3.10 Air Quality

The study area and CESA for air quality comprise the area within a 50-km (31-mile) radius of the proposed project (**Figure 3.10-1**).

3.10.1 Affected Environment

Air quality and pollutant emissions are regulated under both federal laws (Clean Air Act [CAA]) and regulations and Nevada state laws and regulations implemented by the Nevada Bureau of Air Quality. Both federal and state regulations require that ambient concentrations for specific criteria pollutants not exceed allowable levels, referred to as AAQS. These standards have been established by the USEPA and the State of Nevada at levels deemed to preclude adverse impacts on human health and welfare. The applicable National and Nevada AAQS for criteria air pollutants are shown in **Table 3.10-1**.

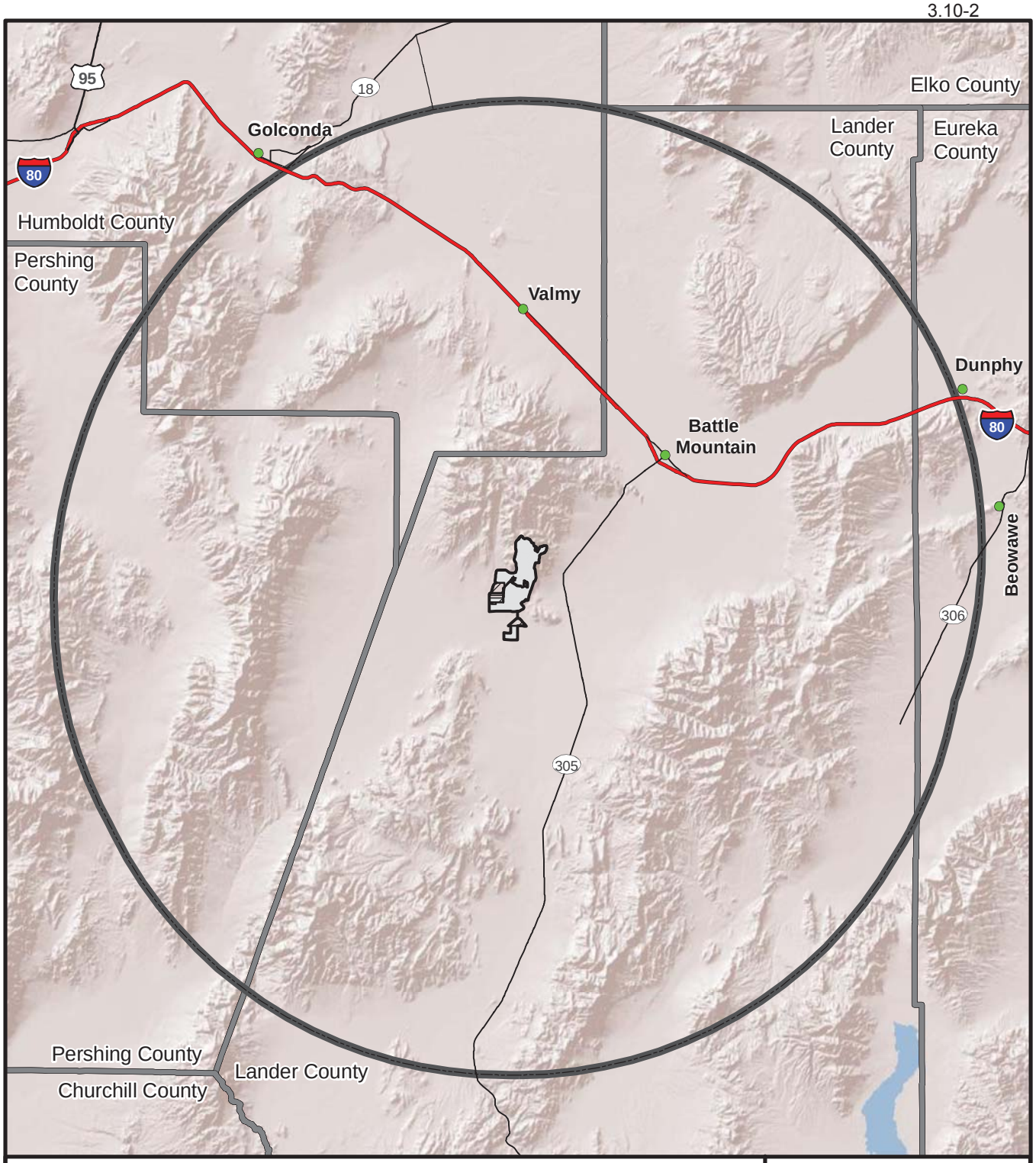
States are required to designate all areas within their borders as being in “attainment” or “non-attainment” with the National AAQS. The study area is classified as attainment, or unclassified, for all criteria pollutants. The only non-attainment areas in Nevada are distant from the study area.

Under requirements of the CAA, the USEPA has established Prevention of Significant Deterioration (PSD) rules, the purpose of which is to prevent deterioration of air quality in areas that are in attainment with the National AAQS. Increases in ambient concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter less than 10 microns in diameter (PM_{10}) are limited to modest increments in Class II areas (most of the country), and to very small increments in Class I areas (national parks and other designated pristine areas). Compliance with the PSD regulations requires new major sources of air pollutants to undergo specific permitting reviews, to demonstrate that increments would not be exceeded, and to ensure best available controls would be applied. The closest Class I area to the existing Phoenix Mine is the Jarbidge Wilderness Area, located approximately 115 miles to the northeast.

A mining source is classified as a PSD major source if potential emissions from stationary sources at a facility of any regulated pollutant equal or exceed 250 tons per year (tpy). Fugitive emissions are not included in the definition of potential emissions except for certain specified source types (40 CFR 52.21, [b][1][iii]); the Phoenix Project is not among the specified source types for which fugitive emissions are counted in the potential to emit.

On May 13, 2010, the USEPA issued the final GHG Tailoring Rule. This rule effectively raised the thresholds for GHG emissions that define when permits under the PSD and Title V Operating Permit programs are required for new and existing industrial facilities. Without the GHG Tailoring Rule, the thresholds established in the CAA for other pollutants would apply to GHGs. The phased in approach, established in the Tailoring Rule, provides time for large industrial facilities and state governments to develop the capacity to implement permitting requirements for GHGs.

