Public Health and Safety

Introduction

The health and safety concerns present in the project area are both natural and human caused. Many of the health and safety issues described are themselves the topics of separate resource sections of this FEIS. Whereas those sections primarily address the effects on the environment, this "Public Health and Safety" resource section focuses on the potential impacts of those resources on human health and safety. Analysis of health and safety is restricted to that of the general public not involved in mine operations. Health and safety risks to mine personnel are regulated by MSHA and are not addressed in this analysis.

Changes from the Draft Environmental Impact Statement

The Coronado reviewed comments on the DEIS regarding public health and safety. In general, the comments expressed concern with the effects of air pollution from the mine on human health, especially for people with respiratory health problems, as well as the potential effects on public safety from mine related traffic on SR 83, including the transportation of hazardous materials. After reviewing these comments, the Coronado reviewed the public health and safety analysis that was conducted for the DEIS and determined that revision of the analysis is not necessary, with the exception of three updates: (1) the Coronado has revised the air quality model, and all Federal air quality standards are expected to be met at the perimeter fenceline for the proposed action, Phased Tailings Alternative, and Barrel Alternative (see the "Air Quality and Climate Change" resource section in this chapter); (2) the analysis has been updated to disclose the impacts of mine related traffic on SR 83 based on revised mine traffic information and traffic projections, which is now contained in the "Transportation/Access" resource section of chapter 3; and (3) the analysis has been updated to reflect the Barrel Alternative's modification, which eliminated the heap leach and oxide ore processing facilities for that alternative (see the "Alternative 4 – Barrel Alternative" section in chapter 2; see also table 192 and the following parts of this resource section: "Use and Transportation of Hazardous Materials," "Effects of Onsite Storage of Sulfuric Acid," "Effects of Transportation of Hazardous Materials," "Emergency Response to Accidents and Spills on Public Roadways," and "Mitigation and Monitoring – Other Regulatory and Permitting Agencies").

Regarding air pollution effects on human health, the Coronado has updated the air models in response to comments from agencies and the public (see the "Air Quality and Climate Change" resource section in this chapter). The revised air quality model indicates that all Federal air quality standards would be met at the perimeter fenceline for three of the action alternatives. Federal air quality standards are set by the EPA and have two goals: the primary goal is to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly; the secondary goal is to protect public welfare against decreased visibility as well as damage to animals, crops, vegetation, and buildings. Based on the original air quality model, the DEIS anticipated that two violations of Federal air quality standards would occur. This resource section has been updated with the findings from the revised modeling results, which indicate that Federal air quality standards would be met at the perimeter fenceline with the exception of the Barrel Trail and Scholefield-McCleary Alternatives (see table 192 and the following parts in this section: "Existing Conditions," "Air Quality and Recreation Hazards," "Environmental Consequences, Air Quality," Cumulative Effects," "Mitigation and Monitoring – Other Regulatory and Permitting Agencies," and "Conclusion of Mitigation Effectiveness").

Because the project area would have limited parking available during construction, Rosemont Copper has modified the premining phase traffic plan for worker commutes. The DEIS analyzed mine related traffic, including worker commutes, and assumed that up to 75 percent of worker commutes would carpool in 5-person vans for year 1 of the premining phase. The revised premining worker commute plan would transport construction workers in up to 37 buses per day. The buses would mostly emanate from the Tucson area northwest of the project area, but a few buses would emanate from the Sonoita area south of the project area. Traffic analysis during the active mining phase uses a no-carpool scenario for analyzing mine related traffic impacts (see the "Traffic Safety" part of this resource section). Although a carpooling mitigation measure for the active mining phase is not included in the analysis, Rosemont Copper maintains the position that it would continue to develop a carpooling plan and encourage its employees to participate.

Issues, Cause and Effect Relationships of Concern

Mine operations necessarily impose commercial and commuter traffic on roadways, the use of hazardous materials and explosives, and landscape modifications, which can cause additional risks to the general public by affecting roadways, air quality, and noise levels and by changing geological conditions.

One significant issue was identified during scoping concerning public safety.

Issue 10: Impact on Public Safety

This issue focuses on the hazardous materials that would be transported and the potential increase in the risk of a spill or other public safety impact. Furthermore, an increase in traffic could reduce public safety by increasing the potential for traffic accidents. Another aspect of this issue is human health risks to forest visitors if they inadvertently come into contact with mine operations, tailings facilities, or waste rock facilities. Air quality impacts resulting from the operation could potentially be harmful to public health.

Issue 10 Factors for Alternative Comparison

1. Qualitative assessment of public health risk from mine operations and facilities
2. Qualitative assessment of public health risk from geological hazards
3. Qualitative assessment of public health risk from noise and vibration
4. Quantitative assessment of ability to meet air quality standards for human health
5. Quantitative assessment of the potential change in traffic accidents
6. Trip count per day for all hazardous materials and qualitative assessment of potential effects
7. Qualitative assessment of impacts on local emergency response to accidents or spills on public roadways

Analysis Methodology, Assumptions, Uncertain and Unknown Information

The analysis for public health and safety is intended to encompass the temporal and spatial extent necessary to describe the public health and safety hazards that may be associated with the proposed project. The temporal bounds of analysis for public health and safety includes the premining, active mining, and final reclamation and closure phases. The analysis area encompasses the project area and the segment of SR 83 between I-10 and the primary access road, which is the planned transportation route for the majority of mine-bound traffic, including all hazardous materials shipments (figure 108).

