

# Anaconda Copper Mine Field Oversight – Anaconda Evaporation Ponds Characterization

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PROJECT NUMBER: 381688.AM.TA

## INTRODUCTION

This technical memorandum provides a summary of the oversight performed of the soil and water sampling event at the Anaconda Copper Mine Site. The mine site is located approximately 1 mile west of Yerington, Nevada on Highway 95A.

The U.S. Environmental Protection Agency (EPA) Remedial Project Manager (RPM) verbally requested that CH2M HILL staff to perform oversight of a portion of the Anaconda Evaporation Ponds Characterization effort soil and groundwater sampling that is being conducted by Brown and Caldwell on behalf of Atlantic Richfield Company (ARC).

## UNLINED EVAPORATION PONDS

On October 8, and October 9, 2008 CH2M HILL personnel performed oversight of groundwater and soil sampling at the Anaconda Copper Mine Site. The purpose of this sampling event is to characterize cover soil, pond sediment, subsurface soil and groundwater conditions at the inactive Anaconda Evaporation Ponds. Oversight work was performed to ensure that the EPA-approved Work Plan was followed, including the QAPP requirements and standard operating procedures (SOPs).

On October 8, 2008 CH2M HILL personnel arrived on site and joined Brown and Caldwell and WDC staff at the large unlined evaporation pond, formerly referred to as the iron bleed pond. Two sample locations, location one and location two were completed in the large sampling pond (Figure 4-2) and staff mobilized to location three for sampling on October 9, 2008. Each sample location included installation of multiple Geoprobe borings for collection of samples for vadose zone hydraulic properties and for geochemical analysis of soil, sediment and groundwater.

Samples were collected at these two sites by drilling three fifteen-foot boreholes directly adjacent to one another. Three holes were drilled to provide adequate soil volume for the meteoric water mobility procedure sample. The uppermost layer of pond sediment was removed and the remaining core was placed into a GLAD “flex” trash bag and composited in a 2.5 gallon bucket. The bucket was then labeled accordingly for MWMP sample analysis.

A fourth hole was drilled to groundwater to collect discrete and composite samples of the subsurface soil and groundwater.

Discrete soil samples were collected by maintaining intact core and using a hacksaw to remove the designated section of core and using paraffin wax and caps to preserve the core for laboratory analysis.

Groundwater samples were collected by filling 10, non-preserved 1L polyethylene receptacles using a 5-foot-long metal bailer, then later transferring the liquid through a in-line filter into a preserved sample receptacle using a peristaltic pump at the Brown and Caldwell onsite laboratory located at the former SX/EW facility. It is not clear why the sample was placed into 10 separate containers

### **Large Unlined Evaporation Pond Location 1**

- Depth to groundwater was approximately 22 feet
- Fines observed on the pond surface consisted of both yellow fines (sulfides?) and red fines (calcines?) (see attached photo).
- Composite samples were collected just below the pond sediment and just above the groundwater table in the vadose zone

### **Large Unlined Evaporation Pond Location 2**

- Depth to groundwater was approximately 17-18 feet (may be a perched water table)
- Field staff switched water collection methodology from using a bailer to using a peristaltic pump with ¼-inch silicon tubing.
- Similar fines were present at location 2 as observed at location 1
- Composite samples were collected just below the pond sediment and just above the groundwater table in the vadose zone
- Acid included for sample preservation in the TOC sample bottle was discarded at the borehole prior to sample collection. It is not clear why the Brown and Caldwell staff discarded the acid, however, the TOC samples were not preserved at the time of sample collection. Justification for this approach should be provided by Brown and Caldwell.

### **Additional Notes and Observations taken on October 8, 2008**

- When drilling at the lined evaporation ponds (north, middle and south) on Monday October 6, 2008 and Tuesday October 7, 2008, Brown and Caldwell noted that approximately 6-inches of VLT is present below the thin asphalt liner.
- Brown and Caldwell also noted that archeologists were on site in 2007 and confirmed the historic Nevada Copper Belt Railroad that intersects the large unlined evaporation pond and that a historical homestead site exists at the northwest corner of the finger ponds.

