Executive Summary

Introduction

Augusta Resource Corporation (Augusta Resource), the parent company of Rosemont Copper Company (Rosemont Copper), submitted a preliminary mine plan of operations (MPO) to the Coronado National Forest (the Coronado), an administrative unit of the U.S. Department of Agriculture Forest Service (Forest Service), for development of the Rosemont ore deposit.
The proposed mine site is located on the east side of the Santa Rita Mountains of the Nogales Ranger District, approximately 30 miles south of Tucson, Arizona (figure ES1). Activity is proposed on approximately 995 acres of private land owned by Rosemont Copper, 3,670 acres of National Forest System land, 15 acres of Bureau of Land Management administered land, and 75 acres of Arizona State Land Department land administered as a State Trust. This includes a proposed utility corridor that is needed to provide utility services to the project area. The mine life, including construction, operation, reclamation, and closure, is approximately 25 years and may include beneficial and adverse impacts on the human environment.

Three Federal agencies have authority regarding the preliminary MPO approval: the Forest Service, Bureau of Land Management, and U.S. Army Corps of Engineers. A number of permits would need to be obtained before mine construction could commence. These permits, which are described in chapter 2 of the draft environmental impact statement (DEIS), are regulated by a variety of Federal, State, and local agencies. The Forest Service is the lead agency, and land managers for the Coronado National Forest prepared the DEIS.

The Rosemont Copper Project DEIS describes the direct, indirect, and cumulative impacts on environmental resources for the proposed action and alternatives. Following the publication of this DEIS, public comments will be solicited and subsequently reviewed and responded to by the Forest Service. Based on the public comments received and any relevant additional analysis identified during the public comment period, the Forest Service will prepare and publish a final EIS (FEIS) and record of decision (ROD). The ROD will identify the alternative that the Forest Service has chosen, as well as any additional monitoring and mitigation measures. The Bureau of Land Management and U.S. Army Corps of Engineers will issue their own respective records of decision.

Purpose of and Need for Action

The purpose and need for action is to respond to Rosemont Copper's preliminary MPO to mine copper and associated minerals for which they own private mineral rights and have a possessory interest in unpatented mining claims within the project area. Pursuant to Federal mining laws, the Forest Service and Bureau of Land Management are required to respond to a preliminary MPO for conducting mining operations.

The Coronado is addressing this project at this time in order to comply with its statutory obligation to respond to Rosemont Copper's preliminary MPO in a timely manner. The actions proposed in this DEIS are for the development of the Rosemont ore deposit owned by Rosemont Copper in a manner that (1) complies with Federal, State, and local laws and regulations, (2) reduces adverse environmental impacts on National Forest System lands, (3) is without undue or unnecessary degradation of lands administered by the Bureau of Land Management, and (4) is the least environmentally damaging practicable alternative in accordance with 40 Code of Federal Regulations 230 as it pertains to Section 404 of the Clean Water Act. Rosemont Copper is entitled to conduct operations that are reasonably incidental to exploration and development of mineral deposits on its mining claims pursuant to U.S. mining laws.

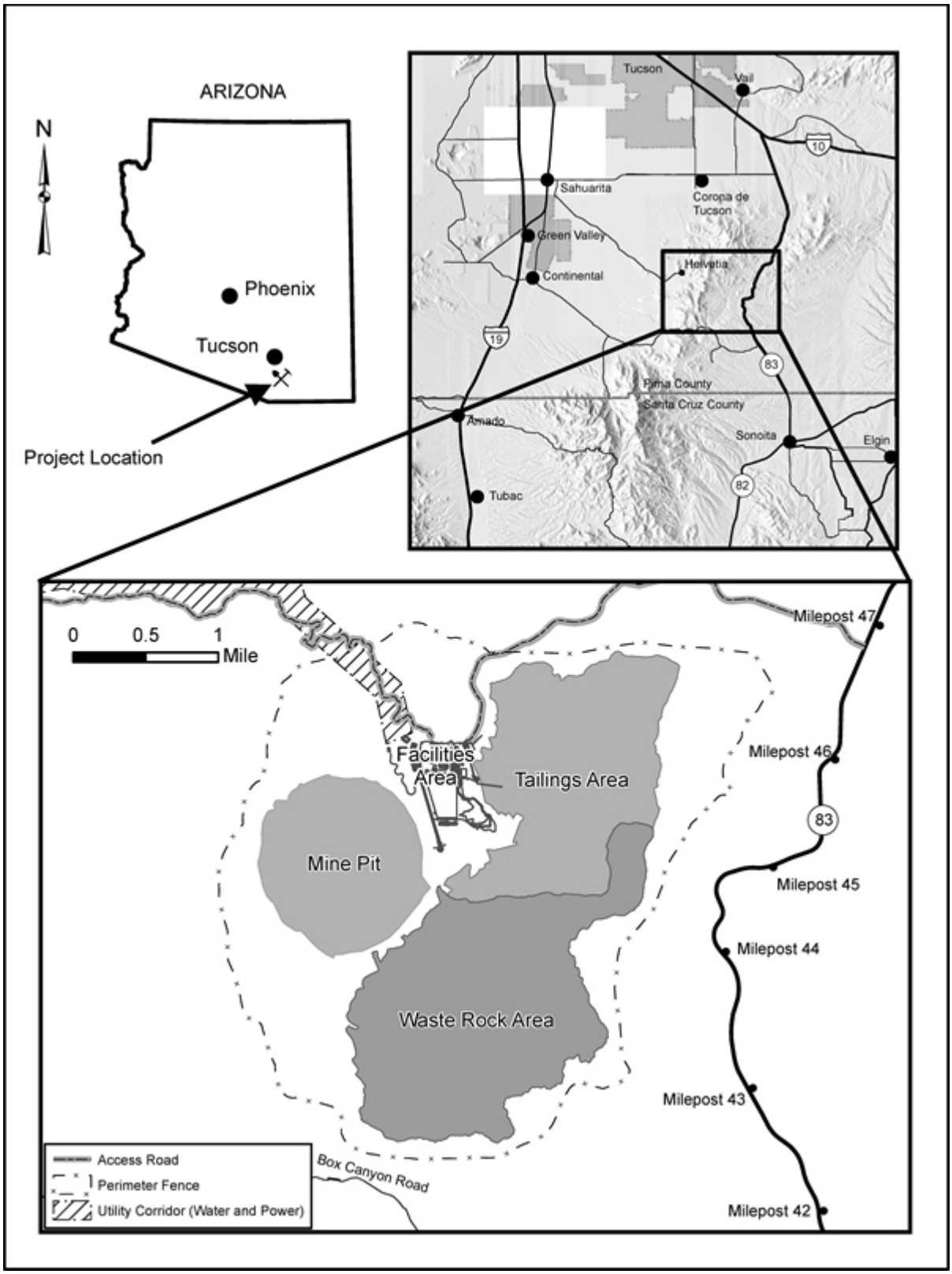

Figure ES1. Project area and proposed action footprint

Issues

Using the comments from tribes, agencies, organizations, and the public, the Forest Service developed significant issues to address in the DEIS. Significant issues are used to formulate alternatives to the proposed action, develop mitigation measures, and analyze environmental effects. A summary of significant issues for this project follows.

Issue 1: Impact on Land Stability and Soil Productivity

Ground disturbance from clearing vegetation, grading, and stockpiling soils may accelerate erosion and reduce soil productivity. The tailings and waste rock piles may be unstable over time, and reclamation may not adequately result in a stable, revegetated landscape. The geochemical composition of tailings and waste rock piles may not support native vegetation. Soils are nonrenewable resources, and loss of the soil resource may result in an irretrievable loss of soil productivity, physical structure, and ecological function across the proposed mine site and across downgradient lands.

Issue 2: Impact on Air Quality

Construction, mining, and reclamation activities at the mine and along transportation and utility corridors would increase dust, airborne chemicals, and transportation related (mobile) emissions in the affected area. Air quality standards could be compromised. The emission of greenhouse gases has been implicated in global climate change, and the policy of the Federal Government is to reduce these emissions when possible.

Issue 3: Impact on Water Resources

This group of issues relates to the effects of mine construction, operation, closure, and postclosure on the quality and quantity of water for beneficial uses, wells, and stock watering.

Issue 3A: East Side Groundwater Availability

The proposed open-pit mine may reduce groundwater availability to private and public wells in the vicinity of the open pit. Household water availability may be reduced.

Issue 3B: West Side Groundwater Availability

Water needed to run the mine facility could reduce groundwater availability to private and public wells in the Santa Cruz Valley, specifically the communities of Sahuarita and Green Valley, Arizona. Household water availability may be reduced.

Issue 3C: Groundwater Quality

Construction and operation of the mine pit, waste rock, and leach facilities may result in exceedances of Arizona Aquifer Water Quality Standards. The mine pit may result in the creation of a permanent pit lake, which may concentrate dissolved metals and toxins and may lower pH levels. Likewise, disposal of waste material in surface facilities such as tailings, waste rock, and leaching operations may contribute to degradation of the aquifer.

Issue 3D: Surface Water Availability

Construction and operation of the mine pit, tailings, waste rock, and leach facilities may result in changes in surface water discharge to Davidson Canyon and Cienega Creek, portions of which are designated an Outstanding Arizona Water by the Arizona Department of Environmental Quality. Additionally, the availability of water for stock water tanks may be reduced.

Issue 3E: Surface Water Quality

Construction and operation of tailings, waste rock, and leach facilities may result in sediment or other pollutants reaching surface water and degrading water quality, leading to a loss of beneficial uses. Sediment may enter streams, increase turbidity, and exceed water quality standards.

Issue 4: Impact on Springs, Seeps, and Riparian Habitats

This issue relates to the potential impacts on riparian and wetland habitat that would result from the alteration of surface and subsurface hydrology from the pit and other operations. Potential impacts may include loss of riparian habitat and fragmentation of riparian habitat and corridors, including Cienega Creek.

Issue 5: Impact on Plants and Animals

This group of issues focuses on effects on plant and animal populations and habitats.

Issue 5A: Vegetation

The pit, plant, tailings and waste piles, road and utility corridors, and other facilities may result in a permanent change to the vegetation, and reclamation may not restore vegetation to preproject conditions.

Issue 5B: Habitat Loss

The mine and ancillary facilities may result in a loss of habitat for numerous plant and animal species.

Issue 5C: Nonnative Species

The mine operations may create conditions conducive to the introduction, establishment, and/or spread of nonnative species, which may out-compete native plants and animals.

Issue 5D: Wildlife Movement

The mine operations may modify and/or fragment wildlife habitats and/or reduce connectivity between habitats. The transportation system and increased traffic could result in more wildlife road kills.