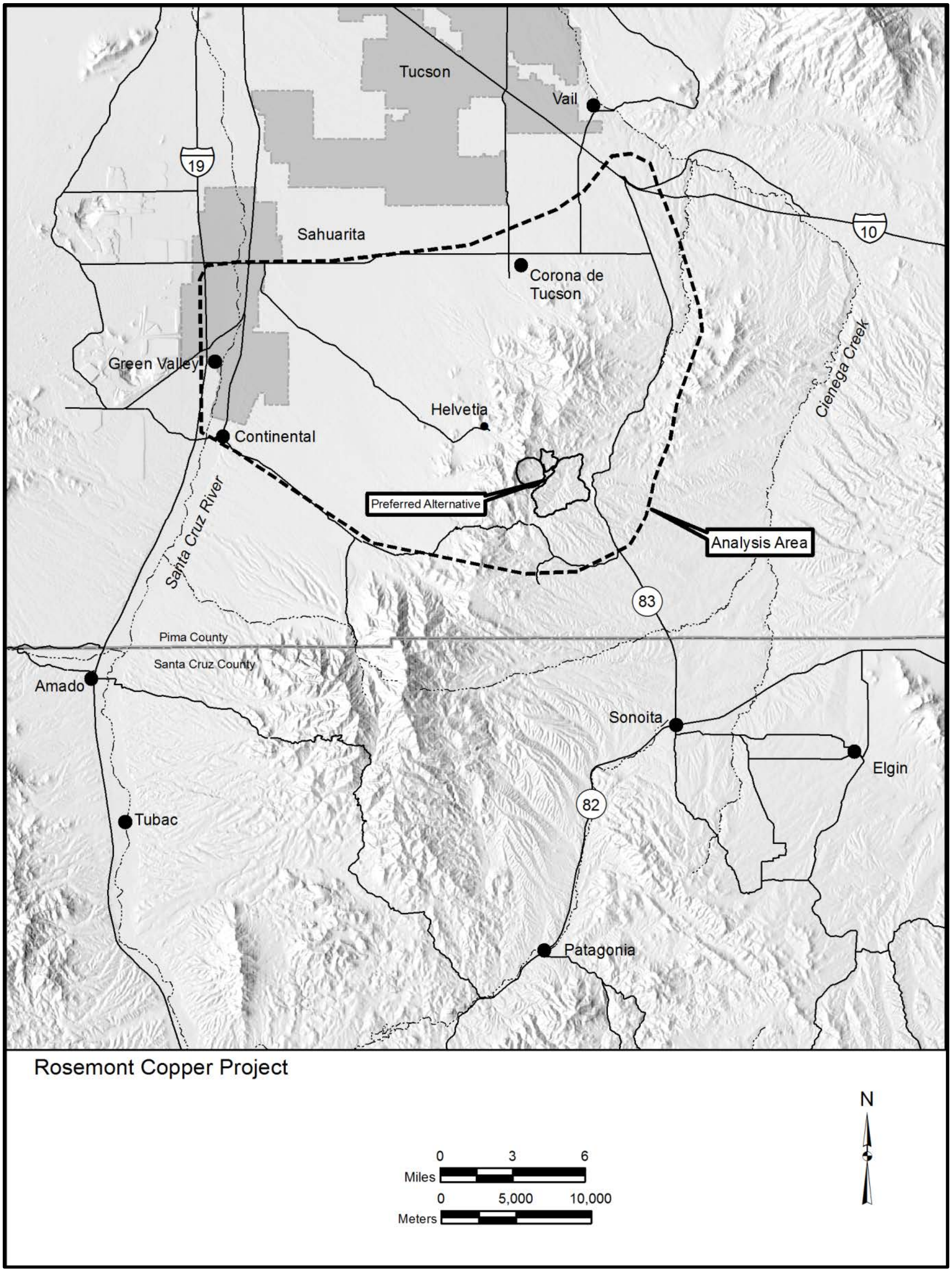

Figure 108. Analysis area for public health and safety

The analysis area also includes a buffer of 1 mile along SR 83, to reflect the likely potential area of evacuation in case of any traffic accident involving explosives, and at least a 2-mile radius around perimeter fence locations, to reflect the potential area of effects from an onsite incident involving ammonium nitrate. Offsite utility corridors were not considered in the analysis area, as impacts on public health and safety were considered negligible in those areas; however, the analysis area extends to the Sahuarita area due to the potential for land subsidence to occur because of ongoing and future groundwater depletion in this area.

Existing conditions in the project area related to public health and safety are primarily a result of the natural and physical environment (e.g., desert and mountainous topography) and current and previous public use activities (e.g., adits and tunnels from previous mining activities). Impacts to public health and safety are assessed as follows:

- Traffic safety is assessed by modeling the change in traffic volume on SR 83 between I-10 and the primary access road and by a quantitative assessment of potential traffic conflicts.
- Risks to public safety from the storage, use, and transportation of hazardous materials are assessed by trip counts and mode of transportation for all hazardous materials and by estimating the likely effects in the event of explosion, fire, or accident. The impact of these types of events is impossible to detail without knowing the exact conditions. Therefore, the potential effects of certain hazardous materials in "worst-case" scenarios are also presented, based primarily on case studies of similar incidents.
- Risks of mine operations and facilities to the general public and recreation users are assessed qualitatively, based on the types and locations of hazards; the potential for geological hazards to occur; and the potential for noise to be immediately hazardous to the public.
- Air quality impacts are assessed based on air quality modeling and the ability to meet numeric air quality standards for acute and chronic exposure.

Summary of Effects by Issue Factor by Alternative

Table 192 presents the summary comparison of impacts from each alternative.

Table 192. Summary of effects

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
Issue 10.1: Qualitative assessment of public health risk from mine operations and facilities	None	None; public is excluded from mine operations and facilities by perimeter fence	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
Issue 10.2: Qualitative assessment of public health risk from geological hazards	No change resulting from proposed mine. Continued ground water pumping in the Santa Cruz Valley resulting from population increases could result in subsidence.	Geological hazards are unlikely, with the exception of land subsidence in the Santa Cruz valley, which could be marginally increased by mine supply pumping	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action
Issue 10.3: Qualitative assessment of public health risk from noise and vibration	None	Acute noise hazards from construction, traffic, equipment, or blasting are unlikely	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action
Issue 10.4: Quantitative assessment of ability to meet air quality standards for human health	No change resulting from proposed mine. Increased traffic and emissions related to population growth would occur.	NAAQS are met at the perimeter fenceline	Same as for proposed action	Same as for proposed action	NAAQS are not met at the perimeter fenceline	NAAQS are not met at the perimeter fenceline
Issue 10.5: Quantitative assessment of the potential change in traffic accidents	Increase in anticipated traffic accidents owing to increased traffic from population growth.	A potential increase of 9 to 14 additional traffic accidents per year on SR 83 during the year with the highest projected traffic volume: active mining phase year 1*	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
Issue 10.6: Trip count per day for all hazardous materials and qualitative assessment of potential effects	None	Up to 157 weekly trips for all hazardous materials shipments. Direct impacts primarily from potential release of petroleum products, ammonium nitrate, or sulfuric acid, but risk of accidental release is low. If occurring, onsite ammonium nitrate explosion could cause damage up to 2 miles away and release a plume of toxic gases. Onsite petroleum product fire or sulfuric acid release could cause a plume of smoke and/or toxic gases. Accident during transportation could affect a radius of up to 0.5 mile for sulfuric acid, fuels, and ammonium nitrate and a radius of up to 1 mile for explosives.	Same as for proposed action	94 weekly trips for all hazardous materials shipments (63 fewer than proposed action as a result of removal of heap leach and oxide plant facilities)	Same as for proposed action	Same as for proposed action

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
Issue 10.7: Qualitative assessment of impacts on local emergency response to accidents or spills on public roadways	No change resulting from proposed mine. Increased development associated with population growth could result in more shipments of hazardous materials, which could result in accidents or spills that require emergency response.	Increased potential of hazardous materials accidents or spills on public roadways and therefore potential increased frequency for emergency responses	Same as for proposed action	Less than other action alternatives due to reduced hazardous materials shipments	Same as for proposed action	Same as for proposed action

* It is important to understand that traffic accidents are the result of numerous variables that cannot be predicted with any certainty; therefore, these projections provide a simple mathematical extrapolation and should be taken as such.

Affected Environment

Relevant Laws, Regulations, Policies, and Plans

Federal

Regulations specific to noise, air, recreation, transportation, and hazardous materials are detailed in those respective sections. The following laws and regulations are specific to public health and safety.

The Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. 11001–11050) requires the private sector to inventory chemicals and chemical products, report those in excess of threshold planning quantities, inventory emergency response equipment, provide annual reports and support to local and State emergency response organizations, and maintain a liaison with the local and State emergency response organizations and the public.

Under ARS 49-99, 49-929, and 49-930, the State refers to the requirements to establish a hazardous waste program equivalent to and consistent with the Federal hazardous waste program promulgated under subtitle C of the Resource Conservation and Recovery Act. This subtitle establishes requirements for the generation, storage, handling, transport, and disposal of hazardous waste.

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 Part 62 became effective on September 13, 2000. Also, 30 CFR 56 provides further safety and health standards specific to surface metal and nonmetal mine operations.

The Pollution Prevention Act of 1990 (42 U.S.C. 13101–13109) encourages and requires prevention and reduction of waste streams and other pollution through minimization, process change, and recycling. It encourages and requires development of new technology and markets to meet the objectives.

Existing Conditions

Public health and safety hazards already exist in the project area as a result of the natural and physical environment and current and previous public use activities. The existing conditions are categorized into six types of hazards to public health and safety: geological hazards, transportation and use of hazardous materials, noise, air quality, recreation hazards, and traffic safety.

Geological Hazards

Geological hazards generally include natural occurrences such as seismic activity, ground subsidence, and fissures. These geological factors need to be taken into consideration with regard to development in the area, in particular with respect to engineered structures. Ground subsidence and fissures are the most likely to be potential safety issues. These hazards would occur in the vicinity of the mine water supply pumping in Sahuarita, rather than within the project area.

