PROCESS WATER POND, TEMPORARY STORAGE POND, AND SETTLING BASIN DESIGN REPORT

ROSEMONT PROJECT
M3-PN08036

Prepared for
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1 INTRODUCTION

1.1 Overview

The Rosemont Copper Project includes a 75,000 ton per day sulfide ore processing plant that includes milling and flotation circuits. The milling and flotation of ore will require a recirculation volume of process water of about 24,000 gpm. Tailings will be dewatered by using high rate thickeners and a Tails Filter Plant. The water recovered through thickening and filtration is the process water that will be recirculated. Its reuse will reduce the overall consumption of fresh water.

This report discusses the design of the Process Water Pond (PW Pond). It also addresses the design of the Temporary Storage Pond (TS Pond) and the Settling Basin.

The Process Water Pond is the primary storage element of the process water system. It is a critical element of the processing plant and must be large enough to provide both operational storage and operational flexibility.

The Settling Basin is also a large storage facility, not for water, but for tails slurry. Though normally empty, it is also critical in that it provides a planned location for the placement of tails slurry (75,000 tpd = 0.9 tons/sec.) during upsets in the normal operation of the plant.

Similarly, the Temporary Storage Pond provides capacity to store stormwater for extreme storm events.

Several of these facilities are eligible for prescriptive BADCT review as discussed in the Arizona Mining BADCT Guidance Manual (BADCT Manual). Whenever possible Prescriptive BADCT criteria were followed in the designs presented. The sections of this report were ordered to follow the topics/sections in the BADCT Manual for ease of review. This design has been developed to meet or exceed all applicable guidelines and standards contained in USFS, ADEQ, and EPA regulations.

The design discussions presented herein supercede any contradictory information contained in either the APP Application submitted February 2009, or the Site Water Management Plan (SWMP) prepared by Tetra Tech in July 2007. A revised SWMP will be prepared by others and submitted separately for review.

The design drawings and this design report are prepared and submitted for permitting level review and are not intended to present detail to the level necessary for construction of these facilities.
2 PROCESS WATER TEMPORARY STORAGE (PWTS) POND

2.1 Facility Description

The PWTS Pond is located southeast of the Plant Site within the Wasp Canyon watershed. The PWTS Pond will be divided into two sections (ponds) identified as the Process Water (PW) and the Temporary Storage (TS) ponds. The feasibility level design did not divide the pond. Any reference to “PWTS” hereafter will pertain to the combined facilities or elements common to both ponds.

The PWTS Pond was designed to meet prescriptive BADCT requirements for environmental protection. The PW Pond is the primary storage component of the process water system. As such, it will be managed as a Process Solution Pond. It is designed to hold a minimum 24-hour supply of the process water required at the mill. This recirculating rate of 24,190 gpm therefore requires 34.8 million gallons or 107 acre feet of storage. The PW Pond will be a double-lined surface impoundment that will normally be at least half full. It will provide storage for 24-hours of process water requirements for the plant. Additionally, ponded stormwater on the surface of the Dry Stack Tailings Facilities may be pumped to the PW Pond to limit infiltration into the tailings material.

The TS Pond will be a single-lined surface impoundment that will receive direct precipitation, stormwater run-off from adjacent slopes of the Tails, and overflow from the PW Pond. The TS Pond will be normally empty to maintain maximum available storage volume for stormwater run-off. During the first four (4) years of operations the PWTS Dam, which forms the southern wall of the PWTS Ponds will be a free standing structure. In Year 4 the dry tailing stacked along the downstream slope of the PWTS Dam will reach equal height with the top of the dam. After Year 4 the Dry Stack Tailing Facilities will continue to be stacked higher in elevation to the east of the dam. This will effectively prevent the possibility of any surface water discharge. As currently designed, the TS portion provides containment of the 100-year, 24-hour storm event.

Incline mounted or barge pumps in the TS pond will pump stormwater to the PW Pond. Barge pumps in the PW Pond will transfer process water to the Reclaimed Water Tank for distribution as needed into the process circuit. The pumps will also allow each pond to be emptied for inspection.

Details for the PWTS Pond are included in Appendix A. Site and Grading Plans are shown on Dwg. 660-CI-004 & 005. Cross sections and liner details are shown on Dwg. 600-CI-006 & 007.

