Technical Memorandum
Expanded Barrel Only Alternative
Stormwater Assessment

To: Kathy Arnold
From: Ronson Chee
Company: Rosemont Copper Company
Date: September 10, 2010
CC: David Krizek, P.E.
Doc #: 0/10-320878-5.3

1.0 Introduction

This Technical Memorandum presents a Stormwater Assessment for the Expanded 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 preliminary grading scheme associated with the Expanded Barrel Only Landform on downstream stormwater flows and average-annual runoff.

In order to determine the potential stormwater impact associated with the Expanded 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 Expanded 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.

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 Expanded Barrel Only Alternative.
Memorandum

To: Bev Everson
Cc: Tom Furgason
From: Kathy Arnold
Doc #: 041/10 15.3.2
Subject: Transmittal of Information for Alternatives
Date: September 30, 2010

Rosemont is pleased to transmit the following documents:

- A Cultural Resource Survey of the 46kV Alternative and Additional Areas for the Rosemont Project 138kV Line, EPG, September 2010
- Technical Memorandum Rosemont Alternatives Infiltration Analysis, Tetra Tech, September 15, 2010
- Technical Memorandum on Expanded Barrel Only Alternative Stormwater Assessment, Tetra Tech, September 10, 2010
- Technical Memorandum Rosemont Expanded Barrel Only Alternative Stormwater Control Features, Tetra Tech, September 15, 2010

Rosemont is providing three hardcopies and two disk copies for the Forest and two hardcopies and one disk copy for SWCA of the reports.
Table 1.0  Expanded Barrel Only Baseline Hydrology Results

<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 1407 acre-feet</td>
</tr>
</tbody>
</table>

3.0 Post-Mining Watershed Conditions

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

- The largest stormwater control feature associated with the Expanded Barrel Only Landform (Landform) is the New Barrel Canyon drainage. Its alignment runs between the Dry Stack Tailings Facility and the Waste Rock Storage Area. New Barrel Canyon is the main drainage channel designed to convey stormwater runoff from the reclaimed surface of the Landform. The channel would have a composite bed slope ranging from 4% to 5%.

  The profile of the New Barrel Canyon drainage would be stepped, with sloping channel segments and stilling/energy dissipation pools along its alignment. Drainage benches would feed into New Barrel Canyon at 100 foot elevation increments along the artificial canyon. The steepness of the New Barrel Canyon drainage would require armoring along the entire length of the drainage.

- Stormwater control on the reclaimed surface of the Waste Rock Storage Area would consist of detention basins, drainage benches, drop structures, and stilling pools.

  The southern side of the Waste Rock Storage Area would retain runoff in detention basins up to the NRCS 500-year, 24-hour event. Runoff volumes exceeding the 500-year, 24-hour event would be routed down the waste rock slopes at select locations (armored) and into perimeter containment areas (PCAs). The spillover areas would be armored with run-of-mine (ROM) rock. The combined storage volume of the detention basins and the PCAs would manage runoff volumes up to the General PMP event.

  Drainage benches on the southeastern side of the Waste Rock Storage Area would route runoff to drop structures and into a PCA. Overflow from the PCA would flow along the toe of the Waste Rock Storage Area and report to New Barrel Canyon via an Overflow Drainage Bench.

  The eastern side of the Waste Rock Storage Area has a ridge that runs adjacent to Highway 83. The ridge serves as a drainage divide for the benches. Stormwater on the eastern side of the ridge would report to a PCA and could eventually flow north to the USGS gauging station.

- Stormwater control associated with the Dry Stack Tailings Facility would consist of drainage benches and drop structures. Pooling on the top surfaces of the Dry Stack Tailings Facility would be limited.
Drainage benches on the northern face of the North Dry Stack Tailings Facility would route flows to a drop structure located at the northwest corner of the facility. This drop structure would direct flow into McCleary Canyon.

Drainage benches on the western face of the North Dry Stack Tailings Facility would eventually report to a flow-through drain via a rock-lined channel located parallel to a former haul road. Stormwater runoff generated on the top surface of the North Dry Stack Tailings Facility would also report to this haul road drainage channel.