On October 9, 2008 CH2M HILL personnel arrived on site and joined Brown and Caldwell and WDC staff at the small unlined evaporation pond (small triangular area) south of the larger unlined evaporation pond. One sample location, located on top of the berm separating the two unlined ponds and five locations at Finger Pond E were completed for Geoprobe drilling for geochemical groundwater and soil (Figure 4-2).

### **Small Unlined Evaporation Pond Location 3**

- Borehole was drilled to a depth of 45-feet however, groundwater was not reached and this location may need to be drilled again at a later date using additional casing, a sonic rig or an auger rig.

## **FINGER PONDS**

The finger ponds are located north of the Phase IV VLT, many of which were covered between 1995 and 1998 by the Phase IV VLT. It should be noted that Finger Pond E is capped with oxide tailings to a depth between 0.5 and 1.0 feet.

### **Finger Pond ‘E’ Location 4**

- Drill depth 15-feet
  - 0’ to 1’ - VLT
  - 1’ to 12’ - “Red Dust” pond sediment (calcines)
  - 12’ calcines are supersaturated
  - 13’ to 15’ subsurface soil

### **Finger Pond ‘E’ Location 5**

- Drill depth 15-feet
  - 0’ to 1’ - VLT
  - 1’ to 4.5’ - “Red Dust” pond sediment (calcines)
  - 4.5’ to 15’ subsurface soil

### **Finger Pond ‘E’ Location 6**

- Drill depth 10-feet
  - 0’ to 0.5’ - VLT
  - 0.5’ to 1.5’ - “Red Dust” pond sediment (calcines)
  - 1.5’ to 5’ subsurface sediment

### **Finger Pond ‘E’ Location 7**

- Drill depth 5-feet
  - 0’ to 0.5’ - VLT
  - little to no “red-dust” pond sediment at 8”
  - remainder of core subsurface soil

### Finger Pond 'E' Location 8

- Drill depth 10-feet
  - 0' to 2' - VLT
  - 2.0' to 4.5' - "Red Dust" pond sediment (calcines)
  - 4.5' to 5.0' subsurface soil