2.2 Authorized and Unauthorized Materials

The PW Pond will normally receive thickener overflows (process water), stormwater, recovered water from the Filter Plant, fresh water make-up, accumulated groundwater/stormwater from the open pit, and could also receive decant water from the
Settling Basin. The TS Pond will collect stormwater run-off and stormwater overflow from the PW Pond. Process water will be pumped from the PW Pond to the Reclaimed Water Tank, then the Process Water Tank to be distributed by gravity pipeline for use in the process circuit.

The PW Pond will receive storm water runoff from the SX/EW plant facilities and possible overflow from the Raffinate Pond. However, there will be no discharge of unauthorized materials such as used oil, fuel, solid waste, garbage, etc., to the PWTS Pond.

2.3 Site Selection

The site was selected by AMEC, Rosemont, and M3 Engineering personnel during basic engineering efforts for the Project. The PWTS Pond is located southeast of the Plant Site within the Wasp Canyon drainage area. The pond site naturally captures run-off from the SX/EW Plant Site.

2.4 Site Characterization

The PWTS Pond is located within the Wasp Canyon drainage area. Groundwater elevations within the area range from approximately 4,850 to 4,900 feet amsl. The lowest floor elevation of the PWTS Pond is about 4,892 feet amsl. Therefore, groundwater may be encountered during construction excavation. Final design will reflect this possibility. Vegetation at the site consists of a sparse coverage of native grasses and shrubs.

Approximately 0.5 miles of seismic refraction surveys were completed within the footprint of the PWTS Pond from 2006 to 2007 under the direction of Tetra Tech. Results from the seismic survey were used to assess bedrock rippability and are presented in the Geotechnical Study (Tetra Tech, 2007d) and the Geotechnical Addendum 1 (Tetra Tech, 2009h).

As illustrated on Figure 12 of the Rosemont Aquifer Protection Permit (APP) Application (Tetra Tech, 2009g), the PWTS Pond is underlain by the early Cretaceous Willow Canyon Formation. The Willow Canyon Formation is characterized as an arkosic (feldspathic) sandstone and argillaceous sandstone, with equal to subordinate amounts of vuggy, silty mudstone. Additionally, an interval of volcaniclastic, pebble-cobble conglomerate is present below a sequence of andesitic lava flows within the formation. The depth to bedrock within the footprint of the PWTS Pond is estimated to range from less than one (1) foot to 20 feet, but is expected to be rippable where excavations for construction are necessary.

Packer Testing was conducted in two boreholes within the Willow Canyon formation to estimate the permeability of the bedrock. Details of the testing are provided in the Geotechnical Addendum 1 (Tetra Tech, 2009h). Permeability of the Willow canyon formation was determined to range from 9.69E-7 to 1.66E-8 ft/s (2.95 E-5 to 5.06 E-7 cm/s).
2.5 Surface Water Control

The PWTS Pond will function as an important surface water control element for the Plant Site and will operate as a closed system. All direct precipitation and run-off from the contribution watershed area collected in the pond will be used in the process circuit. In order to minimize the amount of run-on stormwater collected by the pond, Diversion Channel No. 1 (formerly the PWTS Diversion) will be constructed west of the Plant Site. Various interior stormwater ponds will also be constructed. Diversion Channel No. 1 has been designed as a trapezoidal riprap-lined channel capable of diverting run-off from the 100-year, 24-hour storm event. Additional information regarding this diversion will be submitted separately by others. In the unlikely event of an overflow from the PW Pond, the water would flow into the TS Pond. The TS Pond has been designed with sufficient capacity to contain the design storm event plus significant freeboard as shown in Section 2.8.

The PWTS Dam which forms the southeastern wall of the PWTS Pond has a maximum embankment height of 85 feet and a total storage capacity of 380 acre-feet. Arizona Administrative Code (A.C.C.) Title 12, Chapter 15, Section 1206(A) Table 2 defines this to be an intermediate size dam. A.C.C. R12-15-1206(B)(2)(a) defines a Very Low Hazard Dam Potential: "Failure or improper operation of a dam would be unlikely to result in loss of human life and would produce no lifeline losses and very low economic and intangible losses. Losses would be limited to the 100 year floodplain or property owned or controlled by the dam owner under long-term lease. The Department [Arizona Department of Water Resources (ADWR)] considers loss of life unlikely because there are no residences or overnight camp sites. Based on a review of the rules, it is assumed that the PWTS Dam qualifies as an intermediate size, very low hazard dam per ADWR dam safety requirements.

