1 Introduction

The subject of this Mine Plan of Operations (MPO) is the Rosemont Copper Project (Project), which is owned and will be developed and operated by Augusta Resource (Arizona) Corporation, a wholly owned subsidiary of Augusta Resource Corporation. Augusta maintains offices in Denver, Colorado and Vancouver, British Columbia, Canada. The operating entity for the Project is herein referred to as Rosemont Copper.

1.1 Owner and Operator

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1.2 Project Location, Access, and Areas of Operation

The Rosemont Property (Property) consists of a group of patented mining claims, unpatented mining claims, and fee land that covers most of the Rosemont Mining District and the adjacent Helvetia Mining District (the Property), wholly within the political boundary of Pima County in southeastern Arizona (Figures 1-1 through 1-3). Specifically, the Project is located approximately 30 miles (mi) southeast of Tucson, west of State Route (SR) 83. In geographical terms, the Rosemont Property location coordinates are approximately 31º 50′N and 110º 45′W. Primary access to the property will be from Interstate 10 (I-10) to SR 83 south, then west on the Project's main access road.

The core of the Rosemont Property consists of 132 patented lode claims that in total encompass an area of 1,968 acres (ac) (Appendix A). A contiguous package of 850 unpatented lode mining claims with an aggregate area of approximately 12,000 ac surrounds the core of patented claims. Associated with the Property are 14 parcels of fee land grouped into six individual areas (ranch parcels) that total 911 ac. Most of the unpatented claims were staked on federal land administered by the United States Forest Service (FS; Coronado National Forest [CNF]), but a limited number of claims in the northwest portion of the Property are on federal land administered by the Bureau of Land Management (BLM). The area covered by the patented claims, unpatented claims, and fee lands totals approximately 14,880 ac.

Surveyed brass caps on short pipes cemented into the ground mark the patented mining claim corners. Cairns and wooden posts mark the unpatented claim corners, end lines, and discovery monuments, most of which have been surveyed. The fee lands are located by legal description at the Pima County Recorders Office.

1.3 Mining and Exploration Background

The early history and production of the Rosemont Property has been described in Anzalone (1995), from which the following summary is taken.

Sporadic prospecting reportedly began in the northwestern portion of the Property, the Helvetia Mining District, sometime in the middle 1800s. By the 1880s, the production from mines on both sides of the northern Santa Rita Mountains supported the construction and operation of the Columbia Smelter at Helvetia on the west side of the Santa Rita Mountains and the Rosemont Smelter in the Rosemont Mining District on the east side of the Santa Rita Mountains. Copper production ceased in 1951 after the production of about 227,300 tons (T) of ore containing 17,290,000 pounds (lbs) of copper, 1,097,980 lbs of zinc and 180,760 ounces (oz) of silver. An unknown, but probably minor, portion of the production came from the Rosemont deposit.

Since shutdown in 1951, the area stretching from the Peach-Elgin prospect to Rosemont has seen a progression of exploration campaigns. Churn drilling at Peach-Elgin in 1955 and 1956 by Lewisohn Copper Company began the definition of that deposit. Drilling in 1956 by the American Exploration and Mining Company initiated exploration of the Broadtop Butte prospect. Banner Mining Company had acquired most of the claims in the area by the late 1950s and drilled the discovery hole into the Rosemont deposit. Anaconda Mining Company acquired the claims in 1963 and carried out a major exploration program that identified the Rosemont deposit as a major porphyry copper ore body and advanced the Broadtop Butte and Peach-Elgin prospects. The project continued after Amax and Anaconda formed the Anamax partnership and ceased in 1986 when Anamax sold the Property to a real estate company during the dissolution of Anaconda. By the end of the Anaconda-Anamax programs, exploration drilling was in excess of 297,321 feet (ft), of which approximately 232,000 ft defined the Rosemont deposit.

ASARCO purchased the Property in 1988, renewed exploration of the Peach-Elgin prospect and initiated engineering studies. ASARCO drilling of the Rosemont deposit was limited to 15,466 ft in 12 exploration holes. ASARCO sold the entire Property to real estate interests in 2004. Augusta acquired the Rosemont Property in 2005.

