Noise

Introduction

Noise impacts associated with the project can be divided into four distinct phases: (1) premining, which consists primarily of construction of the main pit and mining facilities; (2) active mining, which consists primarily of operation of the mine; (3) final reclamation and closure of the mine; and (4) postclosure activities. Noise associated with mining activities would occur during the first three phases and would vary both spatially and temporally, as the location and duration of noise-generating project activities would change throughout the life of the project.

The premining phase would occur in the first 18 to 24 months. The primary sources of noise during this phase would be from trucking in mining equipment (including haul trucks, shovels, graders, drills, and water trucks); surface blasting as needed; and material hauling associated with assembly of the processing plant facilities. Increased traffic noise on SR 83 from personnel commuting to and from the mine would also occur during this phase. The active mining phase would occur over the approximately 20- to 25-year period following construction. The primary sources of noise during this phase would be scheduled surface blasting within the open pit; operation of mining equipment; hauling of waste rock and mine tailings; ore processing; delivery of supplies; and commuter traffic. The final reclamation and closure phase of the mine would follow mine operations and would last for 3 years. The primary sources of closure noise would include commuter traffic, delivery of mine closure materials, and deconstruction of facilities.

No noise related activities are associated with postclosure activities, which would begin after closure of the mine and continue for an indefinite period of time.

Changes from the Draft Environmental Impact Statement

Comments received during the comment period for the DEIS regarding noise expressed a general concern of noise impacts from blasting activities on nearby private property. It is important to note that blasting would be restricted to once per day between the hours of 9 a.m. and 4 p.m. during the operations phase. Noise contours from blasting are depicted in figure 106 and indicate that noise from the daily blast would not exceed the selected noise threshold for any nearby residences. The Forest Service reviewed the noise analysis that was conducted and determined that the analysis is adequate and that revision of the analysis is not necessary.

This section was updated to address climate change, cumulative impacts based on the revised list of past, present, and reasonably foreseeable future actions, and mitigation effectiveness based on the latest mitigation measures (see updated analysis in the “Cumulative Effects” and “Mitigation Effectiveness” parts of this resource section). Figure 106 was revised for clarity as follows: (1) the noise contours from traffic related noise on SR 83 north to its interchange with I-10 were expanded in order to accurately reflect the analysis in the text; and (2) the noise contours from blasting activities and traffic related noise were delineated. Finally, noise impacts for the Barrel Trail Alternative were updated (see “Barrel Alternative” in the “Direct and Indirect Effects of Each Alternative” part of this resource section).

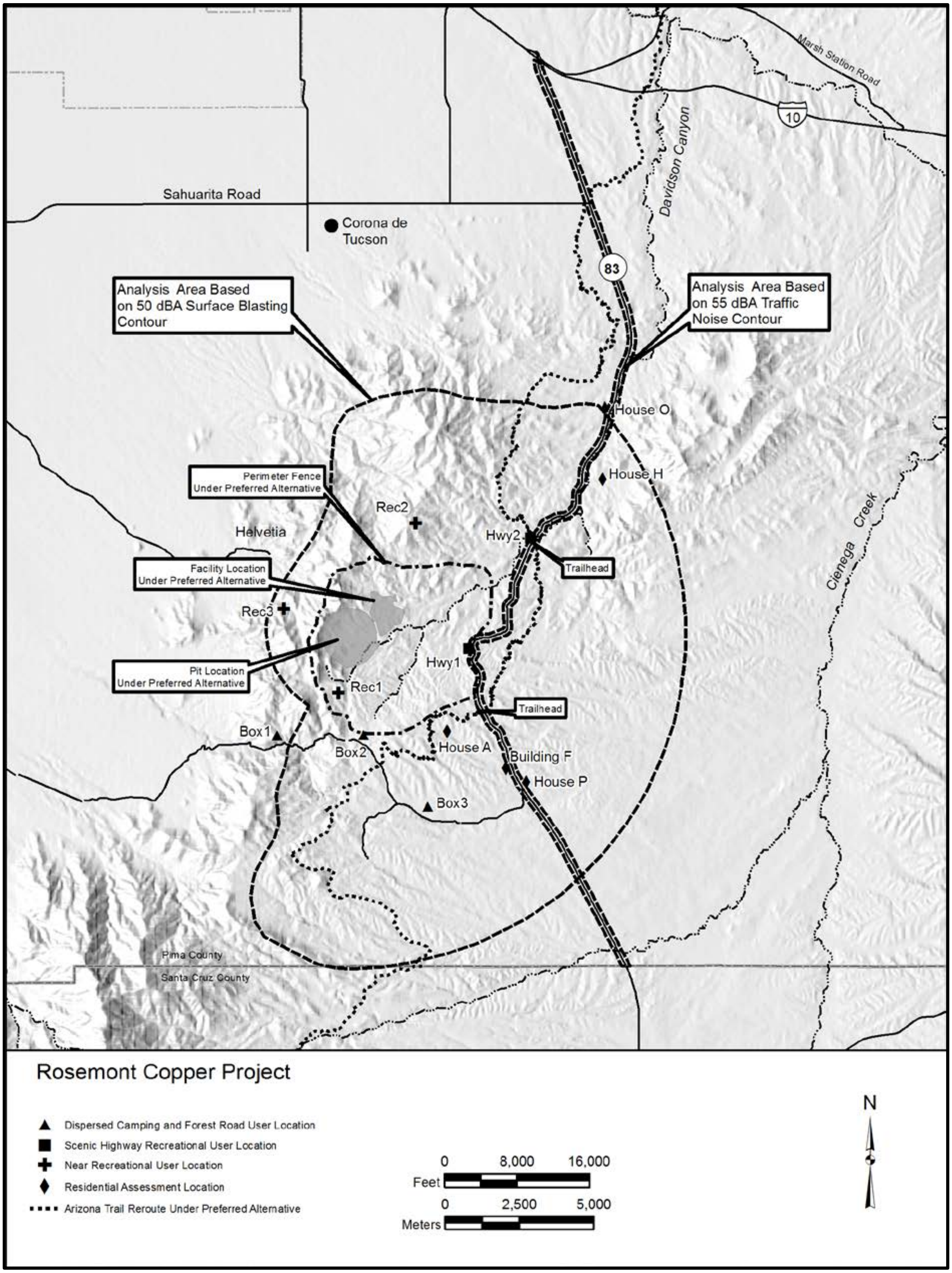

Figure 106. Analysis area and locations of noise receptors (Tetra Tech 2009)

Issues, Cause and Effect Relationships of Concern

No significant issues were specifically identified during scoping concerning noise. However, mine development and operations include a variety of activities that generate noise, which has the potential to affect the quality of life of permanent residents as well as transient recreational users.

Impacts resulting from noise and vibrations from mine operations are also identified in Issues 9 and 11B, as noted below.

Issue 9: Impact on Recreation

This issue focuses on the effects of the mine operation on recreation on NFS land, including loss of access and recreation opportunities and loss of or reduction in solitude, remoteness, rural setting, and quiet.

In this resource section, the only factor that will be analyzed is the potential for noise to reach recreation areas and the expected noise level because it is the only factor relevant to this section.

Issue 11B: Rural Landscapes

The mine operation may not conform to the quality of life expectations as expressed by the forest plan and Federal, State, and local regulations and ordinances. Commenters expressed concerns about modification of rural historic landscapes and local ranching traditions, which are important to local residents and visitors.

This section addresses noise impacts to sensitive noise receptors within the analysis area in terms of the potential for noise to reach recreation areas (Issue 9) and quality of life concerns for rural residents (Issue 11B).

Note that noise impacts to wildlife are addressed in the “Biological Resources” resource section of chapter 3.

Analysis Methodology, Assumptions, Uncertain and Unknown Information

The temporal bounds of analysis for noise impacts includes the premining, active mining, and final reclamation and closure phases. The spatial analysis area for noise impacts is defined by the predicted noise contours of each mining activity category that would occur during these phases of the mine life cycle and the location of noise-sensitive areas within the project area (see figure 106). These contours were developed in a supplemental noise study prepared for Rosemont Copper by Tetra Tech (2009). The results and conclusions of that study set the framework for discussion of the affected environment for noise and vibration in the project area and the analysis of environmental consequences. Offsite utility corridors were not considered in the spatial analysis area, as impacts on noise were considered to be negligible.

Mining activities that would produce the most noise and have noise contours that would extend the farthest from the project area are: (1) surface blasting that would occur during the premining and active mining phases of the mine life cycle; (2) construction and demolition that would occur during the active mining and final reclamation and closure phases of the mine life cycle; and (3) equipment trucking and commuter traffic that would occur during the premining and active mining phases of the mine life cycle. Therefore, these three mine activities are analyzed in this resource section to determine the noise impacts. Figure 106 depicts the overlapping contours for these three activities and the location of noise-sensitive land uses (receptors) in the project area.

Noise is generally defined as the undesired component of sound. Varying noise levels are often described in terms of the equivalent constant decibel level. Equivalent noise levels (L_{eq}) are used to develop single-value descriptions of average noise exposure over various periods of time. The mathematics of calculating equivalent noise level values give greater weight to the higher noise level values than the lower noise level values. Average noise exposure ratings often include additional weighting factors for potential annoyance due to time of day or other considerations. Average noise exposure over a 24-hour period is often presented as a day-night average sound level (Ldn). The day-night average sound level values are calculated from hourly equivalent noise level values, with the equivalent noise level values for the nighttime period (10 p.m. to 7 a.m.) increased by 10 dB to reflect the greater disturbance potential from nighttime noises.

Statistical descriptions (expressed as Lx, where x represents the percentage of time during which noise levels exceed the specified decibel level) are also used to characterize noise conditions over specified periods. L1, L5, and L10 descriptors can be used to characterize peak noise levels, while L90, L95, and L99 descriptors can be used to characterize background (ambient) noise levels. Note that the L50 value (the sound level is exceeded 50 percent of the time) will seldom be the same as the equivalent noise level value for the period being analyzed because the equivalent noise level value is biased toward the high-decibel contributions.

For relatively continuous noise conditions, the equivalent noise level value is often between the L30 and L40 values for the measurement period. If brief loud noises are common, the equivalent noise level value may be close to the L10 value for the measurement period.

