Technical Memorandum

To: Kathy Arnold
From: David Krizek
Company: Rosemont Copper Company
Date: December 16, 2010
Re: Review of Horst Schor Design for Rosemont Copper Project
Doc #: 275/10-320878-5.3

1.0 Introduction

This Technical Memorandum summarizes the landform design presented by Mr. Horst Schor in a draft report titled Landform Design Report for the Rosemont Mine Project (Schor, 2010). This report was prepared for SWCA Environmental Consultants (SWCA) of Tucson, Arizona as part of the Environmental Impact Statement (EIS) process associated with the Rosemont Copper Project (Project).

Attachment 1 provides a copy of the report (Schor, 2010). The landform concept developed by Mr. Schor and is shown on page 24 of the report. This general concept is currently known as the Barrel Trail Alternative in the Rosemont Copper Project EIS process.

Following the submittal of this concept (Schor, 2010), a team was assembled in order to recreate this general landform but maintain both operational and physical constraints. Some of the constraints included:

- No landform encroachment on Plant Site Area;
- Consideration of operational limitations of the mine equipment with regard to material placement; and
- Construction requirements for the dry stack tailings.

The team formed to recreate the landform concept developed by Horst Schor consisted of the following entities:

- Coronado Nations Forest (CNF)
- SWCA Environmental Consultants
- Rosemont Copper Company
- Moose Mountain
- Tetra Tech

Figures 1 and 2 in Attachment 2 provide the resulting concept based on Horst Schor's original design. However, as indicated above, placement constraints were maintained:

- Plant Site facilities were not covered. Adjustment of the Plant Site facilities is not practical based on layout and space limitations up-gradient of the landform;
- Placement of waste rock was based on the use of large tonnage haul trucks. Therefore, placement of waste rock has the following constraints
Placement of ridges, etc., was tied to logical haul routes to and from the Open Pit.

- A minimum 150 wide turning width for haul trucks was maintained (affects development of ridges)
- Maximum 10 percent grade on haul roads (affects development of ridges and peaks)

Placement of the dry stack tailings will be via conveyors and requires a centralized placement location(s). Placement of the dry stack tailings will be behind large waste rock buttresses that have a minimum width of 150 feet. Due to the various construction requirements associated with the dry stack tailings (i.e., compaction of the tailings underneath next buttress lift, conveyor movements/relocations), development of the dry stack tailings facility drove the final reclaimed surface in the area of the Dry Stack Tailings Facility as opposed to conforming the placement of the dry stack tailings to a desired but unrealistic landform shape.

In the design concept presented in Attachment 2, material was pulled a minimum of 500 feet away from State Highway 83 (SR 83). The design presented in Attachment 1 by Horst Schor (Schor, 2010) proposed material placement immediately adjacent to SR-83. In addition to the above, permission from CNF to cover the “Ball Court” archeological site with waste rock was obtained by Rosemont. This area was also covered in Horst Schor’s design (Schor, 2010).

Page 8 of Schor (2010) indicated that one of the design goals was to provide a regraded landform of approximately 1.2 billion cubic yards of material. Page 11 of Schor (2010) indicated that the final draft landform presented in Attachment 1 accommodated only 1.055 cubic yards. Raising the landform contours shown on page 24 (Attachment 1) approximately 30 feet would be required to reach 1.2 billion cubic yards.

The expanded Barrel/Barrel Trail version of the landform developed by the team followed some of the basic concepts originally proposed in the Barrel-McClary Alternative/Rosemont Ridge Landform concept highlighted in the Reclamation Concept Update report (Tetra Tech, 2010b) and in the Site Water Management Update report (Tetra Tech, 2010c). Attachment 3 provides Figure 10 from the Site Water Management Update report (Tetra Tech, 2010c) showing the various water management features. Figure 52 from the Reclamation Concept Update report (Tetra Tech, 2010b) is provided in Attachment 4 showing some of the various post-mining land use features.

