FREEPORT-McMoRAN
COPPER & GOLD

Chino Mines Company
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April 28, 2014

Certified Mail #70123050000053967381
Return Receipt Requested

Ms. Erika Schwender, Director
New Mexico Environment Department
Resource Protection Division
P.O. Box 5469
Santa Fe, New Mexico 87502

Dear Ms. Schwender:

Re: Groundhog No. 5 Stockpile Draft Workplan
Hanover and Whitewater Creeks Investigation Unit- Chino AOC

Freeport-McMoRan Chino Mines Company (Chino) submits under separate cover the *Draft Groundhog No. 5 Stockpile Interim Remedial Action Workplan for Additional Characterization and Controls* for the Hanover and Whitewater Creeks Investigation Unit under the Chino Administrative Order on Consent (AOC). This submittal is in response to New Mexico Environment Department (NMED) request that Chino prepare a draft workplan to further characterize and monitor the Groundhog No. 5 Stockpile water quality in a letter dated March 12, 2014. The workplan was submitted via email today to Mr. Matt Schultz.

Additionally, Chino will request an extension to the reclamation schedule in Mining Act Permit No. GