levels. In all three counties, the trends have been somewhat erratic.

3.13.2 Environmental Consequences

Impacts to social and economic values would be significant if the Proposed Action or other alternatives result in any of the following:

- Changes in long-term local population, employment, or earnings associated with operations of 5 percent or more.

- Demand for temporary or permanent housing would exceed the expected supply of available housing during the scheduled construction and operations periods.

- The project would affect a number of residences or businesses by displacement or other use of the property without fair and reasonable compensation.

- The project's effects on public sector fiscal conditions would result in a 5 percent or greater reduction in revenues or increase in expenditures, or the underlying fiscal conditions would be adversely affected beyond the life of the project.

- Long-term demands on public services and infrastructure would exceed capacities in these systems, either triggering the need for capital expansion beyond the commensurate project related revenue expansion, or resulting in a discernable reduction in the level of service provided.

In addition to the work force information provided in Chapter 2.0 for the Proposed Action, No Action Alternative, and other action alternatives, the following work force numbers were used to conduct the socioeconomic impact analysis.

Construction Phase Assumptions

- The construction work force was assumed to be 70 percent local; 30 percent of the construction work force would come from other parts of Nevada or out of state.

- The new construction work force would seek temporary (i.e., rental or RV site) housing primarily in Elko County and, to a lesser extent, northern Eureka and Lander counties.

- The indirect construction employment (secondary or induced employment) was calculated using a construction employment multiplier of 1.2 (Dobra 1989).

- Based on previous EISs prepared for similar gold mining projects in northern Nevada, it is assumed that 70 percent of the indirect labor force would be second persons in a direct labor household or current residents of the study area.

- Based on previous EISs prepared for similar gold mining projects in northern Nevada, the construction work force composition is estimated to be 80 percent single (including married without family present) and 20 percent married with families. The population estimates are based on 1 person per single household and an average of 2.77 persons per married household (based on average household size in Lander County).

Operations Phase Assumptions

The operations phase assumptions were developed primarily from previous EISs prepared for similar gold mining projects in northern Nevada and on residence locations of current CGM employees.

- The new operations work force was assumed to be 60 percent local; 40 percent non-local.
- The percentage distribution of residence locations for new employees would be approximately the same as for existing CGM employees (i.e., 67 percent of CGM employees live in Elko and vicinity; 12 percent in Crescent Valley and Beowawe; 11 percent in Battle Mountain; 9 percent in Carlin, and slightly less than 1 percent live outside the local area).
- The indirect operations employment (secondary or induced employment) was calculated using an operations employment multiplier of 1.74 (Dobra 1989).
- It is assumed that 70 percent of the indirect labor force would be second persons in a direct labor household or current residents of the study area.
- The new operations work force composition is estimated to be 75 percent married with families and 25 single. The population estimates are based on 1 person per single household and an average of 2.98 persons per married household, including an average of 0.77 school-age children.
- Approximately 80 percent of the new operations work force would purchase a residence (60 percent mobile homes; 40 percent single-family homes).

3.13.2.1 Proposed Action

Construction of the proposed project is anticipated to begin in 2008 and last approximately 18 months. During that time, a construction work force of approximately 300 workers would be employed (**Table 3.13-1**). An additional 150 workers would be hired for development of the underground operations. Existing employees would continue working at the Pipeline/South Pipeline Project operations and at the underground operations through the construction phase, which would continue through 2009. At completion of construction, the 300 construction workers would be replaced by approximately 200 operations workers. (Depending on skill sets of the workers, some of the construction workers may transition to operations.) As noted in **Table 3.13-1**, the existing total employment level of approximately 535 workers would grow to a maximum of 985 during construction, would drop to 885 through completion of surface mining in 2014, when it would drop to approximately 685 for continued processing of ore and closure and reclamation activities through 2018. Total employment would decline to approximately 155 from 2019 through 2021 as closure and final reclamation activities are completed. It is expected that the project would terminate at the end of 2021.

Table 3.13-1
Employment Estimates for the Proposed Action

	2007	2008		2009		2010-2014	2015-2018	2019-2021
		Jan-May	June-Dec	Jan-Nov	Dec			
Existing Work Force								
Open-pit	470	470	470	470	470	470	270	155
Underground	65	65	65	65	65	65	65	0
Subtotal	**535**	**535**	**535**	**535**	**535**	**535**	**335**	**155**
Proposed Work Force								
Open-pit	0	0	300	300	200	200	200	0
Underground	0	0	150	150	150	150	150	0
Subtotal	**0**	**0**	**450**	**450**	**350**	**350**	**350**	**0**
Total Work Force								
Open-pit	470	470	770	770	670	670	470	155
Underground	65	65	215	215	215	215	215	0
Total	**535**	**535**	**985**	**985**	**885**	**885**	**685**	**155**

Population

Anticipated population increases resulting from construction and operation of the Proposed Action are presented in **Table 3.13-2** and **Table 3.13-3**, respectively. The projections include both direct and indirect employment increases together with their family members.

In-migrating construction workers and their families would number approximately 151 persons (**Table 3.13-2**). This increase represents a 0.4 percent increase over the 2005 population estimated at approximately 36,000 for the combined communities in the study area most likely to be affected by project-related population. Typical construction involves fluctuating work forces as special crews may only be employed for certain projects lasting only several weeks. As a result, this population would tend to be transient, represented by different people at different times.

Adding in the population increase associated with underground mining operations, which would occur concurrently with open-pit operations, produces a total in-migrating population during the construction period of approximately 349 persons (**Tables 3.13-2** and **3.13-3**). This number would equal an approximately 1.0 percent increase over the 2005 population. The population increases would be well below the 5 percent impact significance threshold for the study area.

Following completion of construction activities, the project-related population effect would increase further because, although the total employment would drop from 985 to 885, the workers would be more long-term and more likely to have families with them. As a result, the estimated total in-migrating population at this time would increase to approximately 419 persons (**Tables 3.13-3**, **3.13-4**, and **3.13-5**) (minor inconsistencies due to rounding errors). This population would represent a 1.2 percent increase over the 2005 population estimate for the combined most effected communities. None of the projected population increases over the life of the project would reach the 5 percent significance threshold for the entire study area. However, there could be adverse effects in localized areas. In particular, if the in-migrating population distribution parallels the existing worker residence distribution, the Crescent Valley/Beowawe area could experience growth of 7.5 percent during the construction period plus an additional 1.4 percent after construction is completed.

Table 3.13-2
New Construction-related Employment, Households, and Population Projects for the Proposed Action

New Construction-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
210	90	300	42	18	60	252	108	360

New Construction-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	90	18	--
Single	72	7	79
Married - 1 Worker	16	5	22
Married - 2 Workers	1	3	4
New Households	**89**	**15**	**104**

New Construction-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	79	79	0	0	79
Married Households	26	52	16	4	72
Total	**105**	**131**	**16**	**4**	**151**

[1] Construction work force was assumed to be 70 percent local, 30 percent non-local.
[2] Construction-generated indirect employment was calculated using an employment multiplier of 1.2; the indirect work force was assumed to be 70 percent local and 30 percent non-local.
[3] The direct construction work force was assumed to be 80 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.
[4] The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.
[5] Population estimates were based on one person per single household and 2.77 persons per married household.
[6] Eighty percent of children were assumed to be of school age.

Table 3.13-3
New Underground Operations-related Employment, Households, and Population Projections for the Proposed Action

New Underground Operations-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
90	60	150	78	33	111	168	93	261

New Underground Operations-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	60	33	--
Single	15	13	28
Married – 1 Worker	41	10	51
Married – 2 Worker	2	5	7
New Households	**58**	**28**	**86**

New Underground Operations-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	28	28	0	0	28
Married Households	57	114	42	14	170
Total	**85**	**142**	**42**	**14**	**198**

[1] Underground operations work force was assumed to be 60 percent local, 40 percent non-local.
[2] Operations-generated indirect employment was calculated using an employment multiplier of 1.74 (Dobra 1989); the indirect work force was assumed to be 70 percent local and 30 percent non-local.
[3] The direct operations work force was assumed to be 25 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.
[4] The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.
[5] Population estimates were based on one person per single household and 2.98 persons per married household.
[6] Seventy-five percent of the children were assumed to be of school age.

Table 3.13-4
New Surface Operations-related Employment, Households, and Population Projections for the Proposed Action

New Surface Operations-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
140	60	200	104	44	148	244	104	348

New Surface Operations-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	60	44	--
Single	15	18	33
Married - 1 Worker	41	13	54
Married - 2 Worker	2	7	9
New Households	**58**	**37**	**95**

New Surface Operations-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	33	33	0	0	33
Married Households	63	126	47	15	188
Total	**96**	**159**	**47**	**15**	**221**

[1] Operations work force was assumed to be 70 percent local, 30 percent non-local.
[2] Operations-generated indirect employment was calculated using an employment multiplier of 1.74 (Dobra 1989); the indirect work force was assumed to be 70 percent local and 30 percent non-local.
[3] The direct operations work force was assumed to be 25 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.
[4] The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.
[5] Population estimates were based on one person per single household and 2.98 persons per married household.
[6] Seventy-five percent of the children were assumed to be of school age.

Table 3.13-5
New Operations-related Employment, Households, and Population Projections for Underground and Open-pit Operations for the Proposed Action

New Total Operations-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
230	120	350	181	78	259	411	198	609

New Total Operations-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	120	78	--
Single	30	31	61
Married - 1 Worker	81	23	104
Married - 2 Worker	5	12	17
New Households	**116**	**66**	**182**

New Total Operations-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	61	61	0	0	61
Married Households	120	240	89	29	358
Total	**181**	**301**	**89**	**29**	**419**

[1] Operations work force was assumed to be 70 percent local, 30 percent non-local.
[2] Operations-generated indirect employment was calculated using an employment multiplier of 1.74 (Dobra 1989); the indirect work force was assumed to be 70 percent local and 30 percent non-local.
[3] The direct operations work force was assumed to be 25 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.
[4] The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.
[5] Population estimates were based on one person per single household and 2.98 persons per married household.
[6] Seventy-five percent of the children were assumed to be of school age.

Income and Employment

The direct work force increase during the construction period would be approximately 450 workers, including underground operations. Indirect employment generated is projected at 171 additional jobs, raising the temporary increase to 621. Local labor is expected to meet 70 percent of the direct project construction jobs, 60 percent of the direct underground jobs, and 70 percent of the indirect jobs, leaving a demand for 201 workers from outside the local area.

The direct employment effect during the construction period would represent a 2.0 percent increase over total employment in the three-county study area, and 1.9 percent of the total three-county labor force. The total employment effect would be 2.8 percent of existing total employment and 2.7 percent of the three county labor force.

Direct payroll to new workers during the construction period, including the value of benefits, is projected to be approximately $21.4 million on an annual basis. A substantial portion of this would be spent locally for items such as food, clothing, fuel, and rent, stimulating the local economy.

After completion of construction, direct employment associated with the proposed project would be approximately 350 workers, raising total operations employment to 885 workers. Indirect employment generated by operations activity is projected at 259 additional jobs, raising the total operations-related employment under the Proposed Action to 609 (**Table 3.13-5**). Approximately 70 percent of new surface operations workers and 60 percent of new underground operations workers are expected to come from the local labor force; 70 percent of the indirect jobs also are projected to be filed by local workers. The resulting demand for non-local workers is projected at approximately 198. **Table 3.13-6** summarizes the employment and demographic changes that are projected as a result of the proposed Cortez Hills Expansion Project.

The total employment effect during the post-construction operations period would be 609 new jobs, representing a 2.8 percent increase over total employment in the three county study area, and 2.6 percent of the total three county labor force.

The estimated annual payroll under the Proposed Action, including benefits, would be $45.9 million. Each $1.00 in local earnings would indirectly generate $0.37 in earnings to other workers in the local economy (Dobra 1989; BEA 1992). As a result, the annual indirect impact on earnings would be $17.0 million, yielding a combined indirect impact of $62.9 million. Approximately 40 percent, or $24.9 million, would be an increase in income earnings over current levels and would constitute an economic benefit accruing from the project to the local economy.

Potential project-related effects to range resources under the Proposed Action are discussed in Section 3.6.2.1. Associated short-term and long-term financial losses would vary seasonally and annually depending on the location of proposed project-related disturbance in relation to the use areas within the allotments, the seasonal use dates for each use area (see Table 3.6-1), and stock prices at any given point in time.

Table 3.13-6
Summary of Project-related Changes to Demographic Indicators from Non-local Direct and Indirect Employment
Proposed Action

	2007	2008		2009		2010-2014	2015-2018	2019-2021
		Jan-May	June-Dec	Jan-Nov	Dec			
Non-local Workers								
Construction	0	0	108	108	0	0	0	0
Operations	0	0	93	93	197	197	93	0
Total	0	0	201	201	197	197	93	0
Households								
Construction	0	0	105	105	0	0	0	0
Operations	0	0	85	85	181	181	85	0
Total	0	0	190	190	181	181	85	0
Population								
Construction	0	0	151	151	0	0	0	0
Operations	0	0	198	198	419	419	198	0
Total	0	0	349	349	419	419	198	0
School-aged								
Construction	0	0	16	16	0	0	0	0
Operations	0	0	42	42	89	89	42	0
Total	0	0	58	58	89	89	42	0

Public Finance

Construction. During the construction phase, the principal revenue change for Lander County would result from an increase in sales and use tax revenues. According to CGM, it is estimated that capital expenditures for the project would be approximately $454 million. This would generate over $13 million in sales and use tax revenue for the state and local counties.

Operations. CGM estimates the proposed Cortez Hills Expansion Project would make local purchases of approximately $150 million per year. At local sales tax rates of 6.5 percent (Elko and Eureka counties) or 6.75 percent (Lander County), the project would pay approximately $10 million per year in sales taxes.

CGM also would continue to pay net proceeds taxes on mine production and property taxes on the assessed value of the mining property. Both would be expected to increase under the Proposed Action because production would increase and the anticipated $454 million in capital expenditures would be expected to increase the assessed value of the property. **Table 3.13-7** presents the net proceeds and property taxes paid by CGM for 5 recent years.

Table 3.13-7
Net Proceeds and Property Tax Payments for Existing Operations

Year	Net Proceeds Tax	Property Tax
2001	$8,100,000	$1,300,000
2002	$8,300,000	$1,400,000
2003	$9,700,000	$1,300,000
2004	$10,500,000	$1,300,000
2005	$7,700,000	$1,800,000

Public Education

The Cortez Hills Expansion Project would increase the school-age population in the study area by an estimated 58 students during the construction period and 89 students during operations. This would increase enrollment in study area schools by less than 1 percent. The number of new students would be greatest in the Elko area where an estimated 39 to 60 new students would enroll. Elko schools have capacity issues in elementary schools, in particular, and may face overcrowding, depending on the ages of the children and on whether the families choose to live near overcrowded schools. Other districts appear to have sufficient unused capacity to accommodate the small numbers of new students they would receive.

Housing

Demand for housing is estimated at 191 units during the construction period and 182 during the operations period (**Table 3.13-6**). Although data are not available to accurately determine the current availability of housing in the study area, all three counties had very high housing vacancy rates at the time of the 2000 census. Elko's vacancy rate for owner-occupied housing had reportedly dropped substantially within a few years of the census, which could restrict the type of housing available for new residents. The rental housing market was still indicating high vacancy rates, however, so there should be sufficient units available to accommodate the project-related growth even though the choice of type may be limited. Elko and Battle Mountain both have substantial numbers of motel rooms and campground/recreation vehicle sites, which many construction workers prefer. More permanent housing likely is still available in the study area to accommodate more settled workers during operations.

Other Public Services

Generally, existing utilities and emergency response services have indicated there should be few, if any problems accommodating the estimated maximum of 419 new people the Cortez Hills Expansion Project would bring to the three-county study area. Some concerns were expressed about tight budgets for police in Carlin and jail capacity in Elko; however, it is not known whether those issues are ongoing. There are needs to upgrade some water and waste disposal facilities in study area communities, although the issues appear to be matters of ongoing planning and managing to accommodate general growth and tightening regulatory standards. It is expected that the proposed project would have only minor and insignificant effects on public services and facilities in the study area.

3.13.2.2 Grass Valley Heap Leach Alternative

The Grass Valley Heap Leach Alternative would not substantially change the employment, expenditure, or production estimates that drive the social and economic analyses. This alternative would require an additional $3.7 million in operating costs over the project life plus $3.5 million in capital costs. The additional expenditures would increase tax payments to local and state governments by a relatively modest amount, which would be beneficial to local governments. Other social and economic effects of the Grass Valley Heap Leach Alternative would be the same as described for the Proposed Action.

Potential project-related effects to range resources under this alternative are presented in Section 3.6.2.2. Associated short-term and long-term financial losses would vary seasonally and annually depending on the location of proposed project-related disturbance in relation to the use areas within the allotments, the seasonal use dates for each use area (see Table 3.6-1), and stock prices at any given point in time.

3.13.2.3 Crescent Valley Waste Rock Alternative

The Crescent Valley Waste Rock Alternative would result in increased expenditures and employment compared to the Proposed Action. Operating costs would increase by $305 million, capital costs would increase by $109 million, reclamation costs would increase by $5 million, and employment would increase by an estimated 150 workers. Wages and salaries would increase by an estimated $13 million per year to $59 million annually. Assuming sufficient workers are available locally to maintain the local hiring ratios, the project-related population growth increment would rise from 419 to 587, a 40 percent increase (**Table 3.13-8**).

The population increases in individual communities would range from approximately 1.3 percent to 2.3 percent of current populations, except for Crescent Valley/Beowawe, which would experience a 12.5 percent increase, assuming the new households would attempt to locate in a pattern similar to where current workers live.

The increased expenditures associated with this alternative would benefit the local economy with increased money flowing to local businesses from wages and project-related purchases of goods and services. Added expenditures also would benefit local government budgets as additional sales and use taxes would be collected. However, there would be a reduction in net proceeds tax revenues due to increased operating costs.

Table 3.13-8
New Operations-related Employment, Households, and Population Projections for Underground and Surface Operations for the Crescent Valley Waste Rock Alternative

New Total Operations-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
335	165	500	259	111	370	594	276	870

New Total Operations-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	165	111	--
Single	41	44	86
Married - 1 Worker	111	33	145
Married - 2 Worker	6	17	23
New Households	**159**	**94**	**253**

New Total Operations-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	86	86	0	0	86
Married Households	168	336	124	40	501
Total	**254**	**422**	**124**	**40**	**587**

[1] Operations work force was assumed to be 70 percent local, 30 percent non-local.
[2] Operations-generated indirect employment was calculated using an employment multiplier of 1.74 (Dobra 1989); the indirect work force was assumed to be 70 percent local and 30 percent non-local.
[3] The direct operations work force was assumed to be 25 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.
[4] The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.
[5] Population estimates were based on one person per single household and 2.98 persons per married household.
[6] Seventy-five percent of the children were assumed to be of school age.

Potential project-related effects to range resources under this alternative are presented in Section 3.6.2.3. Associated short-term and long-term financial losses would vary seasonally and annually depending on the location of proposed project-related disturbance in relation to the use areas within the allotments, the seasonal use dates for each use area (see Table 3.6-1), and stock prices at any given point in time.

The larger population increase would increase pressure on Elko's housing market, although it is not known to what degree this would be an issue since accurate vacancy rates are not available. There also would be increased demands on public services and facilities. School-age children would increase by an estimated 124, approximately 39 percent more than for the Proposed Action. It appears that there would be sufficient capacity in the schools to accommodate this increase.

Under the Crescent Valley Waste Rock Alternative, the local economy would benefit to a somewhat greater degree than under the Proposed Action. It also would increase pressure on public facilities and services;

however, the effects are not expected to exceed the significance thresholds. Although the thresholds are not likely to be exceeded, the capacity constraints in Elko elementary schools may be further exacerbated by this alternative.

3.13.2.4 Cortez Hills Complex Underground Mine Alternative

The Cortez Hills Complex Underground Mine Alternative would result in decreased expenditures and employment compared to the Proposed Action. The effect on total operating and capital costs is not known; however, they likely would be lower than under the Proposed Action. Fewer new workers would be required, as some existing workers would be moved to the underground operations. Wages and salaries would decrease by an estimated $6 million per year to $36 million annually.

Potential project-related effects to range resources under this alternative are presented in Section 3.6.2.4. Associated short-term and long-term financial losses would vary seasonally and annually depending on the location of proposed project-related disturbance in relation to the use areas within the allotments, the seasonal use dates for each use area (see Table 3.6-1), and stock prices at any given point in time.

There would be fewer new employees under this alternative. Approximately 150 new workers would be hired for underground operations, the same as required for the Proposed Action. They would remain employed for 16 years rather than 10, however (**Table 3.13-9**). The population increase generated by this long-term employment is estimated at 198 people (**Tables 3.13-10** and **3.13-11**). This is just over 47 percent of the population increase projected under the Proposed Action. Approximately 67 percent (133 persons) of the population increase would be expected to locate in the Elko area; approximately 23 new people would be expected to locate in the Crescent Valley/Beowawe area.

Table 3.13-9
Employment Estimates for the
Cortez Hills Complex Underground Mine Alternative

		2008			2009		2010-	2015-	2018-	2025-
	2007	Jan-May	June-Nov	Dec	Jan-Nov	Dec	2014	2017	2024	2027
Existing Work force										
Open Pit	470	470	470	470	470	470	470	270	0	0
Underground	65	65	65	65	65	65	65	65	65	0
Subtotal	535	535	535	535	535	535	535	335	65	0
Proposed Work force										
Open Pit	0	0	100	0	0	0	0	0	0	0
Underground	0	0	150	150	150	150	150	150	150	150
Subtotal	0	0	250	150	150	150	150	150	150	150
Total Work force										
Open Pit	470	470	570	470	470	470	470	270	0	0
Underground	65	65	215	215	215	215	215	215	215	150
Total	535	535	785	685	685	685	685	485	215	150

Table 3.13-10
New Construction-related Employment, Households, and Population Projections for the Cortez Hills Complex Underground Mine Alternative

New Construction-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
70	30	100	14	6	20	84	36	120

New Construction-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	30	6	--
Single	24	2	26
Married - 1 Worker	5	2	7
Married - 2 Workers	0	1	1
New Households	**30**	**5**	**35**

New Construction-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	26	26	0	0	26
Married Households	8	16	5	1	22
Total	**34**	**42**	**5**	**1**	**48**

[1] Construction work force was assumed to be 70 percent local, 30 percent non-local.
[2] Construction-generated indirect employment was calculated using an employment multiplier of 1.2; the indirect work force was assumed to be 70 percent local and 30 percent non-local.
[3] The direct construction work force was assumed to be 80 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.
[4] The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.
[5] Population estimates were based on one person per single household and 2.77 persons per married household.
[6] Eighty percent of children were assumed to be of school age.