- Starting in January 2011, large industrial facilities that must already obtain CAA permits for non-GHGs also must include GHG requirements in these permits if they are newly constructed and have the potential to emit 75,000 tpy of carbon dioxide equivalent (CO_2e) or more or if they make changes at the facility that increase GHG emissions by that amount.
- Starting in July 2011, in addition to facilities described above, all new facilities emitting GHGs in excess of 100,000 tpy CO_2e and facilities making changes that would increase GHG emissions by at least 75,000 tpy CO_2e, and that also exceed 100/250 tpy of GHGs on a mass basis, will be required to obtain permits that address GHG emissions



Legend

- Air Quality CESA
- Proposed POO Boundary
- Proposed Action
- Proposed Action Linear Feature
- Permitted Disturbance

N

0 5 10 Miles

Source: BLM 2008e.

Phoenix Copper Leach Project

Figure 3.10-1

Air Quality CESA

06/29/2011

Table 3.10-1 National and Nevada Ambient Air Quality Standards

Pollutant[1]	Averaging Period	Nevada Standards ($\mu g/m^3$)	National Standards ($\mu g/m^3$)	
			Primary	Secondary
PM_{10}	24-hour Annual	150[2] 50	150[2] None	Same as primary None
$PM_{2.5}$	24-hour Annual	None None	35 15	Same as primary Same as primary
SO_2	1-hour 3-hour 24-hour Annual	 1,300[2] 365[2] 80	196 None 365[2] 80	None 1,300[2] None None
NO_2	1-hour Annual	 100	188 100	Same as primary Same as primary
CO	1-hour 8-hour	40,000[2] 10,000[2,3]	40,000[2] 10,000[2]	None None
O_3	8-hour (2008 standard)[4]	----	147	Same as primary
	8 hours (1997 standard)[5]	----	157	Same as primary
	1-hour	235	None	None
Pb	Rolling 3-month Average	0.15	0.15	Same as primary

[1] $\mu g/m^3$ = micrograms per cubic meter.

CO = carbon monoxide.

NO_2 = nitrogen dioxide.

O_3 = ozone.

Pb = lead.

PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less.

$PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 microns or less.

SO_2 = sulfur dioxide.

[2] Must not be exceeded more than once per year.

[3] For elevations above 5,000 feet amsl, the standard is 6,670.

[4] To attain this standard, the 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.075 parts per million (ppm) (effective May 27, 2008).

[5] (a) To attain this standard, the 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(b) The 1997 standard, and the implementation rules for that standard, will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 O_3 standard to the 2008 O_3 standard.

Sources: NDEP 2008b; USEPA 2011a.

- Operating permits will be needed by all sources that emit at least 100,000 tons of GHG per year on a CO_2e basis beginning in July 2011.
- Sources less than 50,000 tons of GHGs per year on a CO_2e basis will not be required to obtain permits for GHGs before 2016 (USEPA 2011b).

The CAA regulations also include New Source Performance Standards. The standards are applied to new or modified air pollutant sources, requiring best demonstrated emissions control technology and setting specific limitations on pollutant emissions. Some facilities at the existing Phoenix Mine (e.g., crushers and related processing equipment), are subject to New Source Performance Standards (40 CFR Part 60, subpart LL) for Metallic Mineral Processing Plants.

The previous operator of the Phoenix Mine (Battle Mountain Gold), obtained a Class II Air Quality Permit to Operate from the Nevada Bureau of Air Pollution Control for the Phoenix Project. Projects that emit less than 100 tpy of any regulated air pollutant and less than 10 tpy of HAPs (25 tpy in aggregate) are not subject to Title V. The Nevada Bureau of Air Pollution Control is responsible for ensuring compliance with all applicable air quality regulations and for establishing permit limits and conditions necessary to ensure compliance.

The study area is located within the Lower Reese River Valley airshed, which comprises approximately 1,500 square miles in a rectangular area extending from the Town of Battle Mountain to the south for 30 miles and approximately 20 miles to the east and west. Information on the climate and meteorology of the area, as presented in this section, is available from the Town of Battle Mountain (i.e., a National Weather Service Cooperative Network Station located at the Battle Mountain Airport), the Phoenix Mine site, and weather stations in surrounding airsheds. The air quality, air pollutant emissions, and local atmospheric dispersion characteristics of the study area are described on the basis of site-specific data and information from other mining or industrial sources within and surrounding the Lower Reese River Valley airshed.

3.10.1.1 General Climate

Table 3.10-2 contains summaries of temperature and precipitation measurements from Elko, Battle Mountain, and Winnemucca, Nevada, which are the three closest National Weather Service monitoring stations to the Phoenix Mine. Elko is located approximately 70 miles east of the site; the Town of Battle Mountain is located approximately 12 miles to the north; and Winnemucca is located approximately 40 miles to the northwest. All three sites are similar in elevation and terrain to the project site; therefore, data from these stations are considered representative of the immediate mine area. Temperature measurements taken at the Phoenix Mine's Placer monitoring station for 1995-1996 also are listed in **Table 3.10-2**.

Temperature data indicate a relatively large amount of diurnal and seasonal variability, which is typical of dry climates. The warmest temperatures occur in July and August and the coldest in January. Temperatures range from average lows of 13°F in the winter to average highs of 93°F in the summer.

The onsite data for 1995-1996 show a maximum hourly average temperature of 97°F in July and August and a minimum hourly average temperature of 12°F in January. During the data collection period, the annual mean temperature was 52°F. This mean temperature is slightly higher than the climatological mean temperatures collected from Elko, the Town of Battle Mountain, and Winnemucca, possibly indicating a warmer than normal period during 1995-1996.

Precipitation in this portion of Nevada is normally sparse, averaging between approximately 5 and 10 inches annually, with increasing amounts of precipitation at higher elevations. The average annual precipitation at Elko, the Town of Battle Mountain, and Winnemucca is between 7 and 10 inches.

Table 3.10-2 Regional Temperature and Precipitation Data

Station	Elevation (feet amsl)	Years		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Maximum, Minimum, and Mean Temperature (°F)																
Elko, Nevada	5,077	1961-90	Max	36.8	43.3	49.5	57.8	69.8	80.0	90.5	88.6	79.9	65.8	48.4	37.3	62.8
			Min	13.3	20.4	25.4	30.0	37.3	44.3	49.9	48.4	38.8	29.5	22.9	13.0	30.8
			Mean	24.6	31.6	37.3	44.3	52.6	61.9	70.6	69.0	59.0	47.3	36.1	26.2	46.3
Battle Mountain, Nevada	4,531	1961-90	Max	40.9	48.1	54.1	62.6	73.1	82.8	93.1	91.1	81.6	68.9	52.7	41.2	65.8
			Min	16.9	21.6	25.6	29.5	38.3	45.8	51.7	48.6	39.0	29.4	23.8	15.8	32.1
			Mean	29.1	35.0	40.0	46.3	55.2	64.3	72.4	70.0	60.8	49.4	38.7	29.5	49.2
Winnemucca, Nevada	4,314	1961-90	Max	42.3	49.7	54.4	62.8	72.8	83.8	93.3	90.8	80.8	68.1	52.4	41.3	66.2
			Min	17.2	22.6	25.0	29.0	37.0	45.4	51.6	48.1	38.7	28.8	23.3	17.0	32.1
			Mean	30.0	36.3	39.9	46.3	54.5	64.4	72.6	70.0	59.9	48.8	38.3	30.0	49.2
Placer Station	4,958	1995-96	Max	57.2	62.6	69.8	68.0	78.8	89.6	96.8	96.8	93.2	82.4	68.0	62.6	77.2
			Min	12.2	5.0	23.0	24.8	33.8	30.2	46.4	48.2	35.6	28.4	19.4	12.2	26.6
			Mean	33.8	35.6	42.8	44.6	51.8	60.8	73.4	75.2	66.2	53.6	46.4	35.6	51.7
Mean Monthly Precipitation (inches)																
Elko, Nevada	5,077	1948-95	---	1.07	0.79	0.94	0.77	0.99	0.82	0.35	0.49	0.54	0.58	0.99	1.05	9.52
Battle Mountain, Nevada	4,531	1931-95	---	0.73	0.62	0.68	0.80	0.96	0.82	0.28	0.28	0.46	0.66	0.69	0.75	7.54
Winnemucca, Nevada	4,314	1950-95	---	0.82	0.62	0.78	0.77	0.89	0.81	0.25	0.35	0.39	0.59	0.87	0.87	8.01

Sources: EMA 1999b ; U.S. Department of Commerce 2008.

3.10.1.2 Local Winds and Atmospheric Dispersion

The existing Phoenix Mine is located in complex terrain. As a result, highly localized wind variations exist in the region, particularly near unique terrain features such as steep slopes and narrow valleys.

Dispersion conditions at the site are affected by two parameters: stability and mixing depth. Stability is defined as the ability of the atmosphere to disperse a given pollutant concentration. Unstable conditions represent maximum dispersion, while minimum dispersion occurs during stable conditions. Mixing depth defines the vertical extent of the atmospheric volume through which dispersion may take place. In general, mixing depths are greatest during the afternoon hours and during the summer, when incoming solar radiation is strongest.

3.10.1.3 Air Quality

Since 1997, Newmont has been permitted to operate air emission units associated with existing and previously authorized operations in the study area. The operations are conducted in accordance with the project's Nevada Bureau of Air Pollution Control Class II Air Quality Permit to Operate (No. AP 041-0220.03).

The proposed project has the potential to emit particulate matter, carbon dioxide (CO_2), NO_2, and SO_2. Emission estimates for PM_{10}, $PM_{2.5}$, CO, and SO_2 were made as part of this assessment. Emission estimates were not made (nor direct modeling conducted) for NO_2, but rather for the broader pollutant category of oxides of nitrogen (NO_X). In general, of the nitrogen oxides emitted from stationary and mobile sources, the majority of the NO_X emissions are in the form of NO, rather than in the form of NO_2. Further, NO_X emissions are substantially easier and more accurate to estimate. Because initial air impact assessments using NO_X instead of NO_2 are consistent with the Tier 1 approach recommended in Section 6.2.3 (Models for Nitrogen Dioxide [Annual Average]) of Title 40 CFR, Appendix W to Part 51 – Guideline on Air Quality Models ("Appendix W"), and result in a conservative assessment which over-predict the anticipated ambient concentrations of NO_2 resulting from the facility, NO_X emissions are usually estimated and modeled as the first step in modeling NO_2 emissions.

A recent study found that concentration measurements used to develop $PM_{2.5}$ emission factors for AP-42 were biased high by a factor of 2, as compared to $PM_{2.5}$ measurements from Federal Reference Method samplers. This study also shows that the $PM_{2.5}$ /PM_{10} ratios for fugitive dust should be in the range of 0.1 to 0.15 (Cowherd 2006). Using the conservative ratio of 0.15 for the fugitive dust sources and a ratio of 1 for the furnaces and kilns, the total emissions of $PM_{2.5}$ would be approximately 13.35 tpy.

Table 3.10-3 lists the representative background air pollutant concentrations and their sources selected for this air modeling.

For particulate matter the NDEP-Bureau of Air Pollution Control (BAPC) often uses measured concentrations from the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring stations as representative background concentration for rural Nevada sites. The Great Basin National Park IMPROVE site, located in White Pine County, Nevada, approximately 186 miles southeast of the project site, was selected as the appropriate source of particulate background concentrations for this analysis.

Background 24-hour and annual PM_{10} concentrations were calculated as the average of the highest annual 24-hour averages and the average annual average PM_{10} concentrations, respectively, measured during the 2005-2007 period (**Table 3.10-3**). Background $PM_{2.5}$ concentrations were

Table 3.10-3 Representative Background Air Pollutant Concentrations and Sources

Criteria Pollutant	Averaging Period	ppm	(µg/m^3)	Notes	Added Federal Modeled Concentration	Added Nevada Modeled Concentration
PM_{10}	24-Hour	N/A	19.628	Average of highest 24-hour average PM_{10} concentrations measured from 2005-2007 from the IMPROVE Great Basin National Park, Nevada Station.	High Second-High	High First-High
	Annual	N/A	4.775	Average of annual average PM_{10} concentrations measured from 2005-2007 from the IMPROVE Great Basin National Park, Nevada Station.		High First-High
$PM_{2.5}$	24-Hour	N/A	6.726	Average of 98th percentile of the 24-hour average $PM_{2.5}$ concentrations measured from 2005-2007 from the IMPROVE Great Basin National Park, Nevada Station.	High First-High	
	Annual	N/A	2.360	Average of annual average $PM_{2.5}$ concentrations measured from 2005-2007 from the IMPROVE Great Basin National Park, Nevada Station.	High First-High	
SO_2	1-Hour	0.022	56.49	Average of the highest 1-hour average SO_2 concentrations measured from 2005-2007 from the State and Local Air Monitoring Station (SLAMS) in Trona, California.	4th High Daily Maximum 1-Hour	
	3-Hour	0.012	32.15	Average of highest 3-hour average SO_2 concentrations measured from 2005-2007 from the SLAMS in Trona, California.	High Second-High	High First-High
	24-Hour	0.004	11.30	Average of highest 24-hour average SO_2 concentrations measured from 2005-2007 from the SLAMS in Trona, California.	High Second-High	High First-High
	Annual	0.001	2.61	Average of the annual average SO_2 concentrations measured from 2005-2007 from the SLAMS in Trona, California.	High First-High	High First-High