This assumption will be confirmed with ADWR and ADEQ during final design. As a result of the classification, ADWR normally requires the dam to have a spillway capable of safely passing the 100-year storm event. However, the PWTS can contain the 100-year event. Also, any spillway release in the first 4 years of operation would discharge into the Dry Stack Tailings mass. After year 5, the adjacent Dry Stack Tailings Facility will be higher in elevation preventing any spillway discharge and offering further protection against dam failure. The combined volumes available in the PW Pond, TS Pond and Settling Basin are such that the PMF can be contained. Therefore, no spillway is proposed. The PW Pond will be maintained such that two (2) feet of freeboard is maintained below the crest elevation.

2.6 Geologic Hazards

There is an historic mine shaft located near the embankment dividing the PW Pond and the TS Pond. The mine shaft will be properly closed prior to construction of the dam and pond structures. The details of the mine shaft and other geologic hazards associated with the property are discussed in the Geologic Hazards Assessment (Tetra Tech, 2007c).
2.7 Solution Characterization

The PW Pond will typically contain process water, stormwater, fresh make-up water, and/or tailings decant water from the Settling Basin. It will also provide containment of stormwater run-off from the SX/EW Plant Site which could potentially contain reagents. A list of potential reagents used in the concentrating and SX/EW processes are presented on Tables 6.01 and 6.02 of Section 6.2 of the APP Application (Tetra Tech, 2009g). Reagents, acids, and other materials stored at the Plant Site will be properly managed so as not to discharge. The reagents are discussed here because the PWTS Ponds will provide emergency containment for these reagents by remote impounding.

The process water will primarily consist of tails thickener overflow and tailings filtrate water. This water has been carefully characterized for environmental constituents. As a part of the geochemical characterization of the tailings material, humidity cell testing was conducted on two samples (February 2007 and July 2008) to determine the potential leachates. The humidity cell testing are detailed in the APP Application (Tetra Tech, 2009g), the Baseline Geochemical Characterization (Tetra Tech, 2007a), and the Geochemical Characterization Addendum 1 (Tetra Tech, 2009h).

The Aquifer Water Quality Standards (AWQSs) were not exceeded in the February 2007 humidity cell testing sample. Concentrations detected for two (2) constituents did exceed AWQSs in the July 2008 sample. In Week 0 and Week 8, antimony exceeded the AWQS by 0.003mg/l and 0.001 mg/l respectively. Also, in Week 0, selenium exceeded AWQS by 0.10 mg/l. With the exception of these results all other constituent concentrations detected in samples were less than the AWQS.

The PW Pond may also receive accumulated groundwater and stormwater pumped from the Open Pit, or ponded within the Dry Stack Tailing Facility. The TS Pond may receive overflow from the PW Pond. Therefore, the above solution characterization also applies to the TS Pond.

2.8 Capacity and Storage Design

The PW Pond will be sized to provide lined storage of Process water for 24 hours of Mill requirements and containment of the 100-year, 24-hour design storm from directly contributing watersheds while maintaining two (2) feet of freeboard. The current volume requirements for the PW Pond are presented on Table 2.1.
Table 2.1 PW Pond Volume Requirements

<table>
<thead>
<tr>
<th>24 Hours Process Water Storage (ft³)</th>
<th>Design Storm Volume (ft³)</th>
<th>Two (2) Feet Freeboard Volume (ft³)</th>
<th>Total Volume Required (ft³)</th>
<th>Total Volume Provided (ft³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,656,900 (35 M Gal)</td>
<td>1,175,000 (86 AC)</td>
<td>1,071,500 (535,729 ft² x 2 feet)</td>
<td>6,903,400 (159 AF)</td>
<td>10,220,000 (235 AF)</td>
</tr>
<tr>
<td>107 AF</td>
<td>27 AF</td>
<td>24.6 AF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The TS Pond will be lined up to the dam crest elevation of 4,950'. This represents the maximum desired storage level. Since the PW Pond is adequate to contain the 100-year storm event without overflow, the TS Pond design volume is equal to direct stormwater inflow. The maximum watershed would include runoff from the slopes of the Dry Stack Tailings Facility near the end of mine life. This maximum condition is represented below in Table 2.2.

