

## 2.7 Electrical Power Supply

The electrical power supply for the Project facilities falls within the Tucson Electric Power (TEP) and the TRICO service territories. The eastern area of the Rosemont Project, which includes part of the mine and all the process facilities, falls in the TEP service territory. The western area of the Project, including the balance of the mine and the fresh water pumping system, falls in the TRICO service territory. Because most of the Project's estimated electrical load and power requirements fall within TEP's service territory area, TEP will be the main electric utility service provider for the entire facility, including the fresh water system. A joint-venture business arrangement between TEP and TRICO will be negotiated and established to compensate both electric utility service providers. The arrangement will probably be based on a percentage of actual mine electrical load between each of the service territories. However, Rosemont Copper will receive one electric utility rate and bill with the breakdown of revenue between TEP and TRICO transparent to the project. This multiple service territory and provider agreement will be submitted, as required, to the Arizona Corporation Commission (ACC) for review and final approval prior to implementation.

In addition to traditional electrical service from commercial providers, the Rosemont Project will also generate energy on site using solar technologies such as passive solar installations for appropriate applications, such as water heaters and fans, and photo-voltaic cell technology for supplemental electricity generation. By using the significant available surface area on facility roofs for the installation solar systems (approximately 300,000 sf), Rosemont will be able to enhance the overall energy efficiency of the operation.

The total connected load for the Rosemont mine and process facilities is estimated to be 133 mega watts (MW) and will require a minimum transmission voltage of 138 kV. Appendix C provides a summary table of the connected loads by mine process area as well as the demand load and estimated running load.

Four power supply options were evaluated to supply this load to the Project. Each is discussed below, followed by the proposed route.

### 2.7.1 Interconnection with TEP Line Serving Santa Cruz County (Option 1)

TEP currently has a 115 kV transmission line starting at the Nogales tap on the Western Area Power Administration (WAPA) line and running south through the Santa Rita Experimental Range to Santa Cruz County and Nogales. This is the Vail-Kantor line that runs approximately 9 mi northwest of the project site. This option would require that the 115 kV Vail-Kantor line be upgraded to 138 kV and the connection moved from the Nogales tap on the WAPA 115 kV line to the Vail 345 kV substation. A new 138 kV switching station would be required to tap into this line with a new 138 kV transmission line running to the main substation at the plant site. The switching station was initially to be located along Santa Rita Road, which was in the vicinity of the fresh water pipeline and pumps. Step-down transformers at this switching station would distribute power to the pump stations at either 34.5 or 4.16 kV, on a three phase overhead distribution pole line.

Advantages of this option are that the cost for upgrading the Vail-Kantor line to 138 kV would be partially borne by TEP as part of a previously planned system upgrade of the system to improve service to Santa Cruz County. The new transmission line to the project site, at 9 mi, would be the shortest distance. The disadvantages are that the timing of the Vail-Kantor line upgrade to 138 kV may not meet the needs of the project schedule, and additional modifications to the TEP system may be required to ensure that 100-plus MW of power is available to the Project. This system option can currently provide only up to 75 MW of power for the Project.

### **2.7.2 Interconnection with SWTC Sahuarita 230 kV Substation (Option 2)**

This option will connect to the existing SWTC 230 kV substation, located north of Sahuarita, and include a new 230 kV transmission line running south. It will parallel the existing SWTC transmission lines, until the new line reaches Santa Rita Road. At this point, the line will follow Santa Rita Road and the Rosemont Project's west access road to the mine's main substation.

The advantage of this option is that the Sahuarita 230 kV substation currently has capacity to provide the required 100-plus MW power load for the Project with improved reliability. The disadvantages are that the new 16-mi transmission line is the second longest, and there would be added cost for substation electrical equipment rated for the higher, 230 kV transmission voltage. Another disadvantage is the Project load will cause an overload on the existing 345/230 kV SWTC Bicknell transformer.

### **2.7.3 Interconnection with TEP South 345/138 kV Substation (Option 3)**

This option will connect to the existing TEP south 345/138 kV substation located another four mi northwest of the SWTC Sahuarita substation described in Option 2. The new 138 kV transmission line will run east, then about 2.3 mi and then south about 5.2 mi to pick up the same alignment from Santa Rita Road to the mine site as illustrated in Option 2.