Seismic Faults

A full discussion of seismic activity in the analysis area is found in the “Geology, Minerals, and Paleontology” resource section of this chapter. Potentially active faults that could generate earthquakes of magnitude 6.5 to 7.2 are scattered throughout southeastern and central Arizona. Earthquakes of this magnitude are considered strong to major events, with serious damage possible over a wide area. All of the potentially active faults in the Phoenix and Tucson areas have low slip rates and long intervals between ruptures and have had little historic activity. Because of this, the AGS places these areas in the low to moderate hazard category. Tetra Tech (2007) completed a regional seismological assessment, and the results indicate that 27 active faults lie within a 200-kilometer target radius surrounding the project area.

Subsidence

A full discussion of ground subsidence in the analysis area is found in both the “Geology, Minerals, and Paleontology” resource section and the “Groundwater Quantity” resource section. Land subsidence is the lowering of the land surface due to changes that take place underground. The common causes of land subsidence from human activity are pumping water, oil, and gas from underground pore spaces; dissolution of limestone aquifers, causing sinkholes; collapse of underground mines; drainage of organic soils; and hydrocompaction caused by initial wetting of dry soils. Most subsidence in Arizona occurs as a result of compaction of alluvial materials due to withdrawal of groundwater from the pore spaces of underground aquifers. Assessment of geological hazards indicated little risk of subsidence from historic mining operations or karst geology (Tetra Tech 2007). Land subsidence due to groundwater withdrawal has been recorded in the Green Valley area of the Santa Cruz Valley (Carruth et al. 2007). A more detailed discussion of subsidence impacts from groundwater withdrawal is included in the “Groundwater Quantity” resource section of chapter 3.

Use and Transportation of Hazardous Materials

Hazardous materials, when released uncontrolled into the environment, can impact public safety. Direct exposure to hazardous materials can result in significant immediate health hazards; indirect exposure, such as contamination to groundwater or surface water, can result in long-term health hazards, or impairment or destruction of natural resources used by the public. SR 83 and I-10 currently facilitate the transportation of hazardous materials to businesses and industries. All hazardous materials deliveries must be made in accordance with the requirements outlined in 49 ARS.

Further details of hazardous materials use, transportation, storage, and disposal are included in the "Hazardous Materials" resource section.

Although the project area has been used historically for various activities, including mining, overall, the natural condition of the project area is relatively intact. Current infrastructure in the project area includes unpaved roads, wells, and utility lines to support existing ranching and recreation uses. Structures are sparse; there is a ranch house and maintenance area, stock tanks, groundwater wells, and fencing. Past mining activity has left behind mine shafts, mine adits, a smelter slag pile, and a masonry leaching tank on the west side of the Rosemont Ranch property (Ezzo et al. 2011). The disposition of historic mine workings is focused solely on safely closing and securing access to sites; no reclamation from hazardous materials is expected to be necessary (Sturgess 2007).

Noise

Increasing noise levels can lead to nonauditory effects, speech interference, and sleep interference. Nonauditory effects can include hypertension and changes in blood pressure and heart rate. In 1974, the EPA identified noise levels that could be used to protect public health and welfare, including prevention of hearing damage, sleep disturbance, and communication disruption. Any anticipated increase in noise levels in the project area would result from activities associated with the construction or operation of the open-pit mine.

Some areas have been identified as potential noise-sensitive receptors in the vicinity of the proposed Rosemont Copper Mine. Eight residences are located northeast of the project area along SR 83 in the Mulberry Canyon area, approximately 6 to 7 miles from the center of the proposed open-pit mine. Six residences are located southeast of the project area along Singing Valley Road, approximately 3 to 4 miles from the center of the proposed open-pit mine. Nine additional rural residences are located southeast of the project area, approximately 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 open-pit mine.

Background noise data collected from 10 locations in the vicinity of the project area in May 2008 demonstrate the low ambient noise conditions typical of areas with limited development and few major roadways. Most of these monitoring locations showed a similar overall noise level range, with minimum noise levels of approximately 31 to 35 dBA and maximum noise levels of about 71 to 77 dBA. Full details of ambient noise conditions are provided in the "Noise" resource section.

Air Quality

Air quality is regulated for two general classes of pollutants: criteria pollutants and hazardous air pollutants. Criteria pollutants are those pollutants for which NAAQS have been established in order to protect public health. These include CO, NO_2, O_3, $PM_{2.5}$ and PM_{10}, SO_2, and Pb. Hazardous air pollutants consist of almost 200 toxic compounds that have been shown to cause or possibly cause cancer in humans or that may cause adverse environmental and ecological effects.

Ambient air quality monitoring for PM_{10} has been conducted in the project area since 2006; ambient monitoring for all other criteria pollutants has been conducted in Pima County but not specifically in the project area. Ambient concentrations of PM_{10} in the project area are well below the NAAQS. Ambient concentrations of all other criteria pollutants are expected to be well below the NAAQS, based on monitoring conducted in Pima County. Ambient concentrations of hazardous air pollutants are also expected to be low. Further details of expected concentrations of hazardous air pollutants, along with a complete list of hazardous air pollutants, are included in the “Air Quality and Climate Change” resource section of chapter 3.

Recreation Hazards

The project area consists of hundreds of acres of mostly natural terrain—areas that are typically exposed to off-highway vehicle traffic on the roadways, campers, day-users, and hikers. A number of developed and semideveloped campgrounds, picnic areas, day-use areas, trailheads, roads, and trails exist for recreation use in the area (note: no campgrounds or picnic areas exist in the analysis area). Off-highway vehicle use can pose potential safety concerns for those using the vehicles or bystanders. Off-highway vehicle traffic can also contribute to potential air quality issues in the immediate area of use as a result of increased particulate matter, particularly O_3 and PM_{10}. Further details of recreation conditions are included in the “Recreation and Wilderness” resource section of chapter 3.

Traffic Safety

State Route 83

SR 83 is a two-lane state scenic highway in southern Arizona, stretching from its junction with I-10 near Vail south to Parker Canyon Lake. It passes through sparsely populated areas of Pima, Santa Cruz, and Cochise Counties, traversing the town of Sonoita. SR 83 has few school bus pullouts. Roadway safety improvements were recently completed in 2011 within that segment of highway. The primary access road would intersect SR 83 at milepost 46.9.

Further details of SR 83 traffic conditions are included in the “Transportation/Access” resource section in chapter 3. With respect to the analysis of public health and safety, two criteria are useful in assessing future conditions: accident history, and current traffic counts and level of service.

Annual Accidents along State Route 83

Based on analysis of accident frequency and accident rate, the top accident-prone locations were identified to be mileposts 44 through 46, 55, and 58. The proposed primary access road for the project is located at milepost 46.9. The analysis shows that this location has a relatively low accident frequency and rate. At mileposts 44 and 45, there was a significantly higher accident frequency, compared with the rest of SR 83. Of the total accidents that occur along SR 83, 26 percent were at milepost 44. The analysis showed that the roadway between mileposts 44 and 46 had tighter horizontal curves, which have been at least partially addressed by an ADOT safety improvement reconstruction completed in 2011. Roadway geometry has an influence on accident frequency.

Of the total accidents on SR 83 between 2003 and 2008, approximately 49 percent were associated with passenger cars and 30 percent were associated with motorcycles. Accidents involving semi-trucks showed a relatively low value, at approximately 3.8 percent. School bus accidents accounted for 0.54 percent of the total accidents. At milepost 44, the most common accident vehicle type was a motorcycle, and speeding was the documented major accident cause. Motorcycles accounted for 69 percent of the accident vehicles at milepost 44, and passenger cars accounted for 19 percent. Of all the major causes of accidents along SR 83, speeding was the major documented cause, accounting for 51 percent of the total accidents. Approximately 23 percent of documented accidents were not the result of improper driving, meaning that the driver’s behavior was not the main cause of the accident; this often indicates possible problems with roadway geometry.

Of the accidents that occurred on SR 83 between 2003 and 2008, 47 percent resulted in no injury and 24 percent resulted in non-incapacitating injuries. There were three fatal accidents at milepost 44, accounting for 1.6 percent of the total accidents.