This alternative would require approximately 100 construction workers, 33 percent of the number anticipated for the Proposed Action (**Table 3.13-9**). In addition, the construction activity would be completed in 6 months, rather than 18 months. The short duration of construction suggests that most non-local construction workers would seek temporary housing in campgrounds and motels, which are most readily available in Elko and Battle Mountain. The construction work force would generate an estimated population increase of 48 people (**Tables 3.13-12** and **3.13-11**).

Table 3.13-11
New Underground Operations-related Employment, Households, and Population Projections for the Cortez Hills Complex Underground Mine Alternative

New Underground Operations-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
90	60	150	78	33	111	168	93	261

New Underground Operations-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	60	33	--
Single	15	13	28
Married - 1 Worker	41	10	50
Married - 2 Worker	2	5	7
New Households	**58**	**28**	**86**

New Underground Operations-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	28	28	0	0	28
Married Households	57	114	42	14	170
Total	**85**	**142**	**42**	**14**	**198**

1 Underground operations work force was assumed to be 60 percent local, 40 percent non-local.
2 Operations-generated indirect employment was calculated using an employment multiplier of 1.74 (Dobra 1989); the indirect work force was assumed to be 70 percent local and 30 percent non-local.
3 The direct operations work force was assumed to be 25 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.
4 The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.
5 Population estimates were based on one person per single household and 2.98 persons per married household.
6 Seventy-five percent of the children were assumed to be of school age.

Table 3.13-12
Project-related Changes to Demographic Indicators from Non-local Direct and Indirect Employment for the Cortez Hills Complex Underground Mine Alternative

		2008			2009		2010-	2015-	2018-	2025-
	2007	Jan-May	June-Nov	Dec	Jan-Nov	Dec	2014	2017	2024	2027
Non-local Workers										
Construction	0	0	36	0	0	0	0	0	0	0
Operations	0	0	93	93	93	93	93	93	93	93
Total	0	0	129	93	93	93	93	93	93	93
Households										
Construction	0	0	35	0	0	0	0	0	0	0
Operations	0	0	86	86	86	86	86	86	86	86
Total	0	0	121	86	86	86	86	86	86	86
Population										
Construction	0	0	48	0	0	0	0	0	0	0
Operations	0	0	198	198	198	198	198	198	198	198
Total	0	0	246	198	198	198	198	198	198	198
School-aged										
Construction	0	0	5	0	0	0	0	0	0	0
Operations	0	0	42	42	42	42	42	42	42	42
Total	0	0	47	42	42	42	42	42	42	42

The expenditures associated with this alternative would be less than under the Proposed Action, although there still would be benefits to the local economy at a lower level. Local government budgets still would benefit from the project as additional sales and use taxes would be collected; the dollar amounts would be lower, however. Net proceeds taxes paid would be lower than under the Proposed Action because of the lower annual and total production of gold. The effect on property taxes is less certain because property taxes are based on the value of the land and equipment rather than on gold production.

Under this alternative, the smaller population increase would reduce pressure on Elko's housing market, and there would be fewer demands on public services and facilities, including schools. However, the overall local economy would benefit to a somewhat lesser degree than under the Proposed Action.

3.13.2.5 Revised Cortez Hills Pit Design Alternative

Under the Revised Cortez Hills Pit Design Alternative, construction activity and employment levels would be essentially the same as under the Proposed Action. Employment levels would be the same for underground operations; however, employment for operation of the open-pit surface mine would be reduced by approximately 65 workers from late 2009 through 2014 (*Table 3.13-13*). Underground mining would be extended by an additional 3 years, so total employment would be higher by approximately 35 workers during the final 3 years of the project as closure of the underground mine would occur during that time period. Capital cost would be lower than for the Proposed Action as there would be slightly fewer pieces of heavy equipment required for pit and waste rock hauling operations. Operating costs would be higher than for the Proposed Action due to the larger underground component and the associated increased costs. Wages and salaries would be approximately $5.6 million per year less than for the Proposed Action.

Table 3.13-13
Employment Estimates

	2007	2008		2009		2010-2014	2015-2018	2019-2021
		Jan-May	June-Dec	Jan-Nov	Dec			
Existing Workforce								
Open-pit	470	470	470	470	470	470	335	155
Underground	65	65	65	65	65	65	65	35
Subtotal	535	535	535	535	535	535	400	190
Proposed Workforce								
Open-pit	0	0	300	300	135	135	135	0
Underground	0	0	150	150	150	150	150	0
Subtotal	0	0	450	450	285	285	285	0
Total Workforce								
Open-pit	470	470	770	770	605	605	470	155
Underground	65	65	215	215	215	215	215	35
Total	535	535	985	985	820	820	685	190

With the reduced operating employment levels, the project-related population increase would be approximately 348 people compared with an estimated 419 people for the Proposed Action, a difference of 16.9 percent* (Tables 3.13-3, 3.13-14, and 3.13-15)*. The lower population level would

result in less pressure on area housing resources and lower levels of demand for public facilities and services, including schools. There would be approximately 74 new school age children, 15 fewer than the estimate for the Proposed Action.

Table 3.13-14
New Surface Operations-related Employment, Households, and Population Projections for the *Revised Cortez Hills Pit Design Alternative*

New Surface Operations-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
95	*41*	*135*	*70*	*30*	*100*	*164*	*70*	*235*

New Surface Operations-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	*41*	*30*	*--*
Single	*10*	*12*	*22*
Married - 1 Worker	*28*	*9*	*37*
Married - 2 Worker	*2*	*5*	*6*
New Households	*39*	*26*	*65*

New Surface Operations-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	*22*	*22*	*0*	*0*	*22*
Married Households	*43*	*86*	*32*	*10*	*128*
Total	*65*	*108*	*32*	*10*	*150*

[1] *Operations work force was assumed to be 70 percent local, 30 percent non-local.*
[2] *Operations-generated indirect employment was calculated using an employment multiplier of 1.74 (Dobra 1989); the indirect work force was assumed to be 70 percent local and 30 percent non-local.*
[3] *The direct operations work force is assumed to be 25 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.*
[4] *The indirect work force was assumed to be 40 percent single, or married without families present; half of the married households are assumed to be two-worker families.*
[5] *Population estimates are based on one person per single household and 2.98 persons per married household.*
[6] *Seventy-five percent of the children are assumed to be of school age.*

Table 3.13-*15*
New Operations-related *Total* Employment, Households, and Population Projections *f*or Underground and *Open-pit* Operations for the *Revised Cortez Hills Pit Design* Alternative

New *Total* Operations-related Employment								
Direct[1]			Indirect[2]			Total		
Local	Non-local	Total	Local	Non-local	Total	Local	Non-local	Total
185	*100*	*285*	*148*	*63*	*211*	*333*	*163*	*496*

New *Total* Operations-related Households			
	Direct[3]	Indirect[4]	Total New Households
New Non-local Workers	*100*	*63*	*--*
Single	*25*	*25*	*50*
Married - 1 Worker	*68*	*19*	*86*
Married - 2 Worker	*4*	*9*	*13*
New Households	*96*	*54*	*150*

New Total Operations-related Population					
		Population[5]			
			Children[6]		
	Households	Adults	School-age	Other	Total
Single Households	*50*	*50*	*0*	*0*	*50*
Married Households	*100*	*200*	*74*	*24*	*298*
Total	*150*	*250*	*74*	*24*	*348*

[1] *Operations work force was assumed to be 70 percent local, 30 percent non-local for surface workers and 60 percent local, 40 percent non-local for underground workers.*
[2] *Operations-generated indirect employment is calculated using an employment multiplier of 1.74 (Dobra 1989); the indirect work force was assumed to be 70 percent local and 30 percent non-local.*
[3] *The direct operations work force is assumed to be 25 percent single, or married without families present; 10 percent of the married households were assumed to be two-worker families.*
[4] *The indirect work force is assumed to be 40 percent single, or married without families present; half of the married households were assumed to be two-worker families.*
[5] *Population estimates are based on one person per single household and 2.98 persons per married household.*
[6] *Seventy-five percent of the children are assumed to be of school age.*

Under the Revised Cortez Hills Pit Design Alternative, the local economy would benefit to a slightly lesser degree than under the Proposed Action, largely due to the lower employment and, consequently, fewer wage and salary dollars flowing to local businesses. Total production of gold is estimated to be approximately the same as under the Proposed Action, although net proceeds tax revenues may be lower due to the greater cost per ounce associated with underground mining. Sales and use tax revenues also would be expected to be slightly lower. Property tax revenues are likely to be similar to slightly lower than under the Proposed Action.

Potential project-related effects to range resources are discussed in Section 3.6.2.5. Associated short-term and long-term financial losses would vary seasonally and annually depending on the location of proposed project-related disturbance in relation to the use areas within the allotments, the seasonal use dates for each use area (see Table 3.6-1), and stock prices at any given point in time.

3.13.2.6 No Action Alternative

Under the No Action Alternative, the proposed Cortez Hills Expansion Project would not be developed, and the associated effects (both beneficial and adverse) to social and economic values would not occur. On-going open-pit mining and processing at the existing Pipeline Complex and activities associated with the Cortez Underground Exploration Project would continue under existing authorizations.

Under this alternative, mining and ore processing would continue at the Pipeline Complex through 2014; on-going ore processing and closure and reclamation would continue through 2017. Employment would continue at current levels (approximately 470 workers) through 2014. At completion of mining activity, the work force would be reduced to approximately 270 workers from 2015 through 2017, and then to approximately 155 workers for final reclamation activities through 2020. The Underground Cortez Exploration Project would continue through 2011 at its current employment level (55 to 65 workers).

Population

Continued operation of the currently permitted operations would result in a relatively stable project-related population in the study area until 2014. Effects on population levels in the study area from reductions in work force numbers after 2014, and again after 2017 and 2020, would depend on the availability of alternative employment in the vicinity. Given the current level of activity in the mining industry, most of the workers would be expected to find replacement employment. However, determining the exact extent of assimilation and out-migration is not possible at this time as the assimilative potential of the region is dependent on prevailing economic conditions and the timing of the layoffs. In the unlikely event no replacement jobs were available, approximately 1,700 people would be affected over a 6-year period. Based on the current distribution of project related worker residence locations, such an event would have the greatest effect on the Crescent Valley/Beowawe area where over 36 percent of the estimated population of 550 could leave the area in search of new employment opportunities. Population losses for other study area communities would range from 4 percent to over 6 percent.

Income and Employment

Existing employment at the site accounts for nearly 25 percent of total Lander County employment, but only 2 percent of total employment in the three counties combined. Under the No Action Alternative, this level would be sustained through 2014 and would decline over a 6-year period thereafter.

CGM's current payroll levels are estimated at $28 million per year, an average of about $60,000 per employee, including benefits. This level would continue for the life of the mine. Assuming 70 percent is disposable income and up to three-quarters of that currently is spent locally, slightly less than $15 million per year would continue to be injected directly into the local economy. This level of activity would continue through 2014 and gradually decline through closure in 2020.

Under the No Action Alternative, there would be no additional effects to range resources, or associated financial losses, beyond those previously authorized (see Section 3.6.2.6).

Public Finance

The No Action Alternative would result in the continuation of processing activities at the existing operation until the year 2017. CGM would continue to pay property taxes, payroll taxes, sales taxes, and net-proceeds taxes to local, state, and federal taxing entities, through 2014 with gradually declining amounts continuing through 2017. **Table 3.13-7** indicates the level of property taxes and net-proceeds taxes paid by CGM from 2001 through 2005. The property taxes paid to Lander County accounted for approximately half of the total property tax revenue collected in 2001, and about one-fifth of the county's total revenue. The net-proceeds tax is shared by the state and county. Net-proceeds taxes associated with existing operations contributed approximately 25 percent of Lander County's FY 2004-2005 budget.

Under the No Action Alternative, it is anticipated that the operation would continue to contribute a substantial portion of the Lander County revenue through 2017, when ore processing would be completed. As the phase down of operations occurred, tax contributions by the mine would decrease, lagging by 1 year in most cases.

Public Education

As employment levels at the mine are not expected to change under this alternative, there would be no change in demand placed on the area's school system through 2014. Subsequently, there could be a decrease in students unless the current workers obtain jobs within commuting distance of their current residences.

Housing

With existing employment levels expected to continue under this alternative, there would be no change in demand for housing through 2014. Subsequently, there could be a decrease in housing demand unless the current workers obtain jobs within commuting distance of their current residences.

Other Public Services

As existing employment levels are not expected to change under this alternative, there would be no change in demand for other community facilities or services. Subsequently, there could be a decrease in the demand for public facilities and most services unless the current workers obtain jobs within commuting distance of their current residences.

3.13.3 Cumulative Impacts

The cumulative effects study area for social and economic values is shown in **Figure 3.12-2**. The past and present actions and RFFAs are identified in **Table 2-*18*** and shown in **Figure 2-*26***.

The social and economic effects of past and present actions are reflected in the affected environment data presented in Section 3.13.1. As a result, any potential cumulative effects for past and present actions are addressed in the discussion of environmental consequences (Section 3.13.2). Anticipated schedules for increases or decreases in employment at most projects in the cumulative effects study area are not known. Initiation of reasonably foreseeable projects in the study area would increase pressure on housing and public services. Currently, however, it is believed that there is ample capacity to accommodate more than a single project without adversely affecting local communities. The one possible exception is the uncertainty regarding the housing market in Elko and Spring Creek. In other respects, the cumulative economic effects of the proposed project and others that may occur in a similar time frame, are expected to be mostly beneficial.

Cumulative impacts associated with the Grass Valley Heap Leach***,*** Crescent Valley Waste Rock***, and Revised Cortez Hills Pit Design*** alternatives would be similar to cumulative impacts associated with the Proposed Action, with the following exceptions. There would be an incremental increase in tax payments to local governments associated with the Grass Valley Heap Leach Alternative compared to the Proposed Action. For the Crescent Valley Waste Rock Alternative, there would be incremental increases in local wages and salaries (due to a larger workforce) and expenditures in comparison to the Proposed Action, resulting in an incremental increase in local revenues and an incremental reduction in net proceeds tax revenues. There also would be an incremental increase in local population growth and associated incremental impacts to the local infrastructure. ***Under the Revised Cortez Hills Pit Design Alternative, the project's contribution to cumulative beneficial and adverse social and economic impacts would be slightly less than for the Proposed Action.***

For the Cortez Hills Complex Underground Mine Alternative, there would be a smaller incremental increase in local population growth and associated incremental impacts to the local infrastructure in comparison to the cumulative impacts associated with the Proposed Action. There also would be a smaller incremental increase in expenditures and associated benefits to the local economy in comparison to the Proposed Action. In addition, the employment and revenues and associated cumulative social and economic effects would be for a period of 16 years, compared to 10 years for the Proposed Action.

3.13.4 Monitoring and Mitigation Measures

The BLM can and does encourage local, county, and state governments or agencies to initiate discussions with the project proponent on the basis of the analysis presented in the EIS. The establishment of a dialogue based on mutual advantage and understanding, and a commitment to a shared responsibility for resolution of the potential impacts associated with project development, could lead to the preparation and implementation of mitigation measures that are advantageous to all parties. In particular, the volatility of the mining economy suggests that predicted social and economic effects could change if employment opportunities in the industry change. It is recommended that local agencies monitor mining industry trends to ensure that the effects discussed in this analysis remain on track through the construction and early operations periods.

3.13.5 Residual Adverse Effects

There would be no residual adverse effects for social and economic values as a result of the proposed project with the exception of the financial effects associated with the permanent loss of 19 AUMs from the Carico Lake Allotment. However, due to the variables associated with project-related disturbance in relation to the seasonal rotations in the use areas within the allotment and the fluctuation in stock prices over time, this residual loss cannot be quantified.

3.14 Environmental Justice

The study area and cumulative effects study area for environmental justice encompass the ***area within the*** project boundary, the communities of Carlin, Crescent Valley, Elko, Beowawe, and Battle Mountain, as well as Elko, Eureka, and Lander counties.

3.14.1 Affected Environment

Since publication of EO 12898, Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations in the FR on February 11, 1994 (59 FR 7629), the BLM (and other federal agencies) has been developing a strategy for implementing the order. Currently, the BLM relies on the Environmental Justice Guidance Under NEPA prepared by CEQ (guidance) (USEPA 1998), in implementing EO 12898 for NEPA documents.

Pursuant to EO 12898 on Environmental Justice, the BLM (and other federal agencies) shall make the achievement of environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations, low-income populations, and Indian tribes and allowing all portions of the population an opportunity to participate in the development of, compliance with, and enforcement of federal laws, regulations, and policies affecting human health or the environment regardless of race, color, national origin, or income.

EO 12898 requires identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The EO provisions fully apply to programs involving Native Americans. These requirements were addressed by BLM in preparing this EIS by: 1) ensuring broad distribution of public information on the Proposed Action through public scoping meetings and 2) conducting government-to-government consultation with the Yomba Shoshone Tribe, Te-Moak Tribe of the Western Shoshone, Duckwater Shoshone Tribe, Duck Valley Shoshone-Paiute Tribes of Idaho and Nevada, Ely Shoshone Tribe, Timbisha Shoshone Tribe, ***and*** Confederated Tribes of the Goshute Reservation. The public was invited by the BLM to participate in two public scoping meetings; the first meeting was on December 19, 2005, in Crescent Valley, and the second meeting was on December 20, 2005, in Battle Mountain. ***Two public meetings subsequently were held for the Draft EIS; the first meeting was in Crescent Valley on November 6, 2007, and the second meeting was in Battle Mountain on November 7, 2007.*** At the meetings, BLM and CGM representatives discussed the proposed project and answered questions. In addition, project maps and literature pertaining to the NEPA process were available for review. Government-to-government consultation between the BLM and the above-listed Indian tribes concerning the proposed project was initiated on November 18, 2005, and is currently ongoing. For an expanded discussion of Native American consultation conducted for the project, see Section 3.9, Native American Traditional Values.

In response to specific issues raised by Native Americans relative to past, present, and potential future impacts associated with mining activities, the BLM conducted an expanded regional cumulative effects

analysis for Native American traditional values. This regional cumulative effects analysis is included in Section 3.9, Native American Traditional Values.

The baseline data presented below are based on information obtained from the 2000 U.S. Census Bureau website and the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). Data obtained from the U.S. Census Bureau website were compiled and released in 2000. Since that time, some of the data, in particular population and income levels have been revised by local and state government agencies based on estimated projections. Estimated 2005 population and income levels are presented in Section 3.13, Social and Economic Values, to describe the social and economic conditions in the vicinity of the project. Population and income levels also are included as part of the environmental justice analysis; however, 2000 data on population and income levels were used rather than 2005 estimated projections because additional data required for the analysis have not been revised based on 2005 projected estimates. Therefore, for consistency, only 2000 data are presented below.

3.14.1.1 Minority Populations

For the purpose of this EIS analysis, the minority populations residing in the communities of Carlin, Elko, Beowawe, Crescent Valley, and Battle Mountain; and Elko, Eureka, and Lander counties were compared to the minority populations residing in the State of Nevada. **Table 3.14-1** summarizes the ethnic composition of the study area counties and communities and the State of Nevada. As indicated in the table, there is a higher percentage of American Indian, Eskimo, or Aleut residing in the study area compared to the State of Nevada. For Nevada, the American Indian, Eskimo, or Aleut population constituted approximately 1 percent of the total. However, in the study area, the percentages were 5, 4, and 2 percent for Elko County, Lander County, and Battle Mountain, respectively. The percentage of American Indians within the American Indian, Eskimo, or Aleut grouping was 99, 100, and 100, respectively.

In accordance with the guidance, minority populations should be identified when either:

- The minority population of the affected area exceeds 50 percent; or
- The minority population of the affected area is meaningfully greater than, or 1.5 times, the minority population percentage in the general population or other appropriate unit of geographical analysis.

The population of American Indians does not exceed 50 percent; however, the population of American Indians occurring in portions of the study area is “meaningfully greater” than the minority population in the general population, in this case, the State of Nevada. Therefore, for the purpose of identifying environmental justice concerns, a minority population, as defined in the guidance, exists within the study area.

The White population in the study area also is higher than for the State of Nevada, with all of the counties and communities having White populations that comprise more than 70 percent of the total population, while the State of Nevada has a White population comprising 65 percent of the total. In comparison, the study area has much lower populations of Blacks and Asian or Pacific Islanders compared to the State of Nevada.

Table 3-14.1
Ethnic Composition of Study Area and State of Nevada Populations for 2000

Location	Total Population	White		Black		American Indian, Eskimo, or Aleut		Asian or Pacific Islander		Some Other Race		Two or More Races		Hispanic or Latino of Any Race	
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Elko County	45,291	32,771	72	257	0.6	2,150	5	344	0.8	41	0.1	793	2	8,935	20
Carlin	2,161	1,890	87	1	0.0	38	2	14	0.6	3	0.1	34	2	181	8
Elko City	16,708	12,248	73	58	0.3	399	2	200	1.2	16	0.1	259	2	3,528	21
Eureka County	1,651	1,402	85	6	0.4	25	2	14	0.8	0	0.0	46	3	158	10
Beowawe[1]	185	148	80	0	0.0	5	3	0	0.0	0	0.0	13	7	19	10
Crescent Valley[1]	361	311	86	3	0.8	5	1	3	0.8	0	0.0	10	3	29	8
Lander County	5,794	4,385	76	10	0.2	216	4	22	0.4	7	0.1	81	1	1,073	19
Battle Mountain (CDP)[2]	2,871	2,050	71	4	0.1	63	2	15	0.5	7	0.2	55	2	677	24
State of Nevada	1,998,257	1,303,001	65	131,509	6.6	21,397	1	96,362	4.8	2,787	0.1	49,231	2	393,970	20

[1] U.S. Bureau of the Census, Census 2000 Redistricting Data (Public Law 94-171) Summary File, Table PL2, Eureka VTD 4 and 5, Beowawe and Crescent Valley, Eureka County, Nevada. These numbers are based on Eureka Voting Districts 4 and 5 data, which include areas outlying from the actual towns of Beowawe and Crescent Valley.
[2] CDP = Census Designated Place.

