Technical Memorandum
Barrel Only Alternative
Stormwater Assessment

To: Kathy Arnold  From: David R. Krizek, P.E.
Company: Rosemont Copper Company  Date: March 05, 2010
CC: Mike Zeller (Tetra Tech)  Doc #: 059/10-320871-5.3

1.0 Introduction
This Technical Memorandum presents a Stormwater Assessment for the Barrel Only Alternative being considered in the US Forest Service Environmental Impact Statement (EIS) for the proposed Rosemont Copper Project (Project). This analysis quantifies the potential impact of the Barrel Only Alternative on downstream stormwater flows and average-annual runoff.

In order to determine the potential stormwater impact associated with the Barrel Only Alternative, predictions were made for the 100-year regulatory flood-peak [in cubic feet per second (cfs)] and the average-annual runoff (in acre-feet) at a common point associated with the affected drainages. The affected drainages on the east side of the Santa Rita Mountains converge at the United States Geological Survey (USGS) Gauging Station No. 09484580 before storm flows pass beneath State Route 83 (SR 83) in a double-barrel box culvert. Per information associated with the station, the contributing watershed area is calculated to be 14 square miles in size. Figure 1 shows the watershed basins contributing to this gauging station.

2.0 Pre-Mining/Baseline Hydrology
Figure 1 shows the pre-mining or baseline watershed conditions associated with the Barrel Only Alternative. These contributing watershed areas drain to the USGS Gauging Station prior to storm flows passing beneath SR 83. The baseline stormwater analysis associated with this location is detailed in the Technical Memorandum titled Mine Plan of Operations Stormwater Assessment (Tetra Tech, 2010) prepared as part of the alternatives analysis for the Project.

The baseline assessment is assumed to be the same for all the alternatives, including the Mine Plan of Operations (MPO), for storm flows generated on the east side of the Santa Rita Mountains. An additional baseline assessment was made for the Sycamore Tailings and Barrel...
Memorandum

To: Beverly Everson  
Cc: Tom Furgason  
From: Kathy Arnold  
Doc #: 010/10 – 15.3.2  
Subject: Transmittal of Stormwater Assessment Memoranda  
Date: March 15, 2010

Rosemont Copper is pleased to present a series of Technical Memoranda on Stormwater Assessments prepared by Tetra Tech and dated March 15, 2010. These analysis include the following alternatives:

1. Mine Plan of Operations  
2. Barrel and McCleary Alternative  
3. Barrel Only Alternative  
4. Scholefield and McCleary Alternative and  
5. Sycamore and Barrel Alternative

There is also a discussion of the Visual Analysis as it relates to Partial Backfill.

These Technical Memoranda are dated March 5, 2010 and I am providing two hardcopies and one electronic file to the Forest Service and one hardcopy and one electronic file to SWCA.
Waste Alternative. This is the only alternative with facilities located on the west side of the Santa Rita Mountains.

Table 1.0 shows the pre-mining results for the 100-year regulatory flood-peak and the average-annual runoff arriving at USGS Gauging Station No. 09484580, based on the analysis performed for the MPO stormwater assessment. These values also apply to the baseline or pre-mining conditions associated with the Barrel Only Alternative.

<table>
<thead>
<tr>
<th>Point of Concentration</th>
<th>Baseline Conditions (DA = 14.0 square miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USGS Gauging Station</td>
<td>Peak Discharge: 8072 cfs</td>
</tr>
<tr>
<td></td>
<td>Average-Annual Runoff: 1407 acre-feet</td>
</tr>
</tbody>
</table>

DA = Discharge Area

3.0 Post-Mining Watershed Conditions

For the Barrel Only Alternative, it was assumed that the following stormwater controls would be applied:

- Stormwater drainage channels would be placed at every 100 feet of vertical rise on the outer slopes of the Dry Stack Tailings Facility. Stormwater would flow off these benches to stilling pools/drop-structures, located on the outer slopes of the tailings area, to natural ground, or to rock slopes adjacent to the Waste Rock Storage Area. Drop-structures located on the west side of the Dry Stack Tailings Facility would drain to the USGS Gauging Station. Drop-structures would also be located on the west side of the landform that comprises the Barrel Only Alternative. These drop-structures would convey flows to flow-through drains. The flow-through drains are large rock drains intended to provide a hydraulic connection between the up-gradient side of the landform and the down-gradient side.

- Stormwater control basins would be constructed on wide benches in the Waste Rock Storage Area to contain up to the 500-year, 24-hour storm event. Stormwater generated from flows in excess of the 500-year, 24-hour storm event would generally be routed to containment areas located between the toe of the Waste Rock Storage Area and adjacent natural ridge areas. These areas would generally be sized to contain the Probable Maximum Precipitation (PMP) event. Stormwater routing to these perimeter containment areas would be via rocked slopes connecting the benches to the perimeter areas.

- Decant structures would be installed on top of the Dry Stack Tailings Facility to pass stormwater to stilling pools/drop-structures for flows in excess of the 500-year, 24-hour storm event. Storm flows less than this event would be retained on top of the facility in large, depressed areas.