Since the publication of the DEIS, ADOT has provided data regarding accidents on SR 83 between I-10 and SR 82 for the 5-year period between 2007 and 2011 (Psomas 2012). These data indicate that roughly 32 accidents per year occur on SR 83. The majority of accidents occurred between mileposts 44 and 46. Since ADOT completed roadway safety improvements between mileposts 44 and 46 in 2010, there has been a steady decrease in the number of accidents at this location and on SR 83 in general. Two fatal accidents occurred on SR 83 between SR 82 and I-10, the equivalent of 0.4 fatal accident per year. Information on the cause of accidents and type of vehicles involved was not included with the updated data.

Traffic Counts

Table 193 shows traffic counts conducted for SR 83 in 2012, by time of day, on weekdays and weekends, during peak (March/April) and nonpeak (June /July) seasons, and by peak direction and nonpeak direction (Psomas 2012). As shown in table 193, the highest total daily traffic counts occur on weekends during the peak season and, more specifically, during the a.m. and p.m. peak hours during the peak season.

Table 193. Baseline traffic counts for SR 83

		Daily Total	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
			Total	Peak Direction	Nonpeak Direction	Total	Peak Direction	Nonpeak Direction
Peak Season	Weekday	2,242	**166**	90	76	**219**	115	104
	Weekend	2,690	**199**	108	91	**263**	138	125
Nonpeak Season	Weekday	1,875	**139**	76	63	**183**	96	87
	Weekend	2,250	**167**	91	76	**220**	116	104

Environmental Consequences

Direct and Indirect Effects of Each Alternative

No Action Alternative

Under the no action alternative, the project area would remain in its present condition with respect to public health and safety. SR 83 and I-10 would continue to facilitate the transportation of hazardous materials to businesses and industries. Population growth in southern Arizona would continue to increase traffic on highways, which could subsequently affect transportation safety.

Impacts Common to All Action Alternatives

The proposed action and all other action alternatives are identical with respect to geological and recreation hazards and impacts to public health and safety from noise.

Recreation Hazards

Impacts to public health and safety from recreation hazards result from exposure of the recreating public to mine operations or unsafe terrain or conditions and are qualitatively assessed based on the types and locations of hazards. According to the preliminary MPO (WestLand Resources Inc. 2007), a perimeter fence would be erected to minimize and discourage any access by the recreating public to the operational areas of the mine itself and would prevent any interaction with mine equipment, unsafe terrain, air quality exceedances, or unsafe conditions. Restricted access would be indicated by signage along the fence and enforced by security patrols. This would minimize and discourage any contact of the recreating public with mine related hazards. Direct effects on public health and safety associated with recreation in the project area are unlikely.

Geological Hazards

Effect of Subsidence

Subsidence risk is solely related to the withdrawal of groundwater in Green Valley for the mine water supply. Hydrologic modeling shows that groundwater declines as great as 90 feet are expected to occur, based on pumping estimates for the mine water supply. This pumping has the potential to increase or exacerbate ongoing subsidence in the area.

Land subsidence caused by groundwater withdrawal is rarely catastrophic but rather is an extended ongoing process, although existing fissures have been known to open rapidly or grow during heavy rains. As such, fissures generally are more of a risk to property than to public health and safety. There may be direct effects on public health and safety associated with land subsidence as a result of an increase in groundwater pumping, depending on the location and magnitude of the fissures.

Effect of Seismic Activity

A geological hazard analysis (Tetra Tech 2007) was conducted in order to guide the design of the waste rock and tailings facilities, and a separate study was conducted to analyze the stability of the pit (Pratt and Nicholas 2009). Both facilities have been designed to meet or exceed factor-of-stability values for both seismic and static stability that are required under ADEQ regulations. Stability analysis of the tailings and waste rock facilities is discussed in the “Soils and Revegetation” resource section in chapter 3. Stability analysis of the mine pit is discussed in the “Geology, Minerals, and Paleontology” resource section in chapter 3.

Noise

Impacts to public health and safety from noise could arise from traffic noise, blasting noise, or construction or operational noise and are only associated with acute exposure where immediate hearing damage or loss might occur. Impacts are assessed by comparing modeled noise levels with regulatory limits. Modeled noise levels were obtained from a series of technical reports (Sculley 2010a, 2010b, 2010c, 2010d, 2010e; Tetra Tech 2009). Noise impacts are discussed in detail in the “Noise” resource section.

Noise exposure as regulated under the MSHA or Occupational Safety and Health Administration is typically based on the average exposure over a period of time. The Occupational Safety and Health Administration regulatory limit over 8 hours is 80 dBA; while not necessarily applicable to the general public, this threshold has been used to conservatively assess the potential for impacts to public health and safety resulting from noise.

Effects of Traffic Noise

Modeling indicates that any noise in excess of 55 dBA from traffic is unlikely to exist beyond the immediate vicinity of the transportation routes and would not exceed the health and safety threshold of 80 dBA. Direct effects on public health and safety associated with traffic noise are unlikely.

Effects of Blasting Noise

Noise from blasting attenuates with distance, as does all noise. Members of the general public could be present on NFS land near the mine and be exposed to blasting noise. Noise levels exceeding the threshold of 80 dBA would occur in the project area within 1 mile of the blast site. However, more than 1 mile away from the blast site, noise levels would not exceed the threshold of 80 dBA. Modeling indicates that at 1.5 miles from the blast site, noise levels are unlikely to exceed the maximum ambient noise levels observed in the project area. Direct effects on public health and safety associated with blasting noise are unlikely.

Effects of Construction and Operational Noise

Modeling indicates that any noise in excess of 60 dBA from construction and operation is unlikely to exist outside the project boundaries and would not exceed the health and safety threshold of 80 dBA. Direct effects on public health and safety associated with construction and operational noise are unlikely.

Public Safety after Closure

The intent of the Coronado is to return the project area to multiple-use management to the extent feasible after final closure, including grazing management and recreational use. To that end, it is anticipated that the perimeter and security fences would be removed (other than sections that may be used for grazing management purposes) to reopen the area to public access and that areas of the pit that may be unsafe would be fenced or barricaded. It is important to note, however, that decisions about what areas to open to public access, recreational use, livestock grazing, and other uses would be made by the Coronado at the time of final closure, when the actual conditions of the project area are known. Areas that are deemed unsafe or inappropriate for certain uses may continue to be fenced, barricaded, or otherwise closed to those uses. Uses may be restricted for a period of time beyond mine closure if final reclamation objectives, such as revegetation, have not been achieved. Public safety would be a primary consideration in decisions made by the Coronado regarding postclosure use of the project area.

Proposed Action and Action Alternatives

Since the publication of the DEIS, the Barrel Alternative has been modified to eliminate the heap leach and oxide ore processing facilities (see chapter 2). Therefore, use and transportation of hazardous materials would differ under the Barrel Alternative, compared with the other action alternatives.

Traffic Safety

Traffic safety is a concern primarily along SR 83 between the primary access road and I-10, which would be the main transportation route for personnel and materials deliveries, and a potential—and likely—route for out-hauled product from the mine. Therefore, impacts from mine traffic are focused on this segment of SR 83. Impacts to traffic safety are assessed in terms of traffic type and volume based on traffic modeling on SR 83 and extrapolation of those modeling results to accidents and fatalities. Qualitative assessments of traffic impacts were conducted using modeled “level of service” ratings. For a detailed analysis of the impacts to level of service on SR 83 between I-10 and SR 82, see the “Transportation/Access” resource section in chapter 3.

Effects on Traffic Volume—Premining Phase

Premining phase traffic would have a direct impact on SR 83 by increasing traffic volume on SR 83 between the primary access road and I-10. The daily traffic increase during year 1 of the premining phase would be 37 buses for worker commutes, 4 heavy loads, and 50 daily deliveries/semi-truck loads on SR 83 (Psomas 2012). Table 194 below shows projected traffic during year 1 of the premining phase by time of day, on weekdays and weekends, during peak (March/April) and nonpeak (June /July) seasons, and by peak direction and nonpeak direction. The projections include growth in baseline traffic based on traffic projections from ADOT.

