Date: August 27, 2010
To: File
From: Craig Hunt, P.E.
Subject: PWTS Pond and Settling Basin Design Revisions

Project No.: M3-PN08036
Project Title: Rosemont Copper Company
Copy To: Kathy Arnold, P.E., Rosemont Copper Company

1.0 Introduction

This technical memorandum addresses design and drawing revisions that have occurred since the preparation of the report entitled “Process Water Pond, Temporary Storage Pond, and Settling Basin Design Report”, May 2009 (the “Design Report”). It also provides responses to agencies requests resulting from review of the Design Report.

2.0 General Revisions

2.1 Topography

Since the Design Report was prepared, a more accurate topographic survey has been received. Contour intervals of 2 feet are now available throughout the plant site area compared to only 10-foot contours previously. Earthwork quantities for plant site grading and facilities can now be determined with greater accuracy. Generally, topographic surveys have an accuracy of about one half of a contour interval. The newer survey typically displayed an upward shift of elevation values of about 5 to 6 feet, consistent with the level of accuracy of the original survey. In most cases, design elevations for the PWTS Pond and Settling Basin were not revised due to the gravity relationships between them and other plant facilities. Consequently, earthwork volumes and pond/basin capacities have been affected.

2.2 Facility Geometry

Engineering design for the project has continued to progress. Various plant facilities have been adjusted based on design optimizations and selection of specific equipment. Correspondingly, the PWTS Pond and Settling Basin geometries have had minor adjustments to be complimentary to adjacent facilities, access, and grading slopes, to improve constructability, and to accommodate detailed design considerations.

3.0 Process Water Temporary Storage (PWTS) Pond

3.1 Process Water Pond

The Process Water (PW) Pond was designed to hold a minimum 24-hour supply of the process water required at the mill. The design recirculating rate increased from 24,190 gpm to 27,735 gpm which therefore requires 39.9 million gallons or 123 acre feet of storage. The Reclaimed Water Tank was eliminated. Now the process water barge pumps transfer process water directly to the mill and Process Water Tank.

The minimum floor elevation of the PWTS Pond was raised from 4,892 feet (amsl) to 4900' in order to avoid unnecessary excavation beneath the existing flowline of the Wasp Canyon Wash (and/or tributary) and to therefore minimize the potential for encountering groundwater during construction.
The design capacity of the PWTS Pond has changed due to several factors. Detailed grading and drainage designs have been developed for each of the plant facilities. Therefore, the contributing watershed area for the design storm has been refined. Also, the PWTS embankment crest elevation was raised from 4950’ to 4952’. Further, pond geometry changes, as discussed in Section 2.2, have affected the volumes. The volume requirements were presented in Table 2.1 in the original report. A revised Table 2.1 is included below.

**Revised Table 2.1 PW Pond Volume Requirements**

<table>
<thead>
<tr>
<th></th>
<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></td>
<td>5,339,400 (39.9 M Gal)</td>
<td>1,176,100 (79 AC)</td>
<td>978,150 (489,075 ft² x 2 feet)</td>
<td>7,493,650 (172 AF)</td>
<td>9,312,700 (214 AF)</td>
</tr>
<tr>
<td></td>
<td>122.6 AF</td>
<td>27 AF</td>
<td>22.4 AF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2 Temporary Storage Pond

The Temporary Storage (TS) Pond has also been revised. The volume requirements were presented in Table 2.2 in the original report. A revised Table 2.2 is included below.

**Revised Table 2.2 TS Pond Volume Requirements**

<table>
<thead>
<tr>
<th></th>
<th>Design Storm Volume (ft³)</th>
<th>Freeboard Volume (@ 3'-9½&quot;) (ft³)</th>
<th>Total Volume Required (ft³)</th>
<th>Total Volume Provided (ft³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,176,100 (63.8 AC)</td>
<td>523,200 (261,600 ft² x 2 feet)</td>
<td>1,699,300 (39 AF)</td>
<td>5,086,395 (117 AF)</td>
</tr>
<tr>
<td></td>
<td>27 AF</td>
<td>12.0 AF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Revised design drawings are included in Appendix A.