Typical noise levels experienced by humans range from 40 dBA (equivalent to a quiet suburban area at night) to 85 dBA (the approximate noise level occurring 5 feet from a gas engine lawn mower). A change in noise level of 3 dBA may be perceptible to most listeners, whereas a change of 10 dBA may be perceived as a doubling of the noise level. Table 176 provides a summary of the range of dBA levels typically encountered in the environment and examples of various noise sources for each range listed.

Table 176. Typical dBA levels

Characterization	dBA	Example Noise Conditions
Threshold of pain	130	Surface detonation, 30 pounds of TNT at 1,000 feet. Peak noise 50 feet behind firing position, M-16 and M-24 rifles.
	125	Mach 1.9 sonic boom under aircraft at 11,000 feet.
Possible building damage	120	Air raid siren at 50 feet.
Threshold of immediate noise-induced permanent threshold shift (permanent hearing damage)	115	Commercial fireworks (5-pound charge) at 1,500 feet. F/A-18 aircraft takeoff with afterburners at 1,600 feet.
	110	Peak noise 50 feet behind firing position, .22 caliber rifle. Peak crowd noise, professional football game, inside open stadium.
	105	Emergency vehicle siren at 50 feet. Pile driver peak noise at 50 feet. Chainsaw (two-stroke gasoline engine) at 3 feet.

Characterization	dBA	Example Noise Conditions
	100	Jackhammer at 10 feet. 1-mile-range foghorn at 30 feet.
Extremely noisy	95	Locomotive horn at 100 feet. 2-mile-range foghorn at 100 feet. Large wood chipper processing tree branches at 30 feet.
8-Hour Occupational Safety and Health Administration limit	90	Leaf blower at 5 feet. Jackhammer at 50 feet. Dog barking at 5 feet.
Very noisy	85	Gas engine lawn mower at 5 feet. Bulldozer, excavator, or paver at 50 feet. Personal watercraft at 20 feet. Pneumatic wrench at 50 feet.
	80	Forklift or front-end loader at 50 feet. Motorboat at 50 feet. Table saw at 25 feet. Vacuum cleaner at 5 feet.
Noisy	75	Idling locomotive at 50 feet. Street sweeper at 30 feet. Ocean beach with medium wind and surf.
	70	Leaf blower at 50 feet. 1-mile-range foghorn at 1,000 feet. 300 feet from busy six-lane freeway.
Moderately noisy	65	Typical daytime busy downtown background conditions. Typical gas engine lawn mower at 50 feet. Ocean beach with light wind and surf.
	60	Typical daytime urban mixed-use area conditions. Normal human speech at 5 feet. Typical electric lawn mower at 50 feet.
Moderately noisy	55	Typical urban residential area away from major streets. Low-noise electric lawn mower at 65 feet.
	50	Typical suburban daytime background conditions. Open field, summer night with numerous crickets.
Quiet	45	Typical rural area daytime background conditions. Suburban backyard, summer night with several crickets.
	40	Typical suburban area at night. Typical whispering at 1 to 2 feet.
	35	Quiet suburban area at night. Quiet whispering at 1 to 2 feet, low background noise conditions.
Very quiet	30	Quiet rural area, winter night, no wind. Quiet bedroom at night, no air conditioner.
	25	Computer fan running.
Characterization	20	Empty recording studio. Remote area, no audible wind, water, insects, or animal sounds.
	10	Audiometric testing booth.
Threshold of hearing, no hearing loss	0	

Note: Indicated noise levels are average dBA levels for stationary noise sources or peak noise levels for brief noises and noise sources moving past a fixed reference point. Average and peak dBA levels are not 24-hour day-night average sound level values. Decibel scales are not linear. Apparent loudness doubles with every 10-dBA increase, regardless of the initial dBA level. Most adults have accumulated some hearing loss and have a threshold of hearing above 15 dBA. In occupational hearing conservation programs, a threshold of hearing between 20 and 30 dBA is considered normal.

Mine Blasting Vibrations

In addition to audible noise, blasting for open-pit mine construction and expansion generates low-frequency airborne vibrations that can induce vibrations in buildings or other structures. Peak airborne pressure levels occur at frequencies below the range of human hearing and thus do not create any audible noise.

The potential for damage to buildings from blast noise peak pressures has been studied for several decades. Airborne vibrations can sometimes be felt even when they occur at acoustic frequencies below the range of human hearing. At a high enough level, airborne vibrations can rattle loose objects or windows. At even higher intensities, the potential exists for cosmetic damage, such as cracks in stucco, paint, or plaster. Peak overpressures of 122 dB (equivalent to a physical pressure of 0.037 pound per square inch or an approximately 13-mile-per-hour wind gust) can rattle loose objects or windows. Cosmetic damage in the form of cracks in stucco, paint, or plaster can occur at peak overpressures above 134 dB (equivalent to a physical pressure of 0.0145 pound per square inch or an approximately 27-mile-per-hour wind gust). Peak overpressures above 152 dB (equivalent to a physical pressure of 0.115 pound per square inch or an approximately 75-mile-per-hour wind gust) can break poorly mounted windows.

In addition to airborne vibrations, blasting would cause ground vibrations. Ground vibrations travel much faster than airborne vibrations but also dissipate much more rapidly than airborne vibrations. Whereas geological conditions have a strong influence on the distance at which ground vibrations can be felt, it is very rare for blasting operations to produce detectable ground vibrations at distances of more than 1 to 2 miles. Ground vibrations can be measured in various ways, but the “peak particle velocity” is the most commonly used measure.

Thresholds of Significance

No single regulatory agency or threshold is applicable to noise generated at the mine site. The following guidelines are presented to establish an approximate framework within which appropriate thresholds can be selected. Land use compatibility thresholds of significance for mine construction and operation are most appropriately established with the 24-hour day-night average sound level, as determined by the 1980 Federal Interagency Committee on Urban Noise report (Federal Interagency Committee on Urban Noise 1980), because the duration and schedule for these activities may vary from day to day. The U.S. Department of Housing and Urban Development, Federal Transit Administration, and Federal Aviation Administration use this metric to establish impacts. Local nuisance ordinances are often based on a 24-hour day-night average sound level threshold. Land use compatibility standards for transportation improvements that bring increased commuter and supply truck traffic to the mine site may be established with either the day-night average sound level or with the equivalent noise level metric. The equivalent noise level metric is well suited to activities with known peak periods such as morning and evening rush hour traffic to and from the mine site. The Federal Highway Administration and ADOT use this metric, whereas the U.S. Department of Housing and Urban Development applies the day-night average sound level metric to assess traffic noise impacts.

The Occupational Safety and Health Administration has established permissible noise exposure limits based on the amount of time a worker experiences a specified equivalent noise level. Similarly, MSHA sets exposure limits for mine workers to noise sources of varying intensity. A brief discussion of noise thresholds of significance appropriate for mining activities follows.

U.S. Department of Housing and Urban Development Standards

Noise has two different types of effects on people: the direct physical effects such as hearing loss and the less direct effects of interference with activities such as sleep and conversation. The standards contained in the U.S. Department of Housing and Urban Development noise regulation are based on levels that cause interference effects, not levels that can cause hearing loss.

U.S. Department of Housing and Urban Development noise guidelines are based on a series of surveys compiled in the EPA (1974) report titled “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.” Most of the surveys indicated that there were two breakpoints in reported interference and annoyance. Below 55 day-night average sound level, there was very little interference (for example, speech intelligibility was more than 99 percent) and very little resulting annoyance. Over 65 day-night average sound level, interference and annoyance both increase rapidly.

The EPA set 55 day-night average sound level as the basic goal. But other Federal agencies, including the U.S. Department of Housing and Urban Development, in consideration of their own program requirements and goals as well as the difficulty of actually achieving a goal of 55 day-night average sound level, have settled on the 65 day-night average sound level as their standard. At 65 day-night average sound level, activity interference is kept to a minimum, and annoyance levels are still low. It is also a level that realistically can be expected to be achieved. Following the Federal lead, most local jurisdictions that have adopted noise standards have adopted 65 day-night average sound level as the breakpoint for acceptability. Table 177 summarizes the U.S. Department of Housing and Urban Development’s acceptability standards.

Table 177. Site acceptability standards

	Day-Night Average Noise Level (dB)	Special Approvals and Requirements
Acceptable	Not exceeding 65 dB*	None
Normally Unacceptable	Above 65 dB but not exceeding 75 dB	Special Approvals,† Environmental Review,† Attenuation‡
Unacceptable	Above 75 dB	Special Approvals,† Environmental Review,† Attenuation‡

* Acceptable threshold may be shifted to 70 dB in special circumstances pursuant to 24 CFR 51.105(a), U.S. Department of Housing and Urban Development.

† See 24 CFR 51.104(b), U.S. Department of Housing and Urban Development, for requirements.

‡ 5 dB additional attenuation required for sites above 65 dB but not exceeding 70 dB, and 10 dB additional attenuation required for sites above 70 dB but not exceeding 75 dB (24 CFR 51.104(a)).

The U.S. Department of Housing and Urban Development’s standards are most appropriately applied in assessing the impacts of surface and pit blasting noise and noise from the operation of mining and construction equipment on residential land use in the project area. The standards may also be applied to commuter and supply truck traffic associated with the mine, although other Federal and State standards assess impacts using the equivalent noise level metric.

Office of Surface Mining Standards

As mentioned, in addition to audible noise blasting generates low-frequency airborne vibrations that can induce vibrations in buildings or other structures. Peak airborne pressure levels occur at frequencies below the range of human hearing and thus do not create any audible noise. The general requirements of the Office of Surface Mining blasting performance standards (30 CFR 816.67) state, "Blasting shall be conducted to prevent injury to persons, damage to public or private property outside the permit area, adverse impacts on any underground mine, and change in the course, channel, or availability of surface or ground water outside the permit area."

Peak overpressure (airblast) levels from mine blasting may not exceed the maximum unweighted decibel limits shown in table 178 at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area (perimeter fence), except at structures owned by the mining permittee or owned and leased by the permittee to another where a written waiver has been submitted. Flat response and C-weighting are used to capture the low-frequency noise levels associated with blasting.

Table 178. Peak overpressure (airblast) levels

Lower Frequency Limit of Measuring System, in Hz (±3 dB)	Maximum Level, in dB
0.1 Hz or lower – flat response*	134 peak
2 Hz or lower – flat response	133 peak
6 Hz or lower – flat response	129 peak
C-weighted – slow response*	105 peak C-weighted decibels

* Only when approved by the regulatory (permitting) authority.