Table 3.10-3 Representative Background Air Pollutant Concentrations and Sources

Criteria Pollutant	Averaging Period	ppm	(µg/m^3)	Notes	Added Federal Modeled Concentration	Added Nevada Modeled Concentration
NO_2	1-Hour	0.008	15.09	Average of highest 1-hour average NO_2 concentrations measured from 2006-2007 from the Turtleback Dome, Yosemite National Park, California Station.		
	Annual	0.001	1.89	Average annual average NO_2 concentrations measured from 2006-2007 from the Turtleback Dome, Yosemite National Park, California Station.	High First-High	High First-High
CO	1-Hour	1.700	1,942.86	Average of highest 1-hour average CO concentrations measured from 2006-2007 from the Turtleback Dome, Yosemite National Park, California Station.	High Second-High	High First-High
	8-Hour	0.700	800.00	Average of highest 8-hour average CO concentrations measured from 2006-2007 from the Turtleback Dome, Yosemite National Park, California Station.	High Second-High	High First-High
O_3	1-Hour	0.087	170.52	Average of highest 1-hour average O_3 concentrations measured from 2005-2007 from the Great Basin National Park, Nevada Station.		
	8-Hour	0.073	143.73	Average of fourth highest 8-hour average O_3 concentrations measured from 2005-2007 from the Great Basin National Park, Nevada Station.		

Source: EMA 2011.

determined consistent with the guidance provided in the March 23, 2010 memorandum "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS," from Stephen D. Page, Director, USEPA Office of Air Quality Planning and Standards (EMA 2011). The background annual $PM_{2.5}$ concentration was calculated as the average annual average $PM_{2.5}$ concentration measured during the 2005-2007 period. The background 24-hour $PM_{2.5}$ concentration was calculated as the average of the 98th percentile of the 24-hour average $PM_{2.5}$ concentrations measured during the 2005-2007 period. According to the NDEP, PM_{10} monitoring conducted in Elko since 2006 has shown a decline in ambient concentrations (NDEP 2011).

Trona, a small desert town located in southern California approximately 328 miles south of the proposed project, was selected as representative for background concentrations of SO_2. This SLAMS is located in a rural area and was the closest SO_2 monitoring station to the Project area not located at or near an urban center.

Hazardous Air Pollutant Emissions

HAPs, also known as toxic air pollutants or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. The USEPA is required to control 187 HAPs.

Mercury

Mercury is included on the federal list of HAPs, which has been adopted by reference in the Nevada air quality regulations. Nevada air quality regulations (NAC 445B.349) prohibit the "discharge into the atmosphere from any stationary source of any hazardous air pollutant or toxic regulated air pollutant that threatens the health and safety of the general public, as determined by the director."

On February 17, 2011, USEPA finalized the National Emission Standard for Hazardous Air Pollutant to regulate mercury emissions from the gold mine ore processing and production area source category.

Mercury is a hazardous air pollutant but is not considered a criteria pollutant, and no National AAQS have been established under the CAA for mercury. Hazardous air pollutants are controlled through emissions limits at the source rather than ambient air concentrations.

In Nevada, the Voluntary Mercury Reduction Program began in June 2002 with the goal to achieve significant, permanent and rapid reductions in mercury air emissions from precious metal processing operations. In 2006, Nevada adopted the Nevada Mercury Control Program (NMCP), which is a State regulatory program that achieves mercury reduction via add-on control technologies by implementing a standard method of control or any other limitation which is applied to an existing, new or modified thermal unit that emits mercury (i.e., Nevada Maximum Achievable Control Technology [NvMACT]) (NAC 445B3629).

For new/modified emission units, NvMACT requires an emission control that is achieved in practice by the best controlled similar emission unit within the precious metals mining industry. *De minimis* mercury emissions are defined as mercury emissions from a thermal unit that emits mercury, which are determined by the Director to be insufficient to require compliance with the requirements for a mercury operating permit or application of NvMACT. This *de minimis* level is generally applied to units that emit less than 5 pounds of mercury in 1 year. The Proposed Action would not result in mercury emissions above the de minimis level from thermal and non-thermal processes.

Recent monitoring data from the National Atmospheric Deposition Program Mercury Deposition Network in 2008 and 2009 at the two northern Nevada wet deposition monitoring sites referenced in the Betze Pit Expansion Project Draft EIS (BLM 2008g) show that the wet deposition values are on the order of 1.96 (2008) and 5.38 (2009) at Lesperance Ranch (NV-02) and 1.86 (2008) and 2.45 (2009) at Gibbs Ranch (NV-99).

Criteria Air Pollutant Emissions

Ambient concentrations of air pollutants in the vicinity of the Phoenix Mine generally are quite low and far below applicable AAQS. For gaseous pollutants (SO_2, CO, O_3, and NO_2), concentrations are representative of typical background for remote areas of the West because of the scarcity of major sources and the great distance between the few sources that do exist. Concentrations of PM_{10} tend to be higher, which also is typical for arid regions subject to periodic high wind speeds. The primary natural source of PM_{10} is wind erosion from non-vegetated areas during high wind speed episodes. PM_{10} also is generated by vehicle traffic on unpaved roads, agriculture, natural and man-made fires, and mining and industrial operations. PM_{10} monitoring data for a number of locations for the most recent 3-year period of available data previously were compiled from Nevada Bureau of Air Pollution Control files (**Table 3.10-4**). In a few cases, less than 3 years of data exist, and the compilation includes 2 years or less.