Source: U.S. Census Bureau, Census 2000 Redistricting Data (Public Law 94-171) Summary File, Matrices PL1, PL2, PL3, and PL4.

The remainder of the study area has a comparable proportion of Other Race, Hispanic, and Two or More Races to the state. This population is not considered "meaningfully greater" than the minority population in the general population, so it is not considered a minority population as defined in the guidance.

3.14.1.2 Low-income Populations

According to the guidance, low-income populations in an affected area should be identified using the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, federal agencies may consider as a community either a group of individuals living in geographic proximity to one another or a set of individuals (such as migrant workers or Native Americans) where either type of group experiences common conditions of environmental exposure or effect.

On average, the median incomes for the populations living in the study area are higher than the median income for the State of Nevada (**Table 3.14-2**). Analysis of the percentage of persons below the poverty level in each race classification for the State of Nevada and study area counties and communities reveals that a higher incidence of poverty occurs in Eureka and Lander counties (**Table 3.14-3**). However, of any significant ethnic population in the study area, the incidence of poverty tended to be higher for the American Indian, Eskimo, or Aleut population living in the communities of Carlin and Battle Mountain, and Lander County. Battle Mountain and Lander County, which is where the project would be located, also have the two lowest per capita incomes in the study area. These data indicate that American Indians are a low-income population group, as defined in the guidance for the purposes of identifying environmental justice concerns.

Table 3.14-2
1999 Income Level of the Study Area Compared to the State of Nevada Based on a Sample

Location	Average Poverty Threshold[1]	Per Capita Income[2]	Median Income	
			Household[3]	Family[3]
Elko County	$13,290	$18,482	$48,383	$52,206
Carlin	$13,290	$19,377	$49,571	$51,716
Elko City	$13,290	$20,101	$48,608	$52,754
Eureka County	$13,290	$18,629	$41,417	$49,438
Beowawe CCD[4]	$13,290	$19,907	$37,386	$46,875
Crescent Valley	n/a	n/a	n/a	n/a
Lander County	$13,290	$16,998	$46,067	$51,538
Battle Mountain CDP[5]	$13,290	$16,975	$42,981	$50,995
State of Nevada	$13,290	$21,989	$44,581	$50,849

[1] The dollar amount shown is the 2000 weighted average threshold for a three-person family, which is the average household size for each county and community. The poverty threshold is not adjusted for regional, state, or local variations in the cost of living. Since the most current income data provided by the 2000 U.S. Census Bureau is for the year 1999, the weighted average threshold for 1999 was used in the analysis.
[2] Per Capita Income is the mean income computed for every man, woman, and child in a particular group. It is derived by dividing the total income of a particular group by the total population in that group.
[3] A "household" includes all the persons who occupy a housing unit. A "family" consists of a householder living with one or more persons related to him or her by birth, marriage, or adoption.
[4] CCD = Census County Division.
[5] CDP = Census Designated Place.

Source: U.S. Census Bureau 2000.

Table 3.14-3
Persons Below Poverty Level by Race in the Study Area Compared with the State of Nevada

Location[1]	White		Black		American Indian, Eskimo, or Aleut		Asian or Pacific Islander		Other Race		Total Population	
	Number Below Poverty Level	Percent of Total	Number Below Poverty Level	Percent of Total	Number Below Poverty Level	Percent of Total	Number Below Poverty Level	Percent of Total	Number Below Poverty Level	Percent of Total	Number Below Poverty Level	Percent of Total
Elko County	1,963	7	14	5	614	30	26	8	472	25	3,089	9
Carlin	116	6	0	0	12	43	0	0	0	0	128	6
Elko city	1,038	6	<50	n/a	65	0	<50	n/a	163	1	1,338	8
Eureka County	142	10	2	50	5	16	0	0	8	21	157	10
Beowawe[2]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Crescent Valley[2]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lander County	494	9	6	55	123	39	0	0	45	19	668	11
Battle Mountain CDP[3]	280	9	6	55	48	32	0	0	45	30	379	11
State of Nevada	83,235	8	17,262	22	4,766	23	3,843	10	10,554	20	119,660	10

[1] U. S. Department of Commerce, Bureau of the Census, 2000 U. S. Census, unless otherwise noted.
[2] Poverty levels for Beowawe and Crescent Valley not available on the U. S. Census Bureau website.
[3] CDP = Census Designated Place.

3.14.2 Environmental Consequences

USEPA's *Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (USEPA 1998) suggests a screening process to identify environmental justice concerns. This two-step process defines the significance criteria for this issue; if either of the criteria is unmet, there is little likelihood of environmental justice effects occurring. The two-step process is as follows:

1) Does the potentially affected community include minority and/or low-income populations?

2) Are the environmental impacts likely to fall disproportionately on minority and/or low-income members of the community and/or a tribal resource?

If the two-step process indicates that there exists a potential for environmental justice effects to occur, the following are considered in the analysis:

- Whether there exists a potential for disproportionate risk of high and adverse human health or environmental effects;
- Whether communities have been sufficiently involved in the decision-making process; and
- Whether communities currently suffer, or have historically suffered, from environmental and health risks and hazards.

In order to assess the potential for significant environmental justice impacts, the socioeconomic characteristics of the study area counties and communities are first analyzed for the presence of minority and/or low-income populations. Second, if minority and/or low-income populations are identified based on the *EPA's Environmental Justice Guidance* (USEPA 1998) the project and alternatives are evaluated for potential effects that may be expected to disproportionately impact any such populations. If the two-step process above indicates that a potential for environmental justice effects exists, additional analyses under the significance criteria are then applied to determine if the adverse effects would be considered significant impacts if the proposed project or an alternative were implemented.

3.14.2.1 Proposed Action

The analysis indicates that the potential effects of the Proposed Action would not be expected to disproportionately affect any particular population. The area in the immediate vicinity of the proposed project is sparsely populated; the nearest residence is located approximately 1 mile to the west. The nearest residential area is located in the Town of Crescent Valley, approximately 7.5 miles north of the ***study*** area. Crescent Valley does not have an unusually high minority or low-income population, but it does have a substantially greater proportion of Whites compared to the rest of the study area and state (see **Table 3.14-1**). Environmental effects that may occur at a greater distance, such as noise, visual, or air impacts, would affect the area's population equally, without regard to nationality or income level.

A second provision of the criteria requires consideration of "impacts that may affect a cultural, historical, or protected resource of value to an Indian tribe or a minority population, even when the population is not

concentrated in the vicinity." Over the last 10 years, the BLM has conducted ethnographic work and consultation in the Crescent Valley/Cortez Range/Grass Valley areas, which included interviews with knowledgeable Native American individuals, elders, and groups, and compiled data from ethnographic research and field tours. As a result of this work, BLM determined that the top of Mount Tenabo and the White Cliffs satisfied the eligibility requirements for "properties of cultural and religious importance" (PCRI).

As discussed in Section 3.9, Native American Traditional Values, several concerns were raised by tribal representatives during the course of ethnographic studies and Native American consultation conducted for the proposed project. Those concerns included effects to potential burials and NRHP-eligible properties; effects to pine nut harvest areas and the social activities associated with the harvest; effects on access to Mount Tenabo and other known culturally significant sites; effects of the proposed expansion as seen from the top of Mount Tenabo by tribal members who still visit the top of the mountain for prayer and spiritual renewal; and effects to spiritual and religious use areas, in particular, Mount Tenabo. Potential effects of the proposed project in relation to these issues are discussed in Section 3.9, Native American Traditional Values.

When determining whether environmental effects to the above-mentioned resources are disproportionately high and adverse within the context of environmental justice, federal agencies must consider the following three factors to the extent practicable:

1) Whether there is or would be an impact on the natural or physical environment that significantly and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment.

2) Whether environmental effects are significant and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group.

3) Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

The first step in the analysis of environmental justice within the context of Native American traditional values is to review each of the three factors listed above and determine whether a factor is relevant to the analysis. Since no "cumulative or multiple adverse exposures" to minority populations, low-income populations, or Indian tribes from "environmental hazards" would occur as a result of the Proposed Action, the third factor is considered irrelevant and was not applied to this analysis.

The first factor requires an evaluation of whether or not there would be an "impact on the natural or physical environment that significantly (under NEPA) and adversely affects a minority population, low-income population, or Indian tribe." Based on the analysis in Section 3.9, Native American Traditional Values,

removal of piñon groves in the proposed project disturbance areas could affect pine nut harvesting. However, since the piñon groves in this area are not mature and currently provide little pine nut production, it is assumed that removal of these piñon groves as a result of the Proposed Action ***currently*** would not "significantly or adversely affect" any minority or low-income populations or Indian tribes. ***Also as discussed in Section 3.9, potential impacts to future pine nut harvesting in the project study area and the social activities associated with the harvest cannot be quantified due to the lack of information provided relative to usage by tribal individuals of the piñon groves in the study area. Therefore, a determination of "significant or adverse" future effect to minority or low-income populations or Indian tribes cannot be determined.*** The analysis also indicated that the proposed project would increase visual effects to the landscape as seen from the top of Mount Tenabo and as a result would affect the Western Shoshone's spiritual and religious use of Mount Tenabo. Although increased visual effects to the landscape would occur, the number of people who visit the top of Mount Tenabo and the frequency of their visits is unknown. Therefore, as the effects to Native American traditional values cannot be quantified, a determination of "significant or adverse" effect to minority or low-income populations or Indian tribes cannot be determined.

The second factor requires an evaluation as to whether "environmental effects are significant and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group." As previously discussed, based on data from the U.S. Census Bureau and the location of the nearest resident and residential area, potential effects of the Proposed Action would not be expected to disproportionately affect any particular population. However, Native American traditional values have been identified as "values" effected by various forms of development, including mining, based on previous ethnographic studies and communication and consultation with local Indian ***tribes and bands***. Therefore, the analysis needs to consider whether the effects to these values "are or may be having an adverse impact" on local Indian ***tribes and bands*** that "appreciably exceeds or is likely to appreciably exceed those on the general population."

Specific guidelines, thresholds, scales, or appropriate comparisons are required to determine whether the effects to Native American traditional values would have an "adverse impact" on local Indian ***tribes and bands*** that would "appreciably exceed or likely to appreciably exceed" those effects on the general population. However, the USEPA environmental justice guidance does not include specific quantifiable guidelines, thresholds, scales, or appropriate comparisons that could be applied for determining what is an "adverse effect" or what is meant by "appreciably exceeds" in this context. Although not quantifiable, the ***study*** area and the region surrounding the ***study*** area have been home to local ***Native Americans*** for centuries, and the resources in the area, the value placed on those resources, and potential effects to those resources are intertwined with the culture of local Indian tribes more so than any other population in close proximity to the ***study*** area.

3.14.2.2 Grass Valley Heap Leach Alternative

Under the Grass Valley Heap Leach Alternative, environmental justice concerns would be the same as those discussed for the Proposed Action.

3.14.2.3 Crescent Valley Waste Rock Alternative

Environmental justice concerns under the Crescent Valley Waste Rock Alternative would be the same as those ***discussed*** for the Proposed Action.

3.14.2.4 Cortez Hills Complex Underground Mine Alternative

Under the Cortez Hills Complex Underground Mine Alternative, environmental justice concerns as they relate to minority or low-income populations would be the same as those ***discussed*** for the Proposed Action. However, environmental justice concerns as they relate to Native American traditional values would be less than those ***discussed*** for the Proposed Action. Potential impacts to ***the PCRI and other areas of tribal concern, including*** pine nut harvest***ing*** areas, spiritual and religious use areas, possible ancestral burials, and NRHP-eligible properties would be minimized as no surface facilities would be developed at the Cortez Hills Complex under this alternative. A detailed discussion of potential effects to ***the*** PCRI ***and other areas of tribal concern*** under this alternative is presented in Section 3.9, Native American Traditional Values.

3.14.2.5 Revised Cortez Hills Pit Design Alternative

Environmental justice concerns under this alternative would be the same as those discussed for the Proposed Action.

3.14.2.6 No Action Alternative

The initial analysis of environmental justice concerns did not identify any minority or low-income populations in the study area that may be disproportionately affected by the Proposed Action. Under the No Action Alternative, significant changes in the demographics of the study area are not anticipated; therefore, impacts that may disproportionately affect minority and/or low-income populations would be the same as ***those discussed*** for the Proposed Action.

However, another facet of the environmental justice analysis requires consideration of impacts to cultural, historical, or protected resources of value to Indian tribes. As discussed in Section 3.9, Native American Traditional Values, direct effects to ***the*** PCRI ***and other areas of tribal concern*** would not occur under the No Action Alternative because proposed mine expansion facilities would not be constructed. However, indirect effects (i.e., visual and noise) to ***areas of tribal concern as*** related to the existing operations would continue to occur under the No Action Alternative.

3.14.3 Cumulative Impacts

The cumulative effects study area for Environmental Justice is shown in **Figure 3.12-2**. Past and present actions and RFFAs are identified in **Table 2-*18*** and shown in **Figure 2-*26***. The environmental justice analysis did not identify any minority or low-income populations in the study area that may be disproportionately affected by the Proposed Action; therefore, no cumulative effects to these populations would occur as a result of the Proposed Action. However, cumulative effects to ***areas of tribal concern*** were identified through Native American consultation and ethnographic analyses conducted within the cumulative effects study area for Native American traditional values. These cumulative effects include potential visual effects and potential effects to possible burials, NRHP-eligible sites, pine nut harvesting areas, and spiritual and religious use areas as discussed in Section 3.9, Native American Traditional Values. Therefore, it is anticipated that the Proposed Action incrementally would increase effects to Native American uses of these areas.

Cumulative effects under the Grass Valley Heap Leach**,** Crescent Valley Waste Rock***, and Revised Cortez Hills Pit Design a***lternative***s*** would be the same as ***discussed*** for the Proposed Action. Under the Cortez Hills Complex Underground Mine Alternative, the project's contribution to cumulative effects to local Indian groups would be less than under the Proposed Action.

3.14.4 Monitoring and Mitigation Measures

Mitigation measures recommended to minimize impacts to ***the*** PCRI ***and other areas of tribal concern*** are presented in Section 3.9, Native American Traditional Values. No additional measures are recommended for Environmental Justice.

3.14.5 Residual Adverse Effects

No low-income or minority populations are concentrated in close proximity to the ***study*** area; therefore, no residual adverse effects that could disproportionately affect minority or low-income populations would occur as a result of the proposed project. Residual adverse effects relative to Native American Traditional Values are discussed in Section 3.9.

3.15 Visual Resources

The visual resources study area for direct and indirect impacts encompasses the proposed project as seen from the three ***key observation points (***KOPs***)*** identified for the project. The cumulative effects study area encompasses the viewshed of the proposed project, or generally, the area within 20 miles of the proposed project from which the project would be visible.

3.15.1 Affected Environment

The BLM is responsible for identifying and protecting scenic values on public lands under several provisions of FLPMA and NEPA. The BLM VRM system was developed to facilitate the effective discharge of that responsibility in a systematic, interdisciplinary manner. The VRM system includes an inventory process, based on a matrix of scenic quality, viewer sensitivity to visual change, and viewing distances, which leads to classification of public lands and assignment of visual management objectives. Four VRM classes have been established, which serve two purposes: 1) as an inventory tool portraying relative value of existing visual resources and 2) as a management tool portraying visual management objectives for the respective classified lands. The management objectives for each of the VRM classes are displayed in **Table 3.15-1**.

Table 3.15-1
BLM Visual Resource Management Class Objectives

Class I Objective	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic (design) elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective	The objective of this class is to provide for management activities, which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic (design) elements.
Rehabilitation Areas	The objective of this class is to provide for management activities, which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic (design) elements.

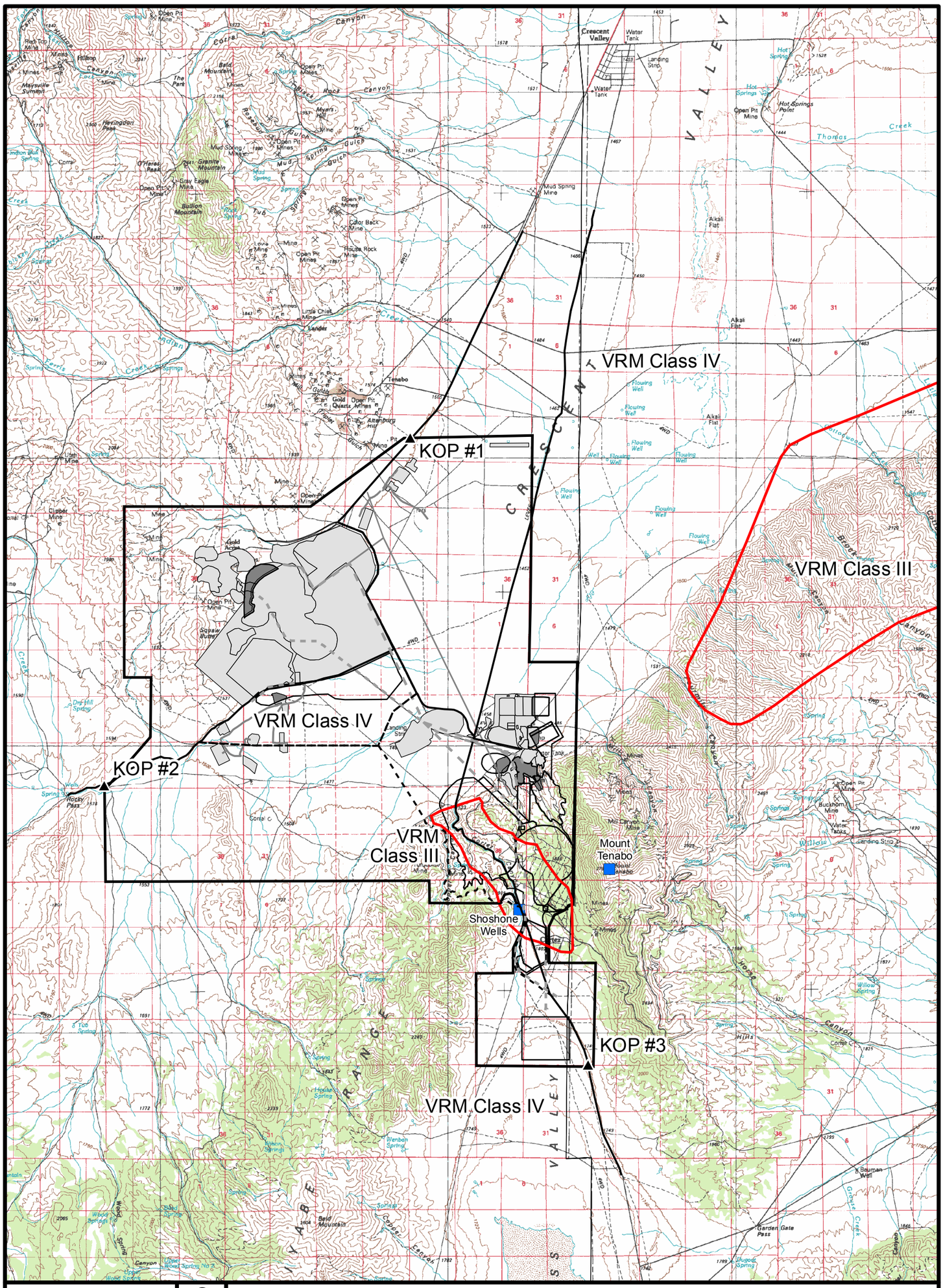
Source: BLM 1986b.

The VRM system also includes a "contrast rating" procedure for evaluating the potential visual effects of a proposed project or management activity. The VRM system was used to evaluate the visual impact of the proposed Cortez Hills Expansion Project as well as the potential cumulative visual effects of the project in the context of other activities that have taken place or may take place in the area in the reasonably foreseeable future.

The extent of the viewshed in open country like this is a matter of judgment. For analysis purposes it is assumed that approximately 20 miles is the limit of visibility; beyond 20 miles, it becomes more difficult to distinguish specific features in the landscape. The viewshed for the proposed project is shaped somewhat like an hourglass, pinched in by the high ground on either side of the Cortez saddle and spreading out on both the north and south into Crescent Valley and Grass Valley, respectively. The east side is defined by the ridge of Mount Tenabo, the west and southwest by the high ground of the Toiyabe Range. North into Crescent Valley, the viewshed fans out into the foothills of the Shoshone Range to the northwest and is unobstructed to the north well into the valley. To the south, the viewshed widens out into Grass Valley, confined on the west by the Toiyabe Range and on the east by Mount Tenabo and the northern reaches of the Simpson Park Mountains (**Figure 3.15-1**).

Under the VRM system, the affected environment for visual resources is characterized using an inventory and evaluation process that addresses scenic quality, viewer sensitivity, and distance between viewers and a proposed modification to the landscape, such as the Cortez Hills Expansion Project. The results of the three-step inventory process are used to determine which of four possible visual management classes should be assigned to lands in the project vicinity by applying a standard matrix to combine the inventory data. Each VRM class has specific objectives giving guidance as to how the visual environment may be managed on lands so designated (**Table 3.15-1**). Landscape characteristics contributing to the inventory process for the proposed project are described below, followed by VRM class designations for the visual area of influence.