Table 2.2 TS Pond Volume Requirements

<table>
<thead>
<tr>
<th>Design Storm Volume (ft³)</th>
<th>Freeboard Volume (@ 4,948') (ft³)</th>
<th>Total Volume Required (ft³)</th>
<th>Total Volume Provided (ft³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>836,400 (54.6 AC)</td>
<td>623,200 (311,600 ft² x 2 feet)</td>
<td>1,459,600 (33.5 AF)</td>
<td>6,344,676 (145 AF)</td>
</tr>
<tr>
<td>19.2 AF</td>
<td>14.3 AF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The TS Pond is the terminal storage element for stormwater affecting the plant. If the capacity were exceeded through Year 4, discharge into the tailings mass would be undesirable. After Year 4, no direct discharge is possible. Other risks of flooding the Plant facilities are equally undesirable. It is therefore prudent to evaluate the ability of the TS Pond to accommodate the Probable Maximum Flood (PMF).

The Probable Maximum Precipitation (PMP) for the Rosemont site was estimated in accordance with the methodology in Hydrometeorological Report No. 49 by NOAA and the U. S. Army Corps of Engineers (USDC, 1984). The General Storm PMP was estimated for the watershed and compared to Local Storm PMP. The total precipitation produced by the General storm - 18.9 inches exceeds the Local Storm PMP - 15.0 inches, but the intensity of the local storm is greater. For facilities designed to store runoff for the PMP, it is more conservative to use the General Storm.

The contributing plant-area watersheds down-gradient from Diversion Channel No. 1 have a total area of 297 acres. Using a PMP of 18.9 inches for the General storm over this area yields a conservative PMP volume requirement of 468 AF. Table 2.3 demonstrates that the
proposed facilities are adequate to contain the PMF (up to the Settling Basin Crest elevation of 4,952’).

<table>
<thead>
<tr>
<th>Table 2.3 Total Storage Volume</th>
</tr>
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<tbody>
<tr>
<td>PW Pond</td>
</tr>
<tr>
<td>235 AF</td>
</tr>
</tbody>
</table>

Supporting documentation in greater detail will be provided in a revised Site Water Management Report to be prepared and submitted separately by others.

2.9 Site Preparation

Areas of the PWTS Pond that will receive controlled fill, structural fill, or support structures will be cleared of vegetation and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Areas where structures will be built upon overburden or weathered bedrock will be scarified, moisture conditioned, and compacted to a minimum of 95% of the maximum dry density as determined by the standard proctor methods.

The PWTS Pond lies on a naturally well draining slope. However, the area will need to be excavated and graded as necessary to the contours specified in the detailed design. Any unsuitable foundation material within the pond footprint will be excavated and replaced as necessary. The side slopes of the pond will be graded to a 2.5H:1V slope in compliance with BADCT guidance (ASTM D-698).

2.10 Liner System

The PW Pond liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted bedding soil (prepared subgrade);
- A sodium bentonite Geosynthetic Clay Liner (GCL) with permeability equal to one (1) foot of low permeability soil (equivalent to 10-6 cm/s);
- A 60-mil HDPE geomembrane lower (secondary) liner;
- A Geonet leak collection layer; and
- A 60-mil HDPE geomembrane upper (primary) liner.
A cross section of the liner system for the PW Pond is presented in Illustration 2.1.

Illustration 2.1 PW Pond Liner System

All ground surfaces will be rolled and inspected prior to GCL installation. A quality assurance/quality control (QA/QC) program will be implemented as part of the construction of this facility and will comply with the BADCT Manual for liner installation, operation, and maintenance.

Typical liner details are shown on Dwg. 660-CI-007 in Appendix A.

2.11 Perimeter Containment

Inflows to the PWTS Pond will include direct rainfall and run-off from the SX/EW Plant Site area and adjacent slopes of the Dry Stack Tailings Facility. The PWTS Pond will operate as a closed system whereby rainfall and run-off collected in the pond will be treated as process water and will be used in the process circuit.

The PWTS Pond will be contained on the south and east side by the PWTS Dam. The north side and the west side will be contained by the natural topography.

2.12 Leak Detection System

A Leak Collection and Removal System (LCRS) is proposed for the PW Pond. The proposed Geonet layer will drain to a collection sump where a perforated well casing with a dedicated pump will withdraw and collected leakage and return it to the PW Pond. Details are shown on Dwg. 660-CI-007.

The TS Pond will be normally empty and is designed for temporary storage only (a "non-stormwater pond"). Therefore, LCRS is not required. The head on the liner will be maintained at low levels so that potential leakage will be minimized. A detailed leakage analysis for both the PW Pond and the TS Pond has been prepared by Tetra Tech and is included in this report in Appendix B.
Typical details for the LCRS for the PW Pond are shown on Dwg. 660-CI-007 in Appendix A.

2.13 Stability Design

The proposed design of the PWTS Dam has been analyzed for stability by Tetra Tech. The results of the stability analysis are included in Appendix B of this report.

