Groundwater Protection Plan
Rosemont Copper

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1.0 INTRODUCTION

This Groundwater Protection Plan presents groundwater protection concepts embodied by the Augusta Resource Corporation (Augusta) at the Rosemont Copper Project (Project), as well as design, operational, and permitting information provided by Tetra Tech, Mining and Manufacturing (Tetra Tech) and Errol L. Montgomery and Associates (Montgomery and Associates).

The Project site is located approximately 30 miles southeast of Tucson, west of State Highway 83 on the east slope of the Santa Rita Mountains (Figure 1). In geographical terms, the Rosemont Property location coordinates are approximately 31° 50’N and 110° 45’W. Access to the Property can be gained from Interstate 10 to State Highway 83 south, then west on Forest Road (FR) 231.
OVERALL CONCEPT

Augusta directed project facility designers and engineers to make their designs compatible with the concept of protection of groundwater quality and quantity. One of the standards set forth early was the Arizona Department of Environmental Quality’s (ADEQ’s) Best Available Demonstrated Control Technology (BADCT) criteria. In order to meet this task several design ideas were incorporated:

- Groundwater quality will be protected by the isolation and containment of process waters;
- Primary and secondary containment structures such as double liners in process impoundments and elevated, double-walled, or contained tanks were be used;
- Overflow protection and spill and leak detection systems were included in designs;
- Stormwater runoff will be managed in sediment basins with the capacity to ensure suspended solids are managed so water quality goals are met; and
- Process water will be managed for zero discharge.

In order to show the effectiveness of these concepts monitoring programs approved by permitting agencies that use monitoring stations, monitoring wells, and data recording devices will be used. This will ensure that designs use BADCT, that the plans are followed, and that the goals are met for all aspects of water quality protection at Rosemont.

In addition to strong design and monitoring concepts, Rosemont has waste rock and tailings with good geochemical characteristics. Both the waste rock and tailings generated at the Rosemont site will be derived predominantly from sedimentary and high-carbonate rock types such as limestone, dolomite, skarn, and siltstones. These types of waste materials are desirable from an environmental perspective, because of their high pH, low sulfur, low acidity potential, good settling characteristics, and tendency toward structural stability. Geochemical testing performed to date has shown isolated tendencies for either acid generating material or potentially acid generating material with the bulk of the material tested thus far being eligible for inert classification by ADEQ.
3.0 GENERAL FACILITIES DESCRIPTIONS

In general, facilities that may affect water quality at a mine site can be classified into three areas: tailings deposition areas, waste rock deposition areas, and leaching operations. Following are general facilities descriptions of those planned activities at Rosemont. Figure 2 shows the basic facility outlines.

3.1 Tailings Deposition

The rougher flotation tailing and the scavenger flotation tailing will be combined in a tailings thickener for water recovery. The thickener underflow slurry will be pumped to a bank of connected large drum filters where moisture will be reduced from 40 to 50% down to 10 to 15%. The filtered tailings will then be transported to the tailings storage area via conveyors.

Design criteria and objectives for the dry tailings storage include (Vector 2006b):

- Provision of secure long-term storage of up to 500 million tons (Mt), which is sufficient for ore mining and processing during about 19 years of Project life at a projected rate of 75,000 tons per day (tpd).
- Location within the immediate general area of the mine footprint or pollutant management area.
- Prevention of airborne release of tailings solids to the environment by provision of dust suppression measures such as the application of fresh water or chemical dust suppressants or binders. Although they are termed “dry,” the tailings materials will be placed in a damp condition (12 to 15% moisture) which will also aid in dust control.
- Compliance with all applicable regulations including BADCT standards for groundwater protection.
- Creation of a site-specific design that accounts for and incorporates local factors including climate, geology, hydrology, seismicity, and vegetation.
- Integration of environmental monitoring technology for water quality assurance.
- Establishment of an effective and efficient reclamation program, with a focus on concurrent reclamation.

The conceptual plan involves placement of waste rock in an engineered berm located in the lower portion of the waste rock storage area to provide a buttress for the dry tailings. Dry tailings will be delivered by conveyor and placed behind the buttress with a radial stacker. A bulldozer may be used at start of the process to spread the dry tailings and provide sufficient compaction for trafficability of the conveyor and stacker.

The tailings facility consists of two separate areas referred to as the North Stack and the South Stack. The North Stack will be operated in Years 1 through 14 and can accommodate approximately 375 Mt of tailings. The South Stack will store the remaining 170 Mt of tailings and will be operated in Years 15 through 19.