The proposed project is located in the Basin and Range physiographic province as defined by Fenneman (1931). The province is characterized by alternating valleys and low, north-south trending mountain ridges common to central Nevada. Topography of the project vicinity is nearly table flat in Crescent Valley and almost the same in Grass Valley, but with somewhat more of a basin effect as the edges of Grass Valley rise less abruptly into the surrounding foothills. Crescent Valley is at an elevation of approximately 4,950 feet amsl at its highest (south) end. The high point on the flats of Grass Valley is at approximately 5,750 feet amsl, dropping gradually to the south. The project boundary includes the saddle between Mount Tenabo and the north end of the Toiyabe Range, primarily on the west-facing slope of the mountain at elevations ranging from 5,440 feet amsl at the edge of Cortez Canyon to approximately 6,800 feet amsl on the side of Mount Tenabo. The high point of the saddle is at approximately 5,050 feet amsl. Mount Tenabo is the most prominent landform in the area, rising steeply to the east in a massive buttress and peaking at approximately 9,160 feet amsl. Topography of the Toiyabe Range, southwest of the project boundary, is rounded and irregular, peaking at approximately 7,480 feet amsl near the project boundary, but rising higher to the south. The project boundary extends across the flats at the southern end of Crescent Valley into the lower foothills of the Shoshone Range. The Shoshone foothills are similarly rounded and irregular. The



Legend

- Project Boundary
- KOP
- VRM Class III Boundary
- Existing Facilities
- Existing and Proposed Facilities Overlap
- Proposed Facilities
- Existing Roads
- Proposed Road Re-routes
- Existing Linear Features
- Proposed Linear Features
- Sensitive Viewpoints

N

0 1 2 3 4 Miles

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Figure 3.15-1

Visual Resources

02/27/2008

elevation of the high point of the existing Pipeline Pit rim is approximately 5,600 feet amsl, although the crest of the range in this vicinity is at nearly 9,700 feet amsl a few miles to the northwest.

Vegetation in the project boundary tends to be sparse, dominated by small to medium sized piñon-juniper forests with mixed shrubs in the higher elevations. Vegetation colors are predominantly dark green in these areas. The valleys are mostly low sagebrush and grasses. Grasses are short and typically sparse, reflecting the desert conditions of the region. Vegetation colors in the valley range from silvery gray-green to medium olive. Somewhat brighter greens are in evidence for periods in the spring with beige, tans, and muted gold during the drier and colder months.

Native soils are light beige to pale whitish gray with rock outcrops adding generally muted browns, oranges, and some mauve to purple hues.

Color differences, though generally not sharply contrasting, can be easily distinguished at ranges of less than a mile, especially with early morning or late afternoon sun at the viewer's back. Colors blend together and become very subtle or undistinguishable at greater distances and under different light conditions, such as high mid-day sun or the light haze often seen in this part of Nevada.

The proposed project is located in an area that has been mined for over a century. There are historic mines on both flanks of Crescent Valley, some of which are currently operating. The Shoshone Range in particular is the location of numerous mines. There also are remnants of a large, historic underground mine on Mount Tenabo above the old Cortez townsite. There are no active mining operations apparent in Grass Valley, although there are numerous prospect holes in the foothills along both sides of the valley.

Views from Crescent Valley toward the south include large, man-made landforms from on-going mining operations. Current mining operations at the Pipeline Complex exhibit strong color contrast with its natural surroundings and moderate to strong line, landform, and surface texture contrast. The light tans and golds of the waste rock facility and tailings stand out from the natural background in late afternoon direct sunlight. They produce less contrast in morning and midday light or under overcast sky conditions when the light angle or intensity does not emphasize the color differences between exposed rock materials and natural vegetation and soils. The tailings impoundments and leach pads appear as very large, regular, geometric shaped mounds, predominantly horizontal in character. They generally are smooth textured.

Areas that have been reclaimed show substantial mitigating effects that the reclamation has had on the visual environment. The irregular softening and rounding of the slopes is more like the natural terrain of the foothills than the angle of repose from dumping on the active waste rock facility. This reclamation reduces the landform and line contrast to a relatively low level. Although shrub growth has not yet reached a level to mimic the vegetation of the surrounding valley and the grasses are characteristically sparse, even this fairly early stage of revegetation substantially reduces the color contrast.

Structures in the visual analysis area are geometric in form, limited mainly to mining structures. There also are a few fence lines and utility pole lines traversing the valley. The fences and utility lines have a linear

rather than structural character in the large, open expanse of Crescent Valley. Road scars and utility corridors are prominent linear man-made features in the study area, most apparent on the valley floor.

The project vicinity is visible from SR 306 in Crescent Valley, CR 225 near Rocky Pass, and CR 222 in Grass Valley. None of these routes are highly traveled. The project vicinity also is visible from the CGM-owned Dean Ranch, approximately 1 mile to the north, and from the town of Crescent Valley, at a distance of 7.5 miles.

The BLM has conducted a visual inventory of the project vicinity under the VRM system and established VRM classes in the study area. An approximately 2.6-square-mile portion of the study area is designated VRM Class III; the remainder of the study area, and most of the surrounding area, are designated Class IV. The Class III area centers on Cortez Canyon from its mouth up to the saddle, spreading out to encompass the old Cortez townsite (**Figure 3.15-1**). The Class III area was modified slightly from the original, field office area-wide inventory mapping based on specific topography and field observations conducted for the EIS. The management objectives for both classes are described in **Table 3.15-1**. In the cumulative effects study area, there are several areas designated Class III. They include the high ground of the Shoshone Range to the west of the town of Crescent Valley, and a portion of the Cortez Mountains approximately 3.5 miles northeast of the project boundary. The Simpson Park Mountains also are Class III on the east side of Grass Valley, 20 miles south of the project boundary. As a matter of policy, the Roberts Mountain WSA, 20 miles southeast of the project boundary, and the Simpson Park WSA, 20 miles south of the project boundary, are both designated Class I.

3.15.2 Environmental Consequences

Potential visual impacts associated with the proposed Cortez Hills Expansion Project were analyzed using the procedures outlined in the BLM Visual Contrast Rating Handbook H-8431-1 (BLM 1986d). Visual impacts were determined by comparing visual contrast ratings for the proposed project facilities with the VRM class objectives for the project vicinity, portions of which are designated VRM Class III and Class IV (**Table 3.15-1**). The process involves comparing the degree of visual contrast from the proposed facilities and activities with the existing landscape character both during active mining and after reclamation is completed. The contrast rating process used three KOPs as the viewpoints for conducting the impact analysis. In addition to the three KOPs, the impact assessment considered views from other sensitive viewpoints in the project vicinity, including Shoshone Wells and Mount Tenabo. Sensitive viewpoints are similar to KOPs but of lesser sensitivity due to infrequency of use, small number of viewers, or similar mitigating circumstances.

The three KOPs used in this analysis (**Figure 3.15-1**) include: KOP #1 at the Dean Ranch Road intersection with SR 306, which is approximately 3 miles north of the Cortez access road. This viewpoint was selected to represent the view for travelers approaching from the north; it also represents views from Crescent Valley approximately 7 miles farther to the north. KOP #2 at Rocky Pass on CR 225 represents the view for travelers approaching from Carico Lake Valley. KOP #3 is located on CR 222 approximately 1 mile southeast of the Lander-Eureka County line and 4.5 miles northwest of the intersection with the road to Garden Gate Pass. It represents the view for travelers approaching from Grass Valley or from Pine Valley to the east. All of these approach routes are lightly traveled, although they are the only improved routes to and

through the area. Most traffic in the area is generated by local mineral development or ranching activity; however, there also is some traffic generated by recreational activities including hunting, camping, or visiting the historic Cortez townsite.

Views for two additional locations were analyzed for visual impacts. These locations are somewhat different than the first three in that they represent sensitive, but lightly used viewpoints. One location is near Shoshone Wells at a spot ***reportedly*** used by Native Americans for ceremonial purposes. It initially was identified by a ceremonial flag stick perched on a small raised rock outcrop on the west side of the Cortez Canyon Road (CR 222) in Section 1, T26N, R47E, approximately 1.4 miles northwest of the old Cortez townsite. The second location is at the top of Mount Tenabo and represents views from this location. This location also has been reported as having ceremonial importance to Native Americans.

Significance of visual impacts would be judged as follows:

- Significant – Predicted visual contrast that exceeds the VRM class guidelines.
- Moderate – Predicted visual contrast levels that are fully at the level of change allowed, but that do not exceed the VRM guidelines.
- Low – Predicted visual contrast levels that are clearly below the VRM class allowable thresholds for visual change.

3.15.2.1 Proposed Action

Development of the proposed Cortez Hills Expansion Project would expand the scope of the visual contrast that currently exists between existing and previously approved mine-related facilities and the natural character of the landscape. The primary change in visual effects from the currently approved levels would be the expansion of the mine footprint, or geographic scope of the project. Of somewhat lesser importance, the proposed project also would extend the duration of active mining, which is the time when visual effects are most prominent. As noted in Section 3.15.1, Affected Environment, prior to completion of reclamation, the existing mine features exhibit strong color contrast, especially under bright, clear light conditions. In addition, there are moderate to strong line and landform contrasts generated to a large extent by the flat tops and geometric shapes of the waste rock, tailings, and heap leach facilities. Finally, there is moderate texture contrast between the bare surfaces of the mine features and the vegetation textures and patterns in the natural landscape. The largest and most visually dominant of these effects under the existing and currently approved portions of the project are located on the western side of the valley at the Pipeline Complex. The proposed project primarily would expand the visual effects on the eastern side of the valley, which would be most prominent during active mining. The visual contrast effects gradually would become less prominent with implementation of reclamation.

Development of the proposed project would result in new and expanded features in the landscape. From a visual perspective, the most visible proposed features would include the three new waste rock facilities (Canyon, South, and North), two expanded waste rock facilities (Cortez and Pipeline), two new heap leach

facilities (Grass Valley and Cortez), and the Cortez Hills Pit. The surface disturbance acreage associated with each of these facilities is presented in **Table 2-1**. Descriptions of each facility (including maximum elevation above native ground surface) are presented in Section 2.4, Proposed Action. The Cortez Hills Pit, unlike other project-related pits, would be visible from well outside the pit area, because it would be located on the side of Mount Tenabo, such that the easterly pit wall would be more than 1,000 feet higher than the westerly pit wall at their extremes. Other features, such as the proposed conveyor system, would be prominent from foreground vantage points, but less so from middle ground and background views.

The proposed waste rock and heap leach facilities would have visual characteristics during active mining that would be similar to existing facilities, notably a geometric form and exposed rock surfaces. As a result, the proposed Cortez Hills Expansion Project would have similar, but expanded, visual effects to those already occurring from the existing facilities, including strong color contrast, moderate to strong line and landform contrast, and moderate texture contrast. The key considerations, therefore, are the degree of expansion of the visual impacts, and the amount of contrast permissible under the relevant VRM class objectives.

Visual effects of the proposed project from perimeter viewpoints would be greatest from KOP #1, because the existing disturbance in the vicinity of the Cortez Mill is quite small against the backdrop of Mount Tenabo and the Cortez Mountains, and portions of the disturbance have been successfully reclaimed and revegetated. As a result, the substantial size of the proposed waste rock facilities plus the visibility of the Cortez Hills Pit wall would have the effect of essentially doubling the horizontal extent of the existing and previously approved visual disturbance. The Canyon Waste Rock Facility, in particular, would rise nearly 1,300 feet above the valley floor, and the Cortez Hills Pit eastern wall would be over 1,000 feet higher at its highest point than the low points on the pit's western wall. Mount Tenabo and the Cortez Mountains still would provide a substantial backdrop, rising almost 2,400 feet above the top of the pit highwall. During active mining, however, the disturbance would be more visually prominent than existing and previously approved activities. In addition, strong lighting used to facilitate around-the-clock mining would exacerbate the visual contrast at night. Most of the area proposed for disturbance is rated VRM Class IV. The class objective provides for "... major modification of the existing character of the landscape ..." so the visual disturbance would be in conformance with the objective if "every effort" is made to minimize the visual impact. **Figure 3.15-2** illustrates a simulation of the visual effects as seen from KOP #1.

The Canyon Waste Rock Facility is proposed for placement in Cortez Canyon, which is rated VRM Class III, a somewhat more restrictive classification. The objective for Class III states, "the level of change to the characteristic landscape should be moderate." Due to the scale of the proposed waste rock facility, and the strong color contrast combined with moderate to strong line and landform contrasts, it is expected that the proposed Canyon Waste Rock Facility would not achieve the requisite "moderate" level of landscape change in the short term, during active mining.

Proposed facilities on the western side of the valley would be appended to the existing Pipeline Complex. The visual effects would be relatively minor, because the facility expansions would be seen as extensions of the existing and previously approved activities. The expanded facilities would be largely screened from view from KOP #1 by the existing heap leach, tailings, and waste rock facilities.

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Expansion Project

Figure 3.15-2
Visual Simulation
for KOP #1

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Recent past and on-going reclamation efforts by CGM have been effective at mimicking natural landforms in the project vicinity. The same reclamation standards would be implemented for the proposed project. As a result, it would be expected that the visual contrasts from waste rock and heap leach facilities would be substantially reduced after reclamation. CGM has committed to construct waste rock facilities with variable topography to facilitate final regrading to achieve more natural appearing landforms (Section 2.4.11, Applicant-committed Environmental Protection Measures). As a result, the long-term visual effects (as seen from KOP #1) would be expected to achieve the VRM class objectives in both Class III and Class IV areas. The upper portion of the Cortez Hills Pit wall would remain visible, and the color contrast from the wall likely would remain strong for a long period of time. However, the ***visible portion of the*** pit would be in a Class IV area and the "major modification" standard would permit the strong contrast effect to continue if efforts are made to minimize the effect to the degree possible.

The proposed project would be visible from KOP #2; however, the effects would be less visually dominant than from KOP #1. Substantial portions of the proposed facilities at the Cortez Hills Complex would be screened from view at this KOP by existing terrain at the north end of the Toiyabe Range. The upper reaches of the Canyon Waste Rock Facility would be visible, as would the upper east wall of the Cortez Hills Pit; however, they would be much less prominent as viewed from KOP #2 than from KOP #1. Several facilities, including the Cortez and Grass Valley heap leach facilities and the North Waste Rock Facility, would be completely screened by existing terrain or by other proposed facilities. With this degree of screening, it is anticipated that the visual contrast effects from KOP #2 would be moderate even during the peak of active mining. As a result, the VRM class objectives would be met from this viewpoint. After completion of reclamation, it is anticipated that the visual contrast would be reduced to low levels, except for the upper pit wall of the Cortez Hills Pit, which would continue as a moderate to strong color contrast, albeit in a Class IV area. The proposed expansion of the Pipeline Waste Rock Facility would be visible from KOP #2; however, it would be seen as only a modest extension of the existing facility. As such, the visual effect would be minor.

The majority of the proposed project facilities would not be visible from KOP #3. The most prominent feature that would be visible would be the Grass Valley Heap Leach Facility, which would be just over 2 miles from the KOP and would rise approximately 300 feet above the natural ground surface. The South Waste Rock Facility and a relatively small portion of the top of the Canyon Waste Rock Facility also would be visible. Most other facilities would be entirely screened by existing terrain. **Figure 3.15-3** illustrates a simulation of the visual effects as seen from KOP #3. The northern half of the Grass Valley Heap Leach Facility would be located in a VRM Class III area. The strong color contrast and moderate landform contrast of the facility marginally may achieve the Class III objective during its active life. However, after successful completion of reclamation, it would comply with the objective in the long term.

The Shoshone Wells location would be surrounded on three sides by project facilities at close range. The Canyon Waste Rock Facility would be less than 1,500 feet to the north-northwest, rising above the site by nearly 400 feet. Processing and administration facilities are proposed directly across CR 222 to the east. The eastern wall of the Cortez Hills Pit would rise approximately 1,000 feet above the site and would be in direct, effectively unscreened line-of-sight at a distance of approximately 6,000 feet. The Grass Valley Heap Leach Facility would be approximately 0.5 mile to the southeast. The site, itself, the closest part of the waste rock facility, and perhaps small portions of the pit and the heap leach all would be in the VRM Class III area.

Even though concurrent reclamation would be carried out to the extent possible (Section 2.4.12, Reclamation), it is unlikely that the Proposed Action would meet the standards of VRM Class III objectives. Even after completion of reclamation, it is expected that the Class III objectives would not be met, because the scale and proximity of project facilities would continue to dominate views from this site.

The top of Mount Tenabo is the highest point in the immediate vicinity. From this perspective, a viewer would be able to experience broad vistas of north-central Nevada. It would be expected, however, that the proposed facilities at the foot of the mountain and in Crescent Valley would tend to dominate the viewer's attention. While this would be acceptable in most of the area because the VRM Class IV rating permits major modification of the landscape, it would conflict with the objective of the Class III area, which requires that the existing, natural character of the landscape be "partially retained." This degree of visual contrast would be minimized to the degree possible after completion of reclamation. It is anticipated that the waste rock and heap leach facilities would satisfy the Class III objective after successful reclamation; however, the pit would continue to be a prominent feature in the landscape over the long term.

The proposed project would for the most part meet the VRM Class IV management objectives during active mining, although meeting the specific objectives regarding "minimizing disturbance" and "repeating basic elements (form, line, color, and texture)" would be a challenge in some areas. However, the objectives also indicate that "major modification" is anticipated and that visual dominance can be accommodated in Class IV areas. The project would not comply with the Class III objective in Cortez Canyon during active mining because the color contrast and landform contrast would be too strong. However, based on the proposed project's reclamation plan and applicant-committed environmental protection measures (Section 2.4.11, Applicant-committed Environmental Protection Measures), waste rock and heap leach facilities would be recontoured and revegetated resulting in a smoothing and rounding of the side slopes into an irregular pattern to more closely approximate the surrounding landscape. Revegetation would be important in meeting the VRM Class objectives, as the most pronounced visual contrast would be the color difference introduced by the bare rock piles in comparison to the natural vegetative color palette. Recontouring and revegetation of the waste rock and heap leach facilities would "minimize the disturbance" and would bring the proposed project into conformance with the VRM objectives, once reclamation activities have been successfully implemented. As a result, the long-term visual effects would not exceed the significance threshold. Reclamation is proposed to occur concurrently with mining to the extent possible as discussed in Section 2.4.11, Applicant-committed Environmental Protection Measures. This would ensure that visual contrast would be minimized at the earliest possible time.

3.15.2.2 Grass Valley Heap Leach Alternative

Under this alternative, the Grass Valley Heap Leach Alternative would be located approximately 1.5 miles south of the location identified under the Proposed Action. This alternative would be similar to the Proposed Action in that the Grass Valley Heap Leach Facility would not be visible from KOP #1 or KOP #2. This alternative would differ from the Proposed Action in that the facility would be approximately 1 mile closer to KOP #3. Although the facility would be more visually prominent from KOP #3, KOP #3 is not a static viewing location; it represents views for travelers approaching the project from the south on CR 222. As a result, the visual effects would be very similar for travelers under either alternative, as few observers would be able

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Figure 3.15-3
Visual Simulation
for KOP #3

05/16/07

to distinguish between the alternatives as they travel north on CR 222. Thus, the visual effects from KOP #3 would be essentially the same for the Grass Valley Heap Leach Alternative and the Proposed Action.

The most substantial visual distinction between this alternative and the Proposed Action would be that visitors to the historic Cortez townsite and viewers from Shoshone Wells would be farther from some large-scale mining activities under this alternative. The Grass Valley Heap Leach Facility would be approximately 0.75 mile from the townsite under this alternative, as compared with 0.25 mile under the Proposed Action. Viewers from Shoshone Wells still would be near the Cortez Canyon Waste Rock Facility.

3.15.2.3 Crescent Valley Waste Rock Alternative

The Crescent Valley Waste Rock Alternative would move the Canyon Waste Rock Facility out of Cortez Canyon and onto the floor of Crescent Valley. The visual effect from KOPs #1 and #3 would be similar to those described for the Proposed Action. From KOP #1, the visual features would have been moved around; however, the overall effect would be very similar. The waste rock facility would not be visible from KOP #3 under this alternative; however, the Grass Valley Heap Leach facility would remain and still would be the most prominent feature visible from this perspective. The waste rock facility would be much more visible from KOP #2 under this alternative. At a distance of 5 miles, the facility would be visually prominent, but the Class IV visual objective would be achievable. CGM's proposed concurrent reclamation and topographic variation on the waste rock piles (Section 2.4.11, Applicant-committed Environmental Protection Measures) would help minimize visual contrast. Visual effects on the Shoshone Wells location would be notably reduced under this alternative, because the valley location for the waste rock facility would not be visible from this site. Views from the top of Mount Tenabo would change somewhat under this alternative; however, the overall effect would be similar to the Proposed Action. This alternative would greatly reduce the amount of major facilities proposed for the area designated VRM Class III.

3.15.2.4 Cortez Hills Complex Underground Mine Alternative

Under this alternative, the surface facilities at the Cortez Hills Complex would not be developed. Surface facilities associated with the underground operation would be developed within existing disturbance areas at the Cortez Complex.

The Cortez Hills Complex Underground Mine Alternative substantially would reduce the visual effects of the Cortez Hills Expansion Project, based on the reduction in surface disturbance and scale of the facilities. The major remaining surface facility (Pipeline Waste Rock Facility Expansion) would be an extension of an existing large land feature. This alternative would minimize the visual effects of the proposed project from every KOP and sensitive view point perspective.

3.15.2.5 Revised Cortez Hills Pit Design Alternative

The primary physical differences between the Revised Cortez Hills Pit Design Alternative and the Proposed Action would be a smaller and shallower pit and a Canyon Waste Rock Facility that would be slightly smaller in footprint, but approximately 10 feet higher at its crest. It is unlikely that most observers would be able to distinguish the visual effects of this alternative from the visual effects of

the Proposed Action. The visible upper pit wall on the east side would be slightly less steep; however, the upper boundaries of the disturbed area would be essentially the same as for the Proposed Action. The smaller pit boundary on the west side of the pit would be screened from public viewing points, except from the top of Mount Tenabo, where the visible difference would be minor. Most of the reduced footprint of the pit would be in the Class III area, which would be slightly beneficial relative to the Proposed Action. The reduced footprint of the Canyon Waste Rock Facility would be visible from KOP #1; however, it would not be visually distinguishable from the Proposed Action from that perspective. The slightly smaller footprint of the Canyon Waste Rock Facility would be visible from the top of Mount Tenabo; however, the difference would be minor and would likely not be noticed by most observers.

The differences between features of the project under this alternative compared with the Proposed Action would not be visible from KOP #2. The slight increase in height of the Canyon Waste Rock Facility would be visible from KOP #3 and from the Shoshone Wells perspective; however, the visual difference from the Proposed Action would not be noticeable by most observers. In summary, the visual effects of the Revised Cortez Hills Pit Design Alternative would be very similar to those of the Proposed Action.

3.15.2.6 No Action Alternative

Under the No Action Alternative, the Cortez Hills Expansion Project would not be constructed. As a result, there would be no additional disturbance beyond what currently exists or is currently permitted. Visual effects would be essentially as described in the Pipeline/South Pipeline Expansion Project Final SEIS (BLM 2004e) and the Cortez Mine Underground Exploration Project EA (BLM 2006a). Activities permitted under these two NEPA documents would continue, including reclamation of disturbance areas, which ultimately would reduce the visual contrast from mining-related activities. The visual effects of the existing project were considered to be “less than significant” (BLM 2006a, 2004e).