Table 194. Traffic volume – premining phase year 1

		Daily Total	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
			Total	Peak Direction	Nonpeak Direction	Total	Peak Direction	Nonpeak Direction
Peak Season	Weekday	2,520	**210**	127	84	**294**	153	140
	Weekend	2,892	**232**	136	96	**319**	166	153
Nonpeak Season	Weekday	2,144	**182**	111	71	**257**	134	123
	Weekend	2,441	**199**	118	81	**275**	143	132

Source: Psomas (2012).

As tables 192 and 194 show, the peak season weekend a.m. and p.m. peak hours have the highest total traffic counts for both the current existing conditions and traffic that would occur during year 1 of the premining phase. The addition of mine related traffic during year 1 of the premining phase and projected traffic volume increases due to population growth would account for a 17 percent increase over current volumes during peak season weekend a.m. peak hour volumes (199 existing/232 projected) and 21 percent increase in traffic during peak season weekend p.m. peak hour volumes (263 existing/319 projected). Total mine related traffic during the premining phase would be up to approximately 182 one-way daily trips of all vehicle types (worker commutes, heavy loads, and semi-truck loads). Therefore, mine related traffic would constitute between 6 to 8 percent of the total daily traffic on SR 83 during year 1 of the premining phase.

In order to reduce the risk of under-representing potential traffic projections, these projections assume that all premining project related traffic would travel from north of the project area using SR 83 between the primary access road and I-10, that 35 worker bus commutes would occur during the peak a.m. and p.m. hours using SR 83 between the primary access road and I-10, and that heavy load and semi-truck loads would not avoid a.m. and p.m. peak hours (Psomas 2012). Variations in traffic point of origin would spread a small amount of projected traffic volume to SR 83 from the primary access road southward to its intersection with SR 82. Worker bus commutes, heavy loads, and daily semi-truck loads that would occur during nonpeak a.m. and p.m. hours would spread the projected traffic volume more evenly across time.

Effects on Traffic Volume—Active Mining Phase

Mine operations would also have a direct effect on traffic volume during the active mining phase. Year 1 of the active mining phase for all alternatives would have the highest projection of mine related traffic and is therefore analyzed here to show the highest potential impact to traffic volume. Daily mine traffic during year 1 of active mining would consist of up to 56 copper concentrate shipments (50 under the Barrel Alternative), 4 copper cathode shipments (0 under the Barrel Alternative), 9 sulfuric acid shipments (0 under the Barrel Alternative), and 19 other materials shipments (Psomas 2012). Worker commutes during weekdays would account for up to 284 daily commutes (up to 311 for the Barrel Alternative). The assumption for the analysis is that 85 percent of the working commute would travel on SR 83 between the primary access road and I-10. Weekends would have 40 fewer daily worker commutes than weekdays because office staff would not be working on the weekends. Worker commute carpooling was not analyzed for the active mining phase. Table 195 below shows projected traffic for all action alternatives except Barrel Alternative during year 1 of the active mining phase by time of day, on weekdays and weekends, during peak (March/April) and nonpeak (June /July) seasons, and by peak direction and nonpeak direction. Table 196 below shows these traffic projections for the Barrel Alternative. The projections include growth in baseline traffic based on traffic projections from ADOT.

Table 195. Proposed action, Phased Tailings, Barrel Trail, and Scholefield Alternatives – traffic volume active mining phase year 1

		Daily Total	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
			Total	Peak Direction	Nonpeak Direction	Total	Peak Direction	Nonpeak Direction
Peak Season	Weekday	3,067	**429**	274	155	**486**	300	186
	Weekend	3,453	**429**	257	172	**497**	289	208
Nonpeak Season	Weekday	2,673	**400**	258	142	**447**	280	167
	Weekend	2,980	**393**	238	156	**451**	265	186

Source: Psomas (2012).

Table 196. Barrel Alternative – traffic volume active mining phase year 1

		Daily Total	A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
			Total	Peak Direction	Nonpeak Direction	Total	Peak Direction	Nonpeak Direction
Peak Season	Weekday	3,075	**450**	285	165	**507**	312	195
	Weekend	3,460	**446**	265	181	**515**	297	217
Nonpeak Season	Weekday	2,681	**421**	269	151	**468**	292	177
	Weekend	2,987	**411**	246	165	**468**	273	195

Source: Psomas (2012).

As tables 195 and 196 above show, the peak season weekday and weekend p.m. peak hours would have the highest total traffic counts during year 1 of the active mining phase. The Barrel Alterative would have a slightly higher traffic volume than the other action alternatives (between 17 and 21 additional vehicles). Based on the Barrel Alternative traffic projections, the addition of mine related traffic during year 1 of the active mining phase and projected traffic volume increases due to population growth would account for a 124 percent increase over current volumes during peak season weekend a.m. peak hour volumes (199 existing/446 projected), a 96 percent increase in traffic during peak season weekend p.m. peak hour volumes (263 existing/515 projected), and a 171 percent increase in traffic during peak season weekday a.m. peak hour volumes (166 existing/450 projected). The other action alternatives would contribute to a slightly less percent increase in total traffic volume (between 89 and 158 percent). Total mine related traffic during year 1 of the active mining phase for the Barrel Alternative would be up to approximately 760 one-way daily trips (744 for the other action alternatives) of all vehicle types (haul trucks, deliveries, and worker commutes). Therefore, mine related traffic would constitute between 22 and 28 percent of the total daily traffic on SR 83 during year 1 of the active mining phase.

In order to reduce the risk of under-representing potential traffic projections, the projections assume that all mine related truck shipments to and from the mine would travel between the primary access road and I-10, that all worker commutes would occur during the peak a.m. and p.m. hours, and that heavy load and semi-truck loads would not avoid a.m. and p.m. peak hours. Variations in traffic point of origin would spread a small amount of projected traffic volume to SR 83 from the primary access road southward to its intersection with SR 82. Worker commutes and daily semi-truck loads that would occur during nonpeak a.m. and p.m. hours would spread the projected traffic volume more evenly across time. Additional information on projected traffic volumes and other roadways is available in the “Transportation/Access” resource section in this chapter and in the “Updated Rosemont Traffic Impact Analysis” (Psomas 2012).

Potential Accidents and Fatalities

ADOT provided data regarding vehicle accidents on SR 83 between I-10 and SR 82 for the 5-year period between 2007 and 2011. Based on these data, roughly 32 accidents per year occur on SR 83. The majority of accidents occurred between mileposts 44 and 46. Since ADOT completed roadway safety improvements between mileposts 44 and 46 in 2010, there has been a steady decrease in the number of crashes at this location and SR 83 in general. Two fatal accidents occurred on SR 83 between SR 82 and I-10 during the period from 2007 to 2011, the equivalent of 0.4 fatal accidents per year.

Including traffic increases due to population growth and project traffic, total traffic on SR 83 is projected to increase from 8 to 14 percent during the premining phase and from 28 to 43 percent during year 1 of the active mining phase for all action alternatives (Psomas 2012). Assuming the same accident rates, based on projected increases in all traffic vehicle types (population growth as well as mine related), in year 1 (the year with the highest increase in traffic volume), approximately 41 to 46 accidents per year could potentially occur on SR 83, with fatalities potentially occurring between 0.51 and 0.57 times per year. It is important to understand that traffic accidents and fatalities are the result of numerous variables that cannot be predicted with any certainty; therefore, these projections provide a simple mathematical extrapolation and should not be taken as a prediction made with any certainty.

Use and Transportation of Hazardous Materials

All hazardous materials and petroleum products would be transported to and from the project area by commercial trucks in accordance with 49 CFR and 28 ARS. The main transportation route for these hazardous materials into and out of the project area would be along I-10 and SR 83. Impacts to public health and safety from transportation of hazardous materials are assessed based on the daily trip count for all hazardous materials.