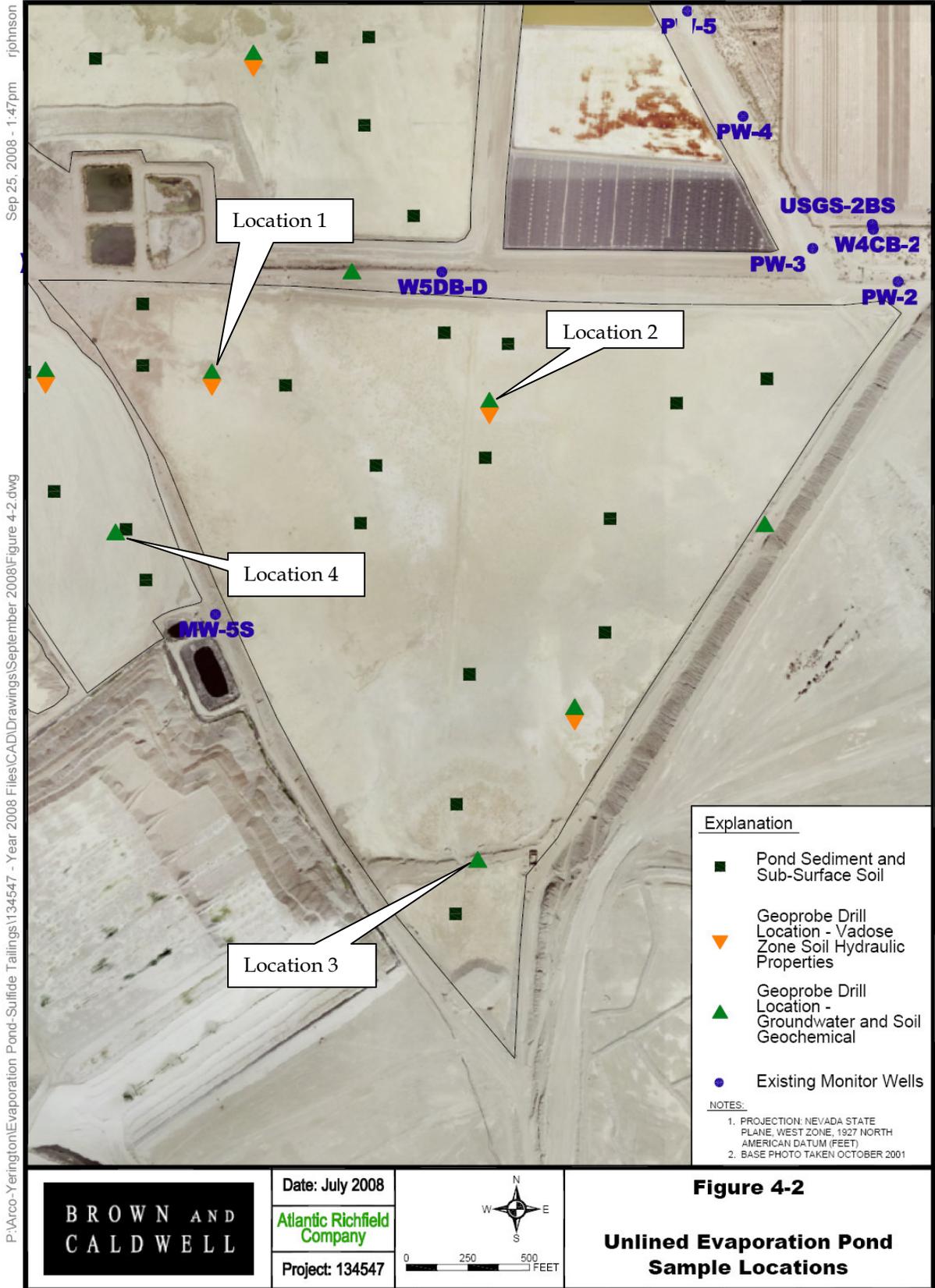
## CONCLUSIONS AND RECOMMENDATIONS

From the oversight performed over the two day period from October 8, 2008 to October 9, 2008, it is concluded that the soil and groundwater sample collections procedures should be further discussed with Brown and Caldwell to ensure that sample quality is not compromised. Proper PPE (i.e., clean disposable gloves) should be worn by the drillers who handle both the core for soil sampling and the bailer for groundwater sampling.

Field notes that were taken onsite by CH2M HILL staff are attached. Key observations that should be noted and addressed are as follows:

- Gloves were not being routinely worn by drilling subcontractor staff. When handling core for soil samples or when handling the bailer for water samples, new gloves should be donned at each sample location according to SOP-11 and SOP-9.
- It is recommended that groundwater samples be collected and filtered right at the sample location to minimize potential chemistry changes prior to preservation and potential contamination from other sources. SOP-9 indicates that that samples can be obtained by filling a non-preserved sample receptacle and then transferring the liquid through an in-line filter into a preserved sample receptacles using a peristaltic pump, however, use of 10 separate non-preserved containers raises questions about homogeneity and sample integrity.
- The pond sediment (i.e., the "Red Dust" calcines) at the finger ponds may be greater in depth than originally proposed. The Work Plan had estimated a maximum depth of pond sediment of 6 feet. However, one boring contained 11 feet of pond sediment.

Additional oversight will be performed by CH2M HILL personnel the week of October 20, 2008 to assess whether the approved Work Plan requirements, including the QAPP and attached SOPs, are being followed.