A stormwater diversion ditch will be constructed upstream of the initial tailings placement area to convey water to an adjacent drainage around the North Stack (see Figure 2). An initial starter buttress will be constructed with waste rock following tailings and waste rock placement.
throughout the life of the tailings facility. Waste rock will be advanced ahead of the tailings level in successive lifts using the upstream construction method. The waste rock buttresses will have top widths of 150 feet to accommodate two-way haul traffic and outer slopes of 3 horizontal to 1 vertical (3H:1V) with benches to achieve overall slopes of 3.5H:1V. This configuration will allow visual screening of the tailings placement activities from Highway 83 and concurrent reclamation of the lower portions of the slopes.

Dry tailings will be delivered by conveyor from the filter plant to the drainage below the planned diversion ditch and placed with a radial stacker against the starter buttress. A dozer will be used to spread the dry tailings and provide sufficient compaction for trafficability of the conveyor and stacker, as necessary. A second conveyor will be constructed along the upper ridge area to allow temporary disposal of tailings into the upper drainage area for placement with dozers while the primary conveyor is inactive for movement or maintenance.

An engineered rock drain (Central Drain) will be constructed between the North and South Stack to convey surface water toward Barrel Canyon drainage from the area above the process plant. Five feet of alluvium in the bottom of the drainage will be removed prior to placement of the rock drain. The remaining alluvium will stay in place and continue to act as a conduit for downstream migration of groundwater. An attenuation pond, constructed at the headwaters of the Central Drain will be designed to temporarily store flows from the 100-year, 24-hour storm event, allowing water from upstream flows seep slowly into the Central Drain for transport downstream. Attenuation time through the drain for the 100-year, 24-hour storm is estimated to be 30 days. Flows will exit the Central Drain and pass through a final compliance pond prior to release. The Central Drain will extend to the top of the south tailings stack and allow surface water from the top reclaimed surface to be conveyed through the drain following closure. The Central Drain System is illustrated in Figure 3.

Stormwater run-on to the North Stack will be limited by diverting the major drainage upstream of the stack area. Stormwater runoff sediments will be captured in a sediment pond located downstream of the tailings stack. During operations, the tailings surface will be sloped away from the waste rock buttresses constructed around the tailings stack to limit potential water impoundment against the buttresses. Ponded water will be pumped to the Process Water Temporary Storage (PWTS) pond, as necessary, to limit infiltration of surface water into the tailings mass.

The waste rock starter buttresses will include an upstream filter zone to limit potential loss of tailings solids during initial operations in each stack area. Figure 2 presents the proposed starter buttress zoning. Stormwater control for the tailings stack and the overall site is discussed in detail in the Site Water Management Plan (Tetra Tech, June 2007).

The active stacking area will be managed in compact areas that will minimize the potential for dust generation and erosion. Stormwater sediments from the buttress will be captured in a sediment pond located downstream of the area. None of the dry tailings will be exposed to the downstream watershed. Detailed conceptual dry stack arrangements are illustrated in the Dry Tailings Facility Design Report (Tetra Tech, June 2007).

The advantage of dry tailings disposal over conventional tailings is the elimination of an engineered embankment and seepage containment system, the maximization of water conservation, and the minimization of water makeup requirements. Additionally, dry tailings will be contained in a very compact site, limiting the disturbance to a single drainage.
3.2 Waste Rock

The waste rock storage areas will be located to the east of the proposed open pit, as shown in Figure 2. Waste rock placement will be initiated with a perimeter buttress designed to minimize the visibility of the Project to traffic along State Highway 83 and to the surrounding area. To the extent practical, the outside face of the buttress will be revegetated and reclaimed as they are completed. The remaining material deposited during each mining phase will then be placed west of (behind) these initial buttress areas. Waste rock stockpiles will consist largely of limestone and skarn rock types, with some andesite, quartz monzonite porphyry, and arkose. These rock types have a very low potential for generating acid rock drainage and will provide a large buffering capacity within the waste rock storage areas. Pyritic zones have been reported overlaying some of the andesite flows and could be potentially acid generating, however these zones appear to be isolated and localized and can be managed, i.e. preferentially placed, within the waste rock facility.