All hazardous materials for the project are delivered to, stored, and used within the mine site. The majority of these hazardous materials, even in the event of an accident at the mine site, represent no threat to public health and safety beyond the mine site. Impacts to public health and safety are assessed qualitatively for three hazardous materials: ammonium nitrate, petroleum products (gasoline, diesel fuel, kerosene), and sulfuric acid. For the purposes of this analysis, several scenarios are qualitatively considered, based on similar case studies.

The Barrel Alternative has been modified to eliminate the heap leach and oxide ore processing facilities. This modification would reduce the number of hazardous materials round trips by 63 per week because sulfuric acid would no longer be required. Kerosene would also no longer be necessary; however, kerosene deliveries are included in the aggregate of fuels and oils deliveries, which constitute less than one trip per week and therefore would not significantly decrease hazardous materials trips.

Effects of Onsite Storage of Ammonium Nitrate

Ammonium nitrate is a strong oxidizer and is useful as a blasting agent when combined in an ammonium nitrate and fuel oil mixture. Both products are stable when separately stored under proper conditions. The primary risk from onsite storage of ammonium nitrate is the risk of explosion under certain temperature and pressure conditions or contact with combustible materials. Ammonium nitrate would be stored onsite in three 75-ton storage silos, for a maximum storage of 225 tons.

There are numerous case studies of ammonium nitrate explosions; worldwide, at least eight ammonium nitrate explosions have been widely reported in the past decade. In general, it is quite difficult to make pure-form ammonium nitrate explode, even when it is exposed to fire. Many incidents involved transportation of small amounts of ammonium nitrate (<25 tons) by ship, truck, or train; these explosions were mainly caused by unrelated accidents and the resulting fire and confinement. Fewer incidents involved storage or handling of ammonium nitrate. In 2001, an explosion in the AZF fertilizer factory in Toulouse, France, involved 200 to 300 tons of ammonium nitrate, approximately the same amount to be stored at the Rosemont Copper Mine. In addition to deaths and injuries in the immediate vicinity, property damage occurred up to 2 miles away. However, these events are exceedingly rare, given how extensive the use of ammonium nitrate is around the world.

The decomposition of ammonium nitrate during a fire or explosion also results in the release of toxic gases, namely, ammonia and NO_x. Release of these gases during a fire at the storage silos would most likely result in plume movement to the east, with prevailing winds, although winds are variable in the project area. A similar event occurred in 2009 in Bryan, Texas, forcing the downwind evacuation of 80,000 people.

Under proper storage conditions, there are unlikely to be direct effects on public health and safety associated with onsite storage of ammonium nitrate. Proper storage conditions are required under Arizona State regulations (AAC R11-1 Article 2), as well as under Federal regulations (30 CFR 77.1304). Ensuring proper storage conditions is the responsibility of the mine operator. The Arizona State mine inspector has the charge of inspecting mines for violations and enforcing state law with respect to explosive storage, as does the Federal MSHA. Consideration of incidents of fire or explosion associated with stored ammonium nitrate suggests that an explosive or fire incident involving the ammonium nitrate storage silos is unlikely but could potentially cause significant damage up to 2 miles away and produce large plumes of toxic gases of ammonia and NO_x.

Effects of Onsite Storage of Petroleum Products

Storage of petroleum products onsite represents a potential risk of fire and explosion. Onsite storage would include one 12,000-gallon tank for kerosene (this would not be included in the Barrel Alternative), four storage tanks for diesel ranging from 10,000 to 100,000 gallons, and one 10,000-gallon tank for gasoline. Hazards from explosion or fire are unlikely to immediately impact anything outside the project area.

The use and storage of petroleum products are so ubiquitous that incidents of fire or explosion involving storage of petroleum products are highly variable. In general, blast impacts from gasoline/diesel/kerosene tank explosions likely would not extend beyond the boundaries of the mine; however, the airborne smoke plume would extend beyond the mine. The plume would extend generally to the east, with prevailing winds, although winds are variable in the project area. Airborne byproducts include CO, CO_2, and uncombusted hydrocarbons.

Direct effects on public health and safety associated with onsite storage of petroleum products are unlikely. However, in the event of an onsite fire or explosion, hazards are unlikely to immediately impact anything outside the project area.

The Barrel Alternative has been modified to not include oxide ore processing facilities in which kerosene is used. Therefore, the Barrel Alternative would not include the 12,000-gallon tank for kerosene storage, and the risks associated with kerosene storage would not occur.

Effects of Onsite Storage of Sulfuric Acid

For all action alternatives except the Barrel Alternative, storage of sulfuric acid onsite represents potential adverse health effects if released. Onsite storage includes three 900-ton tanks. While representing a hazard through immediate exposure on skin or eyes, a release of sulfuric acid is unlikely to result in exposure by the general public except if airborne. Sulfuric acid is a stable liquid at temperatures below 536°F; however, at high temperatures, it does decompose into toxic gases. Although it is not combustible or flammable, sulfuric acid is reactive and can create high heat when reacting with combustible materials.

A simple accident, such as rupture of a storage tank, is unlikely to result in direct effects on public health and safety outside the boundaries of the mine. However, an accident involving exposure of sulfuric acid to fire, or reactive materials, could produce an airborne plume of gas (SO_2 and sulfur trioxide) that would represent a direct, adverse effect on public health and safety.

The Barrel Alternative has eliminated the heap leach and oxide ore processing facilities. Therefore, no onsite storage of sulfuric acid would occur under this alternative, and the risks associated with sulfuric acid storage would not occur.

Effects of Transportation of Hazardous Materials

Transportation of hazardous materials to the project area generates the most risk associated with hazardous materials because of the potential for a traffic accident to cause an accidental release of a hazardous material. The risk can be minimized through adherence to transportation and hazardous material regulations, but it cannot be completely mitigated. The potential would always exist for accidents to occur; in the event of an accidental release, there is the potential for direct, adverse effects on public health and safety.

Hazardous materials would be shipped in a wide variety of forms and quantities and would total an estimated 32 trips per day for all action alternatives except the Barrel Alternative. Table 197 summarizes methods of shipment, amounts, and potential risks.

Table 197. Estimated frequency of shipments of hazardous materials*

Material	Quantity per Year	Trips per Day	Shipment Method	Potential Risks
Sulfuric acid (tons) (except Barrel Alternative)	160,000	9	Liquid by tanker truck	Immediate contact; toxic gases released at high temperatures
Pebble lime (tons)	37,200	5	Bulk dry by truck	Minimal
Diesel fuel (gallons)	9,000,000	4	Liquid by tanker truck	Explosion and fire
Ammonium nitrate (tons)	20,075	4	Bulk dry by truck	Explosion and fire
Miscellaneous reagents (tons)	3,750	1	Various by truck	Minimal
Wear parts and explosives (tons)	3,250	1	Various by truck	Explosion and fire
Fuels and oils (gallons)	105,000	<1	Liquid by tanker truck	Explosion and fire

Source: M3 Engineering and Technology Corporation (2012).
* Applies to all action except the Barrel Alternative.

Every traffic accident is different, but the potential impacts from a traffic accident involving these compounds can be estimated by examining the emergency response guidelines (Wheat Scharf Associates and ADOT/FHWA/BLM/USFS Steering Committee 2008). Emergency response guidelines include distance guidelines for first responders to first isolate the spill and then protect the public from the spill. These guidelines represent the likely radius of impact in the event of a traffic accident, as follows:

- Sulfuric acid. For a spill, isolate up to 150 feet away. In the event of a fire, isolate and order evacuations up to 0.5 mile away.
- Diesel fuel, gasoline, kerosene. For a spill, isolate up to 150 feet away. In the event of a fire, isolate and order evacuations up to 0.5 mile away.
- Ammonium nitrate. For a spill, isolate up to 150 feet away. In the event of a fire, isolate and order evacuations up to 0.5 mile away.
- Explosives. For a spill, isolate up to 0.3 mile away, or up to 0.5 mile away for a large spill. In the event of a fire, isolate and order evacuations up to 1 mile away.