1.4 Physiographic Setting

1.4.1 Climate

Meteorological records for the immediate vicinity of the Rosemont Property are from a limited time period and were obtained 56 to 75 years ago. The FS obtained measurements of rainfall and temperature at the Rosemont town site from August 1914 to June 1931 (University of Arizona 1977). The meteorological station at the Rosemont town site was at 4,800 ft above mean sea level (msl). Daily temperature and precipitation at the Helvetia town site, located a few miles to the west at 4,400 ft on the opposite side of the Santa Rita Mountains, are available through the Western Regional Climate Center (2006) from June 1916 through April 1950. More recent meteorological records are available for weather stations in the region and provide a basis for projecting climatic conditions for the Rosemont Property area. These weather stations include: Canelo, located about 25 mi to the southeast at 5,010 ft; and Santa Rita Experimental Range, located about 8 mi to the southwest at 4,300 ft.

Rosemont has recently installed a new meteorological data station on the site and is collecting current weather and climate information. Data collection at this station began in the second quarter of 2006. After one full year, the data will be summarized into a report and provided to CNF.

1.4.1.1 Temperature

Minimum temperatures for the Rosemont town site from 1914 to 1931 usually occurred in January and averaged about 36˚F; maximum temperatures usually occurred in June and were above 90˚F. The average monthly minimum temperature for Helvetia during the period 1916 through 1950 was 35.9˚F in January, and average maximum temperature was 92.1˚F in June. For comparison, the average monthly minimum temperature for the Santa Rita Experimental Range during the 30-year period from 1971 through 2000 was 37.2˚F in December, with an average maximum temperature of 92.5˚F in June. The average monthly minimum temperature for Canelo during the 30-year period from 1971 through 2000 was 28.3˚F in January, with an average maximum temperature of 90.0˚F in June.

1.4.1.2 Precipitation

Annual average precipitation for the Rosemont town site was estimated at approximately 16 inches (in) by Sellers (University of Arizona 1977) from 1931 through 1970. Based on records available from the Western Regional Climate Center (2006), average annual precipitation for Helvetia for the period 1916 through 1950 was 19.73 in. More recent data shows that average annual precipitation for the Santa Rita Experimental Range from 1971 through 2000 was 22.22 in. The average annual precipitation for Canelo for the period 1971 through 2000 was 18.01 in (Western Regional Climate Center 2006).

More than half of the precipitation recorded at these stations fell during the months of July, August, and September. The months with the least recorded precipitation are April, May, and June. In general, annual precipitation has been less than average for the past 10 years (1995 to 2005), resulting in severe drought conditions locally and regionally.

1.4.2 Geology

The regional, local and property geology of the Rosemont deposit has been described in Anzalone (1995), Wardrop (2005), and Daffron, et al (2007) from which the following summary is taken.

Precambrian sedimentary and intrusive rocks form the regional basement under a Palaeozoic sequence of quartzites, siltstones, and carbonate rocks. Sedimentary deposition ceased for a time during uplift and formation of a widespread unconformity in the early Mesozoic, and then resumed with the deposition of continental and shallow marine deposits. Subsequent granitic intrusions and felsic volcanic eruptions dominated the late Mesozoic and early Cenozoic, corresponding to the Laramide Orogeny when most of the porphyry copper deposits of the region formed. Compressional tectonics during the Laramide

Orogeny created both low-angle thrust faults and high-angle strike-slip faults. Extensional tectonic activity followed the Laramide Orogeny and was accompanied by voluminous felsic volcanic eruptions. Numerous low-angle normal faults formed during this time. These faults have been particularly important in the Rosemont area. The extensional tectonics eventually produced the large-scale block faulting that produced the present Basin and Range Province throughout the southwestern United States. A generalized geologic map of the Rosemont Property is presented in Figure 1-4.

The Rosemont area has experienced a complex history of high-angle and low-angle faulting during and after the Laramide Orogeny. As a consequence, the Peach-Elgin deposit occupies a klippe floored by a low-angle fault. The Copper World Mine deposit is situated in a complexly faulted sliver of Palaeozoic rocks. The Broadtop Butte deposit is located on the western side of a complex fault system, as is the Rosemont deposit.