The waste rock storage facility will not extend beyond the divide that defines the Barrel Canyon drainage basin. Stormwater runoff from the perimeter buttresses will be collected along the western toe of the waste rock storage facility and allowed to drain through the coarse rock along the bottom. Similarly, surface runoff from the eastern faces will be allowed to collect along the toes and either be diverted to the attenuation pond or allowed to drain through the base of the waste rock facility. This water will ultimately be collected in a series of sediment control ponds located northeast of the waste rock storage area. These ponds will provide sediment control and water capture for all of the disturbed areas located within the Barrel Canyon drainage system.

Waste rock will be hauled to the dumping faces along the advancing edge of the facility. Mine haulage trucks will back up to the dumping face and dump their loads. Trucks may occasionally dump their loads atop the current lift, particularly when another overriding lift or surface regrading is planned for the area. Bulldozers will be used to maintain safety berms along all facility crests, pushing excess material over the face and maintaining proper surface gradients for drainage.

Previously undisturbed areas affected by advancing waste rock storage facility may be cleared and grubbed prior to the deposition of waste rock or dry tailings material. When possible, recoverable growth media will be stockpiled for use in future reclamation activities or placed directly into active reclamation areas.

As advancing waste rock faces approach the ultimate limits of the storage facility, set backs will be employed for each lift to approximate a minimum 3H:1V slope. The final faces will be regraded by pushing down the crests and smoothing the overall slope. Growth media will then be spread across the surface as needed, seeded, fertilized, and managed as necessary to promote revegetation.

3.3 Leaching Operations

The oxide ore heap leach pad and solution ponds will occupy an area southeast of the proposed open pit. The leach pad site will be surrounded on three sides (downhill) by the waste rock storage facility described in Section 3.2. Facilities associated with leaching will be lined.
Oxide ore will be transported from the open pit to the lined leach pad by mine haulage trucks via a ramp running along the south and east edges of the pad area. The oxide ore will not be crushed, but will be placed in lifts 20 to 30 feet high atop the lined pad. Crawler dozers will be used to spread the oxide ore and cross-rip the material to a depth of 5 to 6 feet to promote the infiltration of barren leach solution.

Ore placement rates will vary depending on the mix of sulfide versus oxide ore encountered during the mining operations. Oxide placement rates will vary considerably over the long and short term. Ore placed on the leach pad will be leached according to plant capacity, copper recovery, solution balances, and other metallurgical considerations.

The leaching and SX/EW operations at the Rosemont Project will be consistent with other modern operations in Arizona that utilize lined leach pads. Drip emitters will be used to minimize the potential for evaporation or overspray of leaching solutions. This will conserve groundwater and protect the ground and vadose zones that surround the leach pad. Solutions will be collected in ponds that are constructed with double-liners and a leak detection system. The ponds will be operated to maintain at least three feet of freeboard above the normal operating range. In addition, stormwater from the leach pad area will be collected in a lined stormwater pond. Sizing of the ponds associated with the leach circuit will be such that all solutions can be captured for a 24-hour leach facility drain down in case of power failure or process upsets. The ponds and heap leach pad facilities will meet the prescriptive BADCT requirements for these types of facilities as regulated by ADEQ.

Specific operating controls as discussed in ADEQ’s BADCT manual are incorporated into the designs. Those controls include:

- Three feet of operating freeboard in addition to solutions management capabilities equal to those described above.
- Double liners placed on low permeability geosynthetic clay liner (GCL) with leak detection sumps and capability to add a pump as necessary.
- Overflow to a lined facility capable of managing a 100-year, 24-hour storm event, with a minimum of three feet of freeboard.
- The leach pad is lined and placed on a low-permeability GCL with piping and drain fill above the liner to ensure drainage is maintained and hydraulic head on the liner is limited.
- The prepared pad for leach material is graded to drain toward the ponds or lined collection ditch.
- A collection ditch surrounds the entire heap leach pad. This collection ditch also drains to the ponds and will carry piping. This provides secondary containment for the piping.

All leach solutions collected in the process ponds (known as pregnant leach solution or PLS) will be routed to the Solvent Extraction Plant (SX) for processing. Each flow system is isolated, recycled, and contained in this process. The plant will be designed to be non-discharging and will be operated in a manner that isolates process solutions from the environment.
4.0 WATER SUPPLY

In Arizona, groundwater resources are managed carefully, therefore a groundwater protection plan should address quantity as well as quality issues. For this project, freshwater requirements are currently estimated to be approximately 5,000 acre-feet per year. The sources of water supply for the Project include both Central Arizona Project (CAP) water and groundwater. Because on-site groundwater supplies are very limited and groundwater resources of the Cienega Wash and Davidson Canyon areas are both limited and environmentally-sensitive, the source of groundwater will be the basin-fill deposits of the upper Santa Cruz basin west of the Rosemont Project.