The results of the analysis show that the PWTS Dam static and pseudo-static factors of safety against failure are adequate under normal operating conditions and with an unsaturated or saturated foundation.

2.14 Performance Inspections and Operational Monitoring

Routine facility inspections of the PWTS Pond will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan will be developed and implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 8.0 of the APP Application (Tetra Tech, 2009g).

2.15 Fate and Transport Analysis

A fate and transport analysis is not required for the PWTS Pond because this facility has been designed to be non-discharging.

2.16 Evaluation of BADCT Alternatives

As previously discussed, the PWTS Pond has been divided into two (2) sections, the PW Pond and the TS Pond. Because each pond's design and functions are different, the BADCT alternatives for each pond have been evaluated separately. The analysis by Tetra Tech is included in Appendix B.

2.17 Closure

The PWTS Pond will be closed per BADCT guidance for a bermed process pond. Any solid residue on the liner of the PWTS Pond greater than 1/4 inch thick which can be readily removed, by sweeping or high pressure water sprays, will be removed and disposed of as appropriate. The HDPE primary liner will be inspected for holes, tears, or defective seams that could have leaked. After inspection, the HDPE liner will be removed for offsite recycling or burial onsite if recycling is not a viable option. After removal and proper disposal of the Geonet the HDPE secondary liner will be inspected for holes, tears, or defective seams that could have leaked. The GCL will be removed and disposed of as appropriate and, if
necessary, the underlying surface will be visually inspected for signs of contamination. Sampling and analysis of the material may be necessary to determine the potential threat to groundwater quality and, if necessary, soil remediation will be conducted to prevent groundwater contamination. After the soil conditions have been approved, the PWTS area will be graded to drain surface run-off. The slopes of the pond will be ripped, covered, and reseeded as appropriate. In addition the following will be performed at a minimum:

- Removal of liners from embankment slopes
- Breach berm between PW Pond and TS Pond (at low end)
- Rip west slope of PWTS Dam to expose channel rock fill.
3 SETTLING BASIN

Prescriptive BADCT has not been established for the Settling Basin since it is a facility proposed for short-term storage of tailings resulting from potential upset conditions at the Tailings Filter Plant. This section includes an evaluation of the proposed BADCT design and temporary storage conditions that will ensure protection of groundwater.

3.1 Facility Description

The Settling Basin will be located along the east edge of the Plant Site at the southern extent of the McCleary Canyon drainage area. The basin will receive process upset materials comprised of nonfiltered tails slurry. It is anticipated that the tails slurry will be pumped by the thickener underflow pumps through by-pass piping to the Settling Basin. Pipelines associated with the Settling Basin will have a rigorous inspection and instrumentation program or will be double-walled and are therefore exempt from APP regulation pursuant to A.R.S. §49-250(B)(22). The Settling Basin will be sized to provide temporary storage of three (3) days of thickener underflow slurry (65% solids) during process upsets. The three (3) day period allows for adequate emergency tailings storage in case of a service interruption at the Tailings Filter Plant. Tailings decant water or stormwater can overflow via a weir and channel, or be pumped, to the PW Pond.

To accomplish the removal of tailing solids, a slurry pump will be lowered by jib crane at a fixed location. The floor of the basin will be sloped to this low area. Material will be re-slurried and directed toward the pumping location by use of water canons (monitors). To avoid damage to the gravel layer and potential damage to the GCL, a layer of gravel will be placed on top of the GCL and then anchored by a wire mesh screen similar to a gabion. The wire mesh will be vertically anchored under the gravel layer at a horizontal spacing sufficient to contain the gravel layer against the force of the water cannons should this layer inadvertently be reached. Above the screen contained gravel layer, a thicker layer of larger rock (cobble) will be placed. The cobble will be sized to resist displacement by the force of the water cannon.

A single pump launching station for both slurry pumping and water pumping (after a storm event) will simplify operation and piping design.

Alternately, tailings solids can be moved hydraulically by use of a dredge/solids pump and pumped to the tails thickeners. This method would employ a similar gravel layer design and would include an intake screen to prevent the uptake of gravel during dredging.

The tailings will be stored in the Settling Basin for a period not to exceed 90 days. Normal operating protocol would seek to return this material to the process in 3 weeks or less.

The Tails Thickener and Filter Plant have been designed with extra capacity to accommodate slurry returned to the process from the Settling Basin. The Settling Basin is considered a settling/storage surface impoundment for the evaluation of BADCT. The Settling Basin will
have a GCL lined surface impoundment with a protective gravel surface cover to facilitate the removal of tailings material.