Table 3.10-4 PM_{10} Monitoring Data from Monitors in the Vicinity of the Phoenix Mine and Remote Areas

Site Name	Data Period	Highest Annual Average	24-hour Concentration[1]	Direction/Distance From Phoenix Project (distance in miles)
		μg/m³		
State of Nevada Site				
Town of Elko	2007-2008	26	94	NE/24
Battle Mountain High School	1998-2002	27	260	NE/14
Nearby Mining or Industrial Sites				
Cortez Placer Dome Mine	1/96-9/98	49[2]	127	SE/37
Santa Fe Pacific Lone Tree Mine	1/95-6/96	14	50	NNW/22
Echo Bay McCoy / Cove Mine	1/94-12/95	26	64	SSW/13
Coastal Chemical	10/95-9/98	26	64	NE/19
Sierra Pacific Valmy Generating Station	4/96-12/97	17[2]	68	N/25
Remote Areas				
Great Basin National Park	12/95-11/98	8	22	SE/177
Jarbidge Wilderness	6/94-10/96 4/97-11/98	10	32	NE/115

[1] The standard is violated if the average number of exceedences over 3 years is greater than 1 per year. Data shown are the fourth highest over 3 years (or third highest if only 2 years of data are available). Thus, they indicate whether a violation is likely to have occurred over the sampling period.

[2] Annual average represents an incomplete year of data.

Source: JBR 2007b; NDEP 2011; USEPA 2011c.

Data from the Town of Battle Mountain would be expected to show particulate concentrations higher than regional background because of local traffic and activity. Similarly, the mining/industrial monitoring sites generally are operated to monitor local impacts of the particular source and reflect contributions from those source emissions. Based on data provided in **Table 3.10-4**, maximum daily and annual average particulate concentrations are higher at these monitor sites than in remote areas. Nonetheless, all measured PM_{10} concentrations throughout the region, including those at operating mines or industrial sites, were well below the AAQS 24-hour average (150 µg/m^3) and annual average (50 µg/m^3).

3.10.2 Environmental Consequences

Newmont's existing Phoenix Mine facilities operate under a NDEP Class II air permit (AP 1041-0220.03). This permit would be modified, as needed, to incorporate the proposed project. BMPs and other Newmont management practices currently are, and would continue to be, implemented to control fugitive dust and point source emissions. Also, on-site employees and supervisors are trained to identify and minimize fugitive dust emissions associated with the Phoenix Mine operations. In addition, all equipment to control emissions has been, and would continue to be, installed, operated, and maintained in good working order to stay within the permit limitations.

Environmental impacts to air resources would be significant if the Proposed Action or alternative to the Proposed Action result in the following:

- Exceedence of the National AAQS within the local or regional area impacted by total project pollutant emissions.

3.10.2.1 Proposed Action

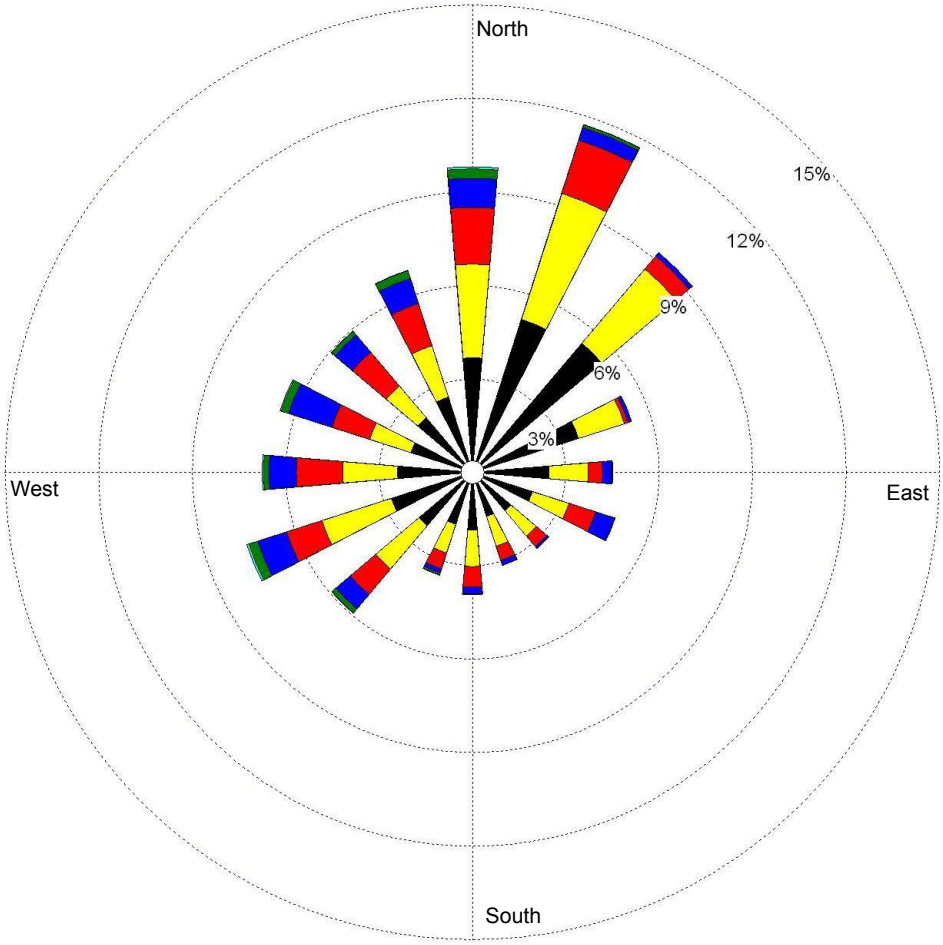
The air quality analysis was based on a dispersion modeling study prepared by EMA in February 2011, which included the Proposed Action and the existing Phoenix Mine facilities. The USEPA-approved American Meteorological Society/USEPA Regulatory Model (AERMOD Version 09292) was used to conduct the air quality analysis. The model was run using elevated terrain, the PRIME building downwash algorithms, USEPA regulatory defaults and the particle dry depletion option. The background PM_{10} concentrations that were applied in the air modeling assessment are representative of conditions in remote areas.

The air quality modeling study used 12 months of meteorological data (09/01/03 – 08/31/04) collected by Newmont Nevada Energy Investment, LLC from its TS Power Plant site and processed using AERMET. A wind rose plot of the meteorological data set is provided in **Figure 3.10-2**. The TS Power Plant site is located approximately 10 miles north of Dunphy, Nevada.

Seasonal values for albedo, Bowen ratio, and surface roughness were used for the land classification "desert shrubland," as provided in the AERMET user's guide. Additional information regarding the modeling study are available in the Air Quality Assessment Report (EMA 2011).

Table 3.10-5 summarizes project emissions by air pollutant and applicable time period as assessed in the dispersion modeling study, including existing Phoenix Mine facilities.