Drainage benches on the eastern side of the North Dry Stack Tailings Facility would route flows to a drop structure and into New Barrel Canyon.

Drainage Benches on the western face of the South Dry Stack Tailings Facility would route flow off the Landform. This flow would travel north along the toe of the Landform and into a flow-through drain.

Drainage benches on the eastern side of the South Dry Stack Tailings Facility would route flow to a drop structure located at the southeastern corner of this facility and into New Barrel Canyon.

The South Dry Stack Tailings Facility would partially encapsulate the Heap leach Pad. Therefore, stormwater would generally be shed off the reclaimed surface of the South Dry Stack Tailings Facility without detention.

- 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, which eventually drains to the USGS gauging station location.

- The Pit Diversion Channel, 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.

4.0 Post-Mining Hydrology

Figure 2 depicts the estimated post-mining watershed area draining to the USGS gauging station for the Expanded Barrel Only Alternative. The total contributing basin area shown on Figure 2 (about 7.56 square miles) is only applicable to the 100-year regulatory flood-peak and to average-annual runoff, based on the following assumptions:

- The top of the dry stack tailings would either contain storm runoff or would shed runoff to the western side of the Landform.

- The northern face of the North Dry Stack Tailings Facility would shed runoff into McCleary Canyon wash.

- Flows directed to the New Barrel Canyon drainage would be retained/attenuated in stilling/energy dissipation pools. The stilling/energy dissipation pools located along the New Barrel Canyon drainage are expected to retain storm runoff from average-
annual conditions and likely up to the 100-year regulatory event. If the pools cannot retain the 100-year event, the peak flows would be significantly attenuated so as not to affect the peak value at the USGS gauging station.

- Stormwater detention basins located in the southern portion the Waste Rock Storage Area are assumed to contain storm runoff from up to the 500-year, 24-hour storm event. The perimeter areas associated with the Waste Rock Storage Area, in combination with these pools, are assumed to contain storm runoff from a General 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 Expanded Barrel Only Alternative Landform 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 to affect the peak value experienced at the USGS gauging station.

- Storm runoff from the Pit Diversion Channel 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 average-annual runoff arriving at USGS Gauging Station No. 09484580 for the Expanded Barrel Only Alternative. Attachment 1 provides the backup data for this post-mining stormwater assessment.

### Table 2.0 Expanded Barrel Only Post-Mining Hydrology Results

<table>
<thead>
<tr>
<th>Point of Concentration</th>
<th>Post-Mining Conditions (DA = 7.56 square miles)</th>
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<tbody>
<tr>
<td></td>
<td>Peak Discharge</td>
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<tr>
<td>USGS Gauging Station</td>
<td>4845 cfs</td>
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### 5.0 Conclusions

The results of the baseline and post-mining hydrology assessment for the Expanded 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 approximately 40.0% when compared to pre-mining conditions. Correspondingly, the average-annual runoff would likely be reduced by approximately 42.0% when compared to pre-mining conditions.
References

ATTACHMENT 1
<table>
<thead>
<tr>
<th>Subbasin</th>
<th>Initial Abstraction (in)</th>
<th>Curve Number</th>
<th>Impervious (%)</th>
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**Precipitation**

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

**Method:** Type 2

*Depth (IN):* 4.23

**Meteorology Model**

**Basins**

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

**Description:**

**Precipitation:** SCS Storm

**Evapotranspiration:** --None--

**Snowmelt:** --None--

**Unit System:** U.S. Customary

**Global Summary Results for Run "Rosemont Closure"**

- **Project:** Exp Barrel Only SW
- **Simulation Run:** Rosemont Closure

- **Start of Run:** 01Jan2006, 12:00
- **End of Run:** 02Jan2006, 12:55
- **Compute Time:** 10Sep2010, 11:22:44

**Show Elements:** All Elements

- **Volume Units:** IN

**Sorting:** Hydrologic

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<th>Drainage Area (MI2)</th>
<th>Peak Discharge (CFS)</th>
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