1.4.3 Seismicity

The Arizona Department of Environmental Quality has published guidelines for mining project design criteria in the "Arizona Mining Guidance Manual, BADCT (Best Available Demonstrated Control Technology)." This manual sets forth recommendations for minimum standard design criteria with the interest of protecting the groundwater aquifers in the State of Arizona. Accordingly, the BADCT manual recommends design criteria for seismic hazards as follows:

> The minimum design earthquake is the maximum probable earthquake (MPE). The MPE is defined as the maximum earthquake that is likely to occur during a 100-year interval (80% probability of not being exceeded in 100 years) and shall not be less than the maximum historical event. This design earthquake may apply to structures with a relatively short design life (e.g., 10 years) and minimum potential threat to human life or the environment.
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> Where human life is potentially threatened, the maximum credible earthquake (MCE) should be used. MCE is the maximum earthquake that appears capable of occurring under the presently known tectonic framework.

In accordance with these recommendations, two distinct levels of ground motion are defined for the proposed Rosemont Project site: the MPE and the MCE. The maximum ground acceleration expected at the proposed site is 0.326g associated with a maximum credible earthquake on the Santa Rita fault zone. Accordingly, the MCE design peak ground acceleration (PGA) equals 0.326g. The site seismicity study is presented in Tetra Tech, 2007c. Additional information is provided in the "Geotechnical Study Report", also prepared by Tetra Tech (2007d).

The MPE definition requires the larger of the maximum historical event, or one having a return period of approximately 448 years. It must correspond to the 80% probability of non-exceedance event in 100 years. The seismic hazard curve for the Rosemont site indicates that the 80% probability of a non-exceedance event in 100 years corresponds to a peak ground acceleration of 0.045g. In comparison, the largest earthquake ground motion recorded in the Project area was associated with the 1887 Bavispe, Mexico event. The estimates of peak ground acceleration presented in Tetra Tech (2007c) indicate that a similar event would result in an acceleration of 0.036g. Therefore, the design MPE for the proposed Rosemont Project site would be the greater of these two accelerations, or 0.045g.

1.4.4 Hydrology

The Project is located in the northern Santa Rita Mountains and is situated partly within the Tucson Active Management Area (AMA). Davidson Canyon and Cienega Creek receive surface waters from areas located east of the crest of the Santa Rita Mountains and east of the Rosemont copper deposit. The upper Cienega basin is east of the Santa Rita Mountains and the Project area, and the upper Santa Cruz basin is west and north of the Santa Rita Mountains. Groundwater may exist in the recent alluvium along the principal drainage channels near the Project. Modest amounts of groundwater may be stored in the Mesozoic and Paleozoic basement rocks of the Santa Rita Mountains, and large amounts of groundwater are stored in the basin-fill deposits beneath the floor of the Santa Cruz basin to the west and the upper Cienega basin to the east. Hydrogeologic conditions in the vicinity of the Rosemont Project are described by Harshbarger and Hargis (1976, 1980, and 1981) and Hargis and Montgomery (1982).

1.4.4.1 Rosemont Area

Groundwater in the sedimentary Mesozoic and Paleozoic rocks of the Rosemont Project area is generally within joints and fractures under confined or semi-confined conditions. Sustainable well yields from most wells in the Rosemont area are in the range of less than 1 gallon per minute (gpm) to a few tens of gpm. Wells located in areas of extensive faulting and/or fracturing may be capable of sustaining yields on the order of a few tens to 100 gpm. As such, the rock units in the Rosemont area may be able to produce a small portion of the required water supply but have insufficient water-bearing capacity to be the primary source of water.

Perhaps the most consistent water-bearing rock in the Rosemont area is the Cretaceous Willow Canyon Formation. Wells completed in this unit are known to produce from a few gpm to several tens of gpm. Because of its water-bearing character, thickness, and presence in the east wall of the proposed pit, the Willow Canyon Formation will likely be the main source of groundwater inflow to the pit during mining operations, so it is anticipated that some part-time dewatering will be required.