Details for the Settling Basin are included in Appendix A. The Site Plan is shown on Dwg. 660-CI-002, with cross sections and liner details are shown on Dwg. 600-CI-003.

3.2 Authorized and Unauthorized Materials

The Settling Basin will receive contact water from the plant site (via a conveyance channel), stormwater, and process upset materials comprised of non-filtered tailings from the Tailings Thickeners. Tailings are finely ground waste rock roughly the consistency of silty sand that is separated from ore during the concentration/flotation stage of sulfide ore processing. The non-filtered tailings will consist of slurry that is about 65% solids and 35% water by weight.

There will be no discharge of unauthorized materials such as used oil, fuel, solid waste, garbage, etc. to the Settling Basin.

3.3 Site Selection

The site was selected by Rosemont and M3 Engineering personnel during basic engineering efforts for the Project. The Settling Basin is located adjacent and east of the tails thickeners and tails filter plant.

3.4 Site Characterization

The Settling Basin is located at the southern extent of the McCleary Canyon drainage area. Groundwater elevations within the area range from approximately 4,900 to 4,950 feet amsl. Vegetation at the sites consists of a sparse coverage of native grasses and shrubs.

Seismic refraction surveys were completed near the basin location from 2006 to 2007 under the direction of Tetra Tech. Results from the seismic survey was used to assess bedrock rippability and is presented in the Geotechnical Study (Tetra Tech, 2007d).

The Settling Basin is underlain by the early Cretaceous Willow Canyon Formation. The Willow Canyon is characterized as an arkosic (feldspathic) sandstone and argillaceous sandstone, with equal to subordinate amounts of vuggy, silty mudstone. Additionally, an interval of volcanioclastic pebble-cobble conglomerate is present below a sequence of andesitic lava flows within the formation. The depth to bedrock within the footprint of the Settling Basin is estimated to range from less than one (1) foot to 20 feet, but is expected to be rippable where excavations for construction are necessary.

3.5 Surface Water Control

The Settling Basin will be located outside the 100-year water surface elevation for the McCleary Canyon Wash in order to minimize the impact of storm flow during operation.
However, the Settling Basin is designed and placed to receive all contact water from the sulphide ore processing plant areas.

In order to minimize the amount of run-on stormwater that reports to the Settling Basin, Diversion Channel No. 1 (formerly the PWTS Diversion) will be constructed west of the Plant Site to collect stormwater flows and divert them away from the facilities. Diversion Channel No. 1 will be designed to divert run-off from the 100-year, 24-hour storm event.

3.6 Geologic Hazards

There are no geologic hazards specific to the Settling Basin.

3.7 Solution Characterization

The Primary Settling Basin will provide emergency containment of non-filtered tailings from the Tailings Thickeners. Geochemical characterization and physical testing of the tailings generated from bench-scale metallurgical tests are discussed in Section 7.2.7 of the APP Application.

3.8 Capacity and Storage Design

The Settling Basin will be sized to provide temporary storage for the equivalent of three (3) days of Tails Thickener underflow slurry while maintaining two (2) feet of freeboard. This underflow rate of 11,940 gpm therefore requires 51.6 million gallons or 158 ac-ft of storage. The current volume requirements for the Settling Basin are presented on Table 3.1. It should be emphasized that discharge of slurry would be infrequent under normal operations and rarely, if ever, would that discharge be a continuous flow for 72 consecutive hours. If the Settling Basin were filled with 3 days of slurry, the slight excess of stormwater beyond the total volume provided will overflow to the PW Pond which has excess capacity.

<table>
<thead>
<tr>
<th>3 Days Tailings Thickener Underflow (ft³)</th>
<th>Design Storm Volume (ft³)</th>
<th>Two (2) Feet Freeboard Volume (ft³)</th>
<th>Total Volume Required (ft³)</th>
<th>Total Volume Provided (ft³)</th>
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</thead>
<tbody>
<tr>
<td>6,895,000 (51.6 M Gal)</td>
<td>701,300 (5.2 M Gal)</td>
<td>693,500 (5.2 M Gal)</td>
<td>8,289,800 62 M Gal</td>
<td>8,202,222 61.4 M Gal</td>
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<tr>
<td>158 AF</td>
<td>16 AF</td>
<td>16 AF</td>
<td>190 AF</td>
<td>188.3 AF</td>
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</tbody>
</table>

3.9 Site Preparation

Areas of the Settling Basin that will receive controlled fill, structural fill, or support structures will be cleared of vegetation and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Areas where structures will be built upon overburden or
weathered bedrock will be scarified; moisture conditioned, and compacted to a minimum of 95% of the maximum dry density as determined by the standard proctor methods.