- Construction of a portion of the AMEC Earth & Environment, Inc. (AMEC) diversion channel is assumed. This diversion channel routes stormwater runoff around the
Plant Site area to McCleary Canyon Wash drainage, which eventually drains to the USGS Gauging Station location.

- The Pit Diversion, located to the south of the Open Pit, is expected to discharge to an area located between the toe of the Waste Rock Storage Area and an adjacent natural ridge and will not drain to the USGS Gauging Station.

Drainage benches would also be required on a small portion of the Waste Rock Storage Area adjacent to the closed and encapsulated Heap Leach Facility. These drainage benches would be similar to those planned for the outer surface of the Dry Stack Tailings Facility. Runoff from these benches would be to the up-gradient side of the landform.

Stormwater control basins located in the Waste Rock Storage Area would not be located above the closed and encapsulated Heap Leach Facility.

### 4.0 Post-Mining Hydrology

Figure 2 depicts the estimated post-mining watershed area draining to the USGS Gauging Station for the Barrel Only Alternative. The contributing basin area shown on Figure 2 (about 8.65 square miles) is only applicable to the 100-year regulatory flood-peak and to the average-annual runoff, based on the following assumptions:

- The top of the dry stack tailings is assumed to contain storm runoff from up to the 500-year, 24-hour storm event.

- The stormwater control basins in the Waste Rock Storage Area are assumed to contain storm runoff up from up to the 500-year, 24-hour storm event. The perimeter areas associated with the Waste Rock Storage Area are assumed to contain storm runoff from up to the PMP event.

- No downstream stormwater contribution is expected from the flow-through drains associated with average-annual conditions. Therefore, ordinary runoff from any watershed located up-gradient of the landform associated with the Barrel Only Alternative is not expected to arrive at the USGS Gauging Station.

- Should runoff from a 100-year regulatory event reach the down-gradient end of the flow-through drains, the flood-peak would be significantly attenuated, and is not expected affect the peak value experienced at the USGS Gauging Station.

- Storm runoff from the Pit Diversion is not anticipated to reach the USGS Gauging Station.

Table 2.0 shows the anticipated post-mining results for the 100-year regulatory flood-peak and for the average-annual runoff arriving at USGS Gauging Station No. 09484580 for the Barrel Only Alternative. Attachment 1 provides the backup data for the post-mining stormwater assessment.
Table 2.0 Barrel Only Post-Mining Hydrology Results

<table>
<thead>
<tr>
<th>Point of Concentration</th>
<th>Post-Mining Conditions (DA = 8.65 square miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Discharge</td>
</tr>
<tr>
<td>USGS Gauging Station</td>
<td>5254 cfs</td>
</tr>
</tbody>
</table>

5.0 Conclusions

The results of the baseline and post-mining hydrology assessment for the Barrel Only Alternative indicate that flood-peaks generated by the 100-year regulatory event on the east side of the Santa Rita Mountains, and arriving at the USGS Gauging Station, would likely be reduced by 34.9%, when compared to pre-mining conditions. Correspondingly, the average-annual runoff would likely be reduced by 33.8%, when compared to pre-mining conditions.

6.0 References

BARREL ONLY ALTERNATIVE

Post-Mining Conditions Model
### Subbasin Area (MI2)

<table>
<thead>
<tr>
<th>Subbasin</th>
<th>Area (MI2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scholefield Canyon</td>
<td>3.3</td>
</tr>
<tr>
<td>R McCleary Canyon</td>
<td>2.08</td>
</tr>
<tr>
<td>R Barrel Canyon</td>
<td>0.77</td>
</tr>
<tr>
<td>R Unknown Canyon</td>
<td>2.5</td>
</tr>
</tbody>
</table>

### Subbasin Lag Time (MIN)

<table>
<thead>
<tr>
<th>Subbasin</th>
<th>Lag Time (MIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scholefield Canyon</td>
<td>70.10</td>
</tr>
<tr>
<td>R McCleary Canyon</td>
<td>46.46</td>
</tr>
<tr>
<td>R Barrel Canyon</td>
<td>29.6</td>
</tr>
<tr>
<td>R Unknown Canyon</td>
<td>71.79</td>
</tr>
</tbody>
</table>

### Initial Abstraction, Curve Number, Impervious (%)

<table>
<thead>
<tr>
<th>Subbasin</th>
<th>Initial Abstraction (IN)</th>
<th>Curve Number</th>
<th>Impervious (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scholefield Canyon</td>
<td>85.75</td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td>R McCleary Canyon</td>
<td>85.72</td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td>R Barrel Canyon</td>
<td>83.8</td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td>R Unknown Canyon</td>
<td>75</td>
<td></td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Met Name: Type 2, 24 hr Mean ARF-H40

- **Description:**
- **Precipitation:** SCS Storm
- **Evapotranspiration:** --None--
- **Snowmelt:** --None--
- **Unit System:** U.S. Customary

### Met Name: Type 2, 24 hr Mean ARF-H40

- **Method:** Type 2
- **Depth (IN):** 4.23