The thickness of the recent alluvium located along the Scholefield and Barrel Canyon washes ranges from a few feet to several tens of feet, generally increasing in the downstream direction. Groundwater in the recent alluvium is mostly under unconfined (water-table) conditions. The maximum amount of groundwater stored in the recent alluvium is immediately following an intense storm runoff and is at a minimum during prolonged drought periods. Because the amount of water stored in the recent alluvium is both limited and temporally variable, it does not provide a substantial or reliable source of water to wells.

Six springs or seeps occur in the immediate vicinity of the Project (Harshbarger and Hargis 1976). In general, these springs and seeps issue from the Willow Canyon and Salero Formations at topographic low points, often in or adjacent to drainage channels. The elevation of these springs is between 4,680 to 5,200 ft above msl. In 1975, these springs produced water throughout the year at rates of 0.01 cubic feet (cf) per second (4.5 gpm) or less (Harshbarger and Hargis 1976). Some of these springs are used as sources of water for livestock. Due to the extreme drought conditions since 1996, current discharges from these springs are anticipated to be less than those observed in 1975.

Contours of groundwater levels in the Rosemont area are presented in Figure 1-5. This map was prepared using groundwater level measurements obtained from existing wells during 2006 and 2007, and supplemented with groundwater level measurements obtained chiefly from Anamax drillholes from 1975 through 1982. Depth to groundwater level in the Rosemont area ranges from 20 to 110 ft below land surface. A comparison of recent to historic groundwater level measurements suggests that groundwater levels are generally lower than in 1975. This slight deepening of water levels is attributed to recent drought conditions. The direction of groundwater movement in the Rosemont area ranges from northeast to southeast. Along the Barrel Canyon drainage, the direction of groundwater movement is toward the northeast.

Recharge to the groundwater system occurs chiefly along the principal washes and canyon bottoms, during and shortly after rainfall and runoff events. Due to the limited capacity for storage of water in the wash alluvium and the generally low permeability and storage capacity of other rock units, the rate of recharge to the groundwater system is believed to be very small. The direction of groundwater flow in the Project area is generally eastward toward the Cienega Creek drainage.

Chemical quality of groundwater in the Rosemont area is suitable for most uses. Groundwater issuing from springs and seeps is typically a calcium-bicarbonate type, whereas groundwater pumped from wells is a sodium-bicarbonate type. Total dissolved solids content of groundwater ranges from about 280 to 500 milligrams (mg) per liter (L), with pH ranging from about 6.9 to 8.2.

1.4.4.2 Upper Santa Cruz Basin

Because the water supply for the Project will be obtained off site in the upper Santa Cruz basin, the groundwater hydrology of this basin is detailed herein. Groundwater exists in the basin-fill deposits of the upper Santa Cruz basin, located west of the Project and Santa Rita Mountains. Hydrogeologic conditions for the upper Santa Cruz basin are given by Davidson (1973), Pima Association of Governments (1979, 1983a, 1983b, and 1983c), Murphy and Hedley (1984), and Anderson (1987).

The proposed wellfield is in the Sahuarita Heights area near the intersection of Sahuarita Road and Santa Rita Road. Groundwater is in the basin-fill deposits of the Fort Lowell Formation and Tinaja beds. Available well production and pumping test data, and recent drilling and testing of an exploration water well in the Sahuarita Heights area, show that the potential for obtaining groundwater in the quantities needed for the Project is very good to excellent.

The depth to groundwater level in the Sahuarita Heights area is between 200 to 300 ft below land surface, and increases toward the east. Generalized groundwater level altitudes and groundwater level contours for the wellfield and surrounding areas are shown on Figure 1-6. Direction of groundwater movement in the wellfield area is toward the northwest.

Based on available well records, potential well yield in the Sahuarita Heights area is probably 1,000 to 2,000 gpm. During March 2007, exploration well [(D 17 14)17bdd[E 1]] was constructed and tested to evaluate the availability of sustainable groundwater supplies to meet the Project's water supply requirements. A pumping test was conducted at the well to determine aquifer hydraulic parameters, sustainable pumping rate, groundwater quality, and dependability of the groundwater supply. Test results showed that the sustainable pumping rate for a production well drilled near the E-1 site should be about 1,500 gallons per minute (gpm). Four to six production wells will be needed to meet the Project's current requirements and provide back-up pumping capacity if a primary production well is off line for maintenance. Further discussion of water supply for the Project is provided in Section 2.8 of this Plan.