The proposed Settling Basin location lies on a naturally well draining slope. However, the area will need to be excavated and graded to the contours specified in the detailed design. Any unsuitable foundation material within the basin footprint will be excavated and replaced as necessary. The side slopes of the basin will be graded to a 2.5H:1V slope in compliance with BADCT guidance.

3.10 Liner System

The Settling Basin liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted bedding soil (prepared subgrade);
- A sodium bentonite GCL with permeability equal to or less than one (1) foot of compacted soil (equivalent to 10-6 cm/sec); and
- A minimum 18 inch thick layer of 1.5 inch minus protective rock.
- A wire mesh screen, anchored vertically through the gravel layer, sized to prevent the displacement of the 1.5 inch protective rock.
- A minimum 18 inch thick layer of 6”< $D_{50}$ <12” protective rock.

A cross section of the liner system for the Settling Basin is presented in Illustration 3.1.

Illustration 3.1 Settling Basin Liner System
All ground surfaces will be rolled and inspected prior to GCL installation. A quality assurance/quality control (QA/QC) program will be implemented during liner installation, operation, and maintenance as part of the general construction QA/QC and will meet BADCT guidance standards.

Typical liner details are shown on Dwg. 660-CI-003 in Appendix A.

3.11 Perimeter Containment

The Settling Basin will be protected by containment berms along the north and northeast edges. The remaining perimeter will be contained by natural topography.

3.12 Leak Detection System

A Leak Collection and Removal System (LCRS) is not proposed for the Settling Basin. A LCRS is not necessary because the engineering control achieved by the proposed design is adequate based on BADCT for a settling/storage surface impoundment containing non-filtered tailings. Additionally, the Settling Basin is designed for temporary storage which will minimize the potential for impacts to groundwater.

3.13 Stability Design

The proposed design of the Settling Basin has been analyzed for stability by Tetra Tech. The results of the stability analysis are included in the Appendix C.

The results of the analysis show that the Settling Basin static and pseudo-static factors of safety against failure are adequate under normal operating conditions and with an unsaturated or saturated foundation.

3.14 Performance Inspections and Operational Monitoring

Routine facility inspections of the Settling Basin will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan will be developed and implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 8.0 of the APP Application (Tetra Tech, 2009g).

3.15 Fate and Transport Analysis

A fate and transport analysis is not required for the Settling Basin because this facility will only be used on a temporary basis during process upset conditions. Tailings will be removed from the basin after short term containment.
3.16 Evaluation of BADCT Alternatives

The analysis by Tetra Tech is included in Appendix C.

3.17 Closure

The Settling Basin will be closed per BADCT guidance for a settling/storage surface impoundment. The GCL will be removed and disposed of as appropriate and, if necessary, the underlying surface will be visually inspected for signs of contamination. Sampling and analysis of the material to determine the potential threat to groundwater quality and, if necessary, soil remediation will be conducted. Once removal is complete, the Settling Basin will be graded to drain surface run-off. The slopes of the basin will be ripped, covered, and reseeded as appropriate.
4 References

Hydrometeorological Report No, 49 by NOAA and the U. S. Army Corps of Engineers (USDC, 1984)

Tetra Tech, 2007a. Baseline Geochemical Characterization

Tetra Tech, 2007c. Geologic Hazards Assessment

Tetra Tech, 2007d. Geotechnical Study

Tetra Tech, 2009g. Rosemont Aquifer Protection Permit (APP) Application

Tetra Tech, 2009h. Geotechnical Addendum 1.
## APPENDIX A

### PRELIMINARY DESIGN DRAWINGS

<table>
<thead>
<tr>
<th>Dwg. No.</th>
<th>Rev.</th>
<th>Description</th>
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<td>P2</td>
<td>Cover Sheet</td>
</tr>
<tr>
<td>660-CI-002</td>
<td>P2</td>
<td>Settling Basin Plan</td>
</tr>
<tr>
<td>660-CI-003</td>
<td>P2</td>
<td>Settling Basin Section &amp; Details</td>
</tr>
<tr>
<td>660-CI-004</td>
<td>P2</td>
<td>Process Water Pond Site Plan</td>
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<tr>
<td>660-CI-005</td>
<td>P2</td>
<td>Process Water Pond Grading Plan</td>
</tr>
<tr>
<td>660-CI-006</td>
<td>P2</td>
<td>Process Water Pond Cross Sections</td>
</tr>
<tr>
<td>660-CI-007</td>
<td>P2</td>
<td>Process Water Pond Sections &amp; Details</td>
</tr>
</tbody>
</table>