Issue 5E: Special Status Species or Species of Concern

The mine operations may impact habitat for species of concern. Species of concern include those afforded protection under the Endangered Species Act, Forest Service and Bureau of Land Management sensitive species, Forest Service management indicator species, migratory birds of

conservation concern, Arizona Game and Fish Department's wildlife of special concern in Arizona, and Sonoran Desert Conservation Plan priority vulnerable species.

Issue 5F: Animal Behavior

Mine operations, including drilling and blasting, may result in noise and vibrations, which may impact animal behavior and result in negative impacts on wildlife. Nocturnal and other animals may be adversely affected by the light glow in night skies.

Issue 6: Impact on Cultural Resources

This group of issues focuses on the adverse effects of the proposed mine operations on cultural resources.

Issue 6A: Historic Properties

Mine construction, operations, and closure would bury, remove, or damage historic properties, including traditional cultural properties, archaeological sites, historical structures, districts, and landscapes. Vibrations from blasting and drilling may damage historical structures in the immediate and adjacent areas. This may also result in the loss of or reduction in the future research and public interpretation potential of known and yet-to-be-discovered sites, along with the permanent alteration of cultural landscapes important to the ongoing cultural practices of Native American tribes and other communities with cultural or historic ties to the project area.

Issue 6B: Disturbance of Human Remains

Human remains have been discovered in previous archaeological excavations of prehistoric and historical sites in the Rosemont area. Additional burials are present in previously excavated and unexcavated historic properties and may be present in as-yet undetected historic properties.

Issue 6C: Sacred Sites

Tribal consultation has identified springs, high vision points, and many natural resources in the project area as having sacred ceremonial functions. Mine construction, operation with concurrent reclamation, and closure may preclude access to or destroy or degrade these types of resources.

Issue 6D: Traditional Resource Collecting Areas

Native Americans and the ranching, mining, and Mexican American communities use the Rosemont area to collect and process natural resources for food, medicines, firewood, and traditional crafts. Mine construction, operation with concurrent reclamation, and closure may preclude access to or destroy or degrade these types of resources.

Issue 7: Impact on Visual Resources

This issue focuses on the visual impacts that would result from the mine pit, placement of tailings and waste rock piles, and development and use of other facilities. The proposed mine tailings and waste rock piles would create significant changes to the landscape. The piles may block valued mountain views. The processing plant and transportation and utility corridors may affect visual resources in the

area. The character of the State Route 83 designated scenic corridor and the views from it may change. The scenic quality of the landscape may be permanently degraded.

Issue 8: Impact on Dark Skies and Astronomy

Increased light and air particulates from mine related facilities, equipment, vehicles, and processes may diminish dark skies. Airborne sulfur or sulfur compounds are known to damage the aluminum coatings on telescope optics. The increased sky glow would reduce the visibility of all celestial objects, particularly the faint ones, which are often the subject of scientific study.

Issue 9: Impact on Recreation

This issue focuses on the effects of the mine operation on recreation on National Forest System and Bureau of Land Management administered lands, including loss of access and recreational opportunities and loss of or reduction in solitude, remoteness, rural setting, and quiet.

Issue 10: Impact on Public Safety

This issue focuses on the impact of increased traffic from the mine site on construction, operation, and maintenance of new and reconstructed roadways. Hazardous materials would be transported, which may increase the risk of a spill or other public safety impact. Another aspect of this issue is human health risks to Coronado National Forest visitors if they accidentally come near the mine operations, tailings, or waste rock piles. Air quality impacts resulting from the operation may be harmful to public health.

Issue 11: Socioeconomic Impacts

This issue relates to the socioeconomic impacts of the proposed mine operation. The mine operation may have negative and positive socioeconomic impacts that may change over time.

Issue 11A: Regional Socioeconomics

The mine facilities and operation may result in changes over time to local employment, property values, tax base, tourism revenue, and demand and cost for road maintenance and emergency services.

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.

Summary of the Proposed Action

The National Environmental Policy Act process begins with a proposed action, in this case the preliminary MPO submitted by Rosemont Copper (see figure ES1). It should be noted that the proposed action is one of several alternatives considered in the DEIS. The proposed action should not be confused with the preferred alternative, which is the Agency’s current preference for implementation based on the current analysis.

Rosemont Copper's preliminary MPO is for construction, operation/reclamation, and closure of an open-pit mine to extract locatable minerals such as copper, molybdenum, and silver. The preliminary MPO also includes associated infrastructure and ancillary facilities. Associated infrastructure consists of haul and access roads, ore transportation systems, ore processing facilities, waste rock and tailings areas, leach facilities, electrical and water transmission lines, and ancillary facilities integral to the operations, such as the administration building, employee change house, warehouse, analytical laboratory, vehicle servicing facilities, storage facilities, guard house, and truck scale. The roughly circular open-pit mine would measure, at end of mine life, between 6,000 and 6,500 feet in diameter, with a final depth of 1,800 to 2,900 feet, depending on the elevation of the pit rim. The mine would produce a total of approximately 550 million tons of ore and 1,228 million tons of waste rock. The pit would disturb 955 acres, of which 590 acres would be on private land and 365 acres would be on National Forest System lands.

Primary highway access would be from State Route 83, which connects to Interstate 10 approximately 12 miles north of the mine site. A new 2-lane gravel road would be constructed to provide primary access between State Route 83 and the mine. At the intersection, State Route 83 would be widened and provided with additional lanes. Public use would be restricted on portions of the primary access road during construction and operation of the mine owing to safety considerations, but would be reopened to the public after closure.

Approximately 1 mile of gravel road would be constructed from the processing facilities to the existing road over Lopez Pass to function as the "secondary access road." The road over Lopez Pass would be improved for use of 2-wheel-drive vehicles. The secondary access road would be closed to the public during construction and operation of the mine, and would be reopened to the public after closure.

The mine contains two types of ore, sulfide and oxide. Oxide ore is located within the top portions of the excavated pit and is expected to be processed only within the first 6 to 7 years of the project. Oxide ore would be sent to a lined heap leach pad, where the ore would undergo a leaching process. The solvent extraction and electrowinning facility would recover copper from the leach solution using an extraction and stripping process that culminates in an electroplating process and would continually recirculate the process solutions. The heap leach pad and ponds would ultimately be encapsulated within the waste rock storage area.

Sulfide ore would be sent through a circuit of crushers, grinding mills, and ball mills to reduce the rock size to the consistency of sand. A flotation circuit would separate the copper and molybdenum concentrates from the waste material. The concentrates would then be dewatered, thickened, filtered, and loaded for shipment. The waste or tailings from the sulfide ore processing would be dewatered using large capacity pressure filters, which would essentially squeeze the water out of the tailings to create a dry cake with a moisture content of 12 to 15 percent. These dry-stack tailings would then be conveyed to the storage facility and placed in the dry-stack disposal, while the water would return to the process for recycled use and the concentrates would be shipped to market. No smelting would occur onsite.

Ore would be produced at an approximate rate of 75,000 tons per day and waste rock at a rate of 195,000 to 267,000 tons per day. Production estimates include 234 million pounds of copper, 4.5 million pounds of molybdenum, and 2.7 million ounces of silver annually over a period of approximately 20 years. Mine construction and closure activities would take an additional 5 years.

Waste rock, which consists largely of chemically basic limestone and other largely nonacid-generating rocks, would be placed in areas located outside the proposed open pit. The dewatered tailings would be sent via conveyor belt to the unlined dry-stack tailings disposal area, where the tailings would be deposited, stacked, and compacted as needed. Ultimately, the tailings would be encapsulated, or covered, completely by a thick layer of waste rock. The general design concept for managing stormwater from the dry-stack tailings facility is to minimize infiltration of water in the tailings. This would be accomplished by constructing uniform lifts of dry tailings that are buttressed by waste rock. The buttresses would be built around the tailings surface for containment and erosion control.

The project would be located primarily within the Barrel Canyon drainage and its tributaries. Diversion channels would be constructed to intercept runoff from precipitation and route it around the mine facilities for discharge to lower Barrel Canyon, downstream of the project. Over time, the northern tailings facility would expand to the south and east and would cover a portion of the Barrel drainage. The diversion channel would then be extended in the natural drainage as a porous rock drain, known as the central drain, and waste rock would be stacked over the top of the rock drain material. A compliance point dam would be located in Barrel Canyon to provide the final stormwater discharge sampling location for the project. Stormwater from the mine pit, ore processing facilities and tailings facilities, and mine maintenance plant areas would be collected in a process water control pond and recycled. Stormwater from the waste rock facilities, including the waste rock buttresses, would be routed to lined stormwater control ponds. The ponds would allow settling of sediment before excess stormwater would flow back to Barrel Canyon.

The project would use approximately 5,000 acre-feet per year of fresh water, for a total over the mine life of approximately 100,000 acre-feet. The water would be pumped from four to six wells located on land owned or leased by Rosemont Copper near the community of Sahuarita in the Santa Cruz Valley and would be piped to the mine. Proposed pipeline routes would require booster stations to maintain waterflow in the line. A much smaller amount of water would be obtained from stormwater and pit dewatering at the mine site. Most of the water used at the mine operation would be allocated to ore processing, with much smaller amounts employed for activities such as dust control, fire protection, drinking water, and sanitary uses.

The total power requirement for the project would be 133 megawatts and would require a minimum transmission voltage of 138 kilovolts. Tucson Electric Power (TEP) has entered into an agreement with Rosemont Copper to construct a transmission line to the proposed mine site. Construction of this line would require a Certificate of Environmental Compatibility from the Arizona Corporation Commission, which requires evaluation of alternative transmission routes. This evaluation is ongoing. In addition to traditional electrical service from TEP, the project would also generate energy onsite using solar technology for ancillary facilities, such as to power the administrative building.

Solid waste would be recycled as appropriate and feasible. Nonrecyclable inert waste would be disposed of at a state-licensed onsite landfill located on Rosemont Copper’s private property. Hazardous waste would be handled and disposed of in accordance with applicable regulations. No hazardous waste would be disposed of onsite. Sanitary waste at the project site would be handled by septic systems, with leach fields located in the vicinity of each building.

Blasting would be required prior to excavation of the ore and waste rock. Blasting operations would be conducted daily and would be limited to daylight hours. Blasting would typically occur once a day with an ammonium nitrate and fuel oil explosive. Dry bulk ammonium nitrate would be stored in

silos on the plant site. Blasting detonators (caps, delays, cord, and boosters) would be stored in special magazines and transported in separate vehicles. All explosives management would be done in accordance with applicable rules, regulations, and safety standards.

Transportation of ore, waste rock, and tailings would occur only in the mine area, which would be closed to the public for safety reasons. Ore and waste rock would be moved in large, off-highway haul trucks. Roads for the haul trucks would be constructed both within the open pit and between the pit and the plant, heap leach, and waste rock disposal sites. Maximum truck speed would be 35 miles per hour. Haul roads are temporary and regularly move based on the locations of material placement. Haul roads would not be paved but would be routinely watered for dust suppression.