The maximum ground vibration also may not exceed the limits on blast particle velocity shown in table 179 at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area, except at structures owned by the mining permittee or owned and leased by the permittee to another where a written waiver has been submitted. The peak particle velocity in inches per second is the most commonly used metric to describe and quantify ground vibrations.

Table 179. Maximum peak particle velocity

Distance from the Blasting Site (feet)	Maximum Allowable Peak Particle Velocity for Ground Vibration (inches per second)*
0 to 300	1.25
301 to 5,000	1.00
5,001 and beyond	0.75

* Ground vibration shall be measured as the particle velocity. Particle velocity shall be recorded in three mutually perpendicular directions. The maximum allowable peak particle velocity shall apply to each of the three measurements.

Federal Highway Administration and Arizona Department of Transportation Standards

The Federal Highway Administration has issued regulations for noise evaluation in 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." The main objectives of 23 CFR 772 are "to provide procedures for noise studies and noise abatement measures, to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to Title 23, United States Code." According to Federal Highway Administration regulations, a traffic noise impact occurs when the predicted traffic noise level approaches or exceeds the noise abatement criteria for the specified land use. In addition, an impact occurs when the predicted traffic noise level substantially exceeds the existing noise level.

Noise level impact criteria may be based on a threshold, the change in noise level from the existing noise level, or both. Table 180 summarizes the Federal Highway Administration Noise Abatement Criteria for various land use categories. The noise abatement criteria for category B, which includes homes, churches, schools, and parks, is 67 dBA.

Table 180. Federal Highway Administration Noise Abatement Criteria

Land Use Category	Noise Level L_{Aeq1h}* (dBA)	Description of Land Use
A	57 dBA (exterior)	Land on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks, or open spaces that are recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	67 dBA (exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, playgrounds, active sports areas, and parks.
C	72 dBA (exterior)	Developed lands, properties, or activities not included in categories A and B above.
D	–	Undeveloped lands.
E	52 dBA (interior)†	Residences, motels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: 23 CFR 772.

* L_{Aeq1h} is the 1-hour equivalent sound level.

† The interior sound level (activity) applies to: (1) indoor activities for those parcels where an exterior noise sensitive activity is identified; and (2) situations in which the exterior activities will not be affected by the noise, but the interior activities will be affected.

The Federal Highway Administration allows each State to define the levels at which the noise “approaches” the criteria and when it “substantially exceeds” the existing noise level. The ADOT (2005) “Noise Abatement Policy” determines the noise level impact for category B land uses when the noise level “approaches” within 3 dBA of the Federal Highway Administration Noise Abatement Criteria, or 64 dBA total, and considers mitigation for customer locations where the predicted highway traffic noise level is equal to or greater than 64 dBA. ADOT also considers mitigation if the noise level from the transportation improvement project is predicted to increase substantially. A substantial noise level increase is equal to or greater than 15 dBA.

According to the “Pima County Noise Abatement Procedure” (Pima County Department of Transportation 2008), noise abatement should be considered if noise levels reach 66 dBA or higher at noise-sensitive properties. Additionally, mitigation measures will be considered for noise-sensitive properties if predicted traffic noise levels substantially exceed existing levels. “Substantially exceed” is defined as an increase of 15 dBA between the existing noise levels and future noise levels, which is identical to the ADOT definition.

These guidelines provide an alternate means of assessing noise impacts for commuter traffic to and from the mine site and for construction activities. However, because the duration and schedule for mining activities, including blasting and equipment operations, may vary from day to day, the

U.S. Department of Housing and Urban Development day-night average sound level metric is more useful and provides a common method for assessing noise from all mine activities.

Occupational Safety and Health Administration

Occupational Safety and Health Administration guidelines state that worker protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in table 181 when measured on the A scale of a standard sound level meter at slow response. When employees are subjected to noise levels exceeding those listed in the table, feasible administrative or engineering controls shall be used. If such controls fail to reduce sound levels within the levels of table 181, personal protective equipment shall be provided and used to reduce sound levels to within the levels of the table.

Table 181. Occupational Safety and Health Administration permissible noise exposures

Duration per Day (Hours)	Noise Level dBA Slow Response
8	90
6	92
4	97
2	100
1½	102
1	105
½	110
¼ or less	115

Note: When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: C(1)/T(1) + C(2)/T(2) + … + C(n)/T(n) exceeds unity, then the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed the 140-dB peak sound pressure level.

The Occupational Safety and Health Administration standards are most appropriately applied in assessing the impacts of surface and pit blasting noise and noise from the operation of mining and construction equipment on miners and mine personnel.

Mine Safety and Health Administration

The Federal MSHA Occupational Noise Exposure standards delineate permissible exposure limits for 32 A-weighted noise levels, measured at slow response, between 80 dBA (32-hour duration) and 115 dBA (0.25-hour duration). The mine operator must establish a system of monitoring that evaluates each miner’s noise exposure sufficiently to determine continuing compliance with this part (30 CFR 62) using a noise dosimeter. The noise determination must be made without adjustment for the use of a hearing protector, integrate all sound levels over the appropriate range, reflect the miner’s full work shift, use a 90-dB criterion level with a 5-dB exchange rate, and use the A-weighting and slow response setting.

The exchange rate is a measure of how much the noise level would have to change to preserve a selected measure of the risk of hearing loss (90 dB for mining activities) when the exposure duration is doubled (or halved). At no time can the noise level exceed 115 dBA; therefore, a maximum noise level metric is appropriate in such cases.

The MSHA standards, as described in 30 CFR 62, are applicable specifically to miners for the duration of their workday. The standards impose reporting requirements and maintenance of records on mine operators. They are most appropriately applied in assessing the impacts of surface and pit blasting noise and noise from the operation of mining and construction equipment on miners.

Selected Thresholds and Noise Receptors

No single regulation or standard provides pertinent thresholds for noise for the purposes of this analysis. Rather, the above agency guidance has been used as input for establishing reasonable thresholds for noise in order to assess impacts. The specific threshold of interest depends on the selected noise receptors.

Selected Noise Receptors

Thirteen locations were selected to represent noise receptors, covering both permanent residents and transient recreational users, as shown in figure 106.

- The nearest residence to the mine to the northeast (House H);
- The nearest residence to the mine to the southeast (House A);
- The nearest residences and structures along SR 83 (House O, House P, Building F);
- Recreational use as close as possible to the perimeter fence, specifically Township 19 South, Range 15 East Section 1 (south of site, labeled REC1); Township 18 South Range 16 East, Section 17 (north of site, labeled REC2); and Township 18 South, Range 15 East Section 26 (west of site on west side of Santa Rita Mountains, labeled REC3);
- Recreational use along the Arizona National Scenic Trail, which varies by alternative;
- Recreational use at common pullouts along SR 83 at the westernmost overlook of the mine site (labeled HWY1) and at Hidden Springs Road (labeled HWY2); and
- Recreational use representing forest road travel and common dispersed camping sites, three locations along Box Canyon Road, specifically Township 19 South, Range 15 East, Section 11 (labeled BOX1), Township 19 South, Range 16 East, Section 7 (labeled BOX2), and Township 19 South, Range 16 East, Section 17 (labeled BOX3).

Selected Noise Thresholds

Residences – Noise

The selected threshold for noise at residences is a day-night average sound level of 65 dBA. This is based primarily on U.S. Department of Housing and Urban Development Site Acceptability Standards. This selected threshold is also more restrictive than the 67-dB level typically used for traffic noise impacts at residences.

Residences – Blasting Vibration

The selected thresholds for airborne (peak overpressure) and ground-borne (peak particle velocity) vibrations are 134 dBs for airborne vibrations and 0.75 inch per second peak particle velocity for ground vibrations. These thresholds are based on Office of Surface Mining Reclamation and Enforcement Standards.

Recreational Users – Noise

The threshold for impacts by noise on recreational users is more difficult to define; none of the listed agencies offer pertinent guidance. For the purposes of this FEIS, several qualitative thresholds were selected based on the noise levels shown in table 176. For the recreational users who may be near the perimeter fence, along the Arizona National Scenic Trail,[1] and along Box Canyon Road, a threshold of 40 dBA was selected, which qualitatively represents "a typical suburban area at night, or typical whispering at 1 to 2 feet." For the recreational users along SR 83, a threshold of 65 dBA was selected, which qualitatively represents "a typical daytime busy downtown."

Summary of Effects by Issue Factor by Alternative

Table 182 presents the summary comparison of impacts from each alternative.

Table 182. Summary of effects

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield -McCleary
Issue 9.3: Qualitative assessment of potential for noise to reach recreation areas and expected noise level	None	Impacts to recreational users from intermittent blasting noise (construction and mining operation phases) and equipment operational noise (mining operation phase), resulting in a likely decrease in recreational value in the area immediately surrounding the project area (premining and active mining phases)	Same as for proposed action	Same as for proposed action, other than relocated Arizona National Scenic Trail, where noise impacts would not be evident	Same as for Barrel Alternative	Same as for Barrel Alternative
Issue 11B.1: Ability of alternatives to meet rural landscape expectations	Likely to meet expectations	For all action alternatives: no impacts to residents from construction, blasting, equipment operation, or traffic noise during any phase of mine life	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action

Affected Environment

Relevant Laws, Regulations, Policies, and Plans

The regulation of noise and vibration from mining activities is accomplished primarily at the Federal level, with States and Municipalities responsible for enforcement. Controls address worker exposure and environmental or land use compatibility.

Federal Regulations

The Noise Pollution and Abatement Act of 1970 (Title IV of the CAA (42 U.S.C. 7627)) established an Office of Noise Abatement and Control within the EPA. The EPA was directed to investigate and identify the effects of noise levels on public health and welfare, including psychological and physiological effects on humans; effects of sporadic extreme noise, compared with constant noise; effects on wildlife and property; effects of sonic booms on property; and such other matters as may be of interest in the public welfare. Title IV of the CAA also requires other federal agencies and departments to consult with the EPA regarding methods for abating objectionable or nuisance condition noise impacts that result from activities they carry out or sponsor.

The Federal Noise Control Act of 1972 (42 U.S.C. 4901 et seq.) established a requirement that all Federal agencies must administer their programs in a manner that promotes an environment free from noise that jeopardizes public health or welfare. The EPA was given the responsibility of providing information to the public regarding identifiable effects of noise on public health or welfare, publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety, coordinating Federal research and activities related to noise control, and establishing Federal noise emission standards for selected products distributed in interstate commerce (construction equipment; transportation equipment; motors and engines; and electrical or electronic equipment). States and political subdivisions of States retain the right to establish and enforce controls on environmental noise through the licensing, regulation, or restriction of the use, operation, or movement of products or combinations of products. The Federal Noise Control Act also directed all Federal agencies to comply with Federal, State, interstate, and local noise control and abatement requirements to the same extent that any person is subject to such requirements.

Although the EPA can require other Federal agencies to justify their noise regulations with respect to the policy requirements of the Federal Noise Control Act, each Federal agency retains the authority to adopt noise regulations pertaining to agency programs.

Land Use Compatibility

The Federal Interagency Committee on Urban Noise was formed in 1979 to review various Federal agency programs related to noise impacts on land use. The committee included representatives of the U.S. Department of Transportation, U.S. Department of Housing and Urban Development, EPA, Department of Defense, and Veterans Administration. The 1980 report issued by the Federal Interagency Committee on Urban Noise summarized federal agency noise policies and programs (Federal Interagency Committee on Urban Noise 1980). In addition, it identified the day-night average sound level noise metric as the most appropriate noise descriptor to use for evaluating noise in the context of land use compatibility issues. The 1980 Federal Interagency Committee on Urban Noise report also included a chart of compatible and incompatible noise levels for various categories of land use.

The Federal Interagency Committee on Noise was formed in 1990 to review Federal agency policies concerning the assessment of airport noise issues. Participating agencies included the U.S. Department of Transportation, Department of Defense, Department of Justice, U.S. Department of Housing and Urban Development, EPA, Veterans Administration, and CEQ. The 1992 report prepared by the committee confirmed the use of the day-night average sound level noise metric as the primary basis for assessing land use compatibility issues but also recognized that supplementary noise descriptors could be useful to further explain noise impacts on a case-by-case basis.

Other Federal agencies, such as the Federal Highway Administration, Federal Transit Administration, and Federal Railroad Administration, have developed noise impact criteria that employ a sliding scale of noise levels, depending on both existing land use and noise levels. Some Federal agencies, such as the National Park Service, BLM, and Forest Service, have not adopted any specific noise impact and vibration criteria or standards.

The Surface Mining Control and Reclamation Act of 1977 sets general guidelines applicable to all surface coal mining and reclamation operations (Public Law 95-87). The performance standards also apply to blasting conducted for minerals mining. With the dissolution of the Bureau of Mines in 1995, regulatory authority was transferred to the Office of Surface Mining Reclamation and Enforcement. Performance standards established by the Office of Surface Mining Reclamation and Enforcement include a preblasting survey of all structures within 0.5 mile of a permitted area; blasting schedule, signs, warnings, and access control; control of adverse effects; and recordkeeping requirements (30 CFR 816).

Worker Exposure

The Occupational Safety and Health Administration has primary authority for setting workplace noise exposure standards. Because of aviation safety considerations, the Federal Aviation Administration has primary jurisdiction over aircraft noise standards. In 1999, MSHA published new “Health Standards for Occupational Noise Exposure.” The purpose of these standards is to prevent the occurrence and reduce the progression of occupational noise-induced hearing loss among miners. Title 30 CFR Part 62, Section 100, sets forth mandatory health standards for each surface and underground metal, nonmetal, and coal mine subject to the Federal Mine Safety and Health Act of 1977. The provisions of this part became effective on September 13, 2000. Title 30 CFR 56 provides additional safety and health standards specific to surface metal and nonmetal mine operations.

State and Local Legislation

State regulations focus primarily on noise from motor vehicles and aircraft as well as equipment operation, with no specific provisions for mining operations. Title 28 ARS, Article 16, Section 955, regulates the use of mufflers on equipment and motor vehicles, including motorcycles. The AAC does not contain any noise abatement language.

Local ordinances also primarily address noise generated by motor vehicles and aircraft. Pima County Development Services Ordinance 2008-119, “Noise Level Design and Construction Standards,” sets minimum requirements for noise level reduction of the building exterior within established noise contour zones of the Tucson International Airport and the Davis-Monthan Air Force Base. The standards apply to noise-sensitive land uses, including all habitable areas of residential uses, all indoor areas where the primary purpose is to receive the public, office areas (with some exceptions), and all noise-sensitive indoor areas or indoor areas where the normal noise level is low, including libraries, schools, and religious facilities.

The Pima County Department of Transportation Procedure No. 03-5, “Traffic Noise Analysis and Mitigation Guidance for Major Roadway Projects,” was developed to provide guidance for the development of noise mitigation for Pima County’s major roadway projects (Pima County Department of Transportation 2008). It contains procedures for traffic noise abatement, noise analysis methodology, and requirements for noise reports and is commonly called the Pima County Noise Abatement Procedure.

Existing Conditions

Rural residential land uses are located northeast and southeast of the project site, as shown in figure 106. Eight residences are located northeast of the project area along SR 83 in the Mulberry Canyon area, about 6 to 7 miles from the center of the proposed open-pit mine. Six residences are located southeast of the project site along Singing Valley Road, about 3 to 4 miles from the center of the proposed open-pit mine. Nine additional rural residences are located southeast of the project site, about 5 to 6 miles from the center of the open-pit mine, scattered along SR 83, East Greaterville Road, Old Sonoita Highway, Beatty Ranch Road, and Singing Hills Trail. The Santa Rita Abbey is located along East Fish Canyon Road, 7.3 miles from the center of the proposed mine.

Ambient Noise Conditions in the Project Area

Figure 107 is an overview map showing locations used for ambient noise monitoring at the project area. Measurements were conducted by Tetra Tech and summarized in the technical report "Rosemont Copper Background Ambient Noise Study" (Tetra Tech 2008), prepared for Rosemont Copper. The measurement results presented in the report are summarized in the following section.

Project Area Measurement Locations and Descriptions

Five locations in the southern part of the project area (monitoring sites L1 through L5) were monitored over the 2008 Memorial Day weekend with Larson Davis 820 sound-level meters for 72 consecutive hours. L6 was monitored for about 9 hours with a Center 322 sound-level meter. Monitoring site L1 was located about 1 mile from SR 83 on the nose of a small side ridge downslope of the main ridge crest at the north of the end of Singing Valley Road. None of the residences along Singing Valley Road were visible from this location. Monitoring site L2 was located about 1 mile from the highway near the top of a ridge that faced west, with an open view of the project area to the northwest. Monitoring sites L3 through L5 were at different elevations in a valley, which is oriented east, toward SR 83. Monitoring site L3 was located just under 1.00 mile from SR 83, and monitoring site L4 was located about 0.64 mile from the highway. Monitoring site L5 was located relatively close to SR 83 (0.11 mile). Monitoring site L6 was on a flat area 234 feet from SR 83.

After the 2008 Memorial Day weekend, additional noise monitoring was conducted at the north end of the project area and at locations closer to the proposed mine. One Larson Davis sound-level meter and one Center 322 sound-level meter were placed at monitoring site L7, which was located near SR 83 at the northeast corner of the proposed mining operations area, about 1.6 miles southwest of Mulberry Canyon. There are scattered rural residences in the area. Two additional Larson Davis meters were placed along a ridge southeast of the proposed mine area (at monitoring sites L8 and L9). The additional monitoring locations are shown in figure 107. Table 183 presents a summary of noise-level data collected at monitoring sites L1 through L6 during the 2008 Memorial Day weekend and at monitoring sites L7 through L9 for the weekdays after Memorial Day weekend. The results of various ways of measuring the noise, such as maximum and minimum sound levels and average day-night sound levels, are shown.

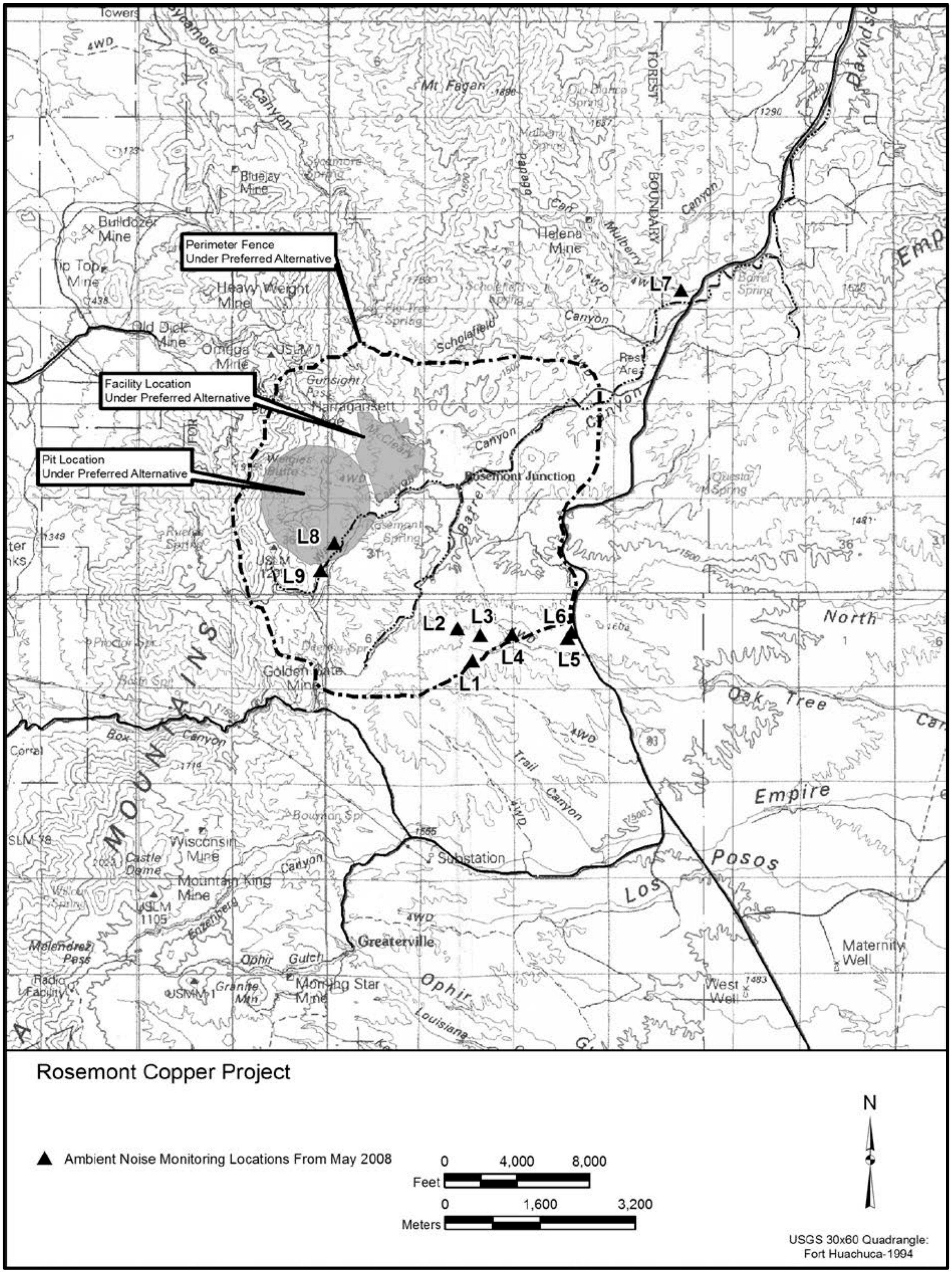

Figure 107. Ambient noise monitoring locations (Tetra Tech 2009)