The main stormwater control concept associated with the design shown in the Reclamation Concept Update report (Tetra Tech, 2010b) and in the Site Water Management Update report (Tetra Tech, 2010c) was controlling stormwater at the source as much as practicable. In the Horst Schor design concept (Schor, 2010) and as shown in Attachment 2 and in the Technical Memorandum titled Rosemont Expanded Barrel Only Alternative Stormwater Control Features (Tetra Tech, 2010a), one of the goals was to route as much stormwater off the reclaimed landform surface as possible to down-gradient receptors.

Taking into account this design goal, along with the physical and operations constraints listed above, the modified design concept for the Barrel Trail landform was developed (Attachment 2). This design concept also employed conservative assumptions related to the material composition on the outer slopes and the maximum vertical slope heights between catch benches/slope breaks. Horst Schor (Schor, 2010) used design recommendations developed by
Golder (2010) which indicated that vertical slope heights could approach 300 feet depending on the slope angle. Due to the uncertainty of the material mix on the outer surface, Tetra Tech selected a vertical rise of 100 feet between catch benches/slope breaks. This also gave the advantage of providing access to all areas of the landform surface for inspections, maintenance, etc.
REFERENCES


ATTACHMENT 1

REPORT
LANDFORM DESIGN REPORT FOR THE ROSEMONT MINE PROJECT
(SCHOR, 2010)
Landform Design Report
for the
Rosemont Mine Project

April 2010
Prepared by H.J. Schor
Submitted To:
SWCA Environmental Consultants
343 W. Franklin Street
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I. INTRODUCTION AND PURPOSE

This Landform Design Study was performed at the request of the Coronado National Forest Service (CNF) and SWCA Environmental Consultants (SWCA) to develop an alternative to the design of certain mine waste rock and tailings deposits proposed by the Rosemont Copper Company as part of their projected mining operation.

This report is in response to the Rosemont EIS Project Scope of Work entitled Landform Design Study dated January 20, 2010 containing tasks 1, 2, 3, 4a and 4b and in accordance with the “Rosemont EIS Project Scope of Work - Design Study” dated January 10, 2010 prepared by H. J. Schor and the project memorandum dated January 20, 2010 and prepared by Dale Ortman.

Rosemont’s current proposal (see Figure 1, Location Map) is of the conventional dump design approach found in other mined areas in the Tucson vicinity and elsewhere. The Figures that follow illustrate such dump sites located outside of Tucson with Figures 4 & 5 depicting linear, planar slope designs that are clearly developing both rill erosion and significant gullying. Figure 6 depicts a stair stepped design with benching construction.

The alternative sought by the CNF was for a design to accommodate 1.2 billion cubic yards of excess excavation from the mining operation in a way that recreated forms that were reflective of the natural topography of the area.

The findings and recommendations of the report, ROSEMONT MINE LANDFORMING - Evaluation of Mine Waste Slope Geometry, February 2010, prepared by Golder and Associates, was evaluated and considered in this alternative design.

An aerial view of the site as well as the existing topography are provided as Figures 2 & 3.

This report, its concept and its various exhibits, will illustrate how this objective can be achieved.
Figure 2 - Aerial View of Site
Figure 3- Existing Topography
Figure 4 - Mine dump example near Tucson exhibiting conventional design principles including linear, planar slopes with rill erosion and level plateau with linear ridge.

Figure 5 - Mine dump example near Tuscon depicting deep gullying
Figure 6 - Mine dump example near Tuscon depicting benching construction.

Figure 7 - Existing visual setting - Rosemont Area
II. REVIEW OF CURRENT CONVENTIONAL DESIGN PROPOSAL

Any massive placement of fill, such as the one proposed for this project, does not just create a dump as it is often referred to in the industry but for better or worse a LANDFORM, unsightly, and artificial as it may be. It will take the natural processes of water and wind erosion, gravity, sedimentation, and thousands if not tens of thousands of years to “whittle down” and re-shape this proposed monolithic block into natural appearing topography once again. Alternatively shaping it geomorphically as the fill is being placed will establish a mature and functioning natural topography from the outset.