The Barrel Alternative would not require sulfuric acid and kerosene because it has been modified to eliminate the heap leach and oxide ore processing facilities. Compared with the other action alternatives, the Barrel Alternative would have at least nine fewer round trips per day of hazardous materials shipments because sulfuric acid is no longer required. Kerosene deliveries are included in the aggregate for fuels and oils shipments, which constitute less than one trip per day. Consequently, the risks presented by transporting sulfuric acid and, to a lesser extent, kerosene would not occur under the Barrel Alternative.

Air Quality

Impacts to public health and safety from air quality consist of both acute (immediate danger to life) and chronic exposure and are assessed by comparing modeled air quality with numeric regulatory levels for criteria pollutants and hazardous air pollutants.

Air quality modeling was conducted for conditions during the construction and operation phases of the project, both in the project area and at Saguaro National Park East (the nearest Class I airshed). Full details of the modeling are included in the "Air Quality and Climate Change" resource section of chapter 3.

Criteria pollutants (CO, NO_x, SO_2, Pb, PM_{10}, and $PM_{2.5}$) are measured against NAAQS. The air quality model indicates that these standards would not be exceeded outside the perimeter fenceline during the active mining phase of the project for three of the action alternatives. The Federal air quality standards establish maximum concentrations in ambient air for suspended criteria pollutants. These standards were adopted by the EPA to protect public health (primary standards) and public welfare against decreased visibility, as well as damage to animals, crops, vegetation, and buildings (secondary standards). These primary standards provide public health protection, including protecting the health of “sensitive” populations such as asthmatics, children, and the elderly. The Forest Service has reviewed the revised air quality modeling analysis, which included a number of additional mitigation measures. These additional mitigation measures would further control fugitive PM_{10} emissions (which could potentially contain such compounds as lead, arsenic, chromium, cadmium, and nickel). The revised analysis indicates that the Barrel Alternative, the proposed action, and the Phased Tailings Alternative would meet all Federal air quality standards at the perimeter fenceline. As currently designed, the Barrel Trail Alternative and Scholefield-McCleary Alternative would not meet all Federal air quality standards at the perimeter fenceline. Determination of the constituents of particulates is not a standard analysis conducted when evaluating particulate emissions. For the purposes of this analysis, it is presumed that if compliance with the PM_{10} and $PM_{2.5}$ NAAQS is achieved, public health would be protected from potential toxic metals within the particulate emissions as well. Therefore, the proposed action, Phased Tailings Alternative, and Barrel Alternative would protect public health, while the Barrel Trail Alternative and Scholefield-McCleary Alternative may have effects beyond the perimeter fenceline that could be detrimental to human health. See the “Air Quality and Climate Change” resource section in chapter 3 for further detail.

Emergency Response to Accidents and Spills on Public Roadways

As described above, traffic increases on public roads, primarily SR 83, would occur under all action alternatives as a result of population growth and mine related traffic, including shipments of hazardous materials. With any increase in traffic on public roads, a related increase in the potential for accidents and hazardous materials spills could occur. Therefore, the need for emergency responses to accidents and hazardous materials spills could increase as well. Although it is impossible to predict how many accidents and hazardous materials spills would occur, if any, there would be a potential increase in the demand for emergency responses.

Compared with the other action alternatives, the Barrel Alternative would have 63 fewer hazardous materials round trips per week (or nine fewer hazardous materials trips per day) because of the removal of the heap leach and oxide ore processing facilities. Therefore, the Barrel Alternative would have the lowest potential for increasing the need for emergency responses of all the action alternatives.

Summary

The Barrel Alternative would no longer need two hazardous materials on the mine site: sulfuric acid and kerosene, used in oxide ore processing. Whereas the other action alternatives would consume up to 160,000 short tons per year of sulfuric acid and 6.2 short tons of kerosene per year, the Barrel Alternative would not require these reagents. This would reduce the amount of hazardous materials delivery by 126 truck trips per week, compared with the other action alternatives.

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 actions were determined to contribute to a cumulative impact to public health and safety:

- Demand for groundwater in the Sahuarita area is expected to increase by 200 percent by the year 2030. Potential individual developments within the Sahuarita area include development of the Farmers Investment Company property (known as Sahuarita Farms), the Rancho Sahuarita development, the Quail Creek development, and the Madera Highlands development.
- In late 2009, Freeport-McMoRan bought 8,900 acres of the long-closed Twin Buttes Mine site, near Sahuarita. Required permits for reopening the mine have not been issued to date, but it is reasonable to assume that this mine could be reopened at some point in the future.
- The Community Water Company of Green Valley is proposing delivery and recharge of groundwater with water from the Central Arizona Project in the Green Valley area.
- The Farmers Investment Company is proposing extension of Central Arizona Project water into actively farmed pecan groves and activation of a groundwater savings facility near Sahuarita.
- Fuels reduction projects are proposed by the Forest Service and other agencies, including the Catalina-Rincon FireScape Project, the Chiricahua FireScape Project, and proposed hazardous fuels project on the Nogales Ranger District.

Groundwater use in the Sahuarita area is expected to double by the end of the mine life due to new developments as well as the potential for reopening of the Twin Buttes mine, any or all of which could increase the potential for subsidence. Conversely, two projects could deliver and recharge Central Arizona Project water to the area of project withdrawal (Community Water Company of Green Valley and Farmers Investment Company), which would tend to offset the effects of groundwater pumping. Groundwater modeling used to assess impacts caused by pumping incorporated future changes in groundwater use and some future recharge unrelated to the above-mentioned recharge activities; thus, potential effects from these activities have already been incorporated into the analysis and the cumulative impact with the Rosemont Copper Project water supply pumping has been analyzed.

Recharge by Community Water Company and activation of the Farmers Investment Company groundwater savings facilities were not incorporated into the groundwater models, as these potential activities lack specifics concerning amounts of recharge and locations where the recharge could occur. In general, offset of groundwater pumping by recharge or a groundwater savings facility would tend to reduce the potential for subsidence. If recharge were to occur, the overall potential for subsidence due to groundwater pumping could decrease or be eliminated in the recharge area.

Firescape and fuels reduction projects have the potential to contribute smoke into the atmosphere from the use of prescribed fire. To minimize the impacts of smoke, land managers work closely with ADEQ air quality managers in both planning and implementing prescribed fires. ADEQ's Air Quality Division implements a smoke management plan that works toward a reduction in smoke impacts from prescribed/controlled burning of nonagricultural fuels with particular regard to heavy forest fuels. All State lands, parks and forests, as well as any federally managed lands in Arizona, are under the jurisdiction of ADEQ in matters relating to air pollution from prescribed burning. To ensure smoke dispersion during prescribed fires, land managers monitor atmospheric conditions closely before prescribed fires are ignited. Factors evaluated include air movement, wind direction and speed, atmospheric stability, and long-range weather forecasts. While short-term cumulative impacts to air quality could result, violations of air quality standards are not expected.

Climate Change

Anticipated changes in the climate of southern Arizona are not expected to contribute to or compound any effects on public health and safety associated with the mine and associated activities.

Mitigation Effectiveness

Several mitigation measures apply to public health and safety concerns.