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M3-PN08036
April 2009
Rev. P2
ROSEMONT COPPER
PROCESS WATER POND,
TEMPORARY STORAGE POND,
SETTLING BASIN
APPENDIX B

TECHNICAL MEMORANDUM –

“ROSEMONT COPPER BADCT ANALYSIS FOR THE PWTS POND”

TETRA TECH, DATED MAY 4, 2009.
Rosemont Copper Project
Locator Sheet

Record # 012400

Document Date: 2009 05 04

Document Title: Rosemont Copper BADCT Analysis for the PWTS Ponds

Document Author: Mike Thornbrue & David Krizek, Tetra Tech

Document Description: PWTS ponds have been designed to meet or exceed BADCT.

Other Notes: Appendix B

This document is located in the following:

[CIRCLE THE CATEGORY (from the list below) IN WHICH THIS ITEM IS FILED]

1. Project Management
   a. Formal recommendations & Directions
   b. Formal meeting minutes & memos
   c. General Correspondence
   d. Contracts, Agreements, & MOUs (Rosemont, Udall, SWCA)
   e. Other

2. Public Involvement
   a. Announcements & Public Meetings
   b. Mailing Lists
   c. Scoping Period Comments
   d. Udall Foundation Working Group
   e. Scoping Reports
   f. Comments after Scoping Period
   g. DEIS Public Comments

3. Agency Consultation & Permits
   a. Army Corps of Engineers (404 permit)
   b. US Fish & Wildlife Service (Sec. 7 T&E)
   c. State Historic Preservation Office (Sec. 106)
   d. Tribes (Sec. 106)
   e. Advisory Council on Historic Preservation (Sec. 106)
   f. Other

4. Communication
   a. Congressional
   b. Cooperating Agencies
   c. Organizations
   d. Individuals
   e. FOIA
   f. Internal
   g. Proponent

5. Proposed Action

6. Alternatives
   a. Cumulative Effects Catalog
   b. Connected Actions
   c. Dismissed from Detailed Analysis
   d. Analyzed in Detail

7. Resources
   a. Air Quality & Climate Change
   b. Biological
   c. Dark Skies
   d. Fuels & Fire Management
   e. Hazardous Materials
   f. Heritage
   g. Land Use
   h. Livestock Grazing
   i. Noise & Vibration
   j. Public Health & Safety
   k. Recreation & Wilderness
   l. Riparian
   m. Socioeconomics & Environmental Justice
   n. Soils & Geology
   o. Transportation & Access
   p. Visual
   q. Water

8. Reclamation

9. DEIS

10. FEIS

11. Geospatial Analysis (GIS Data)

12. FOIA Exempt Documents

13. ROD (including BLM & ACOE)
APPENDIX C

TECHNICAL MEMORANDUM —

"ROSEMONT COPPER BADCT ANALYSIS FOR THE SETTLING BASIN"

TETRA TECH, DATED MAY 4, 2009.
Rosemont Copper Project
Locator Sheet

Document Date: 2009-05-04

Document Title: Rosemont Copper BADCT Analysis for the Settling Basin

Document Author: Mike Thorne & David Krizek, Tetra Tech

Document Description: BADCT will be employed for the Settling Basin

Other Notes: Appendix C.

This document is located in the following

1. Project Management
   a. Formal recommendations & Directions
   b. Formal meeting minutes & memos
   c. General Correspondence
   d. Contracts, Agreements, & MOUs (Rosemont, Udall, SWCA)
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4. Communication
   a. Congressional
   b. Cooperating Agencies
   c. Organizations
   d. Individuals
   e. FOIA
   f. Internal
   g. Proponent
   h. Other

5. Proposed Action
   a. Mine Plan (including compilation)
   b. Supporting Documents
   c. Detailed Designs

6. Alternatives
   a. Cumulative Effects Catalog
   b. Connected Actions
   c. Dismissed from Detailed Analysis
   d. Analyzed in Detail

7. Resources
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   b. Biological
   c. Dark Skies
   d. Fuels & Fire Management
   e. Hazardous Materials
   f. Heritage
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