The design as currently proposed represents the intrusion of an alien, manufactured rigid structure devoid of geomorphic features into an otherwise pristine and highly variable natural landscape. The result is a structure that will contrast significantly with the existing natural environment.

The basic building blocks for this monolithic structure are a single 400 to 500 foot +/- elevated more or less level plateau surrounded by a perimeter planar or stair stepped terraced slope surface with uniform slope ratio.

On this structure runoff is designed to occur in sheet flow fashion versus the dendritic drainage patterns typical of the undisturbed topography, leaving little room for a creative, diverse revegetation process.
III. LANDFORM DESIGN CONCEPT

To recreate a topography that reflects the natural analogs of both the underlying area to be disturbed as well as that which surrounds it in terms of character and geomorphology, relating in particular to existing landforms, slope shapes, rock presence, and run-off patterns, while creating opportunities for diverse revegetation was the concept upon which the Landform Design alternative is based.

To this end the Landform Design Concept avoids the application of conventional design features such as:

- Utilization of linear and planar slopes
- Application of uniform slope ratios
- Sheet flow drainage patterns
- Creation of expansive Plateaus
- Abrupt changes from the man-made structures to natural landforms

A. DESIGN OBJECTIVES

In contrast with conventional approaches and techniques, the following Landform Objectives were established to geomorphically shape the Landform Design:

- Re-establish some of the characteristics of the original landforms while placing excavation from the mining operations
- Breakup the monolithic structure through intervening valleys and ridgelines
- Create a diverse, dendritic like drainage pattern versus a sheet flow design
- Reduce overall fill height and flatten slope gradients significantly from standard proposed 3:1 to minimize long term erosion and sedimentation impacts as considered and recommended by the Golder Report
B. DESIGN PRINCIPLES

The Landform Design was driven by the following principles:

- Place the entire 1.2 billion cubic yards of earth and rock fill in a Geomorphic fashion
- Replicate the distinctive ridge and valley topography characterizing the landforms in the area
- Create dispersing and concentrating run-off patterns to provide for diversity in the ultimate revegetation of the project
- Utilize variable and flatter slope ratios to replicate existing topography and minimize the impacts of long term erosion and siltation
- Pay special attention to the design of the perimeter of the overall fill to create as seamless a transition as possible between the man-made and natural topography

To meet these objectives and design principles the project footprint had to be expanded.
IV. LANDFORM DESIGN EXECUTION

During the design stage, after repeated attempts it was found that the landform design for the waste rock only could not be transitioned into the conventionally designed tailings and heap leach facilities. The more linear, planar and plateau shaped plan of the tailings as well as its placement on that particular underlying topography did not allow an abrupt change or even a gradual transition from one shape to the other.

To reshape waste rock it became necessary to incorporate all mine excess material in one cohesive geomorphic configuration within which the different materials could find a place.

The comprehensive approach to placing the mine excess material was decided upon even though it doubled the previously anticipated design effort.

This approach was presented to SWCA and CNF in a conference call on March 8, 2010 and mutually agreed upon to finalize it along those lines with certain other revisions.

The 500 foot setback from the pit rim was maintained.

In approaching the overall design for the project an inventory of existing conditions was made. This allowed us to determine how best to mitigate and minimize proposed impacts so that once the project is completed it will represent topography similar in character to the natural present and harmonize with the surrounding undisturbed visual setting (see Figure 7).

Examples of natural analogs found in the Rosemont area geomorphology are depicted in the figures that are described below.

Figure 8 shows a sharply meandering primary canyon stream bed cutting through a series of convex ridge lines and concave secondary valleys, canyons and swales, the latter a tributary to the primary canyon.

Figure 9 depicts incised topography, dendritic drainage system, and diverse distributions and concentrations of vegetation reflective of run-off patterns and slope aspects.