Mine related traffic on State Route 83 during operations would primarily consist of trucks carrying supplies to the project, trucks carrying concentrate and copper cathodes from the project, and employee traffic. Truck shipments over the life of the mine are estimated at 582 round trips per week. Copper and molybdenum concentrate shipments would form the largest number of routine truck shipments, with approximately 56 round trips per day, 7 days a week. The largest concentrated volume of mine traffic during a 24-hour period would occur during workforce shift change. Equipment and construction material deliveries to the site would be in addition to the large truck trip data provided. Major equipment arriving by rail would be received at the Port of Tucson, which is located near Vail, Arizona.

Preproduction stripping of overlying rock would require 18 months to prepare for full-scale mining operations, train work crews, construct access and haul roads, and clear and grub the pit and waste rock storage areas that would be disturbed during the initial years of operation. Operation of the mine is proposed to occur over a 20-year period. It is anticipated that by year 10, leaching of the heap leach facility would be completed. At that time, the ponds would be decommissioned and residual leach solutions would have evaporated or been processed. Once the ponds are decommissioned and have been deemed closed or are under active management and in compliance with the aquifer protection permit issued by the Arizona Department of Environmental Quality, the facility would be completely covered by waste rock.

Reclamation would be phased during the mine life, with concurrent reclamation occurring on the outer slopes of the perimeter buttress and waste rock facility as those surfaces are completed. During years 21 through 25, closure and reclamation would take place. The open pit would be bermed and/or fenced to restrict access. Operating facilities at the project site would be demolished, including building foundations. All areas would be investigated for contaminants, and any contaminated soils, reagents, or fuels would be disposed of offsite at licensed facilities. Disturbed areas would be revegetated and monitored for reclamation success.

Project Alternatives

Alternative 1 – No Action Alternative

The National Environmental Policy Act requires consideration of a “no action” alternative. Under this alternative, Rosemont Copper would not develop the Rosemont mineral deposit at this time.
The environmental, social, and economic conditions described as the affected environment in chapter 3 of the DEIS would not be affected by the construction, operation, reclamation, or closure of the mine. Any existing exploration related or baseline collection disturbances on National Forest System lands by Rosemont Copper would be reclaimed in accordance with existing laws and permits. The no action alternative serves as the baseline against which to evaluate impacts of the proposed action and

other action alternatives. Existing uses such as grazing and recreation would continue at current levels.

Alternative 3 – Phased Tailings

The majority of actions and facilities described for the proposed action apply to this alternative as well. The differences between alternative 3 and the proposed action are summarized below. The four alternatives to the proposed action are compared in figure ES2.

The Phased Tailings Alternative was developed to respond to the issues regarding the potential short-term impacts on water resources and visual resources. Alternative 3 phases in the placement of dry-stack tailings in McCleary Canyon, allowing it to remain open approximately 10 years longer than it would under the proposed action. Alternative 3 also modifies water controls, including the central drain and process water control pond, modifies the topography of the slopes to appear undulating, realigns the primary access road, and relocates some plant facilities.

Alternative 4 – Barrel Alternative (Preferred Alternative)

The forest supervisor has chosen the Barrel Alternative to be the preferred alternative. Factors influencing the decision include preservation of resource values in McCleary Canyon, including recreation, riparian areas, and wildlife species habitat and movement corridors, as well as avoidance of waters of the United States and cultural sites in McCleary Canyon and other areas.

The majority of actions and facilities described for the proposed action apply to this alternative as well. The differences between alternative 4 and the proposed action are summarized below.

The Barrel Alternative was developed to respond to the issues regarding potential impacts on visual resources, cultural resources, recreation, and the surface water component of water resources. Alternative 4 places all tailings and waste rock in Upper Barrel and Wasp Canyons and permanently avoids placement of mine waste in McCleary Canyon. Access over Gunsight Pass would be maintained. The primary and secondary access roads and the general layout of facilities would be similar to the Phased Tailings Alternative, except that the tailings conveyor system would require modification to accommodate the relocated tailings facility.

Alternative 5 – Barrel Trail Alternative

The majority of actions and facilities described for the proposed action apply to this alternative as well. The differences between alternative 5 and the proposed action are summarized below.

The Barrel Trail Alternative was developed to respond to the issues regarding potential impacts on visual resources and the surface water component of water resources. Alternative 5 places all tailings and waste rock in upper Barrel, Trail, and Wasp Canyons. This alternative is similar to the Barrel Alternative in that it also permanently avoids placement of mine waste in McCleary Canyon. However, this alternative incorporates a more varied topography to more closely replicate a natural landform than the other action alternatives. The incorporation of a more varied topography necessitated a slightly expanded footprint of the tailings and waste rock facilities. The more varied topography of the Barrel Trail Alternative includes two ridges with varying elevations and an intervening valley that drains to Barrel Canyon. The primary and secondary access roads and

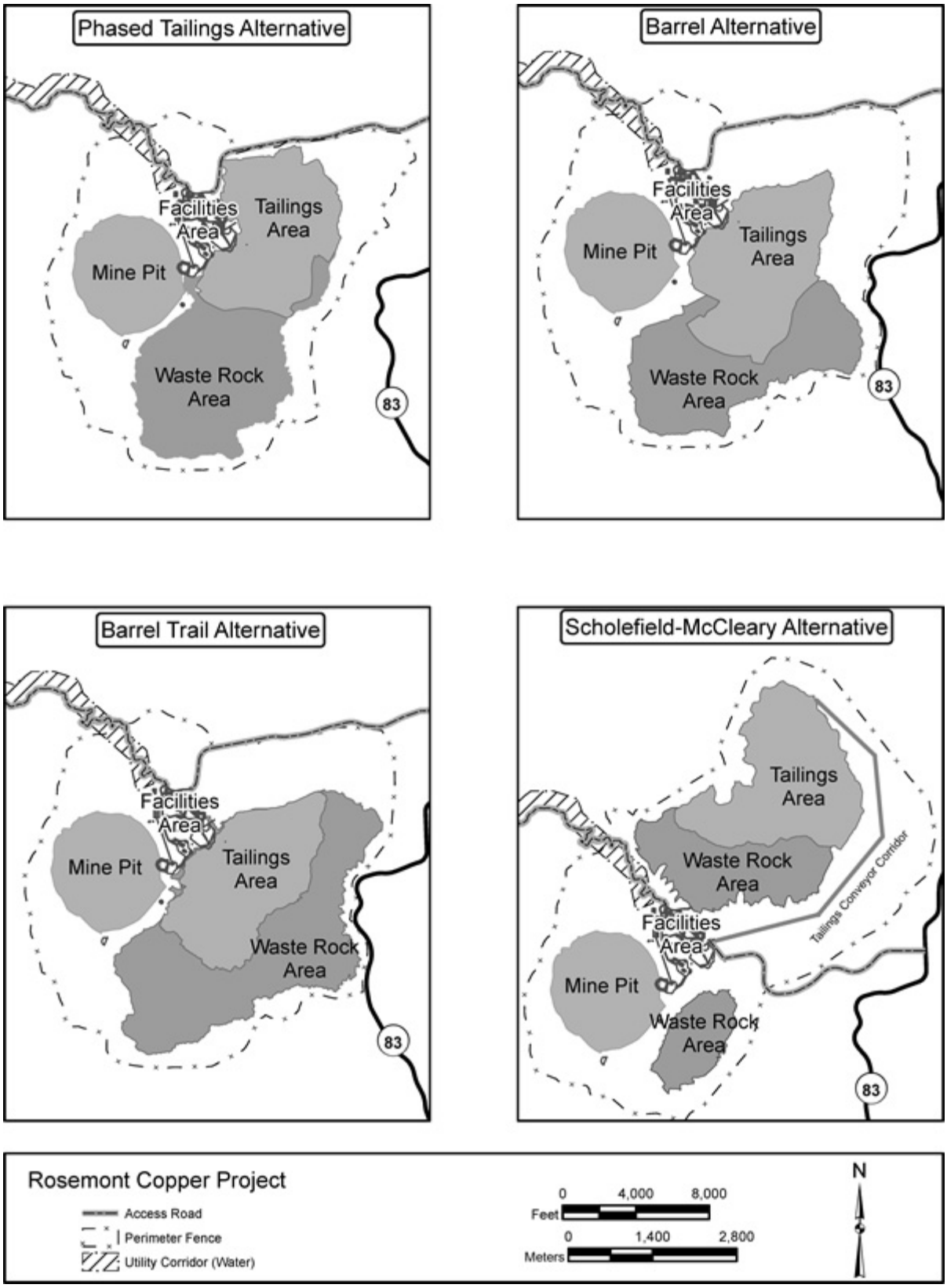

Figure ES2. Action alternative footprints

the general layout of facilities would be similar to the Phased Tailings Alternative, except that the tailings conveyor system would require modification to accommodate the relocated tailings facility.

Alternative 6 – Scholefield-McCleary Alternative

The majority of actions and facilities described for the proposed action apply to this alternative as well. The differences between alternative 6 and the proposed action are summarized below.

The Scholefield-McCleary Alternative was developed to respond to the issues regarding potential impacts on cultural resources, riparian habitat resources, and the surface water component of water resources arising from placing the tailings and waste rock in the McCleary and/or Barrel Canyon drainages. Alternative 6 would place all tailings and the majority of waste rock north of the McCleary Canyon drainage channel, with the dry-stack tailings occupying Scholefield Canyon and an unnamed tributary drainage and with waste rock placed on the northern slope of McCleary Canyon above the drainage bottom and extending to the north atop the tailings. General facility layout within the plant site would be similar to alternatives 3 and 4, except that the tailings dewatering facility would be moved to Rosemont Copper private land near Hidden Valley Ranch to accommodate the relocated dry-stack tailings facility. As a result of the relocation of mine waste to Scholefield Canyon, the primary access road would be realigned.

Utility Lines (Electrical and Water Supply) Alignment Alternatives

Electrical power and water would be brought to the project site from the west for all action alternatives. It is currently proposed that the water and electrical lines would be colocated in places in which they have parallel routes. There are five alternative alignments considered for electrical power, as shown in figure ES3. An initial route (the northern route) was proposed in the preliminary MPO, but it was eliminated from further consideration as a result of concerns from the Arizona State Land Department. All of the transmission lines alternatives include aboveground 138-kilovolt transmission lines and an associated 14-foot-wide unpaved maintenance road.

TEP Preferred Route

West of the Santa Rita Mountains ridgeline, the preferred route generally parallels the existing South Santa Rita Road before entering private property held by Rosemont Copper. The alignment then enters the Rosemont claim block and crosses the ridgeline at Lopez Pass.