Two supply wells have been secured in the Sahuarita area. Several other potential well sites in the same vicinity are currently being evaluated. A total of 5 to 6 wells are anticipated to meet mine water supply requirements. Groundwater supplies pumped from these wells will be transported from the Sahuarita area to the mine via a pipeline and booster system. The identified access route for the pipeline extends eastward from the Sahuarita area, traversing State and BLM lands along the north and east sides of the Santa Rita Experimental Range, and then eastward through the Helvetia area and Gunsite Pass in the Santa Rita Mountains.

CAP water is available for use by the Rosemont Project. The current source of CAP water is approximately 18 miles northwest of the mine site and 5 to 6 miles northwest of the proposed well sites, near Pima Mine Road and Interstate-19. In addition, the availability of CAP water is subject to interruption from planned maintenance outages, unplanned emergency outages along the CAP aqueduct, and availability of Colorado River water. Augusta has contracted to utilize excess CAP water as an indirect source of water. By contracting for and purchasing CAP water in an amount equivalent to, or in excess of, that to be used at the mine, Augusta plans to offset the effects of groundwater pumpage by recharging CAP water at an established groundwater recharge facility or another groundwater recharge site to be constructed. This will reduce the potential impact of groundwater withdrawal on a local scale and will eliminate such impact on a regional scale. With this approach, the Rosemont Project will be consistent with the safe-yield goal of the Tucson Active Management Area (AMA) by the year 2025.

It is anticipated that up to five booster stations, along with the requisite power, will be required to transport water through the pipeline to the Rosemont Project. More detailed information on the proposed water supply pipeline and booster system is provided in the Water Supply Pipeline Design Report (Stantec, 2007).
5.0 SURFACE WATER MANAGEMENT SYSTEM

The objectives of the Surface Water Management Plan (SWMP) are to demonstrate how storm flows and sediment yields will be managed during the active mine life, as well as long-term for closure and reclamation. Many of the site facilities will significantly change with time as mining progresses. The SWMP is designed to account for those changes and to effectively manage stormwater runoff and sediment yield throughout the project life. Wherever possible, stormwater is diverted around mining facilities and discharged back to the local drainages. The main surface water facilities include the North Diversion, the Attenuation Pond, the Open Pit Diversions, the South Storage and Recovery System, the PWTS Pond, the Compliance Point Dam, and various sediment control facilities. The facilities are shown in Figure 4. The specific details of the SWMP are presented in the Site Water Management Plan (Tetra Tech, June 2007).

Fresh water will be stored in tanks located on the hillside above the mill site and will be filled via the water supply pipeline from the wellfield located in the upper Santa Cruz basin. Tanks will minimize water evaporation and provide the required pressures for operations. As described previously, freshwater requirements are currently estimated by Augusta to be 5,000 acre-feet per year.

The lined PWTS Pond located downstream of the mill site is designed to be used as a multi-use pond. The pond will be regulated by ADEQ and the Arizona Department of Water Resources (ADWR) and will be classified as a non-storm water pond. It will provide temporary, emergency containment for:

- Process water overflow storage in case of power loss or process upsets;
- Contact surface water storage for runoff from the mill site; and
- 100-year, 24-hour stormwater runoff storage from the immediate process area.

A small, porous, rockfill check structure known as the Compliance Point Dam will be constructed at the outlet of Barrel Drainage. This ADWR non-jurisdictional, unlined embankment will be built to a height of 6 feet and will provide a final water quality monitoring point as well as sediment control prior to releasing water back to Barrel Drainage. The dam will be constructed of large run-of-mine material that has been determined to be not reactive. The dam is designed to be overtopped by the large storm events. Normally, the pond will be empty except during significant storms when water is temporarily impounded and slowly released through the porous rockfill and the alluvium. Groundwater monitoring wells will be located downstream of the site.

The North Diversion is designed to divert the 100-year 24-hour storm event around the North Dry Tails Stack. The first phase of the North Diversion will be constructed by Year 0 and will be a trapezoidal channel that discharges into a natural drainage. The North Diversion will then be extended in the natural drainage as a porous rock drain, and waste rock will be stacked over the top of the rock drain material. An upstream attenuation impoundment will collect surface runoff and slowly feed the water into the Central Drain (see Section 2.1). The 100-year, 24-hour storm will be drained within 30 days. This attenuation pond will provide interim sediment control.

