

Rosemont Copper Project
Federal Agency Managers' Meeting

October 27, 2014

Attendees:

Coronado: Jim Upchurch, Jennifer Ruyle, Mindy Vogel

SWCA: Chris Garrett

FWS: Jeanne Calhoun, Jason Douglas

BLM: Tim Shannon, Karen Simms

Topics of Discussion:

- Discussion of possible approaches forward for identifying impacts to pools. Presentation of five possible approaches.
- Discussion of possibility of opportunistic pump tests
- Discussion of possible LiDAR overflights of LCNCA

Action Items:

- Move forward with Option B3, with possible addition of historic data or LiDAR data, depending on availability
- BLM to assist in review of proposed scope of work

Briefing Paper
SBA Preparation – Possible Approaches Forward
October 24, 2014

Overview

In June 2014, the Coronado enlisted the help of a biological/hydrological team from federal agencies to help inform preparation of a Supplemental Biological Assessment (SBA) for the Rosemont Copper project. This group has been successful at identifying, compiling, and reviewing available information, and reviewing potential approaches for analyzing biological and hydrological impacts on Empire Gulch and Cienega Creek.

At this point, it appears that all currently available data have been identified and compiled. The next step in preparation of the SBA depends on whether additional data collection is needed or warranted. The purpose of this briefing paper is to outline several possible approaches forward.

Summary of Possible Approaches Forward

Overall, there are two possible approaches in moving forward in this process: (A) proceed with preparation of SBA, or (B) proceed with additional data collection. If the decision is to select Approach B, a second decision would be needed as to which option(s) would be necessary prior to preparation of the SBA.

Each approach and the potential options are briefly described below. Additionally, the attached table summarizes the pros/cons, costs, and timelines associated with the approach, as well as the ability of the approach to increase accuracy or decrease uncertainty in the analysis.

Approach A: Proceed with Preparation of the SBA

A complete analysis approach has been proposed using the most current, existing, available data and analysis techniques that have come out of the federal working group meetings. The details on this approach are being finalized and documented in a separate paper and summarized here. This analysis would be focused on nine key reaches identified on Empire Gulch and Cienega Creek. With the exception of requesting some specific model output at various locations, this approach could be implemented immediately.

Approach B: Proceed with Additional Data Collection

Option 1: Pump Tests on Empire Gulch

There is general agreement that the hydrologic mechanism that gives rise to the Upper Empire Gulch Springs is poorly understood. There appears to be a connection to a regional water source, and there are known artesian conditions in the area, but the exact connection between the regional aquifer and Upper Empire Gulch Springs is not clear. Available data pertinent to answering this question and incorporated into the FEIS analysis include geochemistry and isotope samples, well logs, historic pump tests, flow monitoring, basin gravity surveys, and water level monitoring. Additional data could be collected by attempting a long-duration pump test, potentially on Test Well #2, which is an artesian well close to Empire Gulch. There are monitoring points available to support an aquifer test, but they aren't as numerous or as close as previously believed. A pump test from 7-30 days in duration would be desirable. In order to complete this optional data collection, additional NEPA and likely Sect 7 consultation by the BLM would likely be required in addition to obtaining funding and a contractor to do the work.

Option 2: USGS/BLM Proposed Scope of Work

Over the past four months, several potential methods of modeling aquatic habitat have been discussed. At the request of the Coronado, Jeff Simms (BLM) and Nick Paretti (USGS) prepared a scope of work for both collecting additional baseline information and applying predictive aquatic habitat modeling techniques to Cienega Creek and Empire Gulch. In concept, the proposed scope of work represents a potential approach forward for analyzing the persistence and importance of refugia pools. However, note that it is not clear whether the scope of work can actually answer the questions it is intended to answer; there are several fundamental questions about the approach that would need to be researched and considered to (see table below).

Option 3: Focused Pool Depth Measurements

When boiled down to basics, the results of the proposed predictive aquatic habitat modeling (option 2) can be described as: "at a given water level X, Y number of pools will exist in this reach". Note that while the scope of work was intended to answer more than that simple question, at this point it is not clear whether it could actually accomplish those goals.

The same predictive power may be possible with a less intense data collection effort. This would include: measurement of pool depths along the length of Cienega Creek and Empire Gulch at a single point in time; and simultaneous measurement of streamflow at the three hydrograph locations (USGS gage, BLM monitoring above Gardner Canyon, and BLM monitoring on Empire Gulch). Collecting these data would also allow us to know the number of pools per reach, and would also give us the same ability to predict whether those pools would disappear or be diminished given a modeled drawdown. Simultaneous measurement of surface flow would allow the results to be extrapolated to other seasons (in particular the low-flow season in May/June), as would correlation of measured pool depths with wet/dry mapping results. This approach potentially gives us information that would result in the same predictive ability as option 2.

Option 4: Remodeling of Empire Gulch

Streamflow in Empire Gulch was not explicitly modeled in any of the numeric groundwater flow models used for the project. At the request of the Coronado, Rosemont/Hydro-Logic proceeded to attempt to model Empire Gulch streamflow (see memo 6/27/14). The USGS subsequently reviewed the work (see memo 9/30/14), and the results were also discussed on a follow-up conference call (10/3/14). It was agreed (at least between the USGS and FS) that the Hydro-Logic modeling attempt did not satisfactorily describe streamflow in Empire Gulch. An attempt could be made to further develop a better conceptual model about how Empire Gulch arises by reviewing and synthesizing all available information and data, and then revise the model in and around Empire Gulch in an attempt to better match observed conditions and the conceptual model. If the model could be better refined, this might give us better data for Empire Gulch. However, this would not likely change the overall uncertainty of the analysis of the project.