TEP Alternative 1

TEP Alternative 1 is very similar to the preferred route, but it includes a divergence from the private property alignment across Bureau of Land Management administered lands.

TEP Alternative 2

This alternative would parallel an existing 46-kilovolt power line until the junction of Helvetia Road, where it would head northeast to Santa Rita Road to follow the same path as the preferred route, terminating at the Rosemont Substation.

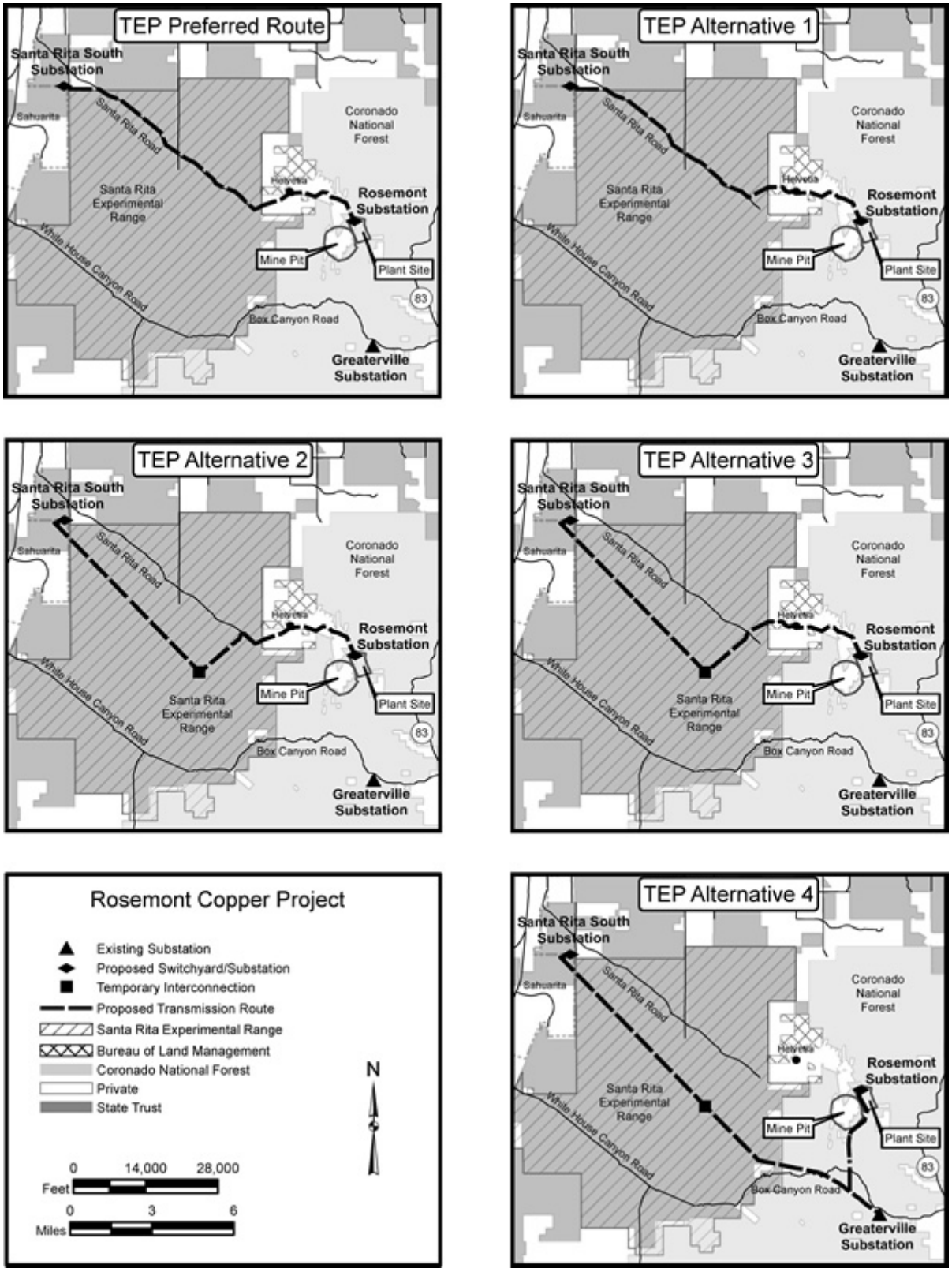

Figure ES3. Proposed utility alignment alternatives

TEP Alternative 3

TEP Alternative 3 is very similar to TEP Alternative 2, but it includes a divergence from the private property alignment across Bureau of Land Management administered lands.

TEP Alternative 4

This alternative would be a double-circuit line and would also parallel the existing 46-kilovolt power line south of Santa Rita Road through the Santa Rita Experimental Range. However, unlike TEP Alternatives 2 and 3, this alternative would continue through Box Canyon until the line is able to head north through the Coronado National Forest to connect to the Rosemont Substation.

Water Line Alternatives

Two water line alignments have been proposed. These alignments generally correspond to the northern and preferred power line routes. The northern route has since been eliminated from further consideration.

Mitigation Measures

A number of measures that are designed to avoid, minimize, rectify, reduce, eliminate, or compensate for impacts of the proposed action and other action alternatives have been proposed. The mitigation measures are described in chapter 2 of the DEIS and are mandatory should one of these alternatives (alternatives 2 through 6) be selected for implementation. An interagency task force would be formed to administer the project once approved. The Coronado, Arizona Department of Environmental Quality, and other appropriate agencies would be members of the task force. This group would oversee regulatory compliance and quality assurance/quality control issues related to the project, including implementation and monitoring of mitigation measures.

In addition to the mitigation measures described in chapter 2 of the DEIS, the Forest Service is currently investigating the feasibility of incorporating geomorphic design concepts (sometimes called landforming) into construction of the Rosemont mine waste rock and tailings piles. Landforms of geomorphic design can create more stable, natural functioning and natural looking topography than conventionally designed landforms, which could mitigate some impacts to water quality and quantity, visual quality, recreation settings, and wildlife habitat. The Forest Service is currently exploring the status of geomorphic landform design in the mining industry. If these investigations show that geomorphic landform design is a reasonable approach and may be feasible for the project, the Forest Service will apply geomorphic principles to at least one alternative. This may include partial backfill of the pit to reduce the footprint of waste rock and tailings facilities while maintaining a hydraulic sink. This investigation currently taking place, and potential design work would occur between the DEIS and FEIS.

Alternatives Considered but Eliminated from Detailed Study

A number of alternatives suggested during scoping or otherwise developed have been eliminated from detailed study by the responsible official. The following criteria were used to narrow the list of potential alternatives for consideration in the DEIS:

1. Does the alternative meet the project purpose and need?

2. Does the alternative resolve environmental or resource conflicts?
3. Is the alternative available? and/or
4. Is the alternative feasible, in terms of cost, current technology, and logistical capability?
5. Further details on alternatives considered but eliminated from detailed study are contained in chapter 2 of the DEIS and the project record.

Forest Plan Consistency

The Rosemont Copper Project was reviewed against the direction contained in the "Coronado National Forest Land and Resource Management Plan" (forest plan), as amended. The review determined that certain aspects of implementing the proposed action (preliminary MPO) or any of the action alternatives would result in conditions that are inconsistent with management direction in the forest plan.

Forest Plan Amendment

The Coronado proposes to amend its forest plan in order to allow activities integral to the proposed project. The proposed forest plan amendment consists of a new management area that specifically addresses copper mining. A detailed description is contained in chapter 2 of the DEIS. The proposed new management area, Management Area 16 – Rosemont Mining Area, includes standards and guidelines specifically developed to allow copper mining to comply with the amended forest plan. The proposed forest plan amendment applies to the proposed action and all action alternatives. All mining and associated ground-disturbing activities associated with the Rosemont Copper Project are located within the boundaries of proposed Management Area 16, with the possible exception of some access road construction and the movement of employees, materials, and mine products.

Summary of Impacts

Alternative 1 – No Action

Under the no action alternative, the construction and operation of the project would not occur. The existing conditions within the project area would be maintained. Mineral resources would still be available for future development.

Alternative 2 – Proposed Action

Air Quality and Climate Change

Under the proposed action, particulate matter 2.5 ($PM_{2.5}$) would increase by two times versus background levels, and particulate matter 10 (PM_{10}) would increase by more than three times versus background levels. National Ambient Air Quality Standards for particulates would not be exceeded, but those for PM_{10} would be close to exceedance (97 percent of standard). Volatile organic compound emissions would be about 105 tons per year and would represent less than a 1 percent increase in Pima County. Nitrogen oxide emissions would be about 1,250 tons per year and would represent a 4 percent increase in Pima County; this would increase the risk of an exceedance of the ozone air quality standard in the Tucson area. Sulfur dioxide emissions would meet the air quality standard at the project site. Greenhouse gas emissions (carbon dioxide) would represent a 1 percent increase in Pima County. Emissions from the project would cause and contribute to degradation of visibility in the Saguaro Park East and Galiuro Wilderness Class I airsheds.

Rosemont Copper has committed to using numerous mitigation measures to minimize emissions and their impacts. These include: operational and engineering controls for controlling fugitive dust associated with the tailings, water sprays and wet scrubbers associated with the ore crushing; use of covers to control emissions from mix tanks and settlers used in the solvent extraction system; spray or physical enclosures for low emission potential processes; location of stockpile and loadout areas within the enclosed stockpile building; use of newer engine designs in mobile sources, dust control on access, haul, service, and maintenance roads; use of low-sulfur diesel fuel onsite for all stationary equipment; expedited construction of electrical lines to reduce the need for onsite power generation and associated emissions; design of the project administration building to showcase use of leadership in environmental and energy design and sustainable energy concepts; and application of acid leaching solution to the heap using emitters (similar to drip irrigation) to avoid aerosol losses to the wind.

Biological Resources

The proposed action would result in the direct loss or conversion of 6,380 to 6,461 acres of habitat and may indirectly impact up to 145,190 acres, which may have the potential to impact animal behavior. For the majority of the species, the impact is not expected to have far-reaching consequences for population viability. However, because of the magnitude, intensity, length, and around-the-clock timing of the project, all special status plants and animals that occur in the area are expected to be impacted.

Some species would be directly and indirectly impacted, including nine species federally listed as threatened or endangered under the Endangered Species Act (Chiricahua leopard frog, Gila chub, Gila topminnow, Huachuca water umbel, jaguar, lesser long-nosed bat, ocelot, Pima pineapple cactus, and southwestern willow flycatcher) and four species federally listed as candidate under the Endangered Species Act (desert tortoise, northern Mexican gartersnake, Rosemont talussnail, and western yellow-billed cuckoo). For two special status plant species (beardless chinchweed and Coleman’s coral-root), all action alternatives may result in a downward trend toward Federal listing as threatened or endangered or in a loss of population viability. For 7 special status plant and 13 special status animal species, all action alternatives may impact individuals of these species but are not likely to result in a downward trend toward Federal listing as threatened or endangered or in a loss of population viability of these species.