The South Storage and Recovery System is designed to collect infiltration from the 100-year, 24-hour storm event in the Barrel Canyon drainage. A small sump will collect surface water flows from within the waste rock storage area and protect the South Tails Stack from inundation from the upstream areas. This sump will be covered by waste rock over time. During
operations, monitoring wells can be installed to check water levels in the sump area, and if required, submersible pumps will be installed to evacuate water. The pumps will be sized to evacuate the 100-year 24-hour storm infiltration within 30 days.

A series of small sediment control ponds will be built throughout the property over time. The sediment control ponds are designed as temporary, unlined storage facilities that are intended to slow velocities and settle wash load. The ponds will be periodically cleaned out. All surface water ponds at the Rosemont Project will be inspected and monitored as required in permits for water quality and discharge containment for the protection of downgradient surface and groundwater sources.
6.0 POTENTIALLY DISCHARGING FACILITIES

6.1 Ponds

Pond requirements were evaluated during the project feasibility analysis. Based on evaluation results, ponds were sized and designed. Current plans call for the following five (5) major ponds areas:

- Process Water Temporary Storage (PWTS) Pond;
- PLS, Raffinate, and Stormwater ponds associated with leaching facilities; and
- An Attenuation Pond and various other small stormwater ponds and sediment traps planned to control sediment.

The number of ponds associated with the processing activities can be considered worst case. Various diversion and water management systems are planned to reduce or even eliminate the small small sediment control stormwater ponds.

Details of the anticipated design associated with the ponds can be seen in Figure 4.

6.2 Leach Pad

Approximately 50 Mt of oxide material will be placed on a pad for leaching. The design parameters meet site-specific BADCT for this type of facility. The pad has a composite liner, run-on and run-off controls, and drains to lined process impoundments.

The orientation and configuration of the heap leach pad is discussed further in the Leaching Facility Design Report (Tetra Tech, June 2007).

6.3 Tailings Management

The dry tailings (12 to 15% moisture) will be stacked behind large containment buttresses constructed from pit run waste rock material. The buttress will provide in-place stability for the tailings and create an outslope that will protect the downstream area from any storm runoff from the tailings stack.

In this way, stormwater quality will be protected. In addition, no impact to groundwater quality is expected from this facility. The results of the testing performed on the tailings material generated in the bench-scale tests indicate that they will not generate acid mine drainage, including a limited potential for leaching of metals to the groundwater or to surface water runoff from storms.

Additional geochemical studies are currently underway to verify the potential for groundwater quality impacts. A Baseline Geochemical Characterization (Tetra Tech, 2007) has been produced to discuss the overall site geochemistry. Seepage and stability analyses were conducted and are discussed in the Dry Tailings Facility Design Report (Tetra Tech, June 2007). In addition, a groundwater monitoring program downgradient from the tailings area will be implemented to ensure that groundwater quality will not be adversely impacted and will continue to meet Arizona Aquifer Water Quality Standards (AWQS). The anticipated groundwater monitoring plan is presented in greater detail in Section 6.3 of this document.
6.4 Waste Rock Storage

Waste rock will be placed within the Barrel Drainage. Based on the available results of Synthetic Precipitation Leaching Procedure (SPLP) tests, Meteoric Water Mobility Procedure (MWMP) tests, humidity cell tests, and on-site column tests, no discharge of pollutants or impacts to groundwater/surface water is expected. An additional series of tests are currently underway to verify these original test results.

In general, approximately 73% of the material tested to date can be defined as inert based on the ADEQ draft policy titled “Policy for the Evaluation of Mining Rock Materials for the Determination of Inertness.” This policy defines inert materials as having a total sulfur concentration of less than 0.3% and a net neutralization potential (NNP) greater than 0 or a neutralization potential ratio (NPR) greater than 3. Those materials that are defined as inert by this definition do not require additional testing. Because this is a mining district, these materials defined as inert may contain metals that may become mobile at alkaline pH values. The kinetic and other on-going tests have been designed to ensure this potential is addressed.