3.15.3 Cumulative Impacts

The cumulative effects study area for visual resources is shown in **Figure 3.15-4**. Past and present actions and RFFAs are identified in **Table 2-*18*** and shown in **Figure 2-*26***.

Visual effects of past and present actions are included in the description of the affected environment (Section 3.15.1). The future actions that would create visual effects are predominantly mining-related activities, including both exploration and development projects. There also would be a potential increase in dirt roads and agricultural developments, including increased grazing activity and additional center pivot irrigation. Among these actions, the mining projects would be the most likely to introduce strong visual contrast in the cumulative effects study area. However, all of the identified future actions would be located in VRM Class IV areas, so it is anticipated that the visual disturbance would be accommodated by the standards of the VRM Class IV objectives, which provide for “major modification” of the landscape. Based on the project’s proposed reclamation plan and the assumption that standard reclamation requirements would be required for permitting of future projects, the cumulative visual effects would be minimized to the degree possible after completion of the projects.

Cumulative visual effects associated with the Grass Valley Heap Leach***,*** Crescent Valley Waste Rock***, and Revised Cortez Hills Pit Design*** alternatives would be similar to the cumulative visual effects associated with the Proposed Action. As described above, the visual effects of past and present actions are included in the description of the affected environment. The cumulative visual effects associated with the Cortez Hills Complex Underground Mine Alternative would vary somewhat from the Proposed Action as the surface facilities at the Cortez Hills Complex would not be developed, resulting in a smaller incremental addition to cumulative visual effects.

3.15.4 Monitoring and Mitigation Measures

During active mining, little can be done to reduce the landform and color contrasts without unduly interfering with mine operations. However, based on CGM's applicant-committed environmental protection measures (Section 2.4.11) and this environmental analysis, the visual effects would be minimized to the extent possible as required by VRM Class IV objectives.

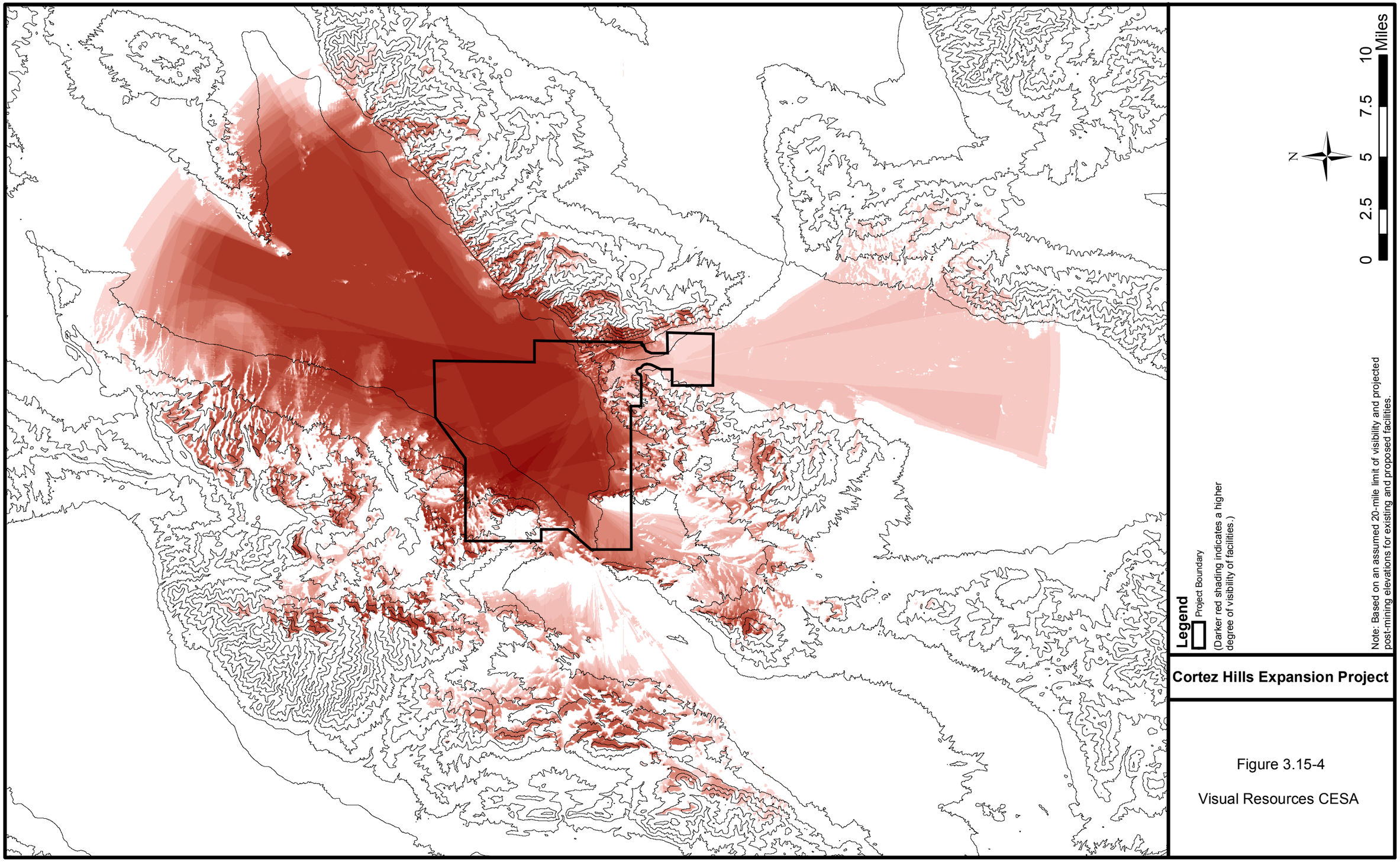
Issue: Potential effects of night lighting on the surrounding area.

Mitigation Measure VR1: To the degree possible, consistent with mine safety, night lighting for the project would be directed downward and shielded to minimize spillover of light beyond the project boundaries.

Effectiveness: Shielding and downward directing of night lighting would reduce the effects on the surrounding area.

3.15.5 Residual Adverse Effects

Residual adverse visual effects would result from the long-term changes in landform and color contrasts associated with the Cortez Hills Pit walls. The visual effects gradually would diminish over time as natural vegetation patterns would develop to help mask the landform and color contrasts. However, the unreclaimed pits and pit walls would result in permanent visual effects.


N
0
2.5
5
7.5
10
Miles
Legend
Project Boundary
(Darker red shading indicates a higher degree of visibility of facilities.)
Note: Based on an assumed 20-mile limit of visibility and projected post-mining elevations for existing and proposed facilities.
Cortez Hills Expansion Project
Figure 3.15-4
Visual Resources CESA
03/28/2007

3.16 Noise

The study area for noise effects encompasses an area within a 10-mile radius of the project boundary. The cumulative effects study area encompasses the ***area within the*** project boundary and includes the area within a 30-mile radius of the proposed project.

3.16.1 Affected Environment

Describing the environment potentially affected by noise from the proposed project involves identifying noise-sensitive receptors and existing noise sources in the project vicinity, characterizing terrain features that may affect noise transmission, and determining existing noise levels.

The proposed Cortez Hills Expansion Project is located in a relatively remote area where existing development primarily consists of other mining projects. There are four occupied ranches in the analysis area: the Cortez-owned Wintle and Dean ranches, just inside the northeast corner of the proposed project boundary and approximately 1.0 mile northeast of the proposed project boundary, respectively; the privately-owned Filippini Ranch, approximately 1.0 mile west of the proposed project boundary; and the Dann Ranch, approximately 9.5 miles northeast of the boundary. The community of Crescent Valley is approximately 7.5 miles north of the project boundary.

Natural sounds, including wind, insects, and birds, are the principal contributors to ambient noise in outlying portions of the study area. Variations in wind speeds can have a dramatic effect on noise levels in the area. Ranching, dispersed recreation, and mining activities in the area generate occasional vehicular noise, although the traffic is very light. The principal sources of noise in the vicinity of the proposed project are associated with mining-related heavy equipment noise and once daily blasting at the existing Pipeline Complex. Military aircraft flyovers, which occur several times a day, often at very low altitudes, produce noise at extremely high levels relative to all other noise sources in the project vicinity.

Terrain in the study area is very irregular. The southeastern portion of the proposed project lies in the saddle between the north tip of the Toiyabe Range and Mount Tenabo at the southern end of the Cortez Mountains. The Toiyabe Range peaks at approximately 7,480 feet amsl adjacent to the project boundary, although it rises higher to the south. Mount Tenabo, to the east, is 9,153 feet amsl in height. The nearly table-flat Crescent Valley lies to the north of the saddle with Grass Valley (nearly as flat) to the south. The southern tip of Crescent Valley is at an elevation of approximately 4,950 feet amsl, dropping at an imperceptible 0.2 percent grade to the northeast. The northern end of Grass Valley is higher at approximately 5,750 feet amsl, with gradual slopes out of the surrounding mountains and a 1.1 percent grade to the south. The mountains both east and west of the proposed project boundary are quite rugged, with Mount Tenabo being particularly steep.

Noise levels in the study area were determined from measurements taken at seven locations in the vicinity of the proposed mining activity: on the northeast slope of Rocky Pass; at the Dean Ranch headquarters; in the Horse Canyon Haul Road vicinity; on the south-southeast side of the existing Pipeline Pit; on the existing tailings facility at the Cortez Complex, south of the Cortez Mill; near the existing Pipeline Heap

Leach/Tailings Facility; and in the parking lot of CGM's headquarters and maintenance yard at the existing operation. Noise levels generally were very low throughout the area. As would be expected in a rural area, levels were highest in high activity areas near the existing mine.

Background noise, approximated by the noise level exceeded 90 percent of the time (L_{90}) in the measurement data (Appendix E), is very low in outlying portions of the analysis area, ranging from 29.5 decibels, A-weighted (dBA) to 32.6 dBA, which is equivalent to a library reading room (see Appendix E). Background levels in close proximity to existing mining activities were somewhat higher, ranging from 41.0 to 53.0 dBA, which would be similar to a quiet urban environment. Average equivalent continuous sound levels (L_{eq}) ranged from 37.3 to 45.6 dBA in outlying areas, but these levels were influenced by low-level aircraft flyovers in several cases. If measurements with flyovers are deleted, the range dropped to 34.2 to 41.1 dBA. The measured L_{eq} for areas close to existing mining activities ranged from 48.1 to 57.3 dBA. Notably, the measurements taken at the CGM headquarters parking lot produced the highest of all levels recorded. This was a reflection of the high levels of existing activity, including heavy equipment movement, maintenance activities, and mill operations. Noise from blasting and from the warning sirens that precede it were audible above background noise, although, even at the relatively close measurement location (approximately 100 yards south-southeast of the pit) the measured maximum level was less than 70 dBA. (The measurements were taken at a location approximately 100 yards south-southeast of the existing Pipeline Pit; however, the effective distance from the source of the blast was estimated as approximately 10,000 feet because the blast occurred on the opposite side of the pit and at an elevation below the level of the pit wall.) **Table 3.16-1** presents typical noise levels associated with several common indoor and outdoor activities, which will be helpful for understanding noise emission levels from the Cortez Hills Expansion Project.

Table 3.16-1
Typical Values of Sound Level of Common Noise Sources

Sound Pressure Level (dBA)[1]	Common Indoor Noise Levels	Common Outdoor Noise Levels
110	Rock band	--
105	--	Jet flyover at 1,000 feet
100	Inside New York subway train	--
95	--	Gas lawn mower at 3 feet
90	Food blender at 3 feet	--
80	Garbage disposal at 3 feet, or shouting at 3 feet	Noisy urban daytime
70	Vacuum cleaner at 10 feet	Gas lawn mower at 100 feet
65	Normal speech at 3 feet	Commercial area, heavy traffic at 300 feet
60	Large business office	--
50	Dishwasher in next room	Quiet urban daytime
40	Small theater, large conference room	Quiet urban nighttime
35	--	Quiet suburban nighttime
33	Library	--
28	Bedroom at night	--
25	Concert hall (background)	Quiet rural nighttime
15	Broadcast and recording studio	--
5	Threshold of hearing	--

[1] A-weighted sound pressure level.

Source: BLM 2000b.

For additional information on existing noise sources in the project vicinity and a brief discussion of basic noise analysis, please refer to the South Pipeline Project Final EIS (BLM 2000a) and the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). Both documents used very conservative estimates of noise emissions to forecast project-related noise levels. Despite their conservative approach, the analyses did not identify significant noise effects from regular project operations and only identified "potentially significant" effects from blasting. Field measurements taken for this analysis found actual noise levels from both mining and blasting to be lower than previously projected.

3.16.2 Environmental Consequences

Noise impacts commonly are judged according to two general criteria: the extent to which a project would exceed federal, state, or local noise regulations, and the estimated degree of disturbance to people. There are no specific federal, state, or local noise regulations that would govern at the Cortez Hills Expansion Project site. Neither the State of Nevada nor Lander County has noise regulations governing mining operations.

Without legislative guidance, the degree of disturbance becomes the key factor in evaluating noise effects. In this case, evaluating disturbance suggests a focus on residents of the four ranches in the general vicinity of the proposed project and, to a lesser degree, for residents of Crescent Valley. The concept of human disturbance is known to vary with a number of interrelated factors, including not only changes in noise levels, but the presence of other, non-project-related noise sources in the vicinity; peoples' attitudes toward the project; the number of people exposed; and the type of human activity affected (e.g., sleep or quiet conversation as compared to physical work or active recreation).

Hard rock mining generates noise from two primary sources: operations of both stationary and mobile heavy equipment, and blasting to loosen overburden and ore from the bedrock for removal by truck and shovel operations. With these considerations in mind, two significance criteria have been identified for evaluating the potential noise effects of the project. Impacts to the noise environment would be considered significant if the Proposed Action or alternatives result in the following:

- Noise levels (excluding short-term blasting-related noise) at sensitive receptors in excess of 55 dBA, equivalent continuous sound level

- Maximum blasting-related noise levels at sensitive receptors in excess of 70 dBA, maximum noise level (L_{max})

3.16.2.1 Proposed Action

Major sources of noise from the proposed mining and processing operations would include drilling, blasting, and loading of rock and ore; truck hauling; ore crushing; and crushed ore handling and distribution. Project construction also would include road building associated with the proposed realignment of CR 222 and CR 225. An equipment roster for surface mining activities with associated noise emissions estimates is presented in **Table 3.16-2**. Noise emissions estimates were developed from published USEPA data

(USEPA 1971b), from the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e), and from file data for comparable mining projects in Nevada and other western states.

Table 3.16-2
Surface Mining Equipment Roster and Associated Noise Emissions

Type of Equipment	Number of Added Units	dBA[1]
Electric wire rope shovels	2 to 3	90
Hydraulic shovel	1	85
Haul trucks (85- to 400-ton)	16 to 23	90
Rotary drills	7 to 10	86
Track bulldozers	4 to 6	85
Rubber tired bulldozers	5 to 7	85
Graders	2 to 3	85
Water trucks	3 to 4	83
Bobcat loader	1 to 3	75
Light plants	10 to 14	78
Blasting trucks	4 to 5	83
Tractor with two 10,000-gallon tanker-trailers	1	85
Trackhoe	1	85
Load-haul-dump machines	3 to 5	85
Haul trucks (40-ton)	10 to 14	80
Development and production drills	4 to 8	86
Flatbed carriers	2 to 3	85
Explosives trucks	2 to 3	83
Road grader	1	85

[1] A-weighted sound pressure levels measured at a reference distance of 50 feet.

The proposed project facilities would be located within the 57,058-acre project boundary, an area of almost 89 square miles. However, project-related noise primarily would emanate from several major focal points of activity within that area. The main noise-generating activity centers would include the North Gap Pit expansion area; Pipeline Waste Rock Facility; Cortez and Cortez Hills pits; Canyon, North, and South waste rock facilities; Cortez and Pipeline mills; and Cortez and Grass Valley heap leach facilities.

For purposes of this analysis, equipment units were assigned to the activity centers, and noise levels were calculated for each of the five noise sensitive receptors identified in Section 3.16.1. The analysis was extremely conservative, assuming all equipment would be operating at full power simultaneously at all of the activity centers. In addition, noise attenuation between the sources and the sensitive receptors was calculated only for the spreading of the sound waves over the distance to the residences. (Taken into consideration were topographic barriers partially blocking Grass Valley Heap Leach Facility-related noise from all of the sensitive receptors, and partially blocking noise from several of the east valley activity centers to the Filippini Ranch and to the Dann Ranch.) As a result, the calculated noise levels are higher than actual project-related noise levels are expected to be. A less conservative, more detailed, analysis would adjust the noise emissions downward in relation to the duty cycles of the equipment; would increase the

attenuation for atmospheric absorption and ground absorption; and would adjust the attenuation over time for barrier changes as pit depths increased and the waste rock piles and heap leach pads grew. In this case, a more detailed evaluation proved unnecessary, because the conservative analysis did not produce noise levels in excess of the significance thresholds.

Based on the equipment distribution scenarios developed for the project activity centers and the highly conservative assumptions described above, the projected noise levels at the five sensitive receptors all would be below 50 dBA, including both project-related noise and background noise. The highest level calculated would be just below 50 dBA at the Cortez-owned Wintle Ranch. The lowest projected levels would be just over 38 dBA at the Dann Ranch and just over 43 dBA at Crescent Valley. Projected levels at the Dean Ranch and the Filippini Ranch would be 48 dBA and slightly under 45 dBA, respectively. These levels, should they occur, would be loud enough to be heard at the receptors during very low noise periods, but would not be loud enough to interfere with normal speech communications. Based on the calculations, field measurements, and field observations of noise during operations at the existing mine, it is likely that noise from the proposed operations would be barely discernable above ambient levels at the noise sensitive areas at most times and under most weather conditions.

As the proposed project would proceed, pit noise reaching the ranch areas would decline because the pit walls would form their own noise barriers, becoming more effective as the pits are deepened.

Blasting noise is not included in the noise level estimates noted above, primarily because mine blasting is typically an extremely brief event occurring an average of once per day in each pit. Although blasts are perceived to be one large explosion, mining blasts are actually a series of smaller, single-hole explosions. Each hole is sequentially delayed and detonated independently of the other holes. Less noise and ground vibrations are generated because several small blasts (delays) are detonated in sequence rather than as one large instantaneous blast. Blasting can be further controlled by varying the amount of explosive, the type of delay, the delay sequence, and the type of explosives. Blasting would take place only during daylight hours and would be conducted under strict MSHA safety procedures.

Information on noise emissions from blasting is inconsistent. Noise analyses for prior development proposals at the Cortez facilities (BLM 2000a, 2004e) have assumed blasting noise levels of approximately 115 to 125 dBA at 900 feet from the blast source, lasting for up to 15 seconds. In contrast, measurements taken for this EIS at the Pipeline Pit in 2003 recorded L_{max} of 69.8 dBA at an estimated equivalent of approximately 10,000 feet from the source, lasting for less than 5 seconds, which would be equivalent to approximately 91 dBA at 900 feet, a substantially lower level (Appendix E).

Based on the field measurements and observations from the same time, this analysis assumes the lower levels are more representative of the actual blasting noise than the assumed levels used for prior EISs. The resulting L_{max} noise levels from blasting are projected to be below 61 dBA at all five of the sensitive receptors. The highest level would be just over 60 dBA at the Wintle Ranch. Levels at other receptors would range from a low of 51 dBA at Crescent Valley to slightly over 57 dBA at the Dean Ranch. In addition, as the mine pits increase in depth, the noise from blasting would be increasingly reflected upward by the pit walls, further reducing the noise levels outside the pits.

With modern blasting techniques, the blasting would be experienced by people at the ranches as a brief, somewhat muted clap and roll of thunder preceded by a warning whistle or siren. Public acceptance generally is improved by scheduling blasting at the same time every day to further reduce the "startle factor."

In summary, the proposed Cortez Hills Expansion Project would generate high noise levels on the site, but there are no sensitive receptors near enough to experience significant adverse noise effects. Mine-related noise would not exceed the significance thresholds at any of the identified sensitive receptors.

In response to public concern regarding potential blasting-related vibration damage to historic headstones in the Cortez cemetery, CGM has agreed to conduct an inventory of the condition of the headstones prior to initiation of mining and periodically monitor the headstones to identify any damage so that preventative measures or repairs could be quickly and appropriately accomplished (see Section 2.4.11, Applicant-committed Environmental Protection Measures).

3.16.2.2 Grass Valley Heap Leach Alternative

This alternative would be similar to the Proposed Action, except the Grass Valley Heap Leach Facility would be moved approximately 1.5 miles south-southeast of the location identified for the Proposed Action. Noise effects under this alternative would be essentially the same as described for the Proposed Action. Both the proposed location for the heap leach facility and the Grass Valley alternative location are screened from the five identified noise sensitive receptors by substantial terrain barriers, so the facility would have very little, if any, effect on noise at the receptors.

3.16.2.3 Crescent Valley Waste Rock Alternative

The Crescent Valley Waste Rock Alternative would shift the associated noise activity from Cortez Canyon to the valley floor. The Proposed Action included noise generating activity on the Gold Acres haul road and the potential cross-valley conveyor through the valley floor area as well as on the expanded site of the Pipeline Waste Rock Facility. This alternative would increase the intensity of this activity somewhat because equipment would be operating more consistently on the valley floor in association with the waste rock facility development. The effect on noise levels at the five sensitive receptors would be minimal, however, because the distances to the receptors would be 5 miles or more, which, combined with the estimated noise emission levels of the equipment, would reduce the noise levels to well below the significance threshold. As a result, the effects of the Crescent Valley Waste Rock Alternative on noise levels in the study area would be considered minor.

3.16.2.4 Cortez Hills Complex Underground Mine Alternative

The Cortez Hills Complex Underground Mine Alternative substantially would reduce the amount of aboveground activity associated with the proposed project. Most of the new heavy equipment needed for this alternative would be slated for use underground where noise emissions would be blocked from transmission to sensitive receptors. As a result, the project-related noise levels at sensitive receptors, which

are projected to be well below the significance threshold for the Proposed Action, would be even lower under this alternative.