Table 183. Summary of noise levels at project area monitoring sites (dBA)

	L_{dn}	L_{eq}	L_{max}	L05	L10	L33	L50	L90	L95	L_{min}
2008 Memorial Day Weekend										
L1	54.8 46.0 43.0	53.9 41.3 40.4	77.1 67.4 75.2	49.7	45.2	37.4	34.2	30.9	30.8	30.3 30.1 30.3
L2	55.2 50.6 51.8	49.6 49.5 47.4	77.8 78.3 80.1	54.7	50.6	41.2	38.3	36.3	36.2	35.7 35.7 35.8
L3	49.2 48.6 48.7	43.3 43.1 43.6	75.1 68.6 81.0	47.1	44.9	41.9	41.3	40.4	40.4	40.0 40.0 40.0
L4	43.3 42.0 42.1	38.0 37.2 38.4	72.2 68.1 75.6	41.3	39.2	35.7	34.3	32.6	32.5	32.1 32.1 32.2
L5	47.4 46.7 45.7	43.2 45.0 43.0	77.6 84.9 74.5	48.9	45.9	38.8	35.3	32.1	31.9	31.5 31.4 31.5
L6	NA	50.0	73.6	55.9	53.5	46.5	42.4	32.3	30.9	27.4
Weekdays after 2008 Memorial Day Weekend										
L7	55.2 54.6	50.7 49.7	82.4 77.0	56.0	52.3	43.1	41.4	40.5	40.4	39.9 40.1
L7B	NA	50.1	77.6	55.7	52.0	41.9	35.2	27.3	27.0	26.9
L8	43.4 44.3	39.0 39.6	71.0 67.2	43.8	41.0	36.6	35.2	33.5	33.1	32.3 32.3
L9	43.7 45.4	39.3 41.1	81.8 71.9	45.7	42.6	36.3	34.7	32.8	32.6	31.7 31.7

Notes:
L05 = sound level was exceeded 5% of the time (overall monitoring period).
L10 = sound level was exceeded 10% of the time (overall monitoring period).
L33 = sound level was exceeded 33% of the time (overall monitoring period).
L50 = sound level was exceeded 50% of the time (overall monitoring period).
L90 = sound level was exceeded 90% of the time (overall monitoring period).
L95 = sound level was exceeded 95% of the time (overall monitoring period).
L_{dn} = day-night average noise level, a 24-hour average with annoyance penalty of 10 dBA for nighttime noise. L_{dn} values for each 24-hour period listed separately.
L_{eq} = equivalent continuous noise level, each 24-hour period listed separately.
L_{max} = maximum sound level (fast response setting), each 24-hour period listed separately.
L_{min} = minimum sound level (fast response setting), each 24-hour period listed separately.
NA = not applicable; monitoring duration not long enough to calculate L_{dn}.

Interpretation of Project Area Ambient Measurements

The monitoring data collected from the project area demonstrate the low ambient noise conditions typical of areas with limited development and few major roadways. All nine sites monitored had noise levels below 45 dBA at least 70 percent of the time. Only monitoring sites L2 and L7 had 24-hour equivalent noise level values consistently above 45 dBA. As indicated in table 183, all monitoring sites in the project area exhibited consistent minimum noise levels, with little day-to-day variation. Most sites showed a similar overall noise level range, with minimum noise levels of approximately 31 to 35 dBA and maximum noise levels of approximately 71 to 77 dBA. Noise graphs in appendix D of the "Background Ambient Noise Study" (Tetra Tech 2008) indicate somewhat higher noise levels during daytime hours than during nighttime hours. However, monitoring sites L8 and L9 showed little variation in noise levels between daytime and nighttime hours.

Distinct spatial patterns in background noise levels were not evident, except for the influence of SR 83 at locations relatively close to the roadway. The influence of the traffic noise from SR 83 is evident from the monitoring results at sites L5 through L7. These monitoring sites also exhibited reduced noise levels during nighttime and early morning hours, when traffic volumes on SR 83 were reduced. Daytime traffic noise levels from SR 83 became a low ambient noise component at distances more than 1,000 to 2,000 feet from the highway. Noise levels also tended to be somewhat higher on ridgelines than in valley areas, as would generally be expected as a result of terrain shielding by ridges and mountains. As shown in table 183, monitoring sites L1 and L2, which were located on or close to the tops of ridgelines, had day-night average sound level and 24-hour equivalent noise level values that were higher than those of monitoring sites L3 and L4, which were located in a valley below the surrounding ridgelines.

Data from locations monitored over the 2008 Memorial Day weekend generally showed higher noise levels on Saturday than on Sunday or Monday. All five sites showed somewhat higher day-night average sound level values on Saturday, compared with Sunday or Monday. Four of the five sites showed small variations in 24-hour equivalent noise level values over the 2008 Memorial Day weekend. Only monitoring site L1 showed a spread of more than 2.5 dBA in 24-hour equivalent noise level values. Wind conditions did not appear to be a major factor in generating the higher noise levels on Saturday. Average wind speeds were slightly higher on Saturday than on the other days, but maximum hourly average wind speeds were the same each day over the weekend. Maximum hourly average wind speeds did not exceed 15 miles per hour, a speed at which wind may begin to inflate background noise conditions.

Monitoring site L1 showed the greatest variation in day-to-day day-night average sound level and 24-hour equivalent noise level values, with noise levels on Saturday (May 24, 2008) noticeably higher than the day-night average sound level and equivalent noise level for Sunday (May 25, 2008) and Monday (May 26, 2008). The more pronounced variation in day-night average sound levels and 24-hour equivalent noise levels at site L1 may reflect variations in outdoor activity levels at the homes along Singing Valley Road. These homes are the closest residences to the project site, approximately 3 miles from the open-pit mine area (which is identical for all action alternatives).

Monitoring site L2 may have been influenced by intermittent mechanical equipment noise. Although no such noise sources were evident when the monitoring site was established, L2 was the only site with day-night average sound-level values consistently above 50 dBA and daily maximum noise levels consistently above 77 dBA. Monitoring site L2 also had the second highest average 24-hour equivalent noise-level values to monitoring site L7 near SR 83. In addition, L2 was the only site monitored over the 2008 Memorial Day weekend that had noise levels above 50 dBA more than 10 percent of the time. A large vertical tank was noted about 300 feet southeast of monitoring site L2. Intermittent operation of a pump or other mechanical equipment might have accounted for the somewhat higher than average noise levels at monitoring site L2. This site had one daily maximum noise level value just over 80 dBA. This may have been the result of a vehicle door closing near the noise meter. A dirt road was located fairly close to the meter location, and security personnel reported that they stopped at and investigated most monitoring sites.

Monitoring site L3 had the highest minimum noise levels (40 dBA) among the five locations monitored over the 2008 Memorial Day weekend in the project area. The source of the relatively high minimum noise levels at monitoring site L3 is unknown. This site was in an upper valley location about 1 mile from SR 83, more than 1,000 feet from the tank near monitoring site L2. Monitoring site L3 also had one daily maximum noise level value over 80 dBA. The source of this relatively high noise event is unclear. The monitoring site was well removed from the nearest unpaved road, and there was no evidence of off-road vehicle use near the noise meter.

Monitoring site L4 had the lowest day-night average sound level and 24-hour equivalent noise-level values of any monitored locations within the project area. Noise levels at monitoring site L4 exceeded 45 dBA less than 5 percent of the time. Monitoring site L4 was in a mid-valley location, about 3,390 feet (0.64 mile) from SR 83.

Monitoring site L5 was somewhat influenced by traffic noise from SR 83. The site was approximately 600 feet from SR 83. The monitoring location was high enough on the side of the valley to have line of sight to a portion of SR 83. However, actual day-night average sound-level values measured at monitoring site L5 were lower than those measured at monitoring sites L1 through L3. Monitoring site L5 had the highest daily maximum noise level value of any of the nine sites monitored in the project area (84.9 dBA). The maximum noise level at monitoring site L5 appears to have been a gunshot. This conclusion is plausible, since the meter was well off the nearest unpaved road, vegetation around the monitoring site showed no evidence of off-road vehicle activity, the site was located about 600 feet from SR 83, and the noise lasted less than 0.1 second.

Monitoring site L6 was monitored for slightly less than 9 hours using a Center 322 meter. Monitoring site L6 was 235 feet from SR 83. Monitoring began on a Friday afternoon and continued until the instrument memory was filled, shortly after midnight. While the duration and timing of monitoring at site L6 prevented an ideal comparison with the other monitoring sites, the data generally showed higher noise levels than those monitored at sites L1 through L5, as would be expected from a location closer to SR 83. Minimum noise levels at monitoring site L6 were lower than those measured by the Larson Davis meter at monitoring site L7, but average noise levels at site L6 were similar to those at site L7.

Monitoring site L7 had a relatively high minimum noise level of about 40 dBA, which is attributable to periods with low traffic volumes on SR 83. This site also had one daily maximum noise level value above 80 dBA, which was probably the result of a peak traffic period, possibly including an unusually noisy vehicle on SR 83. Monitoring site L7 was about 190 feet from SR 83.