Barrel Canyon is the most significant topographic feature in this area. It consists of a broad valley and major run-off collector and concentrator. As such this major water course is also densely vegetated in this seasonal rainfall area.
It was therefore determined to be desirable to recreate Barrel Canyon in the Landform Design, albeit at a much higher elevation and within the body of waste rock. In the Landform Design it is designed as a meandering canyon with a flat valley bottom. Meanders are designed sharply and at frequent intervals to increase canyon length and thereby reduce flow velocities during high flow events. This design reflects existing canyon configurations found in the Rosemont area.

The canyon is designed with a length of 2.5 miles with a gradient of 6%, prior to any flow reduction and stilling mitigation measures.

The valley bottom varies in width from an upstream minimum of 50 feet to more than 250 feet at the downstream terminus to allow for horizontal spreading of the increasing flows.

Primary and secondary ridgelines are designed with gradients of 4% to 8% with an average ratio of 14:1. Canyons, and secondary valleys and swales have gradients of 8% to 11%, with average ratios of 10:1.

These much flatter slopes address the issue of erosional stability. Clearly such flatter slopes significantly reduce run-off flow velocities and thereby minimize both erosion upstream and sedimentation downstream when compared to the 3:1 or 3.5:1 slopes projected for the conventional design.

In its final, revised configuration it became necessary to extend the design beyond the current Upper Barrel Canyon alternative footprint. In order that run-off from southerly descending slopes and flow lines would not enter Cienega Creek a gravity flow earthen channel was shaped that would intercept such runoff and redirect it north along SR 83 back into the Barrel Canyon watershed.

A similar condition developed at the southwesterly transition from the natural topography to the Landform design. The solution here was to create run-off detention ponds from where the collected water would be carried north in an underground drain to the Barrel Canyon watershed as proposed by the current Rosemont design.

The ball court heritage site is negatively impacted by this design as it would be located under some 200 feet of fill. Several design attempts were made to preserve the location, in an as is condition, but the results were not desirable and total avoidance would have a significant negative impact in achieving a successful Landform Design.
The Arizona Trail under this design is relocated and projected to follow both the newly created ridge lines as well as meander along the new Barrel Canyon design.

Based on those design modifications earthwork calculations show a volume capacity for the Landform design of 1,055,000,000 cubic yards, however, the capacity of this design can readily be increased to the full 1.2 billion cubic yards by elevating the existing design contours by 30 feet site without having an impact on any of its other features enumerated. As this plan was drawn to the small scale of 1"=500' and it encompasses such a large area, over 3,300 acres the less than 12% deviation is not significant. Revisions need not be undertaken now but at such time that any other design revisions might be proposed.
Figure 8 - Typical Rosemont Topographic Analog
Figure 9 - Existing Rosemont Geomorphology
V. ROCK AND BOULDER UTILIZATION

During the life of this project large quantities of oversized rocks and boulders will be generated through blasting and excavation of the pit. Aside from reducing them in size to make them suitable for fill placement, rocks and boulders are a desirable and needed commodity for the landforming effort, serving to aid and enhance the restoration and protection of the natural aspects of the new landforms. Therefore, significant quantities of select material should be reserved for later use as described below. Suitable material should be stockpiled for later introduction into the slope and landforms once each reaches its final configuration and elevation.

A. THE FOUR PURPOSES OF ROCK UTILIZATION:

1. DRAINAGE CONTROL

Reduction of flow velocities, erosion, and enhancement of silt entrapment in primary or secondary flow concentrations created by shaping various concave or convex land and slope forms. Concentrated flows in canyons will be controlled and velocities reduced through the use of rocks and boulder weirs, or vertical drops perpendicular to flow lines and/or parallel to them (see Figures 10, 11, 13-16).

Creation of intermediate stilling ponds upstream and/or downstream with rock allows for complete stilling of the flows and the deposition of fines and other sediments (see Figure 12).

2. ROCK FORMATION REPlication

The use of natural rock analogs typical of this area adds a vital component in the effort to re-establish a natural landscape and enhance and authenticate the overall aesthetics of the reconstructed landforms.