The proposed project has the potential to emit particulate matter, CO_2, NO_2, and SO_2. Emission estimates for PM_{10}, $PM_{2.5}$, CO, and SO_2 were made as part of this assessment. Emission estimates were not made (nor direct modeling conducted) for nitrogen dioxide (NO_2), but rather for the broader pollutant category of NO_X. In general, of the nitrogen oxides emitted from stationary and mobile sources, the majority of the NO_X emissions are in the form of NO, rather than in the form of NO_2. Because initial air impact assessments using NO_X instead of NO_2 are conservative and consistent with the Tier 1 approach



Legend

Wind Speed (m/s)

- > = 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

Calms: 1.43%

Source: Newmont 2007a.

N

Phoenix Copper Leach Project

Figure 3.10-2

Wind Rose from the TS Power Plant Site (2003-2004)

06/29/11

Table 3.10-5 Total Project Emissions by Air Pollutant and Applicable Time Period

Time Period	Calculated Air Pollutant Emissions for Indicated Time Period[1]							
	PM	PM_{10}	$PM_{2.5}$	SO_2	CO	NO_X	VOCs*	CO_2
1-hour (lb/hr)	1,448	507	77	13	3,031	582	32	43,285
3-hour (lb/3-hr)	3,405	1,076	154	13	3,253	883	87	81,412
8-hour (lb/8-hr)	8,336	2,518	356	16	3,840	1,717	229	176,851
24-hour (lb/24-hr)	23,537	6,967	975	21	5,549	4,141	606	461,058
Annual (tpy)	4,199	1,231	171	2	657	700	109	77,070

[1] Data is estimated from maximum emissions from year 2016.

*VOCs = volatile organic compounds.

Source: EMA 2011.

recommended in Title 40, CFR, and result in a conservative assessment which over-predict the anticipated ambient concentrations of NO_2 resulting from the facility, NO_X emissions are usually estimated and modeled as the first step in modeling NO_2 emissions. If further refinement of the NO_2 impact is necessary, the Tier 2 step recommended by Appendix W is to multiply the Tier 1 result by an empirically-derived NO_2/NO_X ratio, with 0.75 as the conservative annual national default ratio.

Emission estimates also were not prepared for two other criteria pollutants: O_3 and Pb. As indicated above, O_3 is not a primary air pollutant which is directly emitted by the proposed project, or by most other air pollution sources. Instead, it is principally created from the chemical reaction of NO_X and VOCs in the air under direct exposure to sunlight. Modeling for O_3 formation and transport is a highly complex and resource intensive exercise, and is typically conducted only to guide the choice of strategies to correct a monitored ozone problem in an area not attaining the National AAQS for ozone (Appendix W).

With the phasing out of leaded gasoline in the 1970s, lead is now an air pollutant emitted in substantial quantities only from certain facilities, such as lead smelters, refiners, and recyclers. The proposed project is not such a facility. Lead emissions from trace concentrations of lead in fugitive dust from the Project would be negligible. The air quality study also quantified the total Project emissions of CO_2 from fuel combustion sources, including current operations at the Phoenix Mine.

For modeling purposes, the points of public access were determined to be any point outside of the existing Phoenix Mine perimeter fence, or equivalent physical obstructions constructed and maintained by the Phoenix Mine, which exclude public access from all of the facility sources of criteria air pollutants. Fugitive dust and vehicle exhaust from mining activities and equipment are not included in quantitative permit limits under the NDEP regulations; however, they must be managed under the Class II operating permit.

The Proposed Action would involve new land disturbance due to construction activities, changes in haul road locations, and increases in haul road traffic which would result in increased PM_{10} and combustion emissions. The Proposed Action also would have the potential to increase mercury emissions in the operation of the proposed SX-EW Facility.

Modeling potential effects as a result of the proposed project emissions on air quality requires a reasonable estimate of the proposed project emissions. The emission estimate should include all expected proposed project sources, each operating at its anticipated rate for the time period selected. The estimate also should reflect the reality that not all of the proposed project emission sources would be operating at the same time (i.e., the proposed project would be operating for approximately 25 years, as such, many of the proposed project operations would be completed before others have commenced).

Nearly all substantial sources of criteria air pollutant emissions from the proposed project (or any other mine) are reasonably proportional to the rate of production and processing of the mined material (that is, the mines "throughput"). This is especially true of particulate matter emissions (including PM_{10} and $PM_{2.5}$ emissions), the criteria air pollutant emitted from the greatest number of proposed project sources, and historically the air pollutant of greatest concern for a mining operation. A secondary factor is the distance this mined material is moved by haul trucks, as the movement of haul trucks on unpaved haul roads is typically the single largest source of particulate matter emissions for mine projects. Based on estimates provided by Newmont of yearly proposed project material production rates over the proposed 25-year mine life, Year 2016 has both the largest total material throughput (total quantity of material mined or moved), at 41.745 MT, and the largest number of haul truck miles driven, at 1.451 million miles, than any other projected year. Therefore, proposed project year 2016 was selected as the project period to be assessed in the emission inventory.

A comprehensive list of all identified individual potential sources of proposed project criteria, criteria precursor and GHG air pollutant emissions ("emission units"), organized into "emission groups" of similar activities (such as mining, heap leaching, etc.), are presented in Appendix A of the Air Assessment Report (EMA 2011). Included on this list of approximately 180 emission sources are the air pollutants potentially emitted from each of these emission units.

Estimates of the emission rates for the five criteria air pollutants (PM_{10}, $PM_{2.5}$, CO, SO_2, and NO_X), the two criteria air pollutant precursors (NO_X and VOCs), and the GHG CO_2 were made from each emission unit for all five applicable criteria air pollutant regulatory time periods (1-hour, 3-hour, 8-hour, 24-hour, and annual).

The emission rates for PM_{10}, CO, NO_X, and SO_2 specified in the current NDEP-BAPC Class II Air Quality Operating Permit (No. AP1041-0220.03) for the proposed project were used for the permitted emission units which would be operational during Year 2016. $PM_{2.5}$ emission rates for these permitted sources were calculated from the NDEP-BAPC permitted PM_{10} emission rates using $PM_{2.5}/PM_{10}$ ratios developed from the emission factors found in the current versions of USEPA AP-42 (USEPA 2011d).

Boundary Receptors

The revised modeling protocol directs the use of "boundary" receptors (using UTM NAD83 coordinates) spaced at approximately 25-meter intervals along the fenced boundary of the proposed project.