Monitoring sites L8 and L9 were on a ridgeline in the interior portion of the project area. Both locations measured similar noise levels over a 2-day period. Only monitoring site L4 had 24-hour equivalent noise level values lower than those measured at sites L8 and L9. Monitoring site L9 had one daily maximum noise level value above 80 dBA. This may have been a vehicle door closing near the noise meter. Security personnel reported that they stopped at and investigated most monitoring sites.

The potential contribution from low-altitude military aircraft to monitored peak noise levels was investigated. The two closest military training routes, VR-259 and VR-260, are about 4 to 5 miles from the noise monitoring sites in the southern part of the project area (monitoring sites L1 through L6, L8, and L9). VR-259 is about 2.5 miles from monitoring site L7. These distances are too far from the noise monitoring locations in the project area to have contributed significantly to measured noise levels or to have caused the measured peak noises. Based on the U.S. Air Force Omega 10.8 aircraft noise model, peak F-16 military jet noise contributions at monitoring site L7 would be 66 dBA or less, and peak noise contributions at the other monitoring sites would be 56 dBA or less. Peak noise contributions from other types of military jet aircraft generally would be less than the noise levels from F-16 jets.

In summary, ambient noise levels in the project area do not exceed the noise thresholds of significance selected for this analysis with respect to residences (65 dBA). However, they would exceed the selected threshold for recreational use at several locations (40 dBA).

Noise Levels at an Active Copper Mine

In addition to noise monitoring in the vicinity of the project area, 1 day of noise monitoring was conducted at an active open-pit copper mine in May 2008. The results are presented in the report titled “Rosemont Copper Background Ambient Noise Study” (Tetra Tech 2008).

The active open-pit copper mine was chosen not only because it is in Arizona but because it has several similar terrain features for comparative analysis with the project area. The similar terrain includes ridges for terrain shielding and an open, downward-sloping terrain with no intervening ridges to allow for mining activity noise dispersion.

Active Copper Mine Measurement Descriptions

Permission to monitor noise levels at this mine was granted on condition that the mine would not be identified. Three monitoring locations (L10 through L12) were planned at different distances from an active pit during the May 2008 monitoring period. Monitoring site L10 was on a completed waste rock pile overlooking the active pit area. Monitoring site L11, which was located along a haul road about 1 mile from the blast site, was shielded from the pit area by an intervening ridge. Monitoring site L12, which was about 1.25 miles from the blast site, was located near the boundary of the mining operation. This location was separated from the pit area by downward-sloping terrain, without any intervening ridges, that bordered the remainder of the mining pit. An instrument problem at monitoring site L10 prevented the collection of noise data, but data were collected for more than 24 hours at two other locations.

Table 184 presents a summary of the noise monitoring data collected at sites L11 and L12. One large blast occurred during the noise monitoring period. However, the blast was not identifiable in the time history data from noise monitoring sites L11 and L12. This was the result of the combination of pit-wall shielding, other terrain shielding, and general ground absorption effects, which reduced peak blast noise to levels comparable to ambient background conditions at monitoring sites L11 and L12. Mine operations staff also reported that they do not normally hear blasts at the mine’s office building complex, which is approximately 3.5 miles from the pit area across intervening ridges. Most brief noise peaks in the monitoring data represented vehicle traffic on nearby haul roads.

Additional noise monitoring was conducted at this same active mine in October 2008. The results are presented in the “Supplemental Noise Study, Rosemont Copper Project” (Tetra Tech 2009). Three locations were selected for monitoring. The first meter was located on a completed waste rock pile overlooking the active blast location (monitoring site L10), and the meter was set back about 100 feet from the edge of the pit. The second meter was located on the edge of a different completed waste rock pile overlooking the active pit with a direct line of sight to the blast location (monitoring site L13). The third location was along a haul road leading to the vehicle wash facility (monitoring site L14), with downward-sloping ground but no major ridgelines between the monitoring site and the blast location within the pit area. Monitoring site L14 was about 0.33 mile closer to the pit than the monitoring site L12 location used during the May 2008 monitoring period. One Larson Davis 820 sound-level meter and one Center Technology 322 sound-level meter were placed at each of the three locations. The Larson Davis meters ran for 47.8 hours at monitoring site L10, 42.8 hours at monitoring site L13, and 48.0 hours at monitoring site L14. The Center 322 meters provided backup and generally were set to collect 1-second time history data. Table 184 also presents a summary of noise monitoring data collected by the Larson Davis meters during the October 2008 monitoring period.

Table 184. Summary of noise levels at active copper mine (in dBA)

	L_{dn}	L_{eq}	L_{max}	L_{05}	L_{10}	L_{33}	L_{50}	L_{90}	L_{95}	L_{min}
May 2008										
L11	42.6	38.8	72.5	39.8	37.2	34.2	33.4	32.3	32.0	31.4
L12	41.8	39.4	70.8	41.4	38.4	34.2	33.2	29.4	29.3	29.0
October 2008										
L10	NA 51.7 NA	62.5 59.2 56.6	92.9 72.3 93.3	53.1	50.8	45.1	40.8	28.3	24.1	19.3 18.5 17.6
L13	NA 66.3 NA	62.5 59.2 56.6	111.0 95.1 73.4	65.4	62.9	57.0	53.5	41.9	34.0	20.7 19.3 23.5
L14	NA 59.6 NA	51.7 54.9 52.0	79.7 84.3 80.0	55.3	49.0	36.2	24.3	24.3	23.3	19.8 19.9 20.4

Notes:
L_{05} = Sound level was exceeded 5% of the time (overall monitoring period).
L_{10} = Sound level was exceeded 10% of the time (overall monitoring period).
L_{33} = Sound level was exceeded 33% of the time (overall monitoring period).
L_{50} = Sound level was exceeded 50% of the time (overall monitoring period).
L_{90} = Sound level was exceeded 90% of the time (overall monitoring period).
L_{95} = Sound level was exceeded 95% of the time (overall monitoring period).
L_{dn} = Day-night average noise level, a 24-hour average with annoyance penalty of 10 dBA for nighttime noise. L_{dn} values for each 24-hour period listed separately.
L_{eq} = Equivalent continuous noise level, each 24-hour period listed separately.
L_{max} = Maximum sound level (fast response setting), each 24-hour period listed separately.
L_{min} = Minimum sound level (fast response setting), each 24-hour period listed separately.
NA = Not applicable; monitoring duration not long enough to calculate L_{dn}.

Two blasts occurred during the period of monitoring, one on the first day and another on the third day. A battery failure in the Larson Davis meter at monitoring site L13 prevented measurement of the second blast at the L13 site. The 1-second data logging interval for the Center 322 meter at this site was not fast enough to detect the true blast maximum noise level, but available data indicate that the second blast would have produced a maximum noise level similar to, or perhaps a little lower than, that of the first blast.

Interpretation of Active Copper Mine Measurements

Data from monitoring site L13 provided information on blast noise without any pit-wall or terrain shielding. Data from monitoring site L10 provided information on the effect of pit-wall shielding. Data from monitoring site L11 provided information on the effect of significant terrain shielding beyond the immediate pit area. Data from monitoring sites L12 and L14 provided information on noise levels at distances of about 1.1 miles and 0.8 mile, respectively, with no major intervening terrain shielding but with general ground absorption effects over irregular, downward-sloping terrain.

Blast monitoring occurred at the pit area in both May 2008 and October 2008. Heavy equipment operations at the pit and on haul roads occurred at a lower intensity during the May 2008 monitoring period than during the October 2008 monitoring period.

Except for maximum noise levels from blasts or nearby heavy equipment operations, the noise monitoring data from the active copper mine were similar to the ambient noise levels measured in the project area. Minimum noise levels measured around the active mine were actually lower than the minimum noise levels measured in the project area. In addition, minimum noise levels measured in October 2008 were significantly lower than those measured at the active mine in May 2008. Minimum noise levels measured in October 2008 were about 20 dBA at all three monitoring sites. By comparison, minimum noise levels measured in the project area generally were between 30 and 35 dBA.

Two blasts were monitored at site L10 in October 2008. One blast occurred on a pit bench about 165 feet higher than monitoring site L10 but with intervening terrain shielding within the pit area. The blast location was about 1,790 feet (0.34 mile) from monitoring site L10. The second blast occurred within the pit at an elevation of about 350 feet below the elevation of monitoring site L10. This blast was about 1,390 feet (0.26 mile) from monitoring site L10. As indicated in table 184, both blasts generated similar maximum noise levels at monitoring site L10 (92.9 and 93.3 dBA, respectively). By comparison with data from monitoring site L13, pit-wall shielding was estimated to be about 20 dBA. The day-night average sound level measured at monitoring site L10 in October 2008 (51.7 dBA) represents a day with heavy equipment operations in the pit area but no blasting. In addition, a drill rig was operating on a bench immediately above the waste rock pile, where monitoring site L10 was located. The day-night average sound level and 24-hour equivalent noise level at monitoring site L10 were comparable to the corresponding values measured at monitoring site L2 in the project area.

Monitoring site L11 was monitored in May 2008. This site was within the active mine property about 1 mile from the pit and at about the same elevation as monitoring site L10. There were intervening hills and ridgelines between the pit and monitoring site L11. The May 2008 blast occurred in the pit at a distance of about 1 mile from monitoring site L11. The blast was not detectable in the time history data from monitoring site L11. The day-night average sound level for monitoring site L11 (42.6 dBA) was comparable to that of monitoring site L4 in the project area. The maximum noise-level data from monitoring site L11 (72.5 dBA) represent haul truck traffic near the monitoring site and were comparable to the maximum noise-level values from monitoring site L4 in the project area.

Monitoring site L12 was monitored in May 2008. The site was just outside the mine property, about 1.1 miles from the active portion of the overall pit area and at an elevation below that of the blast. There were no significant hills or ridgelines between the monitoring site and the pit area, although pit walls and benches within the pit provided shielding from the monitored blast. The May 2008 blast occurred in the pit, at a distance of about 1.25 miles from monitoring site L12. The blast was not detectable in the time history data from monitoring site L10. The day-night average sound level and maximum noise level values at monitoring site L12 (41.8 and 70.8 dBA, respectively) were slightly lower than those at monitoring site L11, although the overall equivalent noise level value for monitoring site L12 was slightly higher than that for L11. In general, noise levels at monitoring site L12 were comparable to those at monitoring site L4 in the project area.