Description of Approach	Pros	Cons	Time frame for completion	Costs	Ability to increase <u>project</u> accuracy/decrease uncertainty
A) Proceed with Preparation of the SBA.	<ol style="list-style-type: none"> 1) Can be implemented immediately 2) Due to the consideration of new information, the level of understanding and baseline data are greater than when previous BO was published 	<ol style="list-style-type: none"> 1) No predictive capability at this time for presence/absence of refugia pools. Prediction of P/A of water may still be feasible (based on wet/dry mapping) 	1-2 months	\$	Similar to the FEIS, fundamentally limited by model uncertainty, long time frames, and empirical data correlations. However, predictive techniques are now more accurate and detailed than when the FEIS was issued.
B1) Additional Data Collection – Pump Tests on Empire Gulch (EG)	<ol style="list-style-type: none"> 1) If effects were seen, would potentially help develop a more defensible conceptual model for EG 2) Could lead to effective incorporation of EG streamflow into GW models 3) Empirical data is defensible 	<ol style="list-style-type: none"> 1) If effects were not seen, would represent one more piece of inconclusive data 2) Possible loss of water from T&E habitat due to pumping 3) Possible discharge of water into T&E habitat due to pumping 4) #2 and #3 would likely require NEPA and Section 7 consultation 5) AZPDES permit needed 6) Not many wells close nearby: WP-9 and EG HQ well 	6-9 months	\$\$\$	Given the lack of understanding of Empire Gulch hydrologic framework, if pump test resulted in noticeable effects that could confirm the conceptual model of how the Upper Empire Gulch Springs function, empirical data would increase accuracy by better modeling real-world conditions. However, the ultimate changes in water levels propagating from the mine are not any more certain. Overall, the uncertainty of the <u>analysis as a whole</u> would not change.
B2) Additional Data Collection – Proposed USGS/BLM Scope of Work	<ol style="list-style-type: none"> 1) Would enhance understanding of baseline conditions 2) Answers one part of the analysis we don't have techniques for—persistence of refugia pools 3) In addition to change in pool depth for any given water 	<ol style="list-style-type: none"> 1) Ability to use “weighted usable area (WUA)” results for a single scenario is unclear 2) The fine level of detail collected for each pool may not reflect system as it will appear in ~75 years (time of first impacts), although system as a whole could be similar 3) Logistical difficulties may be 	6-9 months	\$\$\$	The collected data itself would be highly precise, and would result in a highly detailed topographic model. Increases the accuracy of the analysis by providing a predictive component not otherwise available. However, the ultimate changes in water level being applied to the highly detailed

Description of Approach	Pros	Cons	Time frame for completion	Costs	Ability to increase project accuracy/decrease uncertainty
	level, would provide change in wetted perimeter and surface area.	experienced that prevent LiDAR or GPS from being useful; may require manual measurements instead 4) Does not tie to surface water flow, water quality, or riparian vegetation 5) Is not able to make use of velocity component of Habitat Suitability Index (HSI) curves			topographic model are not any more certain. Overall, the uncertainty of the <u>analysis as a whole</u> would not change.
B3) Additional Data Collection – Focused Pool Depth Measurement	1) Would enhance understanding of baseline conditions 2) Answers one part of the analysis we don't have techniques for—persistence of refugia pools 3) HSI curves are based on depth; while "WUA" could not be calculated, species preference for a given depth may still be feasible. 4) Level of precision would better match the overall analysis uncertainty	1) Predictive capability would be limited to presence/absence of pools and pool depth; no predictive capability for wetted perimeter or surface area as in option B2. Wetted perimeter may be important for predicting impacts to near-stream vegetation like water umbel. Surface area is used to develop the "WUA" parameter 2) Does not tie to surface water flow, water quality, or riparian vegetation	1 month	\$	While the data collected would not be as precise as those proposed by option B2, the method is very simple, straightforward, and easy to conduct. Increases the accuracy of the analysis by providing a predictive component not otherwise available. However, the ultimate changes in water level being applied to the measured pool depths are not any more certain. Overall, the uncertainty of the <u>analysis as a whole</u> would not change.
B4) Remodeling of Empire Gulch	1) Would make focused use specific data near Empire Gulch; while these data were used previously to build the model, they could be reconsidered now and given greater weight 2) Would potentially allow prediction of streamflow	1) Model results already show major impacts in Empire Gulch; unless the model drastically changes to show very little impact to Empire Gulch, the overall effects are unlikely to change. Even then, modeling is uncertain enough that it is doubtful the results would carry enough weight to completely change the	3-4 months	\$\$	Reevaluating the hydrologic data specific to Empire Gulch would potentially increase the accuracy of the model for predicting streamflow in this one area. However, the propagation of impacts still takes place through the aquifer between the mine pit and Empire Gulch which is unlikely

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	changes in Empire Gulch	current predictions. 2) There is already a method to predict changes in streamflow in Empire Gulch based on drawdown. Use of the model to do the same would be useful, but would not provide a new avenue of analysis.			to change. Overall, the uncertainty of the <u>analysis as a whole</u> would not change.