There would be significant vegetation losses and changes in the area, resulting in a decrease in nesting, overwintering, foraging, and roosting habitat for dozens of species of migratory and resident birds. Every species currently occupying the area would potentially experience a reduction in individuals and population size.

Current activities such as livestock grazing, combined with the proposed project, would cumulatively contribute to a general loss of native grassland and woodland habitats; noise, air, and light pollution; and degradation of riparian habitats.

An unknown number of acres of animal movement corridors and linkage areas would potentially be impacted, including the potential to: (1) modify and/or fragment animal movements between mountain ranges; (2) reduce local connectivity between habitats; (3) increase animal roadkills from the transportation system and increased traffic; and (4) result in a loss of genetic flow.

The alteration of surface and subsurface hydrology from the pit and other mining related operations may result in the loss of riparian habitat and the fragmentation of riparian habitat and corridors.

Riparian habitat that could be affected includes 490 acres of hydroriparian or mesoriparian habitat along Cienega Creek, 471 acres of xeroriparian habitat along Davidson Canyon, up to 204 acres of mesoriparian habitat along Davidson Canyon, 58 acres of hydroriparian or mesoriparian habitat along Empire Gulch, and 140 acres of hydroriparian or mesoriparian habitat along Gardner Canyon.

Cultural Resources

The proposed action would impact a total of 96 National Register of Historic Places eligible historic properties, consisting of 62 prehistoric sites (28 are known or likely to have human remains), 32 historic sites, and 2 multicomponent prehistoric/historic sites. A total of 63 springs/seeps would be affected within the alternative or by drawdown in the surrounding area; springs are considered sacred by all of the tribes consulted by the Coronado.

Mitigation of adverse effects on archaeological sites has traditionally involved data recovery excavations that sample or completely excavate a site to document the information contained therein and to identify human remains and arrange for their repatriation to culturally affiliated individuals or tribes. Excavation, however, destroys the site and is constrained by the analytical technology available at the time of the excavation. Any future information potential of the sites would be destroyed as well.

The sanctity and power of each spring are also unique and cannot be replaced once the spring is destroyed.

The Tohono O'odham Nation has requested and the Coronado has prepared a nomination of the Santa Rita Mountains as the *Ce:wi Duag* Traditional Cultural Property for listing in the National Register of Historic Places. All of the action alternatives and portions of the utility alternatives in higher elevations are within the proposed boundary of this traditional cultural property. The cultural landscape would be irrevocably altered by the massive movement of rock and soil and transformation of the topography.

Cultural Resources within Utility Corridor Alternatives

Cultural resources in the portions of the utility alternatives that are within the action alternatives boundaries are not included here; only historic properties that lie beyond the action footprints are discussed here. All National Register of Historic Places eligible historic properties within the surveyed corridors are included; some sites may be avoidable by project design.

TEP Preferred Alternative

The TEP preferred utility alternative corridor contains a total of 10 historic properties: 5 are known prehistoric sites (two of which are likely to have human remains), and 5 are Historic period sites (1 of these, Helvetia Cemetery, has human remains). The unnamed spring near Helvetia is within 240 feet of this corridor.

TEP Alternative 1

This alternative corridor contains seven historic properties: three are known prehistoric sites (none of these are likely to have human remains), and four are Historic period sites. However, Helvetia Cemetery is not within this alignment (it includes a different Historic period site). The unnamed spring near Helvetia is within 240 feet of this corridor.

TEP Alternative 2

This alternative contains the greatest amount of historic properties with a total of 14: 9 are prehistoric sites (4 of these may contain human remains), and 5 are Historic period sites (including Helvetia Cemetery). The unnamed spring near Helvetia is within 240 feet of this corridor.

TEP Alternative 3

This alternative corridor contains 11 historic properties: 7 are known prehistoric sites (2 of these are known or likely to have human remains), and 4 are Historic period sites (none of which is suspected to contain human remains). The unnamed spring near Helvetia is within 240 feet of this corridor.

TEP Alternative 4

This alternative corridor is the southernmost alignment and contains a total of 12 historic properties: 10 are known prehistoric sites (5 of these are known or likely to have human remains, and 1 is a multicomponent site), and 2 are Historic period sites.

Dark Skies

The proposed action would cause long-term adverse impacts on astronomy research at Whipple Observatory and Jarnac Observatory, and would cause long-term adverse impacts on amateur astronomers, star gazing, and general public viewing regionally and within the Santa Rita Ecosystem Management Area.

Fuels and Fire Management

The proposed action would cause a slight increased risk of ignition of wildfires along transportation routes, an increased risk of wildfire spread from the transportation of flammable materials, and minor additional fuel loading from noxious weed growth. Noxious weed management would help mitigate overall potential for a fire to occur, and training and fire control plans would help reduce the severity and extent of fires.

Geology, Minerals, and Paleontology

The mine operation would excavate and relocate approximately 1.8 billion tons of geological material, of which approximately 1.3 billion tons would be waste rock and 0.5 billion tons would be ore. Slippage or ground movement would be typically limited to the confines of the pit. The proposed action would disturb 3,782 acres that have a moderate potential fossil yield. A field survey for locating potential paleontological resources was conducted between March 10, 2011, and March 16, 2011, for all action alternatives; no vertebrate fossils were identified. No cave resources have been identified in the project area. However, the potential may exist, and if present, cave resources could be impacted.

Upon indication or discovery of a cave or similar karst features, Rosemont Copper would suspend work at that site and contact the designated Forest Service representative to investigate the discovery before work is reinitiated. In order to mitigate potential impacts to significant paleontological resources, monitoring ahead of ground disturbance by a Forest Service approved paleontologist would occur. Upon discovery of such resources, Rosemont Copper would suspend work at that site and the site would be investigated.

Groundwater Quality

Under the proposed action, seepage is expected to occur from the dry-stack tailings facility from remnant process water. Infiltration of precipitation could cause seepage from the waste rock facility. Both these sources could impact groundwater quality; however, modeling indicates that the water quality of potential seepage from these facilities would meet all Arizona Aquifer Water Quality Standards.

Following closure of the heap leach facility, seepage is expected to continue at low flow rates for 115 years. Modeling indicates that remnant heap leach seepage would exceed numeric aquifer water quality standards for cadmium, nickel, and selenium. This seepage would be collected and treated. Conceptually, modeling shows that with treatment, heap leach seepage can meet all numeric aquifer water quality standards. Long-term discharge from the heap leach facility requires permitting under the Arizona Aquifer Protection Permit program; the specific techniques for collection and treatment of the long-term discharge would be determined by the Arizona Department of Environmental Quality. The heap leach facility is located and designed to collect all possible drainage and solution, is on top of a stable rock location, and will be encapsulated by waste rock to protect from stormwater infiltration.

As modeled, mine pit lake water quality would not exceed any Arizona Aquifer Water Quality Standards.

Groundwater Quantity

Under the proposed action, 5,400 acre-feet per year of groundwater would be pumped from the Upper Santa Cruz Subbasin of the Tucson Active Management Area and piped to the mine site in the Davidson Canyon/Cienega Basin. This would represent a 6 to 7 percent increase in groundwater pumping from the Upper Santa Cruz Subbasin and a 2 percent increase in groundwater pumping from the entire Tucson Active Management Area. Groundwater levels would decrease up to an additional 70 feet from the pumping, declining at a rate of up to 3.5 feet per year above and beyond existing groundwater declines. The geographic extent of the drawdown would be 3 to 4 miles from the Rosemont production wells during the first 20 years of pumping; the geographic extent of impacts would continue to expand an additional 1 to 2 miles for up to 140 years after completion of pumping. An estimated 400 to 450 registered wells are located within this area of drawdown; specific impacts to these wells, if any, are not known.

In the vicinity of the mine site, the presence of the mine pit would create a permanent hydraulic sink as a result of active pumping and long-term evaporation from the lake, which would result in permanent drawdown in water levels in the regional aquifer. Groundwater modeling shows that this drawdown would be greater than 100 feet in the immediate vicinity of the mine pit and from 10 to 100 feet in the vicinity of the residences in Singing Valley and at Hilton Ranch Road; drawdown would not be greater than 5 feet at the Corona del Tucson residences, along Cienega Creek, or at the Davidson Canyon/Cienega Creek confluence. Drawdown up to 10 feet would potentially occur along Empire Gulch and Gardner Canyon. An estimated 500 to 550 registered wells are located within this area of drawdown; specific impacts to these wells, if any, are not known.

Based on median flow values, a reduction in average annual flow from 1 to 3 percent would occur along Cienega Creek from drawdown in the regional aquifer, resulting in 0.16 mile of lost perennial stream length. During periods of low flow (typically May and June), impacts could be much greater. A reduction in flow of 10 percent would occur along Davidson Canyon from reduction in ephemeral

flows stored in the shallow alluvial aquifer; the impact on perennial stream length in Davidson Canyon is not known.

Mountain front recharge to the Davidson Canyon/Cienega Basin would be reduced by approximately 1 percent, and the water lost in perpetuity to evaporation from the mine pit lake would represent up to 5.3 percent of the basin water balance. Groundwater outflow from Davidson Canyon would potentially be reduced by up to 6.4 percent.

A total of 63 springs would potentially be lost either directly to surface disturbance or to impacts from declining aquifer water levels. The presence of most of these springs is based on literature and map review, and they have not been field verified.

Existing groundwater withdrawals contribute to land subsidence in the Santa Cruz Valley; an incremental additional risk of subsidence would result from mine water supply pumping.

To the extent possible, stormwater will be diverted through or around project facilities to transport runoff water to downstream watersheds. Rosemont Copper will mitigate the potential effects of mine related pumping on residential water supply wells in the Sahuarita Heights neighborhood by entering into an agreement with the Rosemont United Sahuarita Well Owners. This well protection plan addresses pump inspection, pump maintenance, pump replacement, well inspection, well maintenance, and well replacement to ensure that residential water wells in the Sahuarita area remain productive throughout the life of minerals production operations.

Rosemont Copper will implement regional groundwater mitigation measures within the Tucson Active Management Area, including recharge of available Central Arizona Project water. The location of the recharge may not be in the vicinity of the mine water supply wells.

Rosemont Copper will also annually fund the U.S. Geological Survey to operate and maintain the existing surface waterflow measurement gage at Barrel Canyon.

Hazardous Materials

This section refers to the risk of release to and effect of hazardous materials on the environment (as opposed to risks to public health and safety). Under the proposed action, the use of ammonium nitrate and fuel oil mixtures, laboratory reagents, cleaning fluids, and solvent extraction and electrowinning reagents (excluding sulfuric acid and kerosene) represent a negligible risk to the environment. The proper storage of ammonium nitrate in dry form in silos presents little risk to the environment. The proper storage, disposal, and transportation of hazardous waste present little risk to the environment.