3.16.2.5 Revised Cortez Hills Pit Design Alternative

This alternative would be very similar to the Proposed Action from a noise perspective. There would be no more than two electric wire rope shovels, one or two fewer haul trucks, and possibly one fewer water truck compared with the equipment listed in Table 3.16-2 for the Proposed Action. Considering the nature of equipment use in a large surface mine, the potential noise effects would be undistinguishable from those of the Proposed Action at any of the noise-sensitive receptors, or elsewhere in the vicinity.

3.16.2.6 No Action Alternative

Under the No Action Alternative, the proposed Cortez Hills Expansion Project would not be developed, and associated noise effects would not occur. The existing Pipeline/South Pipeline Project and Cortez Underground Exploration Project would continue under current authorizations.

Noise effects under the No Action Alternative would be a continuation of the effects described in the South Pipeline Project Final EIS (BLM 2000a) and the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). Noise from the Cortez Mine Underground Exploration Project operation would be similar to the noise effects discussed above for the Cortez Hills Complex Underground Mine Alternative, but likely would be even less because of the lower intensity and smaller scale of the activity. Overall, noise levels would be approximately the same as the measured levels illustrated in Appendix E, although the additional development authorized for the Pipeline/South Pipeline Pit Expansion Project had not been implemented at the time of the field monitoring. These noise levels would continue until 2012 or longer, depending on the pace of development and mining of the previously approved facilities. After that time, noise levels would revert to levels influenced primarily by weather conditions, birds and insects, and aircraft flyovers. Although the previous analyses (BLM 2000a, 2004e) indicated possible significant noise effects from blasting, the current analysis suggests this would not be the case.

The effects of the No Action Alternative on noise levels in the study area would be considered minor.

3.16.3 Cumulative Impacts

The cumulative effects study area for noise is shown in **Figure 3.1-10**. Past and present actions and RFFAs are identified in **Table 2-*18*** and shown in **Figure 2-*26***.

Past actions would have no effect on noise in the cumulative effects study area, because noise emissions terminate at the completion of a project or activity. Any potential cumulative noise effects from present actions are included in the measured background levels for the proposed Cortez Hills Expansion Project (see Appendix E), although no such noise effects were observed at the time of the field monitoring. Noise from future actions would not be expected to cause cumulative effects with noise from the Proposed Action,

because noise tends to be localized to an area within 2 to 5 miles of an activity, and there are no future actions near enough to the Cortez Hills Expansion Project, and with sufficiently strong noise emissions, to create cumulative noise effects.

Cumulative noise effects associated with the Grass Valley Heap Leach***,*** Crescent Valley Waste Rock***, and Revised Cortez Hills Pit Design*** alternatives would be similar to the cumulative noise effects of the Proposed Action. There would be an incremental reduction in cumulative noise effects of the Cortez Hills Complex Underground Mine Alternative relative to the cumulative noise effects of the Proposed Action as surface facilities would not be developed at the Cortez Hills Complex and noise associated with underground operations would be blocked from transmission.

3.16.4 Monitoring and Mitigation Measures

No significant adverse noise effects that warrant monitoring or mitigation have been identified as a result of the proposed project.

3.16.5 Residual Adverse Effects

Upon completion of the construction, operation, and closure and reclamation activities associated with the proposed Cortez Hills Expansion Project, noise emissions would cease and there would be no residual noise effects.

3.17 Hazardous Materials and Solid Waste

The study area for direct, indirect, and cumulative impacts for hazardous materials and solid waste (hazardous and non-hazardous) encompasses the Cortez Hill Expansion Project and the main transportation routes to the site, including SR 306 to I-80 and the access roads to the mine site and related facilities from SR 306.

3.17.1 Affected Environment

The affected environment for hazardous materials includes air, water, soil, and biological resources that potentially could be affected by an accidental release of hazardous materials during transportation to and from the mine and during storage and use at the mine.

3.17.1.1 Project-related Hazardous Materials

The mining and ore processing operations for the proposed project would require the use of the following materials classified as hazardous:

- Diesel fuel, gasoline, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- Sodium cyanide, sodium hydroxide, acid, flocculants, lime, and antiscalants used in mineral extraction processes;
- Ammonium nitrate and high explosives used for blasting in the open pits; and
- Various by-products classified as hazardous waste and chemicals used in the existing assay laboratory.

As discussed in Section 2.4.9, Hazardous Materials Management, there would be no change in the current reagent consumption rate at the existing Pipeline Mill to facilitate the processing of a portion of the mill-grade ore mined under the proposed project. The additional quantities of reagents required for the proposed project are identified in **Table 2-5**.

3.17.1.2 Regulatory Definitions of Hazardous Materials

"Hazardous materials," which are defined in various ways under a number of regulatory programs, can represent potential risks to both human health and the environment when not properly managed. The term hazardous materials includes the following materials that may be utilized or disposed of in conjunction with mining operations:

- Substances covered under OSHA and MSHA Hazard Communication Standards (29 CFR 1910.1200 and 30 CFR 42): The types of materials that may be used in mining activities and that would be subject to these regulations would include almost all of the materials identified above.

- “Hazardous materials" as defined under USDOT regulations at 49 CFR, Parts 170-177: The types of materials that may be used in mining activities and that would be subject to these regulations would include sodium cyanide, explosives, cement, fuels, some paints and coatings, and other chemical products.

- “Hazardous substances” as defined by CERCLA and listed in 40 CFR Table 302.4: The types of materials that may contain hazardous substances that are used in mining activities and that would be subject to these requirements would include sodium cyanide, solvents, solvent-containing materials (e.g., paints, coatings, degreasers), acids, and other chemical products.

- “Hazardous wastes” as defined in the Resource Conservation and Recovery Act (RCRA): Procedures in 40 CFR 262 are used to determine whether a waste is a hazardous waste. The types of materials used in mining activities and that could be subject to these requirements could include liquid waste materials with a flash point of less than 140°F, spent solvent containing wastes, corrosive liquids, and lab assay wastes. Hazardous wastes are regulated under Subtitle C of RCRA.

- Any “hazardous substances” and "extremely hazardous substances" as well as petroleum products such as gasoline, diesel, or propane, that are subject to reporting requirements if volumes on-hand exceed threshold planning quantities under Sections 311 and 312 of SARA: The types of materials that may be used in mining activities and that could be subject to these requirements would include fuels, coolants, acids, and solvent-containing products such as paints and coatings.

- Petroleum products defined as "oil" in the Oil Pollution Act of 1990: The types of materials used in mining activities and that would be subject to these requirements include fuels, lubricants, hydraulic oil, and transmission fluids.

In conjunction with the definitions noted above, the following lists provide information regarding management requirements during transportation, storage, and use of particular hazardous chemicals, substances, or materials:

- The SARA Title III List of Lists or the Consolidated List of Chemicals Subject to EPCRA and Section 112(r) of the CAA.

- The USDOT listing of hazardous materials in 49 CFR 172.101.

Certain types of materials, while they may contain potentially hazardous constituents, are specifically exempt from regulation as hazardous wastes. Used oil, for example, may contain toxic metals, but would not be considered a hazardous waste unless it meets certain criteria. Other wastes that might otherwise be classified as hazardous are managed as “universal wastes” and are exempted from hazardous waste regulation as long as those materials are handled in ways specifically defined by regulation. An example of a material that could be managed as a universal waste is lead-acid batteries. As long as lead-acid batteries are recycled appropriately, requirements for hazardous waste do not apply.

Pursuant to regulations promulgated under CERCLA, as amended by SARA, release of a reportable quantity of a hazardous substance to the environment must be reported within 24 hours to the National Response Center (40 CFR Part 302). The NAC (445A.347) also requires immediate reporting of a release of a reportable quantity of a hazardous substance to the Nevada Division of Emergency Management. In addition, under the State of Nevada Water Pollution Control Permit program, all releases of a reportable quantity must be reported as soon as possible, but not later than 24 hours after the event, to the NDEP Bureau of Corrective Actions. Nevada regulates the storage and handling of certain defined "highly hazardous substances" under NAC 459.952-459.9542.

Incidental spills of hazardous substances have occurred during previous mining and mineral processing operations at the project site. All reported spills have been mitigated, and contaminated materials have been managed in accordance with federal and state regulations.

3.17.1.3 Regulatory Definition of Solid Waste

Solid waste consists of a broad range of materials that include garbage, refuse, wastewater treatment plant sludge, non-hazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances) resulting from industrial, commercial, mining, agricultural, and community activities (USEPA 2001a). Solid wastes are regulated under different subtitles of RCRA and include hazardous waste (discussed in the previous section) and non-hazardous waste. Non-hazardous wastes are regulated under RCRA Subtitle D. In Nevada, solid waste rules are found in the NAC. Disposal of solid waste is regulated under NAC 444.570-444.7499; disposal of hazardous waste is regulated under NAC 444.850-444.8746.

3.17.2 Environmental Consequences

3.17.2.1 Proposed Action

Project-related Hazardous Materials

The Proposed Action would require the transport, handling, storage, use, and disposal of materials classified as hazardous under various regulatory frameworks. All hazardous materials would be shipped to and from the site in accordance with applicable USDOT hazardous materials regulations. All shipping containers and vehicles would be USDOT-approved for the specific materials. The proposed rates of use and storage volumes of these substances are listed in **Table 2-5**. A brief description of the storage, use, and spill response for hazardous materials during operations under the Proposed Action is presented in Section 2.4.9, Hazardous Materials Management.

The major issues concerning hazardous materials include:

- The potential for an accident during transport of hazardous materials; and
- The potential impacts of accidental hazardous materials spills or releases.

Impacts associated with hazardous materials would be considered significant if the Proposed Action or other alternatives result in the following:

- One or more accidents during transport, resulting in the release of a reportable quantity of a hazardous material.
- Release of a hazardous material on the site exceeding the storage volume of the containment structure.

Important issues related to the presence of hazardous materials at the proposed facility are the potential impacts to the environment from an accidental release of hazardous materials during transport to the project site or a release related to use or storage at the site. The criterion for evaluating hazardous materials impacts is the risk of a potential spill and the associated impacts to sensitive receptors along transportation routes or exposure pathways.

If some of the chemicals identified for use during the life of the proposed project were to enter the environment in an uncontrolled manner, there could be associated direct or indirect adverse effects. The environmental effects of a release would depend on the substance, quantity, timing, and location of the release. The event potentially could range from a minor oil spill on the project site where cleanup equipment would be readily available, to a large spill during transport involving a release of sodium cyanide solution. Some of the chemicals could have immediate, but short-term destructive effects on aquatic resources and water quality if spills were to enter waterways such as the Humboldt River. Spills of hazardous materials could seep into the ground and contaminate the local groundwater. Depending on the proximity of such spills to populated areas or the use of degraded water for human consumption, such accidental spills could affect human health.

Transportation. Trucks would be used to transport hazardous materials to the project site. Based on the quantity, number of deliveries, and potential hazard, the materials of greatest concern would be sodium cyanide solution and diesel fuel. These chemicals most likely would be supplied from Elko and Carlin, Nevada. The most likely transportation route would be west on I-80 from Elko or Carlin to SR 306, and then to the project access roads. The Humboldt River would be the major surface water body crossed along this route. This analysis of transportation hazards is confined to trucking along SR 306 (approximately 40 miles from I-80 to the project site) and does not consider I-80, where project-related trucks would be a very small percentage of the total truck volume.

Based on the annual consumption rates shown in **Table 2-5**, an approximate load delivery frequency for the materials can be determined. Assuming all sodium cyanide would be delivered in solution form, approximately 333, 15-ton loads of sodium cyanide would be delivered each year. Diesel fuel use would require approximately 1,100, 10,000-gallon shipments per year.

In order to evaluate the potential impact of the transport of hazardous materials to the mine site, the risk of a transportation accident resulting in a release of hazardous materials was estimated. Accident rates were derived from national statistics for truck accidents that involve hazardous materials as published by the

Federal Motor Carrier Safety Administration (Battelle 2001). Accident rates estimated below vary for different categories of hazardous materials and are based on 1996 data and include accidents involving releases and non-releases of hazardous cargo. The accident rate involving the category of toxics such as sodium cyanide is 0.50 per million miles traveled. The accident rate involving flammable materials (including diesel fuel) is 0.13 per million miles traveled. Using these rates, the potential number of transportation-related incidents for these three materials occurring over the life of the project is shown in **Table 3.17-1**.

Table 3.17-1
Potential Number of Mine-related Transportation Accidents Involving a Release

Material	Number of Shipments[1]	Distance (miles)	Accident Rate per Million Miles[2]	Calculated Number of Accidents (distance x accident rate)	Probability of Release per Accident[3]	Calculated Number of Potential Releases
Sodium Cyanide	249	173,320	0.50	0.005	0.36	0.002
Diesel Fuel	6,800	440,000	0.13	0.035	0.28	0.010

[1] For sodium cyanide, the number of shipments covers a 13-year period. For diesel fuel, it covers a 10-year period, as fuel consumption during reclamation would be negligible compared to consumption during mining.
[2] Includes release and non-release accidents.
[3] Releases during accidents; does not include loading and unloading incidents (Battelle 2001).

The above analysis indicates that there would be a low probability of an accident involving the release of hazardous materials during the life of the Proposed Action. Based on the foregoing, there would be a very low potential for a significant impact due to a hazardous material release during transportation.

Hazardous substances would be transported by commercial carriers or vendors in accordance with the requirements of Title 49 of the CFR. Carriers would be licensed and inspected as required by NDOT and USDOT. Tanker trucks would be inspected and would have a Certificate of Compliance issued by the Nevada Motor Vehicle Division. These permits, licenses, and certificates are the responsibility of the carrier. Title 49 of the CFR requires that all shipments of hazardous substances be properly identified and placarded. Shipping papers must be accessible and must include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire-fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

In the event of a release during transport to the mine site, the transportation company would be responsible for response and cleanup. Each transportation company is required to have an emergency response plan to address spills and accidental releases of hazardous materials. Local and regional law enforcement and fire protection agencies also may be involved initially to secure the site and protect public safety. Title 49 of the CFR requires that the carrier notify local emergency response personnel, the National Response Center (for discharge of reportable quantities of hazardous substances), and the USDOT in the event of an accident involving hazardous materials.

Storage and Use. CGM has developed a Hazardous Materials Spill and Emergency Response Plan. The plan describes the required level of containment and safety measures associated with storage, handling, and spill clean-up of oil (includes but is not limited to petroleum, fuels, sludge, used oil, and mineral oil). Operations conducted in accordance with this plan would ensure that impacts from spills would be minimized and the spilled materials contained and removed. CGM would have the necessary spill containment and cleanup equipment available at the site, and personnel would be able to quickly respond.

Particular provisions of the plan include the following:

- A prediction of the direction, rate of flow, and total quantity of oil spilled from any point where there is a reasonable potential for equipment failure.
- Appropriate containment and diversionary structures including berms, containment ponds, retaining walls, and collection systems.
- A commitment of manpower and equipment to expeditiously control oil that is released in “harmful quantities.”
- A complete discussion of all regulations and procedures that apply to facility drainage, bulk storage tanks, facility transfer operations, pumping and in-plant processes, facility tank truck loading/unloading operations, inspections and records, security, and personnel training requirements.

In the event of a major or minor spill of hazardous materials occurring on site, CGM’s Hazardous Materials Spill and Emergency Response Plan establishes procedures for preventing, controlling, and reporting environmental releases within or from facilities located at the proposed Cortez Hills Expansion Project. The Hazardous Materials Spill and Emergency Response Plan is required to contain the following information in addition to general information concerning the facility and emergency response procedures:

- A hazard evaluation;
- Response planning levels;
- Facility response training drills/exercises;
- Description of discharge protection systems;
- The identity and telephone number of the designated qualified individual having authority to implement removal activities;
- The identity of individuals to be contacted;
- A description of information to be passed to response personnel;

- A description of response equipment and location;
- A description of response personnel capabilities and duties;
- Evacuation plans as appropriate;
- A description of immediate containment measures; and
- A diagram of the facility.

The existing and proposed processing facilities, which would be used under the Proposed Action, were designed to minimize the potential for an upset that could result in a major spill. These facilities are described in Section 2.4, Proposed Action. The Hazardous Materials Spill and Emergency Response Plan would continue to be implemented under the Proposed Action to provide the structures, procedures, and training to minimize the impacts of a potential spill of a hazardous material.

All hazardous substances would be handled in accordance with applicable MSHA or OSHA regulations (Titles 30 and 29 of the CFR). The hazardous materials to be used under the Proposed Action would be handled as recommended on the manufacturer's MSDS. Based on the facility's design features and the operational practices in place, the probability of a major release occurring at the site during the life of the proposed project is considered to be low. Based on the foregoing, there would be a very low potential for a significant impact from storage of hazardous materials.

Disposal. The procedures for storage, containment, transportation, and handling of hazardous waste are outlined in CGM's Solid and Hazardous Waste Management Plan, which currently is, and would continue to be, implemented. Slag from the assay lab currently is, and would continue to be, introduced into the production circuit for gold recovery or disposed of off site at an approved facility. All hazardous waste generated at the mine (e.g., cupels, crucibles, and any liquid lab wastes that meet the hazardous waste criteria) would be transported to licensed disposal facilities in accordance with applicable federal and state regulations.

Potential Effects of a Release. The environmental effects of a release would depend on the material released, the quantity released, and the location of the release. The accident/release statistics presented in **Table 3.17-1** assume an accident involving a hazardous material transporter, but do not address volume or location. Potential releases could include a small amount of diesel fuel spilled during transfer operations at the mine site or the loss of several thousand gallons of diesel fuel or sodium cyanide into a riparian drainage, such as the Humboldt River. In general, the materials of greatest concern would be sodium cyanide and diesel fuel.

A large-scale release of fuel, corrosives, or cyanide would have implications for public health and safety. The location of the release would again be the primary factor in determining its importance. A release in a relatively more populated area could have effects ranging from simple inconvenience during cleanup to potential loss of life if an explosion and fire were involved. However, the probability of a release anywhere

along a transportation route is very small, the probability of a release within a populated area is smaller, and the probability of a release involving an injury or fatality is smaller still. USDOT statistics show that for the State of Nevada between 1983 and 1992, an average of 0.03 injuries or deaths occurred for each hazardous materials highway incident (USDOT 1993). It is not anticipated that a release involving severe effects to human health or safety would occur during the life of the project. None of the process chemicals or fuels to be used in large quantities are carcinogenic. As a result, no increases in cancer risk as a result of a release or mining activity are expected.

The release of a hazardous material or waste into a sensitive area (e.g., stream, wetland, or populated area) is judged to be very unlikely. Again, depending on the material released, the amount released, and the location of the release, an accident resulting in a release could affect soils, water, biological resources, and people.

Response to a Release. All spills, including transportation and loading/unloading spills occurring on site, would be cleaned up as soon as possible. If a spill exceeds reportable quantities, it would be reported to the Nevada Division of Emergency Management; NDEP; BMRR; USEPA; National Response Center; BLM; and Lander County Emergency Response Coordinator.

In the event of a release en-route to the mine site, the transportation company would be responsible for response and cleanup. Law enforcement and fire protection agencies also would be involved to initially secure the site and protect public safety.

Hazardous materials transporters are required to maintain an emergency response plan which details the appropriate response, treatment, and cleanup for a material spilled onto land or into water. For example, a release of hydrochloric acid could require neutralizing the spill with lime, flushing the area with water, or removing contaminated soil. Specific procedures would be developed for fuels, acids, and other hazardous materials. Any cleanup would be followed by appropriate restoration of the disturbed area, which could include replacing removed soil, seeding the area to prevent erosion, and the return of the land to its previous use.

Project-related Solid Wastes

Non-hazardous solid waste would be disposed of in the proposed Class III landfill that would be located on private land in Grass Valley or in the existing on site landfill in accordance with CGM's Solid and Hazardous Waste Management Plan. The landfill would be engineered and designed in accordance with State of Nevada solid waste landfill standards and materials disposed according to federal, state, and local regulations.

3.17.2.2 Grass Valley Heap Leach Alternative

The Grass Valley Heap Leach Alternative would result in an estimated increase of 13,660 hours of haul truck operation. The estimated increase in fuel consumption between the Proposed Action and Grass Valley Heap Leach Alternative would be 751,300 gallons during operations, which represents approximately

7 percent of the projected fuel use during mining operations. The projected increase in fuel use would result in a very small increase for the potential of an accidental transportation-related release.

The plans and procedures (Hazardous Materials Spill and Emergency Response Plan) that would be implemented to minimize the potential impacts of spills or releases of hazardous materials would be the same as described for the Proposed Action. The Grass Valley Alternative would present a very low potential for a significant impact involving a release of hazardous materials during transportation and storage.

3.17.2.3 Crescent Valley Waste Rock Alternative

The Crescent Valley Waste Rock Alternative would use an additional 12,000,000 million gallons of diesel fuel per year for a total of 18,800,000 gallons of fuel on an annual basis, based on the increased haulage distance to the alternate waste rock facility location. The additional fuel use would result in an increase of the calculated number of potential releases to 0.025, which is two and a half times the calculated number of potential releases under the Proposed Action. However, this number represents an extremely low probability of release over the lifetime of the project. The Crescent Valley Alternative would present a very low potential for a significant impact involving a release of hazardous materials during transportation and storage.

3.17.2.4 Cortez Hills Complex Underground Mine Alternative

Under this alternative, the estimated usage of fuels and reagents is less than under the Proposed Action. Therefore, the calculated accident rate and probability of release of hazardous materials would be less than for the Proposed Action. The Underground Mine Alternative would present a very low potential for significant impacts involving a release of hazardous materials during transportation and storage.

3.17.2.5 Revised Cortez Hills Pit Design Alternative

The potential effects of transportation and use of hazardous materials and the generation of solid waste for the Revised Cortez Hills Pit Design Alternative would be essentially the same as the Proposed Action.

3.17.2.6 No Action Alternative

Under the No Action Alternative, the proposed Cortez Hills Expansion Project would not be developed, and the potential for release of hazardous materials as a result of the proposed project would not occur. However the transportation, storage, use, and disposal of hazardous materials for the current mining and processing operation at the existing Pipeline/South Pipeline Project and the currently authorized Cortez Underground Exploration Project would continue until final reclamation has been completed. The South Pipeline Project Final EIS (BLM 2000b), Pipeline/South Pipeline Pit Expansion Project Final EIS (BLM 2004e), and Cortez Mine Underground Exploration Project EA (BLM 2006a) did not analyze the potential for releases of hazardous materials during transportation to the project site. However, the amounts of hazardous materials that were reported to be used are comparable to the proposed project, and as with the proposed project, there would be a low likelihood of a hazardous material release during transportation.