Such rock and boulder applications would include the recreation of rock outcroppings on ridgelines and hilltops (Figure 17), the insertion of rock slabs and boulders into side slopes as rock ledges (Figure 19 and 20) and the topping of level spots with rock caps (see Figures 18).
3. **REVEGETATION ESTABLISHMENT ENHANCEMENT**

   Rock weirs and vertical drops across channel flows lend themselves to the development of debris cones upstream which provide fertile opportunities for revegetation through maximum retention of moisture and fines (see Figure 14).

   Parallel rock and boulder placements also encourage the entrapment of seed and silt and offers stability to root establishment thereby creating opportunities for plant growth (see Figure 21).

4. **IMPROVED WILDLIFE RE-INTRODUCTION OPPORTUNITY**

   In other mine reclamation projects some agencies have required the introduction of boulders and rocks in the reclaimed landscape to provide “housing” opportunities for rodents and other smaller wildlife.

   Big boulders would provide for seclusion and view protection for larger wildlife.
Figure 10 - Plan and profile view of rock weir design for watershed restoration project.

Figure 11 - Photo of sample rock weir installation in re-graded valley on Navajo Reservation in Arizona per design above
Figure 12 - Photo sample of rock weir installation with stilling pond upstream

Type: Unconfined Rubble
Width: 350'
Height: 18'
Foundation: None

Figure 13 - Photo of sample rock weir installation in flow condition
WEIR OR VERTICAL DROP

Incoming Flow

Developing Debris Cone w/ Re-Establishment of Vegetation

Outgoing Flow

ROCK / BOULDER PLACEMENT

DEBRIS CONE DEVELOPING BEHIND EACH GRADE REDUCING WEIR OR DROP STRUCTURE

Outgoing Flow

Rock Weir

Developing Debris Cone

Stilling Basins

Figure 14 - Plan and cross section of debris cone and stilling basins
PARALLEL ROCK/BOULDER PLACEMENT

Figure 15 - Plan of drainage control and flow velocity reduction through parallel channel rock and boulder reinforcement

Figure 16 - Photo sample of parallel channel boulder placement six years after installation
Figure 17 - Natural ridgeline rock outcropping as it appears on this site

Figure 18 - Hilltop rock cap with broken off pieces replicated in mining reclamation project
Figure 19 - Example of rock placed into slopes

Figure 20 - Rock installation replicating rock ledges as part of a mining reclamation project with rock excavated during mining
Figure 21 - Close up photo of above parallel channel boulder placement with revegetation occurring
Figure 22 - Landform Concept Plan
Figure 23 - Graphic Representation of Landform Concept Plan
Figure 24 - Birdseye View of Existing Topography

Figure 25 - Birdseye View of Landform Shaped Fill Placement
Figure 26 - Cross Sections

A

MINE PIT

BARREL CANYON

BOULDER PLACEMENT AT RIDGELINES & PEAKS

HWY SETBACK AREA

A'

B

MINE PIT

BARREL CANYON

BOULDER PLACEMENT AT RIDGELINES & PEAKS

HWY SETBACK AREA

B'
VI. IMPLICATIONS OF GOLDER REPORT AND FINDINGS

The Golder report conducted an exhaustive study to develop criteria for the design of shaping the waste rock deposition in possible Landform configurations.

In their analysis of the Rosemont topography three basic slope configurations were observed: planar concave, concentrating concave, and expanding convex shapes.

It appears that in arriving at design criteria for such slopes their designs would be based on ratios between 2:1 to 3:1.

In addition, it was anticipated that the waste and tailing deposits would receive a cover of rock from the excavations ranging in size from 3 to 5 inches providing further resistance to erosion.

Within the framework of these assumed steeper slopes it was concluded that the maximum elevation difference for planar concave slopes would be 300 feet, for expanding convex slope shapes 420 feet, and for concentrating concave slopes 100 feet.