An accidental catastrophic release of sulfuric acid or petroleum products during transportation would cause direct impacts to plants, wildlife, and soil in the immediate vicinity of the spill; would cause possible migration into surface waters with indirect downstream effects on vegetation, aquatic species, and wildlife; and would pose some risk of groundwater contamination.

An accidental catastrophic or major onsite release of sulfuric acid or petroleum product would cause direct impacts to soil and wildlife, and if a long-term release were to occur, it would carry a high potential for groundwater contamination. Groundwater contamination would be unlikely to migrate beyond the mine site as a result of hydrologic gradients but would cause direct impacts to birds and wildlife from pit contamination.

Failure of the leach pad containment would cause direct impact to groundwater by sulfuric acid. Groundwater contamination would be unlikely to migrate beyond the mine site as a result of hydrologic gradients but could cause direct impacts to birds and wildlife from pit contamination.

Accidental releases of hazardous materials cannot be entirely prevented, but proper training, storage, and handling are intended to minimize the potential for releases, and in the event of a release, to minimize the effects on and threat to the environment.

Landownership and Boundary Management

The proposed action would directly affect corner monuments that could lead to the loss of ability to effectively determine boundaries between public and private land. However, the proposed action includes design of a resurvey and control network to preserve the ability to reestablish landownership boundaries. Mineral survey fractions (5.5 acres) would be impacted by mining operations and would be sold to Rosemont Copper under the Small Tracts Act, relieving the Coronado of management responsibilities. Under the proposed action and other action alternatives, direct impacts would occur to the following lands: 1,212 to 1,369 acres of private land, 6,122 to 7,208 acres of land managed by the Coronado, 3 to 14 acres of Bureau of Land Management administered land, and 93 to 138 acres of Arizona State Land Department land administered as a State Trust.

Livestock Grazing

The proposed action would result in a change from fully capable of supporting grazing activities to partially capable on 4,684 acres of the Rosemont grazing allotment, 280 acres of the Thurber allotment, 88 acres of the Greaterville allotment, 18 acres of the DeBaud allotment, 155 acres of the Helvetia allotment, and 0 acres of the Stone Springs allotment. The proposed action would result in a change from fully capable to not capable on 950 acres of the Rosemont grazing allotment (the area represented by the mine pit). A total reduction of 1,146 animal unit months would occur. Fifteen stock ponds and 63 springs would be lost. Mitigation would replace lost manmade water sources.

Noise

The proposed action would result in impacts to recreational users from 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. The proposed action would not result in impacts to nearby residents from construction, blasting, or equipment operation during any phases of mine life. Noise caused by an increase in traffic would impact private property along State Route 83, although the number of residential noise receptors is unknown.

Public Health and Safety

When combined with increases in traffic on State Route 83 resulting from population growth, the proposed action would result in traffic increases up to 10 to 88 percent during year 1 of the construction phase (under a 75 percent commuter carpool scenario), 128 to 290 percent during year 5 of the operation phase (no carpool scenario), and 204 to 356 percent by the end of mine life (no carpool scenario). A corresponding decrease in traffic safety would occur that may result in 61 to 107 accidents per year (from current rate of roughly 30 accidents per year), with a fatality occurring between one and two times per year (from a current rate of roughly one fatality every 3 years). By applying the mitigation measure of a partial carpool during the operation phase (75 percent of worker commutes in 5-person vans), the traffic increase from mine related traffic and population

growth would be 67 to 135 percent at year 5 of operations and 137 to 201 percent during year 20 of operations. Direct impacts to public health and safety associated with traffic would remain after mitigation.

Risks to public health and safety would exist from the storage, use, and transportation of hazardous materials. While unlikely to occur, an onsite ammonium nitrate explosion would cause damage up to 2 miles away and release a plume of toxic gases. An onsite petroleum product fire or sulfuric acid release would release a plume of smoke and/or toxic gases. An accident during transportation involving sulfuric acid, fuels, or ammonium nitrate would affect a radius of up to 0.5 mile, and an accident during transportation of explosives would affect a radius of up to 1 mile.

Risk to public health and safety from recreational hazards, subsidence and other geological hazards, noise, or air quality would be unlikely to occur.

Recreation and Wilderness

The proposed action would result in a loss of 6,211 acres to the Recreation Opportunity Spectrum based on the area within the perimeter fence, including these categories: 0 acres of semiprimitive nonmotorized, 5,973 acres of semiprimitive motorized, 170 acres of roaded modified, and 68 acres of roaded natural. No hunting permits would be modified or lost, but 4 percent of hunt unit 34A would be affected, resulting in 776 annual hunter days lost for certain species (white-tailed deer, javelina, and Mearn's quail). A total of 30.5 miles of public roads and trails would be lost, and 3.8 miles of the Arizona National Scenic Trail would be relocated.

Socioeconomics and Environmental Justice

The proposed action would result in a small increase in regional employment, taxes, and revenue. There would be increased funding needs for road maintenance on State Route 83 and other roads during the operational phase of the mine. The proposed action would result in a possible decrease in area property value and would cause a potential degradation of area quality of life in terms of community values. There potentially could be a change in regional tourism spending. No change in the cost of emergency services as a result of population increase would occur. There would be disproportionate effects on environmental justice communities as a result of impacts to cultural resources.

Soils

The proposed action would result in the loss of 4,415 acres of soil productivity by direct impact of the mine footprint, and sediment delivery to the surface drainages would be about 16,000 tons annually, compared with 32,600 tons annually under current conditions. Modeled stability of tailings and waste rock facilities exceeds regulatory requirements. Reclamation is expected to approach historical vegetation climax conditions after 100 years.

The design of the proposed action and other action alternatives includes a mine footprint that is substantially smaller than conventional mines with similar production capacity. The use of dry-stack tailings facilities would also enhance reclamation, compared with the use of traditional tailings settling ponds. Filtered tailings would be transported, spread, and compacted to form an unsaturated, dense, stable tailings stack, which would include a surrounding rock and soil buttress seeded for revegetation. Revegetation efforts would be conducted to meet success criteria established by the Forest Service and would include the stockpiling and use of salvage topsoil as a growth medium.

Surface Water Quality

The proposed action would result in the loss of 47.8 acres of jurisdictional waters of the United States, regulated by the U.S. Army Corps of Engineers, and 213.8 acres of riparian areas. Sediment delivery downstream would be reduced from current conditions by about 51 percent at the water quality monitoring point in Barrel Canyon, by 18 percent at the mouth of Barrel Canyon, and by about 5 percent at the mouth of Davidson Canyon. No exceedances of surface water quality standards are anticipated from tailings or waste rock facilities; at present, naturally occurring surface water exceeds some surface water standards.

Mitigation measures under all action alternatives to reduce impacts to surface water quality include: the diversion of surface water from undisturbed areas of the watershed around mining activities; segregation and encapsulation of waste rock believed to have the potential for acid rock drainage by waste rock that has acid-buffering characteristics; continual testing of waste rock for acid rock drainage potential; use of lined ponds and retention of all stormwater flows in contact with ore bodies and other active mining facilities for reuse as process water; collection of stormwater from tailings and waste rock disposal areas in sediment ponds for further water quality testing prior to discharge to natural drainages; reuse or recycling of most process water; revegetation of tailings buttress walls to prevent erosion of sediment during mine operation; reclamation of mine facilities following mine closure; and use of best management practices, stabilization measures, and sediment control measures.

Mitigation measures for impact to waters of the United States include those specifications identified in the Clean Water Act Section 404 individual permit. Mitigation potentially includes the purchase and setting aside of offsite mitigation areas, payment in lieu of mitigation to an established restoration program, and/or permittee responsible onsite mitigation.

Surface Water Quantity

The proposed action would result in the loss of 15 stock tanks, although mitigation would replace lost water sources. Stormwater flow from the area would be reduced by 46 percent, and flow in Davidson Canyon, which is most likely dependent on stormwater stored in the shallow alluvial material, would be reduced by 10 percent.

For all action alternatives, a water source enhancement and mitigation plan would be developed so that there would be no net loss in numbers of surface water sources for livestock and wildlife. Stormwater diversions shall be designed and operated to route stormwater efficiently through or around project facilities and to transport runoff water to downstream watersheds.

Additional proposed measures are designed for monitoring surface water resources and include sharing surface water data. For the purpose of obtaining surface waterflow data, Rosemont Copper will annually fund the U.S. Geological Survey to operate and maintain the existing surface waterflow measurement gage at Barrel Canyon. Rosemont Copper will also perform periodic monitoring and maintenance of spillways, diversions, and other permanent surface water facilities in accordance with specific permit conditions. To share these data, a Rosemont Copper Mine water Web site will be constructed, updated annually, and maintained by Rosemont Copper, with concurrence by the Coronado. All water related data and reports will be accessible to the general public at this location, including all surface water quantity data and monitoring reports.

Transportation/Access

The proposed action would result in increased traffic, which would decrease the level of service of existing roadways and would have a potential effect on public transportation (namely school buses). When combined with the anticipated increase of traffic resulting from population growth, mine related traffic on State Route 83 between Interstate 10 and State Route 82 would decrease the level of service from its current B and C ratings to level C for peak and nonpeak seasons at peak a.m. and p.m. hours during all phases of the mine. Level of service C is not considered an unacceptable level of service, and the mitigation measure of a partial carpool system would help to ensure that a level of service D would not occur. The mitigation measure of constructing four school bus pullouts along State Route 83 would negate the impacts to public transportation by providing safer student loading and unloading. Transportation routes to the mine area open to the public would increase by the building of the primary and secondary access roads, but existing Forest Service roads within the project footprint would be closed to the public.

Visual Resources

The proposed action would adversely impact visual resources. The proposed action would include strong contrasts and adverse impacts from the highly visible pit face and diversion channel, along with permanent and major impacts, including the irreversible loss of scenic views, from highly visible piles and power lines visible in Box Canyon, along the ridgeline, and at Lopez/Gunsight Pass for the life of the project.

Under the proposed action, the plant facility would be visible for up to 7 years. There would be impacts to 13,742 acres within the Santa Rita Ecosystem Management Area with very high and high scenic integrity characteristics. There would be 40 miles of project area visibility along forest roads and trails with concern levels 1 and 2, as defined under the Scenery Management System, and 3.4 miles of scenic quality impacts along State Route 83. There would be 187,893 acres within the analysis area with project visibility.