In addition, the existing facilities have a Hazardous Materials Spill and Emergency Response Plan in place that would provide the training and facility infrastructure to minimize the potential effects of a hazardous materials spill. The No Action Alternative would present a very low potential for a significant impact involving a release of hazardous materials during transportation and storage.

Under the No Action Alternative, non-hazardous solid waste would continue to be disposed in the currently permitted on site Class III waivered landfill.

3.17.3 Cumulative Impacts

The cumulative effects study area for hazardous materials is shown in **Figure 3.1-10**. The past and present actions and RFFAs are identified in **Table 2-*18*** and shown in **Figure 2-*26***.

The use of hazardous materials during active mining under the Proposed Action would be approximately the same as the current usage for the existing Pipeline/South Pipeline Project, in effect doubling the amount of hazardous materials that would be transported and used during the proposed 10 years of mining. However, even with doubling the amount of hazardous materials being transported to the site over the 10 years of concurrent mining, there still would be a low probability of a potential transportation release.

The Hazardous Materials Spill and Emergency Response and Solid and Hazardous Waste Management plans for the existing Pipeline/South Pipeline Project, and implementation of such plans for the proposed project, also would minimize the potential impacts of a spill or release of hazardous materials.

Continued future underground mining at the Cortez Hills site has been identified as a RFFA. Assuming that potential future underground mining would occur following the completion of the currently proposed open-pit and underground mining, but potentially during ongoing ore processing, the potential cumulative impacts would be similar to those described above relative to past and present actions. Ongoing mineral exploration in the area mainly would result in the consumption of fuels and lubricants and would represent only a fraction of the consumption and use of an operating mine.

Potential cumulative effects under the Grass Valley Heap Leach***,*** Crescent Valley Waste Rock***, and Revised Cortez Hills Pit Design*** alternatives would be the same as described for the Proposed Action. The potential for cumulative effects under the Cortez Hills Complex Underground Mine Alternative would be incrementally less than under the Proposed Action due to a lower usage of fuels and reagents for this alternative and a lower potential for a release.

3.17.4 Monitoring and Mitigation Measures

Due to the legal framework (and associated requirements) that regulates the transportation, storage, use, and disposal of hazardous materials and the disposal of solid wastes, no monitoring or mitigation measures have been identified.

3.17.5 Residual Adverse Effects

Residual adverse effects resulting from the use of hazardous materials under the Proposed Action would depend on the substance, quantity, timing, location, and response involved in the event of an accidental spill or release. Operation in accordance with the facility's Hazardous Materials Spill and Emergency Response Plan, and prompt cleanup of potential spills and releases, would minimize the potential of residual adverse effects due to an accidental spill or release of hazardous materials. Reagents such as sodium cyanide can be acutely toxic, but do not persist in the environment for long periods of time. Modern regulations that govern the transportation, storage, use, and disposal of hazardous materials have greatly reduced the potential for residual adverse effects due to hazardous materials.

Proper disposal of non-hazardous solid waste in an engineered Class III waivered landfill according to standards would minimize the potential for residual adverse effects with regard to such materials.

3.18 Relationship Between Short-term Uses of the Human Environment and the Maintenance and Enhancement of Long-term Productivity

As described in the introduction to Chapter 3.0, short-term is defined as the 10-year operational life of the project and the 3-year reclamation period; long-term is defined as the future following reclamation (i.e., beyond 13 years). This section identifies the tradeoffs between the short-term impacts to environmental resources during operation and reclamation versus the long-term impacts to resource productivity that would extend beyond the end of reclamation.

The short-term use of resources during the construction, operation, and reclamation of the proposed project would result in beneficial impacts in the form of additional local employment and the generation of revenue.

The proposed project would result in various short-term adverse impacts, such as the temporary loss of soil and vegetation productivity and the associated loss of wildlife habitat, possible wildlife avoidance and displacement, a temporary reduction in the livestock grazing area and an associated loss of animal unit months, temporary increases in fugitive dust, a temporary reduction in dispersed recreation opportunities, potential social and economic impacts to the local infrastructure, and increased noise levels. These impacts are expected to end upon completion of operations and would be minimized through implementation of applicant-committed environmental protection measures.

The short-term adverse visual impacts would last a few years beyond mine closure and gradually would be reduced as vegetation becomes more established. The scale and extent of the facilities would continue to alter the local landscape and views in the long term.

Impacts to long-term productivity (i.e., following project reclamation) primarily would depend on the effectiveness of the proposed reclamation of the disturbance areas. Successful reclamation would provide for post-mining wildlife and livestock grazing by establishing self-sustaining plant communities. Revegetation also is expected to stabilize disturbed surfaces and control erosion.

There would be long-term loss in wetland/riparian vegetation (approximately 0.7 acre) associated with mine-related surface disturbance and a potential long-term loss of wetland/riparian vegetation associated with 22 seeps and springs (approximately 3.5 acres) and 1 potential perennial stream associated with mine dewatering pending recovery of the groundwater table. There also would be a long-term loss in soil and vegetation productivity and associated terrestrial wildlife habitat, losses in woodland product productivity, a reduction in livestock grazing areas and an associated loss of animal unit months, and public lands used for dispersed recreation that would not be reclaimed. Long-term effects to resources important to Native Americans would include visual effects and effects to future pine nut harvesting.

3.19 Irreversible and Irretrievable Commitment of Resources

The Proposed Action could result in the irreversible commitment of resources (e.g., the loss of future options for resource development or management, especially of nonrenewable resources such as minerals or cultural resources) or the irretrievable commitment of resources (e.g., the lost production or use of renewable natural resources during the life of the operations). Irreversible and irretrievable impacts of the Proposed Action are summarized for each resource in **Table 3.19-1**.

Table 3.19-1
Irreversible and Irretrievable Commitment of Resources by the Proposed Action

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Geology and Minerals	Yes	Yes	Approximately 8 million ounces of gold would be mined during operations. This would result in the irreversible and irretrievable commitment of this resource.
Water Resources and Geochemistry	Yes	Yes	Groundwater levels affected by proposed mine dewatering and infiltration operations are predicted to partially recover in the long term. The total estimated volume of additional groundwater extracted during pit dewatering over the mine life is 50,200 acre-feet. Of this volume, an estimated 28,200 acre-feet would be reinfiltrated in Crescent Valley. The remaining volume of approximately 22,000 acre-feet over the life of the mine would be permanently removed from the groundwater system and consumed for operational use. This permanent extraction of groundwater is considered an irretrievable commitment of resources. Flows could be reduced in 22 inventoried springs and one potential perennial stream within the predicted groundwater drawdown area, resulting in an irretrievable impact. Flows associated with 15 of these springs could be irreversible.
Soils	Yes	Yes	Suitable growth media would be salvaged from the mine disturbance areas for use in reclamation. There would be a loss of soil productivity during operations on approximately 6,792 acres, resulting in an irretrievable commitment of this resource. There would be an irreversible commitment of the resource on approximately 999 acres associated with the Cortez Hills Pit and county road reroutes, which would not be reclaimed.
Vegetation	Yes	Yes	There would be an irretrievable commitment of vegetation resources on approximately 6,792 acres during operations; vegetation subsequently would be re-established on 5,793 acres. Approximately 999 acres of vegetation would be irreversibly lost as a result of development of the Cortez Hills Pit and county road reroutes. No irreversible or irretrievable impacts to special status plant species are anticipated.
Wildlife and Fisheries Resources	Yes	Yes	Approximately 6,792 acres of habitat would be irretrievably lost until vegetation has re-established following reclamation. Approximately 999 acres of the total habitat disturbance would be irreversibly lost to game and avian species as a result of development of the Cortez Hills Pit and county road reroutes. Impacts to special status wildlife species would parallel those for general wildlife.
Range Resources	Yes	Yes	There would be an irretrievable loss of 178 AUMs during the life of the project and an irreversible loss of 19 AUMs associated with the Cortez Hills Pit and county road reroutes.
Paleontological Resources	No	No	No disturbance to scientifically significant paleontological resources is anticipated.
Cultural Resources	***Yes***	No	***NRHP-eligible sites that may be impacted would be mitigated in accordance with the PA and/or Treatment Plan.***
Native American Traditional	Yes	Yes	The spiritual and religious experience may be diminished on Mount Tenabo as a result

Table 3.19-1 (Continued)

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Values			of visual disturbance (see Visual Resources). Permanent loss of 817 acres of piñon-juniper woodland would irretrievably impact future pine nut harvesting.
Air Quality	No	No	Project emissions would not exceed federal or state AAQS. Air quality would return to existing conditions after completion of the project.
Land Use and Access	No	No	There would be no irreversible or irretrievable impacts to access; public access patterns would be maintained.
Recreation and Wilderness	Yes	Yes	There would be an irretrievable loss of public land available for dispersed recreational opportunities during operations and reclamation; an irreversible loss would occur on approximately 999 acres of public land associated with unreclaimed lands.
Social and Economic Values	No	Yes	There would be increased local productivity including jobs for construction and operations workers during the life of the project. State and local government revenues also would benefit.
Environmental Justice	***No***	***No***	The proposed project would not disproportionately affect minority or low-income populations.
Visual Resources	Yes	No	Impacts to visual resources would be reduced through successful reclamation procedures and implementation of the environmental protection measures, but permanent changes would result.
Noise	No	No	Noise is not considered irreversible, because it would cease following the completion of mine operations.
Hazardous Materials and Solid Waste	No	No	No irreversible or irretrievable commitment of resources or impact is anticipated. However, if a spill were to affect a sensitive resource, an irretrievable impact could occur pending the recovery of the resource.

3.20 Energy Requirements

The estimated fuel and electrical power consumption for the Proposed Action and alternatives are provided in* Table 3.20-1*. In accordance with Nevada law, the electrical power consumed by CGM would continue to come from renewable energy sources, increasing from 11 percent in 2009 to 15 percent in 2013 and thereafter (Nevada State Legislature 2008). Barrick Gold Corporation has adopted a climate change program that is applicable to CGM and includes a commitment to improve energy efficiency by 8 percent from its 2006 baseline model by 2012. Any reductions that might be achieved from that program are not reflected in Table 3.20-1.

Table 3.20-1
***Project* Fuel and Power Consumption**

Alternative	*Annual Fuel Consumption (gallons)*	*Annual Power Consumption (megawatt-hour)*	*Annual Greenhouse Gas Emission (tons)*
Proposed Action	*17,800,000*	*229,000*	*385,707*
Grass Valley Heap Leach Alternative	*17,900,000*	*229,000*	*386,863*
Crescent Valley Waste Rock Alternative	*25,600,000*	*229,000*	*475,922*
Cortez Hills Complex Underground Mine Alternative	*13,000,000*	*194,000*	*302,705*
Revised Cortez Hills Pit Design Alternative	*17,800,000*	*229,000*	*385,707*
No Action Alternative	*11,000,000*	*183,000*	*270,934*

Source: CGM 2008a.

Recent scientific evidence suggests there is a direct correlation between global warming and emissions of greenhouse gases (GHG)* (Intergovernmental Panel on Climate Change 2007)*. GHGs include CO_2, methane, NO_X, and O_3. Although many of these gases occur naturally in the atmosphere, man-made sources substantially have increased the emissions of GHGs over the past several decades. Of the man-made GHGs, the greatest contribution currently comes from CO_2 emissions.

GHG emissions associated with the proposed project primarily would be associated with the consumption of energy for mining and ore processing over the 10-year mine life. Operations that would contribute to GHG emissions would include:

- ***Fuel consumption (vehicles and machinery)***
- ***Electricity consumption (machinery, milling, heap leach water circulation, dewatering)***

The current national annual emissions of GHGs are approximately 8 billion tons (USEPA 2008). Under the Proposed Action, the project would emit approximately 386,000 tons per year of GHGs, or approximately 0.0048 percent of the national annual emissions.

At present, there is no regulatory program that requires reductions in GHGs. However, in response to a Supreme Court decision interpreting the CAA, the USEPA has published an advance notice of

proposed rulemaking seeking public comment on whether GHG emissions should be regulated under the CAA, and if so, by what methods. Congress also is debating legislation that would impose regulatory controls or incentives for reducing GHG emissions.

4.0 PUBLIC COORDINATION

4.1 Public Participation and Scoping

The public participation program for the Cortez Hills Expansion Project EIS includes an open forum for determining the scope of issues to be addressed in the assessment.

The BLM initiated the scoping process by publishing a Notice of Intent to prepare an EIS in the Federal Register (FR) on December 2, 2005 (FR Volume 70, Number 231). Public scoping meetings for the EIS were held in Crescent Valley and Battle Mountain, Nevada, on December 19 and 20, 2005, respectively. The comments received during the scoping process were considered in developing this EIS.

The scope of the EIS reflects input received from the public and from appropriate government agencies. The scoping comments were summarized and included in the preliminary EIS Preparation Plan. The following are the key scoping issues identified for the proposed project.

- Potential air quality impacts from fugitive dust and mercury emissions
- Potential visual impacts associated with mine expansion
- Potential vibration-related impacts to culturally and spiritually important areas as a result of blasting
- Potential short-term and long-term impacts to groundwater and surface water quality
- Potential impacts to groundwater and surface water from pit dewatering and mercury emissions
- Potential impacts to water quality from acid-generating waste rock
- Post-closure pit water quality
- Regional impacts to groundwater from drawdown
- Potential for pit lake aquatic community development and associated potential impacts for fisheries and vegetation
- Potential impacts to native vegetation and soil productivity as a result of project development and reclamation
- Potential impacts to wildlife and wildlife habitat from land clearing, mine operations, conveyor and power line installation, noise, and a potential hazardous materials spill
- The need for an ecological risk assessment

- Potential short-term and long-term livestock grazing impacts
- Potential noise impacts from mine operations
- Potential transportation impacts associated with off site transport of ore and mine access traffic safety
- Access to, and protection of, cultural and spiritual sites
- Potential social and economic impacts
- Potential cumulative impacts

4.2 List of Contacts

While preparing the EIS for the proposed Cortez Hills Expansion Project, the BLM communicated with, and received input from, various federal, state, and local agencies and private organizations. The following sections list these contacts.

4.2.1 Federal Agencies

Bureau of Indian Affairs
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

4.2.2 State Agencies

Nevada Bureau of Air Pollution Control
Nevada Division of Environmental Protection
Nevada Department of Transportation
Nevada Department of Wildlife
Nevada Division of State Lands
Nevada Natural Heritage Program
State Historic Preservation Officer

4.2.3 Local Agencies

Lander County Clerk
Lander County Road and Bridge Department
Eureka County Assessor

4.2.4 Tribal Organizations

Battle Mountain Band
Confederated Tribes of the Goshute Reservation
Duck Valley Shoshone – Paiute Tribe
Duckwater Shoshone
Elko Band
Ely Shoshone
South Fork Band
Te-Moak Tribe
Timbisha Tribe
Wells Band
Western Shoshone Committee of Duck Valley
Yomba Shoshone

4.2.5 Other Organizations

Great Basin Mine Watch
Western Shoshone Defense Project
Western Watershed Project

4.3 List of Agencies, Organizations, and Persons to Whom Copies of this Statement are Sent

4.3.1 Federal Agencies

Bureau of Land Management, Carson City Field Office
Bureau of Land Management, Elko Field Office
Bureau of Land Management, Ely Field Office
Bureau of Land Management, Las Vegas Field Office
Bureau of Land Management, Pocatello Field Office
Bureau of Land Management, Tonopah Field Station
Bureau of Land Management, Winnemucca Field Office
U.S. Army Corp of Engineers, Reno, Nevada
U.S. Army Corps of Engineers, Sacramento, California
U.S. Department of the Interior, OEPC
U.S. Environmental Protection Agency, Washington, DC
U.S. Environmental Protection Agency, San Francisco, California
U.S. Fish and Wildlife Service, Reno, Nevada
U.S. Forest Service, Austin Ranger District
U.S. Forest Service, Tonopah Ranger District

4.3.2 State Agencies

Nevada State Clearinghouse/SPOC, Dept of Administration
Nevada Department of Agriculture
Nevada Department of Conservation and Natural Resources, Division of State Lands
Nevada Department of Minerals
Nevada Department of Transportation
Nevada Department of Wildlife, Elko, Nevada
Nevada Department of Wildlife, Las Vegas, Nevada
Nevada Department of Wildlife, Reno, Nevada
Nevada Division of Environmental Protection
Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation
Nevada Division of Forestry

4.3.3 Elected Officials

John Ensign, U.S. Senator
Pete Goicoechea, Assemblyman
Kenneth Guinn, Governor
John Marvel, Assemblyman
Harry Reid, U.S. Senator
Dean A. Rhoads, State Senator
Dina Titus, State Senator

4.3.4 County and Local Agencies

Eureka County Commissioners
Elko County Commissioners
Esmeralda County Commission
Eureka County Natural Resources Department
Greater Austin Chamber of Commerce
Humboldt River Basin Water Authority
Lander County Commissioners, Battle Mountain
Lander County Public Land Use Advisory Commission
Lander Economic Development Authority
Nye County Department of Natural Resources

4.3.5 Tribal Organizations

Battle Mountain Band Te-Moak Tribe of the Western Shoshone
Bureau of Indian Affairs, Eastern Nevada Agency
Duckwater Shoshone Tribe
Elko Band Te-Moak Tribe of the Western Shoshone
Ely Shoshone Tribe

Shoshone-Paiute Tribes of Duck Valley
South Fork Band Te-Moak Tribe of the Western Shoshone
Te-Moak Tribe of the Western Shoshone
Timbisha Shoshone Tribe
Wells Band Te-Moak Tribe of the Western Shoshone
Yomba Shoshone Tribe

4.3.6 Newspapers and Libraries

Battle Mountain Bugle
Elko Daily Free Press
Humboldt Sun

4.3.7 Organizations

Beatty Historical Museum Society
Commission for Preservation of Wild Horses
Committee for the High Desert
Earth Knowledge
EarthWorks
Eureka Sentinel Museum
Great Basin Mine Watch
MOSO RAC
Natural Resources Defense Council
Nevada Cattlemen's Association
Nevada Trappers Association
Railroad Symposium
Sierra Club
Sierra Club, Toiyabe Chapter
The Fund for Animals
Western Action Mining Project
Western Shoshone Defense Project
Western Watersheds Project
WHOA
Wild Horse Preservation League
Wild Horse Wildness and Wildlife

4.3.8 Industry/Business

Barrick Gold Corporation
Beatty Cattle Company LLC
Becker Realty
C Ranches Inc.
Carter Cattle Company

Chiara Ranch
Cortez Gold Mines
Cortez Joint Venture DBA Dean Ranch
Geothermal Associates
Hecla Ventures Corporation
JBR Environmental Consultants
Julian Tomera Ranches, Inc.
Kuipers and Associates
Nevada Land and Resource Company
Nevada Mining Association
Permits West Inc.
Plumb Line Mechanical
Resource Concepts Inc.
Romarco Minerals Inc.
Round Mountain Gold Corporation
Sansinena Ranch
Sierra Pacific Power Company
Summa Minerals
Toiyabe Exploration Inc.
Truckee River Ranch
Twin Springs Ranch
Vogue Linen Supply

4.3.9 Individuals

Leon Abrams
Gary Adams
Donna Bailey
Marriah Banghart
Clay Baty
Clinton and Ellen Boehringer
Madaya and Shayne Burdine
Edward Burger
Paul Burkett
Rex Cleary
Roy Clifford
Joe Dahl
Ronald Damele
Bruce Delaney
Al Drayton
Barbara and Ken Dugan
Eden
Leroy Etchegaray
John and Ginger Fareio
Malloy Foster
Aaron Foxworthy
Chris Fuller
Theresa Gaiato
Dawn Gann
Donna Grill
Carl and Carole Hanks
Ritonda Harding
Cynthia Harris
Rich Harrison
Tuesday Henderson
Jerry Hepworth
Bud Johns
Rod Johnson
Tara Johnson
L.A. Jones
Bill and Peggy Kirkpatrick
Lee Koch
Bill Kohlmoos

Julie Fishel
John Lemke
Frank Lewis
Herman Lindermann
Ruby Lingelbach
John Livermore
J. Locke
Sara Locke
Robert Long
Nancy Louden
Corey Lucero
Lowell Lynte
Dorene McClure
Suzy McCoy
Norman McKitrick
Richard Medley
Gale Mehrer
Diane Mihal
William Miller
John Minoletti
Sheldon Morrison
Marion Murphy
Jason New
Henry Nye
Eric Oakes
Royal Orser
Adell and Norman Panning
Durk Pearson
Elaine Peterson
Earl Phillips
Bruce Piscitello
David Plummer
Kenneth Reim
Trish Rippie
Joe Rodriquez
Bret Rosecrans
Brian Rowley
Sam Sandoval
Mike Sansinena
Jay Scott
Sandy Shaw
Norman Sharp
Diane Shelley
Wanda Shuflin
Brian Krueger
Marjorie Sill
Mark Simpson
Stanley Smith
Gordon Sobering
Randy Spevak
Kevin Stills
Jason Sutherland
Beth Swartz
Bill Templeton
JoAnne Thomas
Vernon Thompson
Fidel Velqsquez
Jose Vasquez
Ronie Waddell
Ed and Miriam Ylst

4.4 Public Comments and Responses

4.4.1 Draft EIS Public Review

A 60-day public comment period for the Cortez Hills Expansion Project Draft EIS commenced on October 5, 2007, with the publication of the Draft EIS Notice of Availability in the Federal Register.

Two public meetings were held for the Draft EIS; a meeting was held in Crescent Valley on November 6, and a meeting was held in Battle Mountain on November 7. A total of 104 people signed the sign-in sheets at the public meetings.

4.4.2 Draft EIS Public Comments

The BLM received the following comments during the public comment period:

- **Agency comments**
  - **Federal agencies – 2**
  - **State agencies – 3**
  - **Local agencies – 5**
- **Tribal comments – 4**
- **Organizations – 3**
- ***Businesses – 4***
- **Individuals – 50**
- **Form letters (via Great Basin Mine Watch or direct submittal to BLM) – 5,942**
- **Postcards – 211**
- **Oxfam America petition signatures – 11,582**

Unique written comments are reproduced in Appendix F of this Final EIS. Each comment is identified by a bracket and a letter and comment reference number in the left margin. The response to each comment accompanies the letter in the right margin and is identified by the reference number of the respective comment.