Groundwater in the Sahuarita Heights area is considered suitable for most uses. Samples were obtained from exploration well E-1 and submitted to a State-approved laboratory for a complete set of drinking water analyses. Total dissolved solids content of the groundwater was 340 mg/L and pH was 8.0. No exceedances of maximum contaminant levels were identified from results of laboratory analyses, indicating no pre-existing contamination at the E-1 well site. Results of laboratory chemical analyses indicate that the quality of groundwater is suitable for anticipated mine uses, including potable public water supply.

1.5 Local Community

The Project is located in unincorporated southeastern Pima County in an undeveloped area among large tracts of state and federal lands. The nearest established communities are Sonoita, Patagonia, Sahuarita, Green Valley, Corona de Tucson, and Vail. Tucson, Arizona is approximately 30 mi northwest of the project area.

1.5.1 Population Demographics

The area in and around the Project represents a population in transition, and has experienced at least two significant waves of migration in the past 50 years. Historically, the area was populated by families with Mexican and Native American ancestry, or families who arrived during the US western migration of the 1800s. Many residents have lived in the area for generations and have farms, ranches or small businesses. The late 1960s and 1970s saw an influx of people seeking a rural lifestyle. Within the last 10 to 15 years, there has been a steady influx of new residents looking for property in a scenic setting, or affluent young retirees wanting an active outdoor lifestyle and a potential second career.

More recent economic developments and opportunities in Sonoita and Elgin include experiential tourism, wineries, spiritual retreat and renewal centers, bed and breakfasts, inns, art galleries, boutiques and gourmet restaurants. These businesses are replacing the historical local economy of ranches and farms. Agriculture has been negatively impacted by the rising cost of land, nearly a decade of drought, and volatile livestock markets. Development pressures have created a burst of new home construction on five- to 10-ac tracts of former ranch land, much of which is considered unregulated, or wildcat development. What was once a rustic rural setting is now growing into a suburban community adjoining Tucson.

1.5.2 Significant Employers

Major private-sector manufacturers in the greater Tucson urban area include, but are not limited to, Raytheon Systems (10,756 employees), IBM Storage System Division (1,800), Texas Instruments (650), and Honeywell (750). In addition, there are three large open pit copper mines operating within a 75-mi range of the Project: the ASARCO Silver Bell Mine near Marana, the ASARCO Mission Complex near Sahuarita, and the Phelps Dodge Sierrita Mine near Green Valley.

Silver Bell Mine in Marana is 75 mi northwest of the Project. The mine produces copper, operating four open-pits and other plant facilities situated on 18,000 ac. The Silver Bell Mine currently operates a solvent extraction plant, tankhouse, warehouse, administrative, and maintenance areas and employs 125. The mine is owned and operated by ASARCO.

Also operated by ASARCO is the Mission Complex near Sahuarita, located approximately 20 mi northwest of the Project. It is an open-pit mine composed of the Mission, Eisenhower, Pima, Mineral Hill, and South San Xavier properties and the nearby North San Xavier mine. The Mission mine produces copper and silver. The current pit, 2.5 mi long by 1.5 mi wide and 1,200 ft deep, is situated on 20,000 ac. The Complex currently is operating one mill with crushing, grinding, and flotation facilities, warehouse, maintenance and administrative areas and employs 188. The mine also has a spur to the Union Pacific Railroad.

The Sierrita Mine, located near Green Valley, is owned and operated by the Phelps Dodge Mining Company. The site, approximately 15 mi west of the Project, is one of the largest in the area, employing approximately 750. The mine produces copper, molybdenum and rhenium. The site has a solvent extraction and electrowinning (SX/EW) plant, a concentrator and a molybdenum roasting plant.

In addition to mining and manufacturing, there are several other large employers in other business sectors, such as government, education and military. Tucson is home to Davis Monthan Air Force Base (8,233 employees), and Sierra Vista (50 mi from the Project Area) is adjacent to the Fort Huachuca Army Base with 13,098 employees. University of Arizona employs approximately 10,000.