Mitigation and Monitoring – Forest Service

- **Hazardous materials containment and management.** This mitigation involves handling, storage, use and communication information about hazardous materials, in accordance with laws and regulations. A variety of agencies have regulations defining what materials are classified as hazardous, and how they should be transported, handles and stored. This mitigation is expected to effectively reduce potential impacts to human health and environmental risks (such as impacts to surface and groundwater quality) from transportation, use and storage of hazardous materials.
- **Maintain material safety data sheets in accordance with 30 CFR 47.** This mitigation involves maintaining material safety data sheets on-site; and providing this information to emergency service providers. Regulations require material safety data sheets be available to workers and that notification of potential hazards be provided to site visitors. Access to material data safety sheets would also be provided to as appropriate emergency response departments and hospitals. This would reduce impacts to worker and public health and safety in the case of exposure, by allowing appropriate treatment to be implemented more rapidly, and thus reduce the potential cost of emergency services.
- **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; sequenced blasting using time-delay technology. Furthermore, explosive usage is limited to 52 tons per day as consistent with the limits contained in the air quality permit. While acute noise hazards from construction, traffic, equipment, and blasting are unlikely, this mitigation would contribute to a reduced potential for acute impacts noise hazards from blasting.
- **Construction of perimeter fence to exclude public from mine site.** This mitigation involves construction of a perimeter fence to keep the public from coming into contact with mining operations or potentially hazardous conditions. Furthermore, Federal air quality standards are met at the perimeter fence for the proposed action, Phased Tailings, and Barrel Alternatives and would therefore prevent the public from entering the areas where these standards would not be met. This mitigation is expected to be effective in reducing the risk to members of the public from the effects of degraded air quality in the immediate area of the mine.
- **Preparation of emergency response and contingency plans, including a fire plan.** This mitigation requires Rosemont Copper to coordinate with Emergency Medical Services

providers and local fire districts in development of emergency response and contingency planning. Pre-emergency planning and coordination with Emergency Medical Services providers and local fire districts would be expected to reduce response time and improve services of Emergency Medical Services, reducing effects from wildfires and potential human injuries from accidents.

Mitigation and Monitoring – Other Regulatory and Permitting Agencies

- **Air quality mitigation to reduce release of pollutants.** Numerous elements were developed to reduce potential impacts on air quality from dust, vehicle emissions, and volatile chemicals related to mine activities. These would effectively reduce public exposure to levels of pollutants exceeding these standards. Refer to appendix B, items OA-AQ-01 through OA-AQ-10; and the "Air Quality and Climate Change" section of this chapter for further details on these mitigation measures and their effectiveness in reducing potential impacts.
- **The heap leach facility would be designed and located to reduce potential impacts to groundwater and surface water quality.** The heap leach facility, which is contained in all action alternatives except the Barrel Alternative, has been designed and located to reduce the risk of potential contamination of groundwater from seepage. It is designed to collect all possible drainage and solution; is located on top of a stable rock location; the liner system is designed to meet requirements of the aquifer protection permit; and the facility would be encapsulated by waste rock at closure to protect from stormwater infiltration. This mitigation would be effective at avoiding contamination to surface and groundwater that could affect water quality, including water that could be consumed by humans.
- **Equipment and methods to keep potentially contaminated water from being released into the environment.** This mitigation measure requires the use of appropriately sized lined ponds; retention of all contact stormwater for reuse as process water; and the installation of overflow alarms to alert operators of a potential overflow situation. It would avoid or reduce to potential for contamination of surface and groundwater.
- **Control and recycling of process water.** This mitigation avoids discharge of potentially contaminated water by containing all process water in lined facilities, to be recycled back into the process stream to offset fresh water use; and the installation of overflow alarms to alert operators of a potential overflow situation. It would avoid or reduce to potential for contamination of surface and groundwater.
- **Use of dry-stack tailings.** This mitigation requires the use of dry-stack tailings technology, which eliminated the need for traditional tailings impoundments; and allows tailings to be placed and compacted in a manner that would reduce seepage and avoids or reduces impacts related to potential groundwater contamination.
- **Implementation of stormwater pollution prevention plan.** This mitigation involves requirements to prepare a stormwater pollution prevention plan. The stormwater pollution prevention plan identifies methods to reduce potential pollution of stormwater; this plan is site specific, flexible, and constantly updated as needed. Implementation of the stormwater pollution prevention plan would prevent contact of stormwater with hazardous materials, thereby reducing the risk of release of contaminated water into the environment.
- **ADOT activities to mitigate impacts of increased traffic on SR 83.** This mitigation consists of Rosemont Copper providing funding to ADOT to implement activities to reduce impacts resulting from increased traffic on SR 83. ADOT has indicated the activities they plan to implement include 3-inch pavement overlay from I-10 to the intersection of the

primary access road; striping; raising guardrails and signs to match new pavement height; and paving 3 existing bus pullouts for school bus use. Rosemont Copper and ADOT are currently negotiating the amount of funding that would be provided. This mitigation would reduce potential traffic safety hazards on SR 83.

Mitigation and Monitoring – Rosemont Copper

- **Recharging the aquifer in the Tucson Active Management Area to offset pumping of mine supply water.** Rosemont Copper intends to implement regional groundwater mitigation measures within the Tucson Active Management Area by using available Central Arizona Project water as a source to conduct recharge within Tucson Active Management Area (Lower Santa Cruz). Recharge would occur as close as possible within the Tucson Active Management Area to the Rosemont Copper well field. Rosemont Copper also intends to fund a 7-mile extension of Central Arizona Project to deliver Community Water Company of Green Valley’s Central Arizona Project allotment; and use the extra capacity of that pipeline to recharge in the general vicinity of the mine supply wells. Should these mitigations be implemented, they have to potential to compensate for some or all of the mine supply water pumped out of the aquifer, and off-set the risk of subsidence related to Rosemont Copper groundwater pumping in Sahuarita area.
- **Rosemont Copper plans to schedule deliveries to the mine to take place during nonpeak traffic hours to avoid adding to traffic congestion.** Deliveries would be scheduled to minimize material delivery on SR 83 during peak traffic hours (6:30 to 7:30 a.m. for northbound traffic; and 5:00 to 6:00 p.m. for southbound traffic). Should Rosemont Copper implement this plan, it has the potential to reduce impacts to the public from mine related traffic on SR 83 during peak traffic hours.
- **Rosemont Copper intends to allow access to a new water source for firefighting efforts.** Rosemont Copper has stated they would allow ASLD personnel to access the water fill station at #2 booster pump station for firefighting purposes. The #2 booster pump station is located along the water supply pipeline. Should this water source be made available to public firefighting agencies for use in fire suppression actions, it could potentially reduce impacts from wildfire and threats to public health and safety, particularly on and near the Santa Rita Experimental Range, by providing a new water source to firefighting agencies.

Conclusion of Mitigation Effectiveness

The Forest Service mitigation measure and the other regulatory and permitting agencies’ mitigation measures listed above would effectively lower risks to public health and safety. However, these mitigation measures would not avoid or eliminate all impacts and risks.

- Proper transport and storage of hazardous materials and coordination with local emergency service providers would minimize the potential for accidental release but cannot completely remove the potential that an on- or offsite accident will happen.
- Air quality mitigation would be effective at reducing emissions. Due in part to the application of these mitigation measures, air quality was found to comply with State and Federal regulations designed to protect public health and safety for the proposed action, Phased Tailings Alternative, and Barrel Alternative. In addition, construction of a perimeter fence would limit exposure of members of the public to emissions that may exceed national standards.

- A number of groundwater and surface water mitigations would avoid or reduce the risk of release of contaminants into the environment, thus reducing the risk of contaminants entering into groundwater that is used by humans.
- ADOT mitigations for SR 83 would help to reduce impacts of increased traffic and contribute to safer highway conditions.

Rosemont Copper mitigations have the potential to further reduce impacts to public health and safety should they occur.

- Groundwater recharge in the Upper Santa Cruz Sub-Basin may help alleviate the possibility of subsidence and the associated impact to public health and safety.
- Scheduling deliveries to the mine outside peak traffic periods would avoid adding those vehicle trips to existing traffic.
- Providing a new source of water for firefighting efforts could improve the effectiveness of firefighting efforts, particularly in the vicinity the Santa Rita Experimental Range. If fires are controlled and extinguished when they are small, the result would be less smoke produced and reduced risk to members of the public in the vicinity of the wildfire.