The BLM has addressed the form letters in the following manner:

- ***Form letters with no substantive comments or written opinions added to the original form letter text have been treated as generic form letters. A copy of the original form letter and associated responses has been printed in Appendix F; the names of the individuals who submitted this letter are listed in Appendix F. Note that minor wording modifications are not considered substantive comments.***

- ***Form letters with substantive comments or written opinions added to the original form letter text have been treated as individual letters, with response(s) provided for the additional comment(s).***

The BLM has addressed the postcards in the following manner:

- ***Postcards with no substantive comments or written opinions added to the original postcard text have been treated as generic postcards. A copy of the original postcard has been printed in Appendix F. The names of the individuals who submitted this postcard are listed in Appendix F. Note that minor wording modifications are not considered substantive comments.***

- ***Postcards with substantive comments or written opinions added to the postcard text have been treated as individual letters, with response(s) provided for the additional comment(s).***

The BLM received a petition from Oxfam America containing comments on the proposed Cortez Hills Expansion Project. The BLM has printed the petition and the names of the individuals who signed the petition (see Appendix F).

Table F-1 in Appendix F lists each of the comment letters and the assigned comment letter number. Each letter has been reviewed in its entirety and considered by the BLM in determining the BLM-preferred Alternative (Section 2.8) for the proposed project.

5.0 LIST OF PREPARERS AND REVIEWERS

5.1 Bureau of Land Management EIS Team		
Responsibility	**Name**	**Degree(s) and Experience**
NEPA Coordinator, Environmental Justice	Chris Worthington (BMFO)	BS Forestry 23 years experience
	Angelica Ordaz (BMFO)	BS Environmental Studies 6 years experience
Minerals, Geology, 3809 Lead, Hazardous Materials and Solid Waste	Stephen Drummond (BMFO)	BS Mining Engineering 26 years experience
Realty, Lands and Rights-of-Way	Charles Lane (BMFO)	MS, BS Geology 31 years experience
Fire Management	Lisa Walker (BMFO)	Associate Science 15 years experience
Air Quality	Robert Boyd (NSO)	BS Geophysics 19 years experience
Water Quality and Quantity	Jon Sherve (BMFO)	MS Hydrology/Hydrogeology BA Biological Sciences 14 years experience
	Tom Olsen (NSO)	PhD Geology Engineering MS, BS Geology 26 years experience
Cultural Resources, Paleontology	Paula Sutton (BMFO)	MA Public Service Archaeology BA Anthropology 20 years experience
Native American Coordination	Gerald Dixon (Elko FO and BMFO)	BS Cultural Anthropology 12 years experience
Socioeconomics	Tom Crawford (CCFO)	MS/BS Environmental and Natural Resource Economics 32 years experience
Forestry, Soils, Noxious Weeds	Joe Ratliff (BMFO)	MS Water Management BS Forestry 15 years experience
Range Resources, Vegetation	Michele McDaniel (BMFO)	BS Natural Resource Management 5 years experience
Migratory Birds, Special Status Species	Mike Stamm (BMFO)	BS Zoology 28 years experience
Wildlife, Riparian and Wetlands	Duane Crimmins (BMFO)	BS Wildlife Biology 30 years experience
Ecological Risk	Cris Ross (NSO)	PhD Ecology 13 years experience
Visual Resources	Robert Perrin (BMFO)	BS Economics 10 years experience
Administrative Support	Leesa Marine (BMFO)	2 years experience
	Claudette Ramos (BMFO)	Bachelor of Applied Science Management Technology 2 years experience
GIS	Kathy Graham (BMFO)	BS Wildlife Management Biology 20 years experience
Fuels Management	Chad Lewis (BMFO)	BS Forestry 14 years experience
Cooperating Agency – Nevada Department of Wildlife		
Name		**Degree(s) and Experience**
Rory Lamp		BS Zoology 27 years experience

5.2 ENSR EIS Team (Third-party Consultant)		
Responsibility	**Name**	**Degree(s) and Experience**
Project Manager, NEPA Compliance	Valerie Randall ENSR	BA Urban Studies 29 years experience
Assistant Project Manager and NEPA Document Coordinator	Dolora Koontz ENSR	BA Biology 18 years experience
Surface Water, Soils, Reclamation	James Burrell ENSR	MS Civil Engineering BS Forest Management 31 years experience
Geology, Groundwater	Patrick Plumley Plumley & Associates	MS Geology BS Geology 22 years experience
Geochemistry	James Drever University of Wyoming	PhD Geochemistry MA Chemistry BA Chemistry 39 years experience
Hazardous Materials and Solid Waste	William Berg ENSR	MS Geology BS Geology 26 years experience
Air Quality	Vince Scheetz ENSR	MS Systems Management BS Mathematics 37 years experience
Vegetation, Special Status Plant Species, Range Resources, Wetlands	Jon Alstad ENSR	MS Range Science BS Animal Science 22 years experience
Wildlife and Special Status Species	Charles Johnson ENSR	MS Biology BS Wildlife Biology 15 years experience
Cultural Resources, Native American Consultation, Paleontology, and Environmental Justice	Kim Munson ENSR	MA Anthropology BA Anthropology 13 years experience
Socioeconomics, Land Use and Access, Recreation and Wilderness, Visual Resources, and Noise	Bernie Strom ENSR	MCRP City and Regional Planning BS Urban Planning 32 years experience
Document Production	Debbie Thompson ENSR	3 years General Education 23 years experience
Graphics Preparation	Scott MacKinnon ENSR	BS Physical Geography 4 years experience

5.3 Cortez Gold Mines Reviewers	
Name	**Title and Company**
Steve Schoen	Cortez Lead, Cortez Gold Mines
George Fennemore	Cortez Assistant Lead, Cortez Gold Mines
Jim Butler	Attorney, Parsons Behle & Latimer
Connie Rogers	Attorney, Davis Graham & Stubbs

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7.0 GLOSSARY

Acre-feet	The volume of water required to cover 1 acre to a depth of 1 foot; equivalent to a volume of 43,560 cubic feet.
Adverse Effect (under the National Historic Preservation Act)	An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.
Allotment	A unit of land suitable and available for livestock grazing that is managed as one grazing unit.
Alluvial	Pertaining to material or processes associated with transportation or deposition of soil and rock by flowing water (e.g., streams and rivers).
Alluvium	Unconsolidated or poorly consolidated gravel, sands, and clays deposited by streams and rivers on riverbeds, floodplains, and alluvial fans.
Ambient	The environment as it exists at the point of measurement and against which changes or impacts are measured.
Ambient Noise	Total, all-encompassing noise associated with a given environment and time.
American Indian Religious Freedom Act of 1978	Act establishing national policy to protect and preserve for Native Americans their inherent right of freedom to believe, express, and exercise their traditional religions, including the rights of access to religious sites, use and possession of sacred objects, and freedom to worship through traditional ceremonies and rites.
Animal Unit Months	Grazing of a cow/calf, sheep/lamb, or other animal pair for 1 month.
Archaeological Resources Protection Act (ARPA)	A federal law, passed in 1979 to protect archaeological resources on public and Indian lands.
Area of Potential Effects (APE)	Defined in Section 106 regulations as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.
Aquifer	A body of rock that is sufficiently permeable to conduct groundwater and to yield economically significant quantities of water to wells and springs.

7.0 GLOSSARY

Background Noise	Noise from all sources other than that from a particular source of interest (e.g., other than mining noise if mining noise were being investigated).
Barren Solution	In a metallurgical process, the solution left after the mineral value has been removed.
Bedrock	Any solid rock exposed at the surface or overlain by unconsolidated material.
BLM Sensitive Species	Previous Category 2 (C2) candidate species.
Code of Federal Regulations	The compilation of federal regulations adopted by federal agencies through a rule-making process.
Carrying Capacity	The maximum population of an animal that an ecosystem can support without being degraded.
Community Noise Equivalent Level	L_{eq} for a 24-hour, midnight to midnight period with 5 dBA added to the sound levels from 7:00 p.m. to 10:00 p.m. and 10 dBA added to the sound levels between 10:00 p.m. and 7:00 a.m.
Cone of Depression	The depression of groundwater levels around a pumping well caused by the withdrawal of water.
Confining Bed	A layer of rock having very low hydraulic conductivity that hampers the movement of water into and out of an aquifer.
Critical Habitat	Habitat that is present in minimum amounts and is the determining factor in the potential for population maintenance and growth.
Cultural Resources	Archaeological sites, architectural structures or features, traditional use areas, and Native American sacred sites or special use areas.
Cumulative Effects	The combined environmental impacts that accrue over time and space from a series of similar or related individual actions, contaminants, or projects. Although each action may seem to have a negligible impact, the combined effect can be significant. Included are activities of the past, present, and reasonably foreseeable future; synonymous with cumulative impacts.
Decibel (dB)	A unit used in expressing ratios of electric or acoustic power; the relative loudness of sound.

Decibel, A-weighting (dBA)	The most commonly used frequency weighting measure; simulates human sound perception and correlates well with human perception of the annoying aspects of noise.
Direct Impacts (under the National Environmental Policy Act)	Impacts that are caused by the action and occur at the same time and place (40 Code of Federal Regulations 1508.7); synonymous with direct effects.
Discharge	The volume of water flowing past a point per unit time, commonly expressed as cubic feet per second, gallons per minute, or million gallons per day.
Disturbed Area	An area where natural vegetation and soils have been removed.
Dolomite	A mineral, calcium magnesium carbonate ($CaMg[CO_3]_2$), or a rock composed largely of dolomite.
Drainage	The natural channel through which water flows some time of the year; natural and artificial means for affecting discharge of water as by a system of surface and subsurface passages.
Drawdown	The lowering of the water level in a well as a result of withdrawal; the reduction in groundwater level at a point caused by the withdrawal of water from an aquifer.
Effect (under the National Historic Preservation Act)	An effect on one of the characteristics that may make a historic property eligible for inclusion in the National Register of Historic Places.
Effective Perceived Noise Level	Measurements consisting of a frequency weighting scheme considerably more complicated that the A-weighting filter used to determine sound exposure levels (SELs). They incorporate a penalty for the presence of pure tones to account for people's increased annoyance with single frequencies, such as the tones emanating from the compressor of turbofan engines. Thus, although specific values must be determined by computer analysis of a signal, effective perceived noise levels has been adopted for certain specialized uses involving the noise of individual aircraft over-flights.
Endangered Species	Any species in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.
Ephemeral Stream	A stream or portion of a stream that flows briefly in direct response to precipitation in the immediate vicinity and whose channel is at all times above the water table.

Erosion	The wearing away of soil and rock by weathering, mass wasting, and the action of streams, glaciers, waves, wind, and groundwater.
Executive Order 11593 of 1971, Protection and Enhancement of the Cultural Environment	Requires federal agencies to survey properties under their jurisdiction and nominate appropriate candidates to the National Register of Historic Places.
Executive Order 13287 of 2003, Preserve America	Initiative affirming the federal government's leadership role in protecting historic properties. Among the goals of Preserve America are to promote partnerships for the use and rehabilitation of historic properties, and to assist in developing heritage tourism opportunities.
Exploration	The search for economic deposits of minerals, ore, and other materials through practices of geology, geochemistry, geophysics, drilling, and/or mapping.
Fault	A fracture in rock units along which there has been displacement.
Flocculant	A reagent added to water to aggregate minute suspended particles so that they may precipitate out of suspension.
Floodplain	That portion of a river valley, adjacent to the channel, that is built of sediments deposited during the present regimen of the stream and that is covered with water when the river overflows its banks at flood stages.
Fugitive Dust	Dust particles suspended randomly in the air from various sources including road travel, excavation, and rock loading operations.
Geochemistry	The study of the distribution and amounts of the chemical elements in minerals, ores, rocks, soils, water, and the atmosphere, and their circulation in nature on the basis of the properties of their atoms and ions.
Geotechnical	A branch of engineering concerned with the engineering design aspects of slope stability, settlement, earth pressures, bearing capacity, seepage control, and erosion.
Groundwater Recovery	An increase in groundwater levels such that the groundwater elevations rise above initial baseline groundwater elevations. Used to refer to an increase in water levels following drawdown.
Groundwater Table	The surface between the zone of saturation and the zone of aeration; that surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

Habitat	A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.
Heap Leaching	The process of recovering gold and other metals from low-grade ores by leaching ore that has been mined and placed on a specially prepared pad. A chemical solution is applied through low volume emitters, and the metal-bearing leachate solution percolates and is collected.
Historic Property	Defined by the National Historic Preservation Act as any property included in or eligible for the National Register of Historic Places.
Hydraulic Conductivity	The capacity of a rock to transmit water. It is expressed as the volume of water at the existing kinematic viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.
Hydrostratigraphic Unit	Grouping of stratified, mainly sedimentary rocks that have similar hydrologic properties.
Impact	A modification in the status of the environment brought about by the proposed action or an alternative.
Indian Sacred Sites	Defined in Executive Order 13007 as “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.”
Indirect Impacts (under the National Environmental Policy Act)	Impacts that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 Code of Federal Regulations 1508.8); synonymous with indirect effects.
Infiltration	The movement of water or some other liquid into the soil or rock through pores or other openings.
Irretrievable	Applies primarily to the lost production of renewable natural resources during the life of the project.
Irreversible	Applies primarily to the use of nonrenewable resources, such as minerals, cultural resources, wetlands, or to those factors that are renewable only

	over long time spans, such as soil productivity. Irreversible also includes loss of future options.
Jurisdictional Wetland	A wetland area identified and delineated by specific technical criteria, field indicators, and other information for purposes of public agency jurisdiction. The public agencies that administer jurisdictional wetlands are the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Natural Resources Conservation Service.
Key Observation Point	"One or a series of points on a travel route or at a use area or a potential use area, where the view of a management activity would be most revealing" (BLM 1986c). KOPs are commonly selected to represent the most sensitive viewpoints for a proposed management activity based on the number of people who would experience them or the frequency and duration of viewing.
L_d	Day average sound level. L_{eq} for the daytime period from 7:00 a.m. to 10:00 p.m.
L_{dn}	Day-night average sound level. L_{eq} for a 24-hour, midnight to midnight period with 10 dBA added to the sound levels from 10:00 p.m. to 7:00 a.m.
Leachate	A solution obtained by leaching as in downward percolation of water through soil or waste.
L_{eq}	Equivalent continuous sound level. Level of steady state sound that, in a specific time period, has an equal amount of sound energy as the actual time-varying sound.
L_{max}	Maximum sound level. The greatest sound level measured on a sound level meter during a designated time interval or event, using "fast" time averaging on the meter.
L_n	Night average sound level. L_{eq} for the nighttime period from midnight to 7:00 a.m. and from 10:00 p.m. to midnight.
L_p or Sound Pressure Level	A measure of the change in atmospheric pressure induced by sound; depends not only on the power of the sound source, but also on the distance from the source and on the acoustical characteristics of the space surrounding the source. In decibels, 20 times the logarithm (base 10) of the ratio of a sound pressure to the reference sound pressure of 20 micropascals.

L_{pk}	Peak sound level: Maximum instantaneous sound level during a specified time interval or event.
L_W	Sound Power Level: A measure of the acoustic energy output of a sound source. In decibels, 10 times the logarithm (base 10) of the ratio of a given power to the reference poser of 1 picowatt.
L_1	Sound level exceeded 1 percent of the time during a given period.
L_{10}	Sound level exceeded 10 percent of the time during a given period; often represents a short-term noise event associated with passing vehicles or airplanes flying over.
L_{50}	Sound level exceeded 50 percent of the time during a given period; the median sound level.
L_{90}	Sound level exceeded 90 percent of the time during a given period; sometimes used as an approximation for background noise.
Mineralization	The process by which a valuable mineral or minerals are introduced into a rock.
Mitigate, Mitigation	To cause to become less severe or harmful; actions to avoid, minimize, rectify, reduce or eliminate, and compensate for impacts to environmental resources.
Monitor	To systematically and repeatedly watch, observe, or measure environmental conditions in order to track changes.
National Environmental Policy Act (NEPA)	The National Environmental Policy Act (NEPA) of 1969; the national Policy charter for protecting the environment. NEPA establishes policy, sets goals, and provides means for carrying out the policy. Regulations from 40 Code of Federal Regulations 1500-1508 implement the act.
National Historic Preservation Act of 1966, as amended (NHPA)	Act directing federal agencies to consider the effects of their programs and projects on properties listed on or eligible for the National Register of Historic Places. If a proposed action might impact any archaeological, historical, or architectural resource, this act mandates consultation with the proper agencies.
National Pollutant Discharge Elimination System	A part of the Clean Water Act that requires point source dischargers to obtain permits. These permits are referred to as National Pollutant Discharge Elimination System (NPDES) permits and are administered by the U.S. Environmental Protection Agency.

National Register of Historic Places (NRHP)	A register maintained by the National Park Service (NPS) that lists districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering and culture that meet criteria set forth in 36 Code of Federal Regulations 60.
Native American Graves Protection Act (NAGPRA)	A federal law, passed in 1990 that provides for the return of certain sacred and ceremonial objects held by museums and other repositories to the Native American peoples from which they were originally acquired.
Native Species	Plants that originated in the area in which they are found (i.e., they naturally occur in that area).
Nevada Administrative Code (NAC)	The text of the regulations implementing the laws passed by the Nevada legislature.
Nevada Revised Statutes (NRS)	The text of laws passed by the Nevada legislature.
Noise	Unwanted sound; one that interferes with one's hearing of something; a sound that lacks agreeable musical quality or is noticeably unpleasant.
Octave	The interval between two sounds having a frequency ratio of two. There are 8 octaves on the keyboard of a standard piano.
Octave Band	A segment of the frequency spectrum separated by an octave.
Octave Band Level	The integrated sound pressure level of only those sine-wave components in a specified octave band.
One-third Octave Band	A frequency band whose cutoff frequencies have a ratio of 2 to the one-third power, or approximately 1.26 (e.g., the cutoff frequencies of 891 Hz and 1,112 Hz define the 1,000 Hz third-octave band in common use).
Ore	A deposit of rock from which a valuable mineral or minerals can be economically extracted.
Overburden	Material that must be removed to allow access to an orebody, particularly in a surface mining operation.
Paleozoic	The span of time between approximately 570 and 245 million years ago.
Particulate(s)	Minute, separate particles, such as dust or other air pollutants.
Perennial Stream	A stream or reach of a stream that flows throughout the year.

Physiographic Province	Region in which all parts have similar geologic structure and climate and whose landforms differ significantly from those of other regions.
Pregnant Solution	Solution derived from the leaching process that contains dissolved metals.
Project Alternatives	Alternatives to the Proposed Action developed through the National Environmental Policy Act (NEPA) process.
Properties of Cultural and Religious Importance (PCRI)	A “property of cultural or religious importance” that is a historic property eligible for the National Register of Historic Places and associated with the cultural practices of an Indian tribe or other cultural or ethnic community.
Raptor	A bird of prey (e.g., eagle, hawk, falcon, and owl).
Recovery (Groundwater)	An increase in groundwater levels such that the groundwater elevations rise above initial baseline groundwater elevations. Refers to an increase in water levels following drawdown.
Reserves	Identified resources of mineral-bearing rock from which the mineral can be extracted profitably with existing technology and under present economic conditions.
Right-of-Way (ROW)	Strip of land or corridor over which a power line, access road, or maintenance road would pass.
Riparian	Situated on or pertaining to the bank of a river, stream, or other body of water. Riparian is normally used to refer to plants of all types that grow along streams, rivers, or at spring and seep sites.
Run-of-Mine Ore	Ore that is taken from a mine or pit directly to a mill for processing.
Runoff	That part of precipitation that appears in surface streams; precipitation that is not retained on the site where it falls and is not absorbed by the soil.
Sediment	Material suspended in or settling to the bottom of a liquid. Sediment input comes from natural sources, such as soil erosion and rock weathering, construction activities, or anthropogenic sources, such as forest or agricultural practices.
Sediment Load	The amount of sediment (sand, silt, and fine particles) carried by a stream or river.
Seismicity	The likelihood of an area being subject to earthquakes; the phenomenon of earth movements.

Sensitive Receptors (Noise)	Activities or land uses that are more susceptible than others to noise interference.
Sensitive Viewpoint	Similar to a Key Observation Point, but of lesser sensitivity due to infrequency of use, small numbers of viewers, or similar mitigating circumstances.
Sound Power	The total sound energy radiated by a source per unit time. The unit of measurement is the watt or some fraction of a watt.
Sound Pressure	The instantaneous difference between the actual pressure produced by a sound wave and the average or barometric pressure at a given point in space.
Species	A group of individuals of common ancestry that closely resemble each other structurally and physiologically, and in nature interbreed producing fertile offspring.
Stratigraphy	Form, arrangement, geographic distribution, chronological succession, classification, and relationships of rock strata.
Subsidence	Sinking or downward settling of the earth's surface.
Tertiary	The span of time between 65 and 10 million years ago.
Threatened Species	Any species of plant or animal that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
Total Dissolved Solids (TDS)	The total amount of dissolved material, organic or inorganic, contained in a sample of water.
Total Suspended Solids	The amount of undissolved particles suspended in a sample of water.
Traditional Cultural Property	A site or resource that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices or beliefs of a living community.
Transmissivity	The rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient; it equals the hydraulic conductivity multiplied by the aquifer thickness.
Visual Resource	The composite of basic terrain, geologic features, water features, vegetation patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for viewers.

Visual Resource Management (VRM) Classes	A classification of landscapes according to the kinds of structures and changes that are acceptable to meet established visual goals (BLM).
Water Table	The level in the saturated zone at which the pressure is equal to the atmospheric pressure.
Waters of the United States	A jurisdictional term from Section 404 of the Clean Water Act referring to water bodies such as lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. The use, degradation, or destruction of these waters could affect interstate or foreign commerce.
Wetlands	Areas that are inundated by surface or groundwater with a frequency sufficient to support (and under normal circumstances do or would support) a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.
Wind Rose	A graphical representation of wind direction and wind speed frequencies.

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