Cartesian Grid Receptors

Cartesian receptor grids were created for the modeling (using UTM NAD83 coordinates) as follows:

- Spaced at 100-meter intervals, out to a distance of at least 1,000 meters from the nearest proposed project emission source;
- Spaced at 250-meter intervals, out from the 100-meter grid to a distance of at least 3,000 meters from the nearest proposed project emission source; and
- Spaced at 500-meter intervals, out from the 250-meter grid to a distance of at least 5,000 meters from the nearest proposed project emission source.

The maximum modeled pollutant concentrations and design values for the Proposed Action are presented in **Table 3.10-6**. The total design value concentrations reflect the inclusion of background concentrations as discussed above. As shown in the last column of **Table 3.10-6**, the Proposed Action would be in compliance with the National AAQS.

Table 3.10-6 Modeled Air Pollutant Concentrations – Highest of All Source Groups – National AAQS

Criteria Pollutant	Averaging Period	Concentration ($\mu g/m^3$)				Total as a Percent of National AAQS
		National AAQS	Modeled High	Background	Total	
PM_{10}	24-Hour	150	41.65	19.628	61.28	40.85
$PM_{2.5}$	24-Hour	35	15.82	6.726	22.55	64.42
	Annual	15	3.64	2.360	6.00	39.98
SO_2	1-Hour	196	6.80	56.488	63.28	32.29
	3-Hour	1,300	3.09	32.155	35.25	2.71
	24-Hour	365	0.39	11.298	11.69	3.20
	Annual	80	0.03	2.607	2.64	3.30
NO_X	1-Hour	188	104.84	15.094	119.93	63.79
	Annual	100	7.03	1.887	8.92	8.92
CO	1-Hour	40,000	2,021.37	1,942.857	3,964.23	9.91
	8-Hour	10,000	284.33	800.000	1,084.33	10.84

Source: EMA 2011.

In summary, modeled criteria pollutant concentrations show levels well within the state and National AAQS.

Hazardous Air Pollutant Emissions

Annual HAP emissions were calculated to determine if the proposed project constituted a major HAP source. The inventory includes all stationary sources, as well as the process fugitive emissions from mining and processing operations for the open pit and heap leach area. The fugitive dust from trucking, dumping, and blasting also are included. HAP combustion emissions from mobile sources, such as haul vehicles, do not contribute to the HAP emission calculation for major source status but also are included in this analysis. The total estimated HAPs emissions are 0.439 tpy.

Internal combustion emissions are primarily diesel-fired generators. The external combustion emissions are primarily derived from boilers and heaters. No individual HAP would be emitted in a quantity greater than the major source limit of 10 tpy. Also, the combined HAP emissions are less than the major source limit of 25 tpy. Therefore, the Proposed Action would not constitute a major HAP source.

Haul trucks at the mine are powered by diesel internal combustion engines. In 2016, the haul trucks are estimated to travel 1.451 million miles, consuming on average 30 gallons of fuel per hour of operation. A conservative estimate of the number of hours is provided in the Air Quality Assessment Report as 114,352 hours. Using standard emissions factors from AP42 for diesel engines larger than

600 horsepower, the HAP emissions from the haul trucks during mine operations are as shown in **Table 3.10-7**.

Table 3.10-7 HAP Emissions from Mine Operations

Pollutant	Emissions (lb/MMBtu)[1]	Emissions (tpy)
Benzene	7.76E-04	1.84E-01
Toluene	2.81E-04	6.65E-02
Xylenes	1.93E-04	4.57E-02
Propylene	2.79E-04	6.60E-02
Formaldehyde	7.89E-05	1.87E-02
Acetaldehyde	2.52E-05	5.97E-03
Acrolein	7.88E-06	1.87E-03
Total PAH	**2.12E-04**	**5.02E-02**

[1] lb/MMBtu = pounds per million British thermal unit.

Source: EMA 2011.

GHG Analysis

The assessment of climate-changing pollutant emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impact to climate; however, the Intergovernmental Panel on Climate Change (IPCC 2007) concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.” The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts, so there is no established mechanism to accurately predict the effect of project specific impacts on global climate change.

Potential impacts to air quality and other resources due to climate change are likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased wind-blown dust from drier and less stable soils. Spatial ranges of cool season plant species are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated. Due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Less snow at lower elevations would be likely to impact the timing and quantity of snowmelt, which, in turn, could impact aquatic species.

Project GHG emissions have been assessed as part of this analysis. GHGs include CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfurhexaflourides; however, emissions of CO_2 are orders of magnitude larger than the other GHG. The total annual GHG emissions for the proposed project are expected to be approximately 77,070 tpy.

Each GHG has been assigned a global warming potential (GWP) that relates to the potential of the gas to raise temperatures in the atmosphere over a specified period of time. A relative contribution method has been established by the IPCC to estimate a total GHG weighted emission because the GHGs have various 100-year GWPs. CO_2 has been established as the reference gas equivalent (CO_2e) with a GWP of one. The GWP equivalents for methane and nitrous oxide are 21 and 310,

respectively. The GHG emission estimates for the Proposed Action maximum operational scenario for the Year 2016 are presented in **Table 3.10-5**. For the Proposed Action, including the current Phoenix Mine facilities, the total CO_2e emissions of 77,070 metric tons represents the cumulative warming potential that is expected as a result of GHG emissions from fuel combustion. In addition to the fuel that is consumed at the mine, purchased electrical power also contributes to the total GHG emissions. Purchased power results in an additional 21,473 tpy of CO_2e emissions from the Proposed Action. The Phoenix Mine including the Proposed Action would emit a total of 238,353 tpy of CO_2e.

3.10.2.2 Reona Copper Heap Leach Facility Elimination Alternative

The Reona Copper HLF Elimination Alternative would be similar to those described for the Proposed Action, except that the proposed Reona Copper HLF and associated infrastructure (i.e., solution pipelines) would not be developed, resulting in a reduction in fugitive dust emissions.

3.10.2.3 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and associated impacts would not occur. Under this alternative, the existing Phoenix Mine would continue to operate under current authorizations. Potential impacts to air quality resources previously were discussed and analyzed in the Phoenix Project Final EIS (BLM 2002a).