Based on the results of the testing, three of the samples or approximately 3% of the samples tested (AR2010-03, AR2011-03, and AR2014-02) show characteristics of being potentially acid generating (PAG). Each has a negative NNP value and an NPR ratio below 1, suggesting the material could generate acid. In addition, each of these samples has a total sulfur content greater than 2%, with the majority being in the form of pyritic (or sulfide) sulfur. Table 6.1 summarizes this information for the three samples.

Table 6.1: Results for Potentially Acid Generating Samples

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>NNP</th>
<th>NPR</th>
<th>Sulfur</th>
<th>Pyritic Sulfur</th>
<th>Rock Type</th>
<th>Sample Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR2010-03</td>
<td>-25.6</td>
<td>0.5</td>
<td>2.01%</td>
<td>1.67%</td>
<td>Andesite</td>
<td>763 – 808</td>
</tr>
<tr>
<td>AR2011-03</td>
<td>-14.6</td>
<td>0.8</td>
<td>2.51%</td>
<td>2.20%</td>
<td>Andesite</td>
<td>700 – 750</td>
</tr>
<tr>
<td>AR2014-02</td>
<td>-17.1</td>
<td>0.9</td>
<td>4.77%</td>
<td>1.55%</td>
<td>Andesite</td>
<td>650 - 700</td>
</tr>
</tbody>
</table>

In addition to the material characterized as PAG, twenty-two other samples or approximately 23% of the samples tested resulted in an “uncertain” acid generating potential. These samples had NNP, NPR, and/or total sulfur results that do not meet the ADEQ definition of an inert material. The results of these samples are summarized in Table 6.2. The results in this table exclude those samples that had a total sulfur content greater than 0.3%, but a pyritic sulfur content less than 0.3%. These samples were excluded because pyritic sulfur is the form more commonly associated with acid generation.
### Table 6.2: Results for Uncertain Acid Generating Samples

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>NNP</th>
<th>NP/AP</th>
<th>Sulfur</th>
<th>Pyritic Sulfur</th>
<th>Rock Type</th>
<th>Sample Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1535-01</td>
<td>7.0</td>
<td>1.2</td>
<td>1.47%</td>
<td>1.09%</td>
<td>unk</td>
<td>407-428</td>
</tr>
<tr>
<td>AR2000-02</td>
<td>51.3</td>
<td>5.7</td>
<td>0.55%</td>
<td>0.35%</td>
<td>Earp</td>
<td>450 – 500</td>
</tr>
<tr>
<td>AR2003-03</td>
<td>10.5</td>
<td>1.5</td>
<td>0.92%</td>
<td>0.66%</td>
<td>Arkose</td>
<td>600 – 650</td>
</tr>
<tr>
<td>AR2005-02</td>
<td>4.7</td>
<td>1.2</td>
<td>1.21%</td>
<td>0.94%</td>
<td>Arkose</td>
<td>650 – 700</td>
</tr>
<tr>
<td>AR2009-03</td>
<td>35.0</td>
<td>1.5</td>
<td>2.33%</td>
<td>2.05%</td>
<td>Andesite</td>
<td>750 – 800</td>
</tr>
<tr>
<td>AR2009-04</td>
<td>63.1</td>
<td>4.7</td>
<td>0.80%</td>
<td>0.55%</td>
<td>Andesite</td>
<td>1000 – 1050</td>
</tr>
<tr>
<td>AR2010-02</td>
<td>3.8</td>
<td>1.3</td>
<td>0.57%</td>
<td>0.44%</td>
<td>Arkose</td>
<td>550 – 600</td>
</tr>
<tr>
<td>AR2013-01</td>
<td>11.3</td>
<td>1.2</td>
<td>1.98%</td>
<td>1.55%</td>
<td>Andesite</td>
<td>150 – 200</td>
</tr>
<tr>
<td>AR2013-02</td>
<td>37.1</td>
<td>2.1</td>
<td>1.36%</td>
<td>1.06%</td>
<td>Andesite</td>
<td>350 – 400</td>
</tr>
<tr>
<td>AR2013-03</td>
<td>47.1</td>
<td>2.5</td>
<td>1.02%</td>
<td>1.02%</td>
<td>Arkose Conglomerate</td>
<td>500 – 550</td>
</tr>
<tr>
<td>AR2014-03</td>
<td>42.1</td>
<td>2.4</td>
<td>1.22%</td>
<td>0.95%</td>
<td>Andesite</td>
<td>800 – 850</td>
</tr>
<tr>
<td>AR2014-05</td>
<td>94.1</td>
<td>10.4</td>
<td>0.37%</td>
<td>0.32%</td>
<td>Earp</td>
<td>1621 – 1641</td>
</tr>
<tr>
<td>AR2017-03</td>
<td>32.3</td>
<td>1.8</td>
<td>1.60%</td>
<td>1.31%</td>
<td>Arkose</td>
<td>750-790</td>
</tr>
<tr>
<td>AR2022-01</td>
<td>54.5</td>
<td>2.6</td>
<td>1.60%</td>
<td>1.09%</td>
<td>Andesite</td>
<td>725 – 735 &amp; 740 – 770</td>
</tr>
<tr>
<td>AR2025-01</td>
<td>7.5</td>
<td>1.2</td>
<td>1.30%</td>
<td>0.97%</td>
<td>Arkose</td>
<td>35 – 80</td>
</tr>
<tr>
<td>AR2025-02</td>
<td>56.0</td>
<td>4.5</td>
<td>0.72%</td>
<td>0.51%</td>
<td>Arkose</td>
<td>820 – 840</td>
</tr>
<tr>
<td>AR2028B-01</td>
<td>46.3</td>
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<td>0.94%</td>
<td>Andesite</td>
<td>645 – 700</td>
</tr>
<tr>
<td>AR2030-03</td>
<td>56.6</td>
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<td>0.38%</td>
<td>Andesite</td>
<td>135 – 155</td>
</tr>
<tr>
<td>AR2039-03</td>
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<td>0.65%</td>
<td>Arkose</td>
<td>575 – 600</td>
</tr>
<tr>
<td>AR2043-01</td>
<td>55.2</td>
<td>2.2</td>
<td>2.08%</td>
<td>1.52%</td>
<td>Andesite</td>
<td>670 – 715</td>
</tr>
<tr>
<td>AR2043-02</td>
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<td>1.51%</td>
<td>1.03%</td>
<td>Arkose</td>
<td>715 – 775</td>
</tr>
<tr>
<td>Composite</td>
<td>66.5</td>
<td>5.1</td>
<td>0.60%</td>
<td>0.52%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Samples identified as PAG, or that have uncertain acid generating behavior, appear to be in a relatively limited area of the pit. As discussed in the Baseline Geochemical Characterization (Tetra Tech, June 2007), additional samples are being collected to cover a broad spatial distribution in an effort to define an exact area of concern. However, based on currently available data, it appears the PAG material may be able to be managed through proper placement within the waste rock storage area.