3.3 Probable Maximum Flood (PMF)

The original Design Report demonstrated that the combined storage volume of the PW Pond, the TS Pond and the Settling Basin was adequate to contain the PMF. At the time, it seemed desirable to contain the PMF in order to avoid flooding plant facilities. Present layout and elevations of the plant facilities demonstrate that there would be no buildings or equipment subject to damage from inundation by the PMF. Therefore, full containment of the PMF is unnecessary for this reason and reductions of capacity of both the PW Pond and the TS Pond, as shown in the tables above, are acceptable. The contributing plant-area watersheds down gradient from Diversion Channel No. 1 now have a total area of 221 acres. This reflects a significant reduction of area due primarily to less drainage off the western slopes of the Dry Stack Tailing Facility in accordance with the current storm water management design for the tailings slopes. Using a PMP of 18.9 inches for the General storm over this area yields a conservative PMP volume requirement of 348 AF. Under a PMF scenario, the three ponds would function as a system of storage elements. The PW Pond would fill first, then overflow into the TS Pond until both were full. The PW Pond would then back up the channel between it and the Settling Basin and “overflow” into the Settling Basin until it too was full. Revised Table 2.3 shows that the combined storage capacity of all three facilities (up to the maximum crest elevation of 4952’) is more than adequate to contain the PMF event.
Revised Table 2.3 Total Storage Volume

<table>
<thead>
<tr>
<th>BW Pond</th>
<th>TS Pond</th>
<th>Settling Basin</th>
<th>Stormwater Ponds</th>
<th>Less BW Pond Operating Volume</th>
<th>Net Volume Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>214 AF</td>
<td>117 AF</td>
<td>188 AF</td>
<td>35 AF</td>
<td>123 AF</td>
<td>431 AF</td>
</tr>
</tbody>
</table>

4.0 Settling Basin

4.1 Phased Construction

The main function of the Settling Basin was to receive tails slurry in the event of a process upset. Both plant and process designs have been adapted to include storage elements and extra filter capacity which provide time in the process to respond to upsets. There is a greater level of confidence such that process upsets seem less likely and the perceived necessity of the Settling Basin (to fulfill this primary function) is reduced. Further, during plant commissioning, total tonnage through the plant will be at a reduced rate. A ramp-up period of six to eight months is anticipated before design tonnage is achieved. Plant piping design does not currently include a pumped bypass of tails slurry as was previously planned.

Nevertheless, this facility has been retained for its secondary function of providing stormwater storage capacity. Also, it is recognized that a minimal volume of tails slurry storage capacity would remain. In the event of power failure, it would be necessary to purge the tails slurry from the pipelines between the tails thickeners and the Tailings Filter Plant to prevent these pipelines from plugging due to settling of slurry solids.

Therefore, only a small portion of the Settling Basin would be initially lined. This phase 1 area would be adequate to contain the volume of tails slurry within the pipelines. The structures necessary to accommodate intake and extraction of the slurry will be constructed in this initial phase. However, the water cannons and process water pipe loop around the Settling Basin will be deferred. Slurry pipeline volume would be less than 50,000 gallons. Slurry removal would be on a much smaller scale in terms of volume, depth, and surface area. Water trucks or other small scale equipment would be adequate to facilitate slurry removal. An earthen berm has been added at the southern limit of the phase 1 liner. This berm will prevent any deposited tails slurry from migrating into the unlined area at the south end of the basin. The berm shall be 8 feet high in order to contain the 100-year, 24-hour storm event in the central and northern portions of the basin.

If during the commissioning and ramp-up period, process dynamics suggest that a greater slurry storage volume is warranted, the remainder of the liner and the other deferred items could be installed at that time (phase 2). The Settling Basin is still sized to hold 3 days of thickener underflow slurry. The basin volume requirements previously presented in Table 3.1 of the Design Report are unchanged.

4.2 Liner System

The liner system presented in the Design Report was proposed, in part, under the belief that it would be more cost effective than using a geomembrane. Subsequently, costs have been determined and it is clear that this assumption was incorrect. Therefore, the liner system has been changed to more closely match a typical BADCT lining system for a non-stormwater pond.
The Settling Basin proposed liner system will now 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 60-mil HDPE geomembrane liner.

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

**Revised Illustration 3.1 Settling Basin Liner System**

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### 4.3 Requested Information

Agency review of the Design Report resulted in certain requested information as follows. The maximum operating depth is 37' at the center of the basin, 34' at the ends. The design freeboard is 2'. The design capacity is 174 AF at an elevation of 4950'. This can accommodate 185,890 tons of slurry. This information is also listed in notes on drawing 660-CI-002. In addition, an anchor trench detail was requested. Anchor trench details are now depicted on drawing 660-CI-003. See Appendix A for revised drawings.

### 5.0 References

APPENDIX A

REVISED DESIGN DRAWINGS
1. The maximum operating depth is 37'.
2. The design freeboard is 2'.
3. The design capacity is 174 acre-feet at an elevation of 4950'.