The No Action Alternative comprises the facilities and operations that are currently authorized by the BLM and/or the State of Nevada. Total emissions, after application of pollution controls as specified in the Phoenix POO and Fugitive Dust Control Plan (BMG 2000), were used for an earlier air quality modeling impact analysis (EMA 1999b). In that analysis, total controlled emissions were calculated to be 535 tpy of PM_{10}, 62.5 tpy of SO_2, and 615 tpy of NO_x. The totals included mobile sources (light-duty trucks and heavy-duty mining equipment); process equipment; and fugitive dust from mining, material handling, traffic on roads, and wind erosion. Also included were all point source and fugitive emissions, after application of planned emission controls. Total actual emissions under the No Action Alternative are shown in **Table 3.10-8**, and impacts to ambient air quality would be correspondingly lower. Criteria pollutant concentrations would be at levels below the state and National AAQS.

Table 3.10-8 Actual Emissions by Air Pollutant and Applicable Time Period for the No Action Alternative

Time Period	Calculated Air Pollutant Emissions for Indicated Time Period							
	PM	PM_{10}	$PM_{2.5}$	SO_2	CO	NO_X	VOCs	CO_2
1-hour (lb/hr)	1,290	450	64	13	3,017	560	29	40,630
3-hour (lb/3-hr)	3,039	960	134	13	3,217	823	79	74,274
8-hour (lb/8-hr)	7,450	2,254	319	16	3,748	1,563	208	158,488
24-hour (lb/24-hr)	21,048	6,245	885	20	5,282	3,695	545	407,412
Annual (tpy)	3,759	1,106	156	2	609	620	98	67,428

Note: Under the No Action Alternative, emissions from hauling ore from the pits to the waste rock dump would be similar to hauling ore form the pits to the copper leach pad. The ore-hauling emissions are associated with units identified as 1.035, 1.036, 1.037, and 1.038 in the Air Quality Assessment Report (EMA 2011).

Source: EMA 2011.

3.10.3 Cumulative Impacts

The CESA for air resources is shown in **Figure 3.10-1**. Past and present actions and RFFAs are identified in **Table 2.8-1**; their locations are shown in **Figure 2.8-1**.

The 11 permitted air pollutant sources included in the cumulative modeling analysis are listed below:

- Newmont Mining, Trenton Canyon Mine;
- Sierra Pacific Power Company, Battle Mountain Substation;
- M-I, LLC, Battle Mountain Grinding Plant;
- AL Park Petroleum, Battle Mountain SVE;
- Lander County, Battle Mountain Airport Fuel Tanks;
- M-I Drilling Fluids, LLC Mountain Springs;
- Ormat Nevada, Inc. Jersey Valley Project;
- AllTel Communications, LLC Antelope Valley Site;
- Paiute Pipeline Company, Battle Mountain Compressor Station;
- 3D Concrete Company, Newmont Phoenix Mine Site; and
- Newmont Mining, Phoenix Mine, NMCP OPTC.

Based on the air permit and modeling information provided by NDEP-BAPC, of the eleven identified cumulative project sources identified above, two (3D Concrete and Sierra Pacific Power Company Battle Mountain Substation) would not be active in year 2016. Three others (Phoenix Mine mercury permit, All Park Petroleum and Lander County Airport Fuel Tanks) do not emit NO_X. Emissions rates and air modeling parameters were obtained from NDEP-BAPC.

Three AERMOD model runs were used to assess cumulative impacts as follows:

- 24-hour and annual ambient concentrations of PM_{10};
- 24-hour and annual ambient concentrations of $PM_{2.5}$; and
- 1-hour and annual ambient concentrations for NO_X.

The first three columns in **Table 3.10-9** lists each of the modeled criteria air pollutants, the averaging period, and the applicable National AAQS. Additional columns show the modeled concentration, the added background concentration, and the resulting total concentration. The final column compares the applicable standard to the modeled results as a percent of the standard.

Daily 24-hour concentrations for PM_{10} and $PM_{2.5}$ show that the short term impacts evaluated on a cumulative basis are well within National AAQS. Annual impacts for $PM_{2.5}$ also are well within National AAQS.

For NO_X initial model results were processed to produce the 8th high 1-hour daily maximum at each model receptor. The model results for NO_X represent a very conservative estimate of NO_2 since only a fraction of NO_X is actually NO_2. The 8th high annual daily maximum modeled 1-hour NO_X concentration is 107.96 µg/m^3, and this is added to the background concentration of 15.094 µg/m^3. This resultant maximum concentration of 123.05 µg/m^3 indicates that the cumulative impacts from the Proposed Action would be well within the National AAQS.

Table 3.10-9 Modeled Cumulative Air Pollutant Concentrations – Highest of All Source Groups

Criteria Pollutant	Averaging Period	National AAQS ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total ($\mu g/m^3$)	Total as a Percent of National AAQS
PM_{10}	24-hour	150	41.68	19.628	61.31	40.9
$PM_{2.5}$	24-hour	35	15.83	6.726	22.56	64.5
	Annual	15	3.65	2.36	6.01	40.1
NO_X	1-hour	188	107.96	15.094	123.05	65.5
	Annual	100	7.12	1.887	9.00	9.0

Source: EMA 2011.

3.10.4 Monitoring and Mitigation Measures

The proposed project would include the use of control devices and dust suppression methods to mitigate PM_{10} emissions. Newmont has committed to the implementation of these air emissions controls in the Nevada Bureau of Air Pollution Control Permit to Operate and in the Fugitive Dust Control Plan for the Phoenix Project, which would be modified, as needed, for the proposed project. Due in part to these emission controls, the air quality analyses have demonstrated that impacts to air quality would not exceed acceptable levels compared to National AAQS. As the permitting process continues, the State of Nevada may require monitoring or mitigation measures as required by applicable regulations, if such regulations are triggered. To ensure that the BLM is informed of air quality impacts and the steps taken to mitigate impacts and comply with Nevada's regulatory requirements, the BLM currently is requiring, and would continue to require, that Newmont submit copies of all air quality reports delivered to the State of Nevada to the BLM Battle Mountain District Office, and also report annually to the BLM on measures taken to control emissions of fugitive dust. No additional monitoring and mitigation measures are recommended.

3.10.5 Residual Adverse Effects

Increases in emissions of criteria air pollutants (i.e., PM_{10}, SO_2, NO_X, CO) associated with the proposed project would be temporary (life-of-mine) and transitory in nature and would be within state and National AAQS. Following the completion of mining and subsequent reclamation, air quality would return to background levels determined by emissions from other regional source operations and/or natural background pollutant concentrations. As a result, there would be no residual adverse air quality effects.