Once all test work is completed, a mine waste management plan will be developed so that any materials that may be acid generating or could cause an impact to groundwater or surface water will be placed where they will not be exposed to water. A site-wide geochemical model is planned including possible mitigation and management strategies should ARD issues arise.

### 6.5 Open Pit

The hydrogeology and geochemistry of the open pit are being investigated to determine if passive containment will be achieved and maintained, or if long-term discharge will need to be managed. Groundwater flow and solute transport modeling is planned for this facility to verify the appropriate management and permitting scenario.

Geochemical tests were performed on a limited number of available samples within the pit that may be exposed to potential leaching on the pit walls at closure. These sample results will be
used in the modeling effort to determine the potential overall water condition in the pit. The results available to date indicate the acid generating potential will be limited. Humidity cell testing has been ongoing and will continue. As these results become available, these assumptions will be revised, as necessary.

6.6 Concentrator, SX-EW, and Other Process and Maintenance Facilities

Design plans have also been developed for the operational and maintenance facilities located at the plant site. These facilities were designed “so as not to discharge.” Typical design criteria for tanks, concrete-floored buildings with curbs, and concrete sumps will be used to ensure the facilities are non-discharging. Pipelines will have a rigorous inspection and instrumentation program, or will be double-walled so the non-discharging classification can be applied. Finally, larger tanks will be constructed with secondary containment.

6.7 Material Stockpiles

There are two types of stockpiles anticipated at the Rosemont facility: those related to the process and those designed to contain growth media for reclamation purposes. The process-related stockpiles will all meet the definition of temporary storage and be managed inside the process areas. The growth-media stockpiles will consist of topsoil and grubbed material that will be available for reclamation activities. Neither type of stockpile will meet the definition of a discharging facility.
7.0 POLLUTANT MANAGEMENT AREA (PMA)

7.1 PMA

As described in the Arizona Revised Statutes (ARS) §49-244.1 and the Arizona Aquifer Protection Permit (APP) program, the Pollutant Management Area (PMA) is the limit projected in the horizontal plane of the area on which pollutants are or will be placed. The PMA is an imaginary line circumscribing potentially discharging facilities or activities at the site. Figure 5 depicts the currently proposed PMA in relation to the facilities under evaluation. This boundary may change as facility designs and layouts are finalized in the public process.