Mitigation measures to reduce the impact to visual resources would occur during mine operations, closure, and postclosure. Concurrent reclamation will occur during operations that would have minor beneficial impacts to scenic quality. Sediment and dust controls would reduce but not eliminate visual impacts from fugitive dust. During operations, the colors of buildings would be painted or stained in earth tones to reduce color contrasts with the surrounding landscape. During closure, facilities and foundations would be removed, access roads would be reclaimed, and final reclamation would be conducted on the waste rock and tailings piles. During closure, the applicability of measures to darken the exposed rock faces of the mine pit to reduce color contrasts would also be determined. Postclosure reclamation would include monitoring revegetation success on the waste rock and tailings slopes.

Additional mitigation measures may be considered. The Forest Service is investigating the feasibility of geomorphic design (sometimes called landforming) to create more stable, natural functioning, and natural looking topography related to the waste rock and tailings piles. With respect to the facility footprint, grading to restore a natural appearing topography would reduce impacts and encourage more natural revegetation in this area. Breaking up the horizontal benches in the visible portions of the upper pit may also be pursued. There are several ways to accomplish this, including double benching, postmine bench blasting, and randomized benching.

Alternative 3 – Phased Tailings Alternative

Impacts on these resources would be the same as under the proposed action alternative: air quality and climate change, dark skies, fuels and fire management, groundwater quality, hazardous materials, landownership and boundary management, noise, public health and safety, socioeconomics and environmental justice, and transportation/access.

Biological Resources

The Phased Tailings Alternative would result in the direct loss or conversion of 6,278 to 6,359 acres of habitat and may indirectly impact up to 145,190 acres, which may have the potential to impact animal behavior. All species affected would be identical to the proposed action, and direct and indirect impacts to these species would be equivalent to the impacts of the proposed action. Compared with the proposed action, the Phased Tailings Alternative would delay impacting McCleary Canyon by 12 years.

Cultural Resources

The Phased Tailings Alternative contains the same National Register of Historic Places eligible historic properties, with the exception of three fewer along the primary access road, *Ce:wi Duag* Traditional Cultural Property, and springs as located within the proposed action alternative. Impacts to cultural resources within the Phased Tailings Alternative would be identical to those described for the proposed action.

Impacts to cultural resources from the utility corridor alternatives are briefly described above in the impacts summary for the proposed action.

Geology, Minerals, and Paleontology

Impacts to geology and minerals and the potential for subsidence would be the same as under the proposed action. The Phased Tailings Alternative would disturb 3,759 acres that have moderate potential fossil yield.

Groundwater Quantity

Under the Phased Tailings Alternative, impacts to groundwater quantity would be identical to the proposed action.

Livestock Grazing

The Phased Tailings Alternative would result in a change from fully capable of supporting grazing activities to partially capable on 4,590 acres of the Rosemont grazing allotment, 280 acres of the Thurber allotment, 88 acres of the Greaterville allotment, 8 acres of the DeBaud allotment, 155 acres of the Helvetia allotment, and 0 acres of the Stone Springs allotment. The Phased Tailings Alternative would result in a change from fully capable to not capable on 950 acres of the Rosemont grazing allotment (the area represented by the mine pit). A total reduction of 1,129 animal unit months would occur. Fifteen stock ponds and 63 springs would be lost. Mitigation would replace lost manmade water sources.

Recreation and Wilderness

The Phased Tailings Alternative would result in a loss of 6,107 acres to the Recreation Opportunity Spectrum, including these categories: 0 acres of semiprimitive nonmotorized, 5,868 acres of semiprimitive motorized, 170 acres of roaded modified, and 69 acres of roaded natural. No hunting permits would be modified or lost, but 4 percent of hunt unit 34A would be affected, resulting in 757 annual hunter days lost for certain species (white-tailed deer, javelina, and Mearn's quail). A total of 30.5 miles of public roads and trails would be lost, and 3.7 miles of the Arizona National Scenic Trail would be relocated.

Soils

The Phased Tailings Alternative would result in the loss of 4,390 acres of soil productivity by direct impact of the mine footprint, and sediment delivery to the surface drainages would be about 16,500 tons annually, compared with 32,600 tons annually under current conditions. Modeled stability of tailings and waste rock facilities exceeds regulatory requirements. Reclamation is expected to approach historical vegetation climax conditions after 100 years.

Surface Water Quality

The Phased Tailings Alternative would result in the loss of 44.9 acres of jurisdictional waters of the United States, regulated by the U.S. Army Corps of Engineers, and 220.8 acres of riparian areas. Sediment delivery downstream would be reduced from current conditions by about 50 percent at the water quality monitoring point in Barrel Canyon, by 17 percent at the mouth of Barrel Canyon, and by about 5 percent at the mouth of Davidson Canyon. No exceedances of surface water quality standards are anticipated from tailings or waste rock facilities; at present, naturally occurring surface water exceeds some surface water standards.

Surface Water Quantity

The Phased Tailings Alternative would result in the loss of 15 stock tanks, although mitigation would replace lost water sources. Stormwater flow from the area would be reduced by 44 percent, and flow in Davidson Canyon, which is most likely dependent on stormwater stored in the shallow alluvial material, would be reduced by 7 percent.

Visual Resources

The Phased Tailings Alternative would adversely impact visual resources in a manner similar to the proposed action. However, the open pit would be more visible in early years and slightly less visible permanently, and the scree slopes and increased visibility of the piles would cause more contrasts and adverse impacts. The facility would be visible for up to 12 years. There would be impacts to 13,427 acres within the Santa Rita Ecosystem Management Area with very high and high scenic integrity characteristics. There would be 40 miles of project area visibility along forest roads and trails with concern levels 1 and 2, as defined under the Scenery Management System, and 3.5 miles of scenic quality impacts along State Route 83. There would be 245,038 acres within the analysis area with project visibility.

Mitigation measures to reduce the impact to visual resources would be similar to those for the proposed action.

Alternative 4 – Barrel Alternative

Impacts on these resources would be the same as under the proposed action alternative: dark skies, fuels and fire management, groundwater quality, hazardous materials, landownership and boundary management, noise, public health and safety, socioeconomics and environmental justice, and transportation/access.

Air Quality and Climate Change

Under the Barrel Alternative, $PM_{2.5}$ would increase by more than eight times versus background levels, and PM_{10} would increase more than four times versus background levels. National Ambient Air Quality Standards for particulates would be exceeded. Volatile organic compound emissions, greenhouse gas emissions, sulfur dioxide emissions, and impacts on Class I airsheds would be the same as under the proposed action. Nitrogen oxide emissions would increase by more than six times versus background levels and would represent a 4 percent increase in Pima County; this increases the risk of an exceedance of the ozone air quality standard in the Tucson area.

Biological Resources

The Barrel Alternative would result in the direct loss or conversion of 7,014 to 7,095 acres of habitat and may indirectly impact up to 145,190 acres, which may have the potential to impact animal behavior. All species affected and all direct and indirect impacts to these species would be equivalent to the impacts of the proposed action, with the possible exception of Coleman's coral-root because the project footprint of this alternative would not directly impact McCleary Canyon.

Cultural Resources

The Barrel Alternative contains a total of 111 National Register of Historic Places eligible historic properties, consisting of 77 prehistoric sites (29 are known or likely to have human remains), 33 historic sites, and 1 multicomponent prehistoric/historic site. Impacts to the historic properties and the *Ce:wi Duag* Traditional Cultural Property are the same as those described for the proposed action.

Impacts to cultural resources from the utility corridor alternatives are briefly described above in the impacts summary for the proposed action.

Geology, Minerals, and Paleontology

Impacts to geology and minerals and the potential for subsidence would be the same as under the proposed action. The Barrel Alternative would disturb 4,409 acres that have moderate potential fossil yield.

Groundwater Quantity

Under the Barrel Alternative, impacts to groundwater quantity would be identical to the proposed action.

Livestock Grazing

The Barrel Alternative would result in a change from fully capable of supporting grazing activities to partially capable on 5,316 acres of the Rosemont grazing allotment, 290 acres of the Thurber allotment, 88 acres of the Greaterville allotment, 8 acres of the DeBaud allotment, 155 acres of the

Helvetia allotment, and 0 acres of the Stone Springs allotment. The Barrel Alternative would result in a change from fully capable to not capable on 950 acres of the Rosemont grazing allotment (the area represented by the mine pit). A total reduction of 1,075 animal unit months would occur. Nineteen stock ponds and 63 springs would be lost. Mitigation would replace lost manmade water sources.

Recreation and Wilderness

The Barrel Alternative would result in a loss of 6,844 acres to the Recreation Opportunity Spectrum, including these categories: 0 acres of semiprimitive nonmotorized, 6,054 acres of semiprimitive motorized, 170 acres of roaded modified, and 621 acres of roaded natural. No hunting permits would be modified or lost, but 4 percent of hunt unit 34A would be affected resulting in 702 annual hunter days lost for certain species (white-tailed deer, javelina, and Mearn's quail). A total of 32.6 miles of public roads and trails would be lost, and 5.3 miles of the Arizona National Scenic Trail would be relocated.

Soils

The Barrel Alternative would result in the loss of 4,165 acres of soil productivity by direct impact of the mine footprint. Sediment delivery has not been modeled. Modeled stability of tailings and waste rock facilities exceeds regulatory requirements. Reclamation is expected to approach historical vegetation climax conditions after 100 years.

Surface Water Quality

The Barrel Alternative would result in the loss of 39.9 acres of jurisdictional waters of the United States, regulated by the U.S. Army Corps of Engineers, and 207.5 acres of riparian areas. Sediment delivery downstream would be reduced from current conditions by about 38 percent at the water quality monitoring point in Barrel Canyon, by 13 percent at the mouth of Barrel Canyon, and by about 4 percent at the mouth of Davidson Canyon. No exceedances of surface water quality standards are anticipated from tailings or waste rock facilities; at present, naturally occurring surface water exceeds some surface water standards.

Surface Water Quantity

The Barrel Alternative would result in the loss of 19 stock tanks, although mitigation would replace lost water sources. Stormwater flow from the area would be reduced by 34 percent, and flow in Davidson Canyon, which is most likely dependent on stormwater stored in the shallow alluvial material, would be reduced by 5 percent.

Visual Resources

The Barrel Alternative would adversely impact visual resources in a manner similar to the proposed action; however, the open-pit face would be permanently visible. The facility would be visible for up to 10 years. There would be impacts to 14,773 acres within the Santa Rita Ecosystem Management Area with very high and high scenic integrity characteristics. There would be 42 miles of project area visibility along forest roads and trails with concern levels 1 and 2, as defined under the Scenery Management System, and 3.9 miles of scenic quality impacts along State Route 83. There would be 264,795 acres within the analysis area with project visibility.

Mitigation measures to reduce the impact to visual resources would be similar to those for the proposed action.

Alternative 5 – Barrel Trail Alternative

Impacts on these resources would be the same as under the proposed action: dark skies, fuels and fire management, groundwater quality, hazardous materials, landownership and boundary management, noise, public health and safety, socioeconomics and environmental justice, and transportation/access.