The advantage to this option is that the TEP South substation can provide the required 100-plus MW at a lower transmission voltage without affecting the 345/230 kV SWTC Bicknell transformer described in Option 2. The 138 kV main substation at the mine site would be less expensive at 138 kV than the higher transmission voltage in Option 2. The South 345/138 kV substation is also owned and operated by TEP, which will be the electric utility service provider for the project. The disadvantage is the new 138 kV transmission line would be the longest at 21 mi.

### **2.7.4 Interconnect the TEP South Line to the TEP Vail-Kantor Line (Option 4)**

This option will connect the 138 kV transmission line from the TEP 345/138 kV south substation described in Option 3 with the TEP 138 kV Vail-Kantor line. They will join where the two lines cross at Santa Rita Road when the Vail-Kantor transmission line is upgraded to 138 kV service voltage. This will be the most expensive option; however, the two sources of electrical power will provide greater reliability for the mine.

### 2.7.5 Preliminary Power Flow Analysis

A preliminary power flow analysis was prepared for an interconnection option with the TEP system (Option 1) and with the SWTC system (Option 2). The power flow studies utilized a 2010 summer peak-load base-case prepared by the Western Electricity Coordinating Council (WECC). The studies assessed the impacts on the system in southern Arizona for both normal and outage contingency conditions and for both pre- and post- project scenarios. Contingencies were simulated on the 345 kV lines into and within southern Arizona, and on all facilities in the area with an operating voltage greater than 100 kV.

The studies indicated that the Vail substation could serve up to 75 MW of mine load if 20 MW of generation is on-line at the Valencia generating facility, or up to 100 MW if the Gateway Project were in service. The Gateway Project is a new substation facility expected to come on line in 2010. The facility is located near Sahuarita. The studies also indicated that shunt capacitors at Sonoita and the Rosemont Project substation would be required to maintain pre-project voltage levels. Upgrades to certain SWTC facilities would also be required to mitigate any impacts due to outages.

The analysis of the SWTC substation at Sahuarita indicated that the SWTC substation could provide 100-plus MW of power to the mine; however, some upgrades to their facilities would be required to mitigate the impacts of outages. Shunt capacitors at Sahuarita and the Rosemont Project substation would also be required to maintain pre-project voltage levels.

### 2.7.6 Description of Proposed Electrical Power Supply

Based on the analysis summarized above, Option 4 is proposed, although the line routing has been modified to avoid traversing the Santa Rita Experimental Range. Recent discussions with TEP have confirmed that the Vail-Kantor transmission line upgrades will be completed in time to support the project and that the Vail substation can supply the 100-plus MW of power for the project. The source of power for the project is, therefore, based on tapping into the upgraded 138 kV Vail-Kantor transmission line as noted in Option 4. The tap will be made at the intersection of the transmission line and the northern boundary of the Santa Rita Experimental Range (Figure 2-9). A new switching station will be provided for the tap and a new 138 kV transmission line will run about 4 mi east, along the northern boundary of the Santa Rita Experimental Range. The transmission line will then turn south for another 4 mi until it intersects the west access road into the mine site. The new transmission line to the plant main substation is about 11.6 mi long and follows the proposed fresh water pipeline route from the well fields north west of the tap near Sahuarita, Arizona (see Section 2.8).

The proposed 138 kV transmission poles will be single 90 foot, two section, direct buried, steel supporting a vertical type, three phase line configuration, providing a minimum of 75 ft ground clearance for the transmission line. Pole spacing will be about 800 ft on level ground and less where required to maintain ground clearance on varying and steep topography.

A new substation would be located at the switching station with a single 138 kV to 4.16 kV or 34.5 kV, step down transformer, isolation switches, and circuit breakers to distribute electrical power to the fresh water wells and pump stations at either 34.5 kV or 4.16 kV, using a three phase, overhead distribution wooden pole line. As an alternative, electrical power for the well fields and fresh water pump stations could be fed independently from a separate source on the SWTC system which is in TRICO's service area. The estimated power load for the well fields and pump stations is about 7.2 MW.