7.2 Point of Compliance (RP), Hydrologic Characterization (HC), and Pit Characterization (PC) Wells

Based on the current proposed PMA, proposed Point of Compliance (RP) monitor wells, as described in ARS §49-244.2, are shown in Figure 5. In addition to the RP wells, proposed hydrogeologic characterization (HC) and pit characterization (PC) wells are also shown. The existing PC wells are located on Augusta land and were installed to characterize hydrogeologic conditions in the vicinity of the pit, to monitor ambient groundwater quality, and to evaluate pit dewatering requirements, groundwater flow regime, and pit-lake water quality. The RP and HC wells are planned for installation to document ambient groundwater quality, monitor groundwater quality over time, and to define the hydrogeologic characteristics of the planned operational areas.

It is anticipated that some or all of the PC and HC wells will remain in place during the pre-operational period. However, they may be abandoned or modified once they are encroached upon by mine activities or facilities.

7.3 Monitoring Plan

Water quality at the facility will be monitored as required under groundwater and stormwater permits. Ambient groundwater quality will be determined for each RP monitor well using a very comprehensive suite of chemical analyses, as required by APP statutes and rules. Following the ambient groundwater quality assessment and selection of Aquifer Quality Limits and Alert Levels, subsequent monitoring of selected indicator constituents and parameters will be conducted on a quarterly basis. The samples will be analyzed for a more comprehensive suite of chemical analysis on a biennial basis. The APP program requires that any discharge from a facility not degrade groundwater beyond background (ambient) levels. The RP wells will be installed to establish ambient groundwater quality before potentially discharging facilities are installed. The HC and PC wells will be used to characterize groundwater quality and hydrologic characteristics upgradient from the RP wells.

Groundwater monitoring procedures will be consistent with established ADEQ protocol and follow a site specific groundwater sampling plan that includes quality control procedures. Laboratory chemical analyses will be conducted by State-certified laboratories. Results of groundwater monitoring will be reported to ADEQ on a quarterly basis.

In the unlikely event that an Alert Level or Aquifer Quality Limit is exceeded at an RP monitor well, contingency plans, including verification sampling, will be implemented as required by the APP program. If an exceedance is confirmed, additional contingency plans and corrective
actions will be developed with ADEQ and implemented according to an ADEQ-approved schedule.
8.0 STORMWATER MANAGEMENT

8.1 Arizona Pollution Discharge Elimination System Program (AZPDES)

Process water will be managed in a manner that will avoid discharges, and the only stormwater discharges associated with this Project will be those waters that can be covered as non-contact water or as stormwater. Therefore, it is anticipated that the AZPDES Industrial General Permit or the similar EPA Federal Multi-Section General Permit (MSGP) will apply to the site during the operational phase.

These permits specify the monitoring required to qualify under the program. Implementation of a site-specific Stormwater Pollution Prevention Plan (SWPPP) will be required. This plan specifies best management practices (BMPs) that will be used to assure stormwater quality, and has additional requirements that address employee training, recordkeeping, monitoring and mitigation requirements, and reporting. Rosemont intends to participate in this program and develop management plans as required to ensure stormwater quality is not affected by the operation.

8.2 Monitoring Plan

Stormwater will be monitored at the Compliance Point Dam (see Figure 4) and any other applicable discharge points. The dam is designed as a 6-foot-high porous, rockfill dam and will provide a final water quality monitoring point. This location will also provide final sediment control prior to releasing water back to the environment. Normally, the pond will be empty except during significant storms when water is temporarily impounded and slowly released through the porous rockfill and the alluvium. Water quality will be tested to insure that there will be no impact to surface or groundwater. Improvements to the BMPs and surface water management system will be made if water quality does not meet the expected water quality.

Stormwater sampling will be dictated by permit conditions but in general will include Total Suspended Solids, a select suite of metals, pH, chemical oxygen demand, and any other constituents specified at the time of coverage. The samples will be restricted to discharge points that leave the facility boundaries. BMPs will be adjusted or improved based on inspections and or sample analysis.
8.0 REFERENCES


FIGURES