P:\Arco-Yerington\Evaporation Pond-Sulfide Tailings\134547 - Year 2008 Files\CAD\Drawings\September 2008\Figure 4-2.dwg

Sep 25, 2008 - 1:47pm

rjohnson



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Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_

@ Location 1

## Sampling Process:

- Drill 3 holes adjacent to one another each to 15'
- Drill 4<sup>th</sup> hole to groundwater
- Three holes are drilled to collect sample for the NMWAP.  
\* Pond sediment removed/excluded
- Fourth hole is drilled to collect additional sample for chemical analysis and groundwater sample

\* Note: Drillers routinely not wearing gloves when handling core.

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Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_

## NOTES:

From the three 15' core, the uppermost layer of pond sediment is removed and remaining core placed into GLAD flex trashbag for composite. Placed in 2.5 gal bucket, and labeled Mixed.

- Core descriptions provided by Brown & Caldwell

From the last borehole, hacksaw was used to remove <sup>intact</sup> sample. Intact core sample was capped and labeled

Water was retrieved using 5' metal 1/2" bailer and captured into 10 poly (1 L containers) Containers filled with sample were later transported to B & C onsite lab, where

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Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_

Brown & Caldwell would filter and prepare samples for shipment.

~~Water samples not collected and labeled with~~

Water samples were not directly allocated to sample bottles on location.

Depth to Groundwater at Location 1 :  $\approx$  22 feet

Fines observed on pond

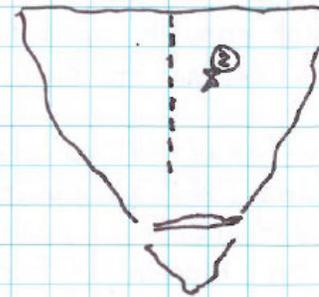
- Yellow fines (sulfide?)
- Red fines (calcines?)
- Uppermost "Yellow" deposit is  $\approx$  3"-6"
- Collecting composite just below pond sediment & just above GW table.

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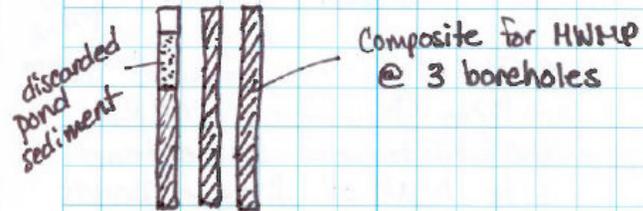
Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_

@ Location 2 - Approx 50' East from historic NCBRR



1:30 Follow same SOP as previous borehole Location 1



4<sup>th</sup> borehole - excluding sample locations preserved for archive

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Location \_\_\_\_\_ Date \_\_\_\_\_  
 Project / Client \_\_\_\_\_

Depth to GW 17-18'

@ Location 2: Perched H<sub>2</sub>O Table  
 Not enough water collecting  
 in casing to bail.

Switched to peristaltic pump  
 using 1/4" silicon tubing

NOTE: On Monday/Tuesday  
 when drilling occurred  
 at N, M, S Lined Ponds  
 determine ~6" VLT below  
 the 'asphalt' liner

Archeologists onsite 2007  
 confirm Historic NCBRR  
 and historical homestead  
 site NW of finger ponds.

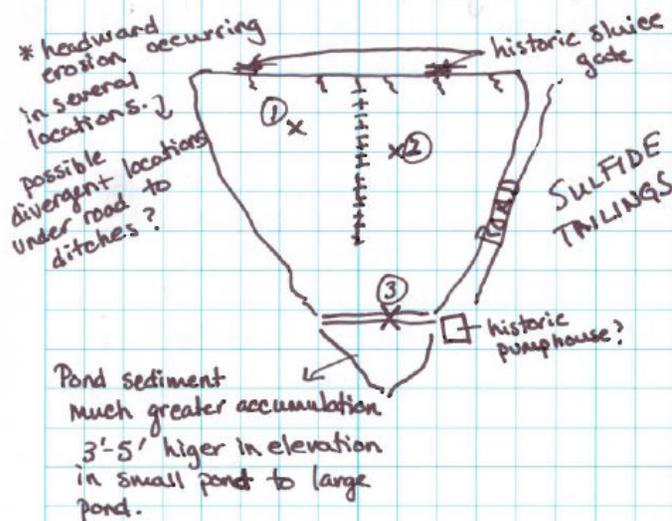
17:30 Depart Site

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Location \_\_\_\_\_ Date 10/9  
 Project / Client \_\_\_\_\_