On the other hand, in the Landform Design the typical continuous height run from the top of a given slope to its toe is in the range of 160 feet to 250 feet. In two instances the run is 300 and 500 feet but at the same time the slope ratios are considerably flatter than 3:1. As mentioned previously they are designed to be between 10:1 and 14:1.

As conventionally built mine dumps have frequently demonstrated, because of their uniform, planar and fairly steep slope ratios, they are susceptible to erosion. It was therefore one of the primary objectives to use variable, much flatter slope ratios and drainage dispersal landforms while designing the Landform shapes to reduce the effects of erosion and consequent siltation.

Consequently, the Landform Concept is far more conservative than the criteria set forth by Golder Associates. For example, the graphs in their Appendix "C" allow a planar concave slope of 900 feet in length to be at a ratio as steep as 2.5:1 and for a slope as much as 1,500 feet in length to be at a 4:1 slope ratio.

It should also be kept in mind that in a final Landform Design proposed under this concept the secondary valleys and swales currently shown running essentially perpendicular down the slope face would be detailed so as to create various
symmetrical and asymmetrical depression forms. This would include curvilinear,
diagonal and elbow configuration, all replicating natural analogs, and all designed
to reduce flow velocities within them as the flow descends down the slope (see
Figure 27). Furthermore it should be noted that the change from convex to concave
is frequently designed to occur fairly abruptly thereby minimizing the tributary
drainage area to each concave collecting zone.

Figure 27 - Natural analog of curvilinear swale
The multiple tear concept suggested by Golder for higher and steeper slopes — not anticipated for the Landform Design — has some merit but only if no "heavy armoring" is used, i.e., concrete or pipes; the first being aesthetically detrimental and the latter being susceptible to plugging without regular maintenance. Placement of the excavated rock should be the first consideration for any required reinforcement.

VII. OTHER CANYON ALTERNATIVES

Three available other canyons have been conceptually evaluated and the conclusion is that:

1. Sycamore Canyon has much holding capacity but because of accessibility issues and visual considerations is not a viable candidate.

2. Schoefield Canyon, even though it can accommodate large fill quantities, is a prime candidate for preservation due to its scenic attributes and dense vegetation.

3. McCleary Canyon on the other hand, with its proximity to the mine site, could provide holding capacity for any quantity that could not be accommodated in the Barrel Canyon area should some of the constraints for the Barrel Canyon become too restrictive. Use of McCleary Canyon would require a more extensive re-evaluation and is not a part of the scope of this assignment.
VIII. SUMMARY

Landforming or Geomorphic Reclamation and the establishment of mature landforms is possible from the outset for the Rosemont waste rock and dry stack tailings project as the Landform Concept Plan demonstrates. Above all it should be noted that the elements incorporated into the Landform Design - use of existing natural analogs on site, recreation of Barrel Canyon, shaping of diverse topographic features, flatter slope gradients and the re-introduction of the rock and boulder element all will distinctly enhance the visual appearance and aesthetics of the site should the excavated materials be placed in such fashion.

However a larger project footprint is required to accommodate material yardage when lower, more natural appearing, and less erosive slope gradients are used. As with any design there are certain tradeoffs that need to be weighed.

In conclusion, questions have arisen that need to be addressed that arose during the design process. These deal with issues such as the actual final excavated yardage, requirements for setbacks from SR 83, and other areas, and protection requirements for sensitive resource areas. Given these issues perhaps another approach might be advisable.