Air Quality and Climate Change

Under the Barrel Trail Alternative, $PM_{2.5}$ would increase by more than three times versus background levels, and PM_{10} would increase by more than five times versus background levels. National Ambient Air Quality Standards for particulates would be exceeded. Volatile organic compound emissions, greenhouse gas emissions, sulfur dioxide emissions, and impacts on Class I airsheds would be the same as under the proposed action. Nitrogen oxide emissions would increase by more than seven times versus background levels and would represent a 4 percent increase in Pima County; this would increase the risk of an exceedance of the ozone air quality standard in the Tucson area.

Biological Resources

The Barrel Trail Alternative would result in the direct loss or conversion 7,014 to 7,095 acres of habitat and may indirectly impact up to 145,190 acres, which may have the potential to impact animal behavior. All species affected and all direct and indirect impacts to these species would be equivalent to the impacts of the proposed action, with the possible exception of Coleman's coral-root because the project footprint of this alternative would not directly impact McCleary Canyon.

Cultural Resources

The Barrel Trail Alternative contains a total of 111 National Register of Historic Places eligible historic properties. The historic properties include 77 prehistoric sites (29 are known or likely to have human remains), 33 historic sites, and 1 multicomponent prehistoric/historic site. Impacts to the historic properties, the *Ce:wi Duag* Traditional Cultural Property, and the 63 springs/seeps affected by this alternative would be the same as those described for the proposed action alternative.

Impacts to cultural resources from the utility corridor alternatives are summarized above in the impacts summary for the proposed action.

Geology, Minerals, and Paleontology

Impacts to geology and minerals and the potential for subsidence would be the same as under the proposed action. The Barrel Trail Alternative would disturb 4,409 acres that have moderate potential fossil yield.

Groundwater Quantity

Under the Barrel Trail Alternative, impacts to groundwater quantity would be identical to the proposed action.

Livestock Grazing

The Barrel Trail Alternative would result in a change from fully capable of supporting grazing activities to partially capable on 5,316 acres of the Rosemont grazing allotment, 290 acres of the Thurber allotment, 88 acres of the Greaterville allotment, 8 acres of the DeBaud allotment, 155 acres of the Helvetia allotment, and 0 acres of the Stone Springs allotment. The Barrel Trail Alternative would result in a change from fully capable to not capable on 950 acres of the Rosemont grazing allotment (the area represented by the mine pit). A total reduction of 1,075 animal unit months would occur. Nineteen stock ponds and 63 springs would be lost. Mitigation would replace lost manmade water sources.

Recreation and Wilderness

The Barrel Trail Alternative would result in a loss of 6,844 acres to the Recreation Opportunity Spectrum, including these categories: 0 acres of semiprimitive nonmotorized, 6,054 acres of semiprimitive motorized, 170 acres of roaded modified, and 621 acres of roaded natural. No hunting permits would be modified or lost, but 5 percent of hunt unit 34A would be affected, resulting in 886 annual hunter days lost for certain species (white-tailed deer, javelina, and Mearn's quail). A total of 32.6 miles of public roads and trails would be lost, and 5.3 miles of the Arizona National Scenic Trail would be relocated.

Soils

The Barrel Trail Alternative would result in the loss of 4,165 acres of soil productivity by direct impact of the mine footprint, and sediment delivery to the surface drainages would be about 20,300 tons annually, compared with 32,600 tons annually under current conditions. Modeled stability of tailings and waste rock facilities exceeds regulatory requirements. Reclamation is expected to approach historical vegetation climax conditions after 100 years.

Surface Water Quality

The Barrel Trail Alternative would result in the loss of 53.3 acres of jurisdictional waters of the United States, regulated by the U.S. Army Corps of Engineers, and 210.8 acres of riparian areas. Sediment delivery downstream would be reduced from current conditions by about 38 percent at the water quality monitoring point in Barrel Canyon, by 13 percent at the mouth of Barrel Canyon, and by about 4 percent at the mouth of Davidson Canyon. No exceedances of surface water quality standards are anticipated from tailings or waste rock facilities; at present, naturally occurring surface water exceeds some surface water standards.

Surface Water Quantity

The Barrel Trail Alternative would result in the loss of 19 stock tanks, although mitigation would replace lost stock tanks. Stormwater flow from the area would be reduced by 42 percent, and flow in Davidson Canyon, which is most likely dependent on stormwater stored in the shallow alluvial material, would be reduced by 7 percent.

Visual Resources

The Barrel Trail Alternative would adversely impact visual resources in a manner similar to the Barrel Alternative. The facility would be visible for up to 10 years. There would be impacts to 21,170

acres within the Santa Rita Ecosystem Management Area with very high and high scenic integrity characteristics. There would be 59 miles of project area visibility along forest roads and trails with concern levels 1 and 2, as defined under the Scenery Management System, and 4.9 miles of scenic quality impacts along State Route 83. There would be 260,589 acres within the analysis area with project visibility.

Mitigation measures to reduce the impact to visual resources would be similar to those for the proposed action. In addition, under the Barrel Trail Alternative, mitigation to reduce visual impacts would include construction of more variable topography to replicate natural landforms. This would have minor or no beneficial impact in the short and long term, but after sufficient vegetation coverage became established, the variable topography would beneficially reduce visual contrasts.

Alternative 6 – Scholefield-McCleary Alternative

Impacts on these resources would be the same as under the proposed action: dark skies, fuels and fire management, groundwater quality, hazardous materials, landownership and boundary management, noise, public health and safety, socioeconomics and environmental justice, and transportation/access.

Air Quality and Climate Change

Under the Scholefield-McCleary Alternative, $PM_{2.5}$ would increase by more than seven times versus background levels, and PM_{10} would increase by more than 14 times versus background levels. National Ambient Air Quality Standards for particulates would be exceeded. Volatile organic compound emissions, greenhouse gas emissions, sulfur dioxide emissions, and impacts on Class I airsheds would be the same as under the proposed action. Nitrogen oxide emissions would increase by more than eight times versus background levels and would represent a 4 percent increase in Pima County; this would increase the risk of an exceedance of the ozone air quality standard in the Tucson area.

Biological Resources

The Scholefield-McCleary Alternative would result in the direct loss or conversion of 7,363 to 7,444 acres of habitat and may indirectly impact up to 145,190 acres, which may have the potential to impact animal behavior. All species affected and all direct and indirect impacts to these species would be equivalent to the impacts of the proposed action, with two possible exceptions: (1) Coleman's coral-root because the project footprint of this alternative would not directly impact McCleary Canyon, and (2) Arizona giant sedge because dry-stack tailings associated with this alternative would completely bury the population at Scholefield Spring.

Cultural Resources

The Scholefield-McCleary Alternative contains 69 National Register of Historic Places eligible historic properties. The properties include 64 prehistoric sites (20 of these are known or likely to have human remains), 32 historic sites, and 2 multicomponent prehistoric/historic sites. Impacts to the historic properties and the *Ce:wi Duag* Traditional Cultural Property would be the same as those described for the proposed action alternative. A total of 67 springs would be impacted under the Scholefield-McCleary Alternative.

Impacts to cultural resources from the utility corridor alternatives are briefly described above in the impacts summary for the proposed action.

Geology, Minerals, and Paleontology

Impacts to geology and minerals and the potential for subsidence would be the same as under the proposed action. The Scholefield-McCleary Alternative would disturb 3,592 acres that have moderate potential fossil yield.

Groundwater Quantity

Under the Scholefield-McCleary Alternative, impacts to groundwater quantity would be identical to the proposed action, with the exception that a total of 67 springs would potentially be lost either directly to surface disturbance or to impacts from declining aquifer water levels.

Livestock Grazing

The Scholefield-McCleary Alternative would result in a change from fully capable of supporting grazing activities to partially capable on 4,445 acres of the Rosemont grazing allotment, 0 acres of the Thurber allotment, 0 acres of the Greaterville allotment, 1,235 acres of the DeBaud allotment, 155 acres of the Helvetia allotment, and 219 acres of the Stone Springs allotment. The Scholefield-McCleary Alternative would result in a change from fully capable to not capable on 950 acres of the Rosemont grazing allotment (the area represented by the mine pit). A total reduction of 1,409 animal unit months would occur. Eight stock ponds and 67 springs would be lost. Mitigation would replace lost manmade water sources.

Recreation and Wilderness

The Scholefield-McCleary Alternative would result in a loss of 7,194 acres to the Recreation Opportunity Spectrum, including these categories: 119 acres of semiprimitive nonmotorized, 6,874 acres of semiprimitive motorized, 0 acres of roaded modified, and 201 acres of roaded natural. No hunting permits would be modified or lost, but 5 percent of hunt unit 34A would be affected, resulting in 905 annual hunter days lost for certain species (white-tailed deer, javelina, and Mearn's quail). A total of 30.7 miles of public roads and trails would be lost, and 3.8 miles of the Arizona National Scenic Trail would be relocated.

Soils

The Scholefield-McCleary Alternative would result in the loss of 4,310 acres of soil productivity by direct impact of the mine footprint, and sediment delivery to the surface drainages would be about 24,200 tons annually, compared with 32,600 tons annually under current conditions. Modeled stability of tailings and waste rock facilities exceeds regulatory requirements. Reclamation is expected to approach historical vegetation climax conditions after 100 years.

Surface Water Quality

The Scholefield-McCleary Alternative would result in the loss of 31.5 acres of jurisdictional waters of the United States, regulated by the U.S. Army Corps of Engineers, and 83.4 acres of riparian areas. Sediment delivery downstream would be reduced from current conditions by about 26 percent at the water quality monitoring point in Barrel Canyon, by 9 percent at the mouth of Barrel Canyon, and by about 3 percent at the mouth of Davidson Canyon. No exceedances of surface water quality standards are anticipated from tailings or waste rock facilities; at present, naturally occurring surface water exceeds some surface water standards.

Surface Water Quantity

The Scholefield-McCleary Alternative would result in the loss of eight stock tanks, although mitigation would replace lost water sources. Stormwater flow from the area would be reduced by 23 percent, and flow in Davidson Canyon, which is most likely dependent on stormwater stored in the shallow alluvial material, would be reduced by 4 percent.

Visual Resources

The Scholefield-McCleary Alternative would adversely impact visual resources in a manner similar to the proposed action but would have greater adverse impacts from the open views of pit face and diversion channel. There would be impacts to 21,904 acres within the Santa Rita Ecosystem Management Area with very high and high scenic integrity characteristics. There would be 52 miles of project area visibility along forest roads and trails with concern levels 1 and 2, as defined under the Scenery Management System, and 3.5 miles of scenic quality impacts along State Route 83. There would be 763,295 acres within the analysis area with project visibility.

Mitigation measures to reduce the impact to visual resources would be similar to those for the proposed action.