@ Location 3 on berm between  
 small triangular pond and  
 larger unlined evaporation  
 pond

Personnel Onsite: Penny Bassett,  
 Jake & Rick,  
 Roy (Anaconda)  
 Chuck (B & C) + HSE (B & C)



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Location \_\_\_\_\_ Date \_\_\_\_\_  
 Project / Client \_\_\_\_\_

Location 3 only to collect  
 Water sample.

Drill to 45' - still no  
 water. DRY!

Will return with additional  
 casing to drill to greater depth.  
 with geoprobe or sonic/auger rig.

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Location \_\_\_\_\_ Date \_\_\_\_\_  
 Project / Client \_\_\_\_\_

### FINGER POND "E"

@ Location 4

Notes: Finger Pond 'E' Capped  
 with  $\approx 0.5 - 1.0'$  VLT

Drilled 15'

0-1' VLT

1'-12' "Red Dust"  $\rightarrow$  Calcines

@ 12' "Red Dust" is Supersaturated

@ 13' reach subsurface sediment

@ Location 5

Hole depth 15'

Top 1' = VLT

1' - 4.5'  $\Rightarrow$  "Red Dust"

4.5' - 15' Pond Sediment and  
 Sand

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Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_

@ Location 6

Top 6" VLT

0.5' - 1.5' "Red Dust" Calcines

1.5' - 5.0' Sediment

Drill borehole depth: 10'

@ Location 7Drill depth  $\approx$  5.0'

Little to no "red dust" @ 8.0"

@ Location 8

0 - 2.0' VLT

2.0 - 4.5' "Red Dust"

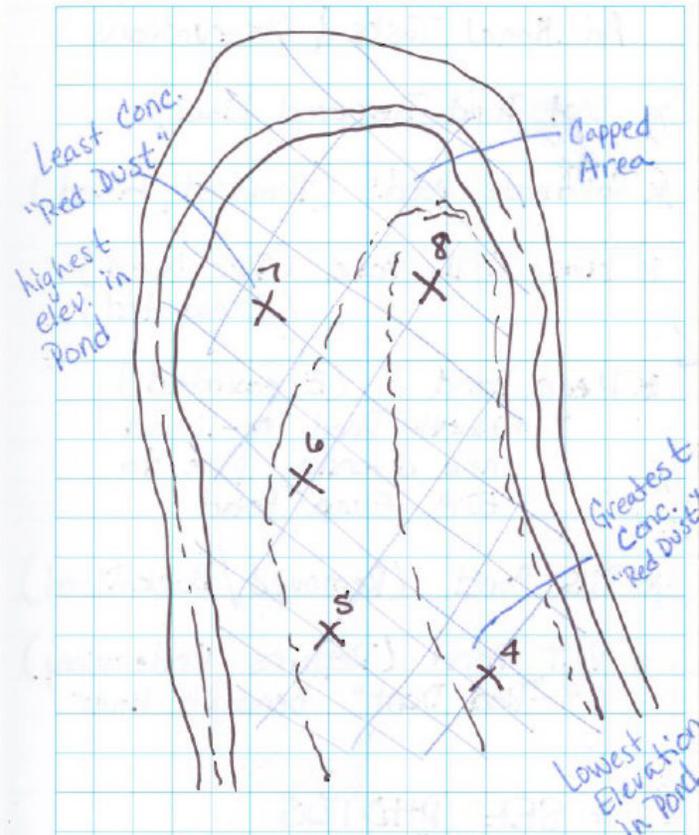
4.5 - 5.0' Subsurface Sediment

Total Depth 10.0'

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Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_



Finger Pond "E"

 $\approx$  2:00 pm Depart Site