Monitoring site L13, at the edge of the active pit, was monitored in October 2008. This site had the highest noise levels, as would be expected for a location with line of sight into the pit. Monitoring site

L13 was about 260 feet above the monitored blast location. As noted previously, a battery failure terminated monitoring by the Larson Davis meter before the second blast. The measured blast produced a maximum noise level of 111 dBA. On the day between blasts, mining activity in the pit area produced a day-night average sound level of 66.3 dBA, a 24-hour equivalent noise level of 59.2 dBA, and a maximum noise level of 95.1 dBA. As expected, these values were higher than the background noise levels measured in the project area.

Monitoring site L14 was monitored in October 2008. Monitoring site L14 was close to an onsite mine road and obtained data on passing heavy equipment noise levels and blast noise levels. The mine road provided access to the pit area and to a vehicle wash facility.

Monitoring site L14 was in the same general area as monitoring site L12, although somewhat closer to the pit area and about 60 feet from the edge of the mine road. Two blasts were monitored at monitoring site L14. The first was about 1 mile from monitoring site L14, and the second was about 0.7 mile from monitoring site L14. The elevation at monitoring site L14 was about 445 feet below the elevation of the first blast site and at about the same elevation as the second blast site. The first blast was not detectable in the time history data from monitoring site L14. The second blast was detectable in the maximum noise level and instantaneous peak time history data but not in the equivalent noise level time history data from monitoring site L14. The second blast generated a maximum noise level of 66.5 dBA at monitoring site L14, which was less than the maximum noise level values generated by trucks and heavy equipment on the mine road. On the day between blasts, measured day-night average sound level (59.6 dBA), 24-hour equivalent noise level (54.9 dBA), and maximum noise level (84.3 dBA) values at monitoring site L14 were the result primarily of heavy truck and other equipment operations on the adjacent mine road. These noise levels were slightly higher than comparable levels measured at monitoring site L7 in the project area.

Environmental Consequences

Direct and Indirect Effects of Each Alternative

No Action Alternative

The no action alternative would result in noise levels similar to those measured during the ambient noise level monitoring. Under ambient conditions, none of the various regulatory standards described above are exceeded. Population growth would lead to increased traffic on SR 83 and result in increased noise impacts to private properties adjacent to the highway. Population growth would also lead to an increase in demand for recreation activities on Forest Service lands such as off-road vehicle use. An increase in recreation activities would result in increased noise impacts.

Impacts Common to All Action Alternatives

Expected noise impacts under the proposed action alternative have been assessed (Tetra Tech 2009). Noise impacts during construction and closure phases (blasting, construction, and traffic noise) would be identical for all action alternatives. Noise impacts from traffic were modeled for a segment along SR 83 from approximately milepost 52 to the north and the Pima/Cochise County line to the south. Noise impacts during the operational phase (equipment noise) would vary by alternative and are assessed separately. Noise impacts to Arizona National Scenic Trail users would also vary by alternative; however, under the Barrel, Barrel Trail, and Scholefield-McCleary Alternatives the trail would be relocated away from the mine operations and outside the selected noise thresholds.

Airborne and ground vibrations during construction and operational phases would be identical for all action alternatives.

The connected actions that are described in chapter 1 include the use of mechanized equipment to reroute an electrical transmission line within the project area; construct an electrical distribution line, water supply line, and associated maintenance road within the utility corridor; reroute the Arizona National Scenic Trail and construct ancillary facilities; and implement SR 83 maintenance improvements required by the ADOT encroachment permit. These activities have been considered in the description of impacts common to all action alternatives for the premining phase when they would be constructed; and for the final reclamation and closure phase, when the water line and electrical distribution line would be removed. These activities would have temporary, short-term noise impacts that would typically be localized and in remote locations away from potential noise receptors.

Results of Noise Modeling

Direct impacts from blasting, construction, operation, and traffic noise have been modeled for the project area (Tetra Tech 2009). Noise modeling was conducted for seven parameters. The following five modeled parameters are pertinent to residential and recreational noise receptors:

- Maximum blast noise for surface blasting (dBA);
- Maximum blast noise for in-pit blasting (dBA);
- Maximum construction noise for plant site (dBA);
- Maximum intermittent equipment noise at waste rock and tailings (dBA); and
- 24-hour day-night average sound level for traffic noise (dB).

For blasting impacts, the following two parameters were also assessed:

- Airborne vibrations through peak overpressure levels (dB); and
- Ground vibrations through peak particle velocity (inches per second).

Premining Phase – Noise Impacts

Noise impacts during the construction phase consist of construction noise, traffic noise, and blasting noise. Note that blasting would be much less prevalent during premining than it would be during the active mining phase. Noise impacts for the premining phase are shown in table 185.

Table 185. Noise impacts expected to occur during premining phase

Analysis Location	Threshold of Significance	Construction	Blasting	Traffic
House A	65	<30	50 to 60	35 to 40
House H	65	<30	50 to 60	40 to 45
House O	65	<30	<50	53.4 to 55.5
House P	65	<30	50 to 60	52.7 to 54.8
Building F	65	<30	50 to 60	53.3 to 55.3
REC1	40	30 to 40	70 to 80	<30
REC2	40	30 to 40	60 to 70	<30
REC3	40	30 to 40	50 to 60	<30
BOX1	40	<30	40 to 50	<30

Analysis Location	Threshold of Significance	Construction	Blasting	Traffic
BOX2	40	<30	60 to 70	<30
BOX3	40	<30	50 to 60	30 to 35
HWY1	65	30 to 40	60 to 70	60 to 65
HWY2	65	<30	50 to 60	60 to 65

Note: Shaded cells indicate an exceedance of selected noise threshold.

Blasting was modeled for both surface blasting and in-pit blasting conditions. Surface blasting was generally found to have the greater impact of the two and therefore has been used in this analysis. The results for modeling of maximum surface blast noise range from more than 90 dBA near the open pit to 60 to 70 dBA at the edges of the mine facility. Maximum surface blast noise at residential receptors is not expected to exceed 60 dBA, which does not exceed the selected threshold of 65 dBA. However, maximum surface blast noise exceeds the selected threshold at almost all recreational locations.

The results for modeling of maximum construction noise range from more than 80 dBA near the plant site to 30 to 40 dBA at the edges of the mine facility. Maximum construction noise at all receptors is expected to be less than 40 dBA, which does not exceed the selected threshold at any location. Traffic noise at the peak of operations (20 years) was modeled along SR 83 (this represents a worst-case scenario with respect to traffic volume). Immediately adjacent to the roadway, traffic noise peaks at more than 65 dBA; however, none of the noise receptors are within this range. The nearest noise receptors fall within a modeled noise range of 50 to 55 dBA; this noise level does not exceed the selected threshold at any location.

To summarize, blast noise during the construction phase is expected to affect recreational users in the area (although blasting would not be used frequently or regularly during premining). Noise levels would generally remain below 70 dBA, which is considered moderately noisy to noisy, and would be similar in nature to a leaf blower at 50 feet or a six-lane freeway at 300 feet. However, because blasting would not be used extensively during the premining phase, impacts to recreational users during this time are not likely to be significant.

Final Reclamation and Closure Phase – Noise Impacts

Noise impacts during the final reclamation and closure phase would consist of demolition noise (considered to be similar to construction noise and not separately modeled) and traffic noise. Truck traffic would be limited to one round trip per day, and worker commutes would be limited to 10 round trips per day. Therefore, noise from mine related activities during the final reclamation and closure phase would not be distinguishable from background traffic noise. Noise impacts for the final reclamation and closure phase are shown in table 186.

Table 186. Noise impacts expected to occur during final reclamation and closure phase

Analysis Location	Threshold of Significance	Demolition	Traffic
House A	65	<30	35 to 40
House H	65	<30	40 to 45
House O	65	<30	53.4 to 55.5

Analysis Location	Threshold of Significance	Demolition	Traffic
House P	65	<30	52.7 to 54.8
Building F	65	<30	53.3 to 55.3
REC1	40	30 to 40	<30
REC2	40	30 to 40	<30
REC3	40	30 to 40	<30
BOX1	40	<30	<30
BOX2	40	<30	<30
BOX3	40	<30	30 to 35
HWY1	65	30 to 40	60 to 65
HWY2	65	<30	60 to 65

Noise levels during the closure phase do not exceed the selected threshold levels at any of the monitoring locations.

Premining and Active Mining Phases – Airborne and Ground Vibrations

Airborne and ground vibrations caused by blasting were also modeled. Subsonic vibrations are of concern only with respect to property damage; therefore, results are compared only with the nearest residential receptor to the southeast (House A) and northeast (House H) and not with potential recreation users on the Coronado National Forest. Based on the modeling results, as shown in table 187, the modeled airborne and ground vibrations at the closest structures to the southeast and northeast do not exceed Office of Surface Mining Reclamation and Enforcement regulatory standards.

Table 187. Impacts from airborne and ground vibrations

Modeled Parameter	Nearest Receptors House A	Nearest Receptors House H
Airborne Vibration (Peak Overpressure (dB))	106.5	98.8
Ground Vibration (Peak Particle Velocity (inches per second (in/sec)))	0.040	0.014
Office of Surface Mining, Reclamation, and Enforcement (OSM) Maximum Peak Overpressure 0.1 Hz or lower (dB)	134	134
OSM Maximum Peak Overpressure 2 Hz or lower (dB)	133	133
OSM Maximum Peak Overpressure 6 Hz or lower (dB)	129	129
OSM Maximum allowable peak particle velocity (in/sec)	0.75	0.75

Proposed Action Alternative

Active Mining Phase – Noise Impacts

Noise impacts during the operational phase would include equipment operational noise, blasting noise, and traffic noise, as shown in table 188.

Table 188. Noise impacts expected to occur during operational phase under proposed action

Analysis Location	Threshold of Significance	Equipment	Blasting	Traffic
House A	65	30 to 40	50 to 60	35 to 40
House H	65	<30	50 to 60	40 to 45
House O	65	<30	<50	53.4 to 55.5
House P	65	<30	50 to 60	52.7 to 54.8
Building F	65	<30	50 to 60	53.3 to 55.3
REC1	40	40 to 50	70 to 80	<30
REC2	40	40 to 50	60 to 70	<30
REC3	40	<30	50 to 60	<30
BOX1	40	<30	40 to 50	<30
BOX2	40	40 to 50	60 to 70	<30
BOX3	40	<30	50 to 60	30 to 35
HWY1	65	30 to 40	60 to 70	60 to 65
HWY2	65	<30	50 to 60	60 to 65

Note: Shaded cells indicate an exceedance of selected noise threshold.