IX. REFERENCES:


RECLAIMING THE AMERICAN WEST, by Alan Berger, Published by Princeton Architectural Press, 2002

GEOMORPHIC RECLAMATION AND NATURAL STREAM DESIGN AT COAL MINES, proceedings published by U.S. Department of Interior, Office of Surface Mining, 2009

FLUVIAL PROCESSES IN GEOMORPHOLOGY, by Leopold, Wolman and Miller, WH Freeman & Company, 1964
Rosemont Copper Project
Locator Sheet

Document Title: Rosemont Expanded Barrel Only Alternative Stormwater Control Features

Author/Recipient: Ronson Chee, Tetra Tech

Description: Summarizes the stormwater control features anticipated for the Expanded Barrel Only Alternative

Other Notes: Attachment 2 of 014165

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
   g. AZ Dept of Environmental Quality (APP)

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

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

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

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
   a. Plans & Reports
   b. Notes & Correspondence
   c. References
   d. Other

9. DEIS
   a. DEIS
   b. References

10. FEIS

11. Geospatial Analysis (GIS Data)

12. FOIA Exempt Documents

13. ROD (including BLM & ACOE)
ATTACHMENT 3

FIGURE

FIGURE 10 FROM THE SITE WATER MANAGEMENT UPDATE REPORT (TETRA TECH, 2010C)
PIT DIVERSION
CHANNEL/
PP POWER
LOOP ROAD

PIT DIVERSION CHANNEL
OUTLET AREA/PERIMETER — A
CONTAINMENT AREA

SCALE

CONTAINMENT AREAS
WEST ACCESS ROAD
DETENTION PONDS/POOL
PERMANENT DIVERSION CHANNEL NO. 2 (BY AMEC)
STORMWATER PONDING AREA PM, OVERFLOW BENCH
GLOW-THROUGH DRAIN OR FINGER DRAIN
DENTENTION BASIN. NCI. 2A (BY AMEC)
PERMITTER CONTAINMENT AREA/OVERFLOW FROM DIVERSION CHANNEL
WATERSHED DE RID MT (BY AMEC.)
PERMANENT DIVERSION CHANNEL NO. 2 (BY AMEC)
PERIMETER CONTAINMENT AREA

NOTES:
1. DESIGN OF THE PLANT SITE AND ASSOCIATED EARTHWORK, SEPTIC PONDS, PLANT POND, AND ACCESS ROADS COMPLETED BY 23 ENGINEERING & TECHNOLOGY.
2. DESIGN OF THE DRY STACK TAILINGS AND ASSOCIATED DIRECTIONS BY AMEC.
3. OPEN PIT OUTFLOW BY MOOSE MOUNTAIN.

PROJECT: ROSEMONT COPPER PROJECT
PROJECT NO.: 3101320
COUNTY: ARIZONA

TETRA TECH
PROJECT MANAGER: LEE KANZ
PROJECT 12: CHRISTOPHER L. JACOBS
DATE: 07/11
ATTACHMENT 4

FIGURE

FIGURE 52 FROM THE
RECLAMATION CONCEPT UPDATE REPORT
(TETRA TECH, 2010B)
WATER MANAGEMENT

AR. (TYP.)

DOT 03 10

POLLYANT MANAGEMENT AREA (OVA)

PRIMARY ACCESS ROAD

SCREE AREA

TETRA TECH

SCALE

0 1.0 (10.000')

RANTING CONTOURS

TOWNSHIP/RANGE ONE

SECTION LINE

PROPOSED CONTOURS

PRIMARY POLLUTANT MANAGEMENT AREA

(PMA)

UNITS OF MAIN DISTURBANCE AREA

HILLOCKS

RANCHING

WATER MANAGEMENT AREAS

SCREE (ROCK SLOPES)

MAN DISTURBANCE AREA (ROSEMONT TOME LANDFORM)

LANDFORM BASE CONCEPT

TR. RECLAMATION CONCEPT UPDATE

ROSEMONT RIDGE LANDFORM POST-MINING LAND USE BASE CONCEPT - PLAN VIEW

PIMA COUNTY, ARIZONA

NOTE,

1. DESIGN OF THE PLANT SITE AND ASSOCIATED DIVERSIONS, PONDS PONDS, AND ACCESS ROADS COMPLETED BY 413 ENGINEERING N TECHNOLOGY.

 DESIGN OF THE DRY STACK TAILINGS AND ASSOCIATED DIVERSIONS BY AMEC.

OPEN PIT OUTLINE BY MOOSE MOUNTAIN.

Figure No.

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