No residential receptors within the modeled analysis area are expected to experience noise levels above the selected thresholds. If the 55-dB traffic noise contour on SR 83 is extended to the north from milepost 52 (the approximate northern limit of the model) to I-10, approximately 320 private parcels of land would be wholly or partially within the contour between I-10 and the Pima/Cochise County line, according to Pima County Assessor records.

Recreational users would experience noise levels from blasting and from equipment operation above the selected threshold of 40 dBA, particularly along the rerouted Arizona National Scenic Trail adjacent to the perimeter fence (applies to the proposed action and Phased Tailings Alternative) and in dispersed camping locations along forest roads that are located within the 50-dBA noise contour depicted in figure 106. Noise levels at the proposed trailhead for the Arizona National Scenic Trail would also exceed the selected threshold of 40 dBA because of the proximity of traffic along SR 83.

During the active mining phase, blasting operations would be conducted up to once per day and would be limited to daylight hours, typically between 9 a.m. and 4 p.m. There would likely be a reduction in recreation as a result of noise impacts under the proposed action.

Phased Tailings Alternative

Active Mining Phase – Noise Impacts

Noise impacts expected during the active mining phase for the Phased Tailings Alternative are the same as for the proposed action.

Barrel Alternative

Active Mining Phase – Noise Impacts

Noise impacts during the operational phase would include equipment operational noise, blasting noise, and traffic noise, as shown in table 189.

Table 189. Noise impacts expected to occur during operational phase under Barrel Alternative

Analysis Location	Threshold of Significance	Equipment	Blasting	Traffic
House A	65	40 to 50	50 to 60	35 to 40
House H	65	<30	50 to 60	40 to 45
House O	65	<30	<50	53.4 to 55.5
House P	65	<30	50 to 60	52.7 to 54.8
Building F	65	<30	50 to 60	53.3 to 55.3
REC1	40	<30	70 to 80	<30
REC2	40	<30	60 to 70	<30
REC3	40	<30	50 to 60	<30
BOX1	40	<30	40 to 50	<30
BOX2	40	<30	60 to 70	<30
BOX3	40	<30	50 to 60	30 to 35
HWY1	65	40 to 50	60 to 70	60 to 65
HWY2	65	<30	50 to 60	60 to 65

Source: Sculley (2010a).
Note: Shaded cells indicate an exceedance of selected noise threshold.

No residential receptors are expected to experience noise levels above the selected thresholds. However, recreational users would experience noise levels from blasting above the selected threshold of 40 dBA in dispersed camping locations along forest roads that are located within the 50-dBA noise contour depicted in figure 106. During the operational phase, blasting operations would be conducted up to once per day and would be limited to daylight hours, typically between 9 a.m. and 4 p.m.

Equipment noise would not be noticeable to recreational users under the Barrel Alternative. Noise levels along the rerouted Arizona National Scenic Trail would be less than the 40-dBA threshold, with two exceptions: (1) the two trail crossings with SR 83; and (2) the two proposed trailheads. Both the crossings and the trailheads would exceed the noise threshold because of noise from traffic on SR 83. Noise from blasting and equipment during operations would not impact recreation on the rerouted alignment of the Arizona National Scenic Trail under this alternative.

Barrel Trail Alternative

Active Mining Phase – Noise Impacts

The actions and activities that would contribute to noise are similar to the other action alternatives, and the effects of the Barrel Trail Alternative (table 190) would be similar to those for the other action alternatives (Dieckhaus 2012).

Table 190. Noise impacts expected to occur during operational phase under Barrel Trail Alternative

Analysis Location	Threshold of Significance	Equipment	Blasting	Traffic
House A	65	40 to 50	50 to 60	35 to 40
House H	65	<30	50 to 60	40 to 45
House O	65	<30	<50	53.4 to 55.5
House P	65	<30	50 to 60	52.7 to 54.8

Analysis Location	Threshold of Significance	Equipment	Blasting	Traffic
Building F	65	<30	50 to 60	53.3 to 55.3
REC1	40	<30	70 to 80	<30
REC2	40	<30	60 to 70	<30
REC3	40	<30	50 to 60	<30
BOX1	40	<30	40 to 50	<30
BOX2	40	<30	60 to 70	<30
BOX3	40	<30	50 to 60	30 to 35
HWY1	65	40 to 50	60 to 70	60 to 65
HWY2	65	<30	50 to 60	60 to 65

Note: Shaded cells indicate an exceedance of selected noise threshold.

No residential receptors are expected to experience noise levels above the selected thresholds. During the operation phase, blasting would be conducted daily and would be limited to daylight hours, typically between 9 a.m. and 4 p.m. Blasting would occur up to once per day and would be expected to impact recreation users in dispersed camping locations along forest roads that are located within the 50-dBA noise contour depicted in figure 106. The alignment of the Arizona National Scenic Trail reroute and the locations of the two proposed trailheads would be the same as under the Barrel Alternative. Therefore, noise impacts from traffic along SR 83 would be identical to those under the Barrel Alternative at the trail crossings and proposed trailheads. Noise from blasting and equipment during operations would not impact recreation on the rerouted alignment of the Arizona National Scenic Trail.

Scholefield-McCleary Alternative

Active Mining Phase – Noise Impacts

Noise impacts during the operational phase would include equipment operational noise, blasting noise, and traffic noise, as shown in table 191.

Table 191. Noise impacts expected to occur during operational phase under Scholefield-McCleary Alternative

Analysis Location	Threshold of Significance	Equipment	Blasting	Traffic
House A	65	30	50 to 60	35 to 40
House H	65	<30	50 to 60	40 to 45
House O	65	<30	<50	53.4 to 55.5
House P	65	<30	50 to 60	52.7 to 54.8
Building F	65	<30	50 to 60	53.3 to 55.3
REC1	40	30 to 40	70 to 80	<30
REC2	40	40 to 50	60 to 70	<30
REC3	40	<30	50 to 60	<30
BOX1	40	<30	40 to 50	<30
BOX2	40	30 to 40	60 to 70	<30
BOX3	40	<30	50 to 60	30 to 35
HWY1	65	30 to 40	60 to 70	60 to 65
HWY2	65	<30	50 to 60	60 to 65

Source: Sculley (2010b).

Note: Shaded cells indicate an exceedance of selected noise threshold.

No residential receptors are expected to experience noise levels above the selected thresholds. However, recreational users would experience noise levels from blasting above the selected threshold of 40 dBA in dispersed camping locations along forest roads that are located within the 50-dBA noise contour depicted in figure 106. During the active mining phase, blasting operations would be conducted up to once per day and would be limited to daylight hours, typically between 9 a.m. and 4 p.m. Compared with the proposed action, equipment noise would be less noticeable to recreational users under the Scholefield-McCleary Alternative, with the selected threshold being exceeded only in the recreational location just north of Scholefield Canyon. The alignment of the Arizona National Scenic Trail reroute and the locations of the two proposed trailheads would be the same as under the Barrel Alternative. Therefore, noise impacts from traffic along SR 83 would be identical to those under the Barrel Alternative at the trail crossings and proposed trailheads. Noise from blasting and equipment during operations would not impact recreation on the rerouted alignment of the Arizona National Scenic Trail.

Cumulative Effects

This cumulative effects discussion addresses the cumulative impacts of the action alternatives and any applicable reasonably foreseeable actions as identified on the Coronado ID team’s list of reasonably foreseeable future actions, provided in the introduction to chapter 3. The following reasonably foreseeable action from that list was determined to potentially contribute to a cumulative impact to noise:

- The Forest Service proposes to add, decommission, close, or change the designation of roads in the NFS database and prohibit off-road motorized travel for dispersed camping in certain areas on the Nogales Ranger District.

Implementation of the Forest Service Travel Management Rule (add, decommission, close, and change designation of roads in the NFS database and prohibit off-road motorized travel for dispersed camping in certain areas) would result in changes to the established system of roads and trails in the Santa Rita Mountains. It is anticipated that those changes would include closing unauthorized roads and existing system roads, prohibiting motor vehicle use, and adding new roads to the current system. The Santa Rita Mountains would continue to be closed to cross-country motorized vehicle travel. Road closures and vehicle prohibitions would contribute to a decrease in access for motorized recreation opportunities in the analysis area in the long term. When combined with roads that would be decommissioned as a result of the project (see the “Recreation and Wilderness” resource section in this chapter), decommissioned roads would decrease motorized recreation opportunities and would subsequently reduce noise associated with motorized recreation. Road decommissioning activities in the vicinity of the proposed mine could create noise that would overlap with noise from mining related activities, thus resulting in additional noise for short durations (days to weeks) in the immediate vicinity of such activities.

Climate Change

Anticipated changes in the climate of southern Arizona are not expected to have any effects on noise.

Mitigation Effectiveness

Mitigation and Monitoring – Forest Service

- **Management techniques to reduce potential noise impacts from blasting.** This mitigation is focused on noise management techniques, including generally limiting blasting to once per day during daylight hours; sequencing blasting using time-delay technology; limiting explosive usage to 52 tons per day, consistent with the limits contained in the air quality permit (dated January 31, 2013) (Arizona Department of Environmental Quality 2013:17). As described earlier, limiting blasting to once per day during daylight hours would reduce the potential impacts of blasting related noise, particularly to recreational users of land and wildlife in the vicinity of the project area.
- **Actions to reduce potential noise impacts from vehicles.** This mitigation would reduce potential noise from certain vehicles by requiring backup alarms on vehicles to be attuned to reduce noise. MSHA standards for backup alarms would be met (30 CFR 56/57.14132(a) and (b), "Horns and Backup Alarms for Surface Equipment Standard"). While this measure would reduce a level of noise that is associated with backup alarms, the results would be incremental. These sounds would be noticeable to nearby Coronado National Forest visitors; however, the noise associated with traffic and machinery would continue to be present and noticeable.

Conclusion of Mitigation Effectiveness

While the mitigation measures described above would help to reduce the noise related to mining operations, this would remain a large-scale industrial operation with associated sounds and noise, particularly in the immediate vicinity of the perimeter fence and near ongoing activities associated with construction of utilities and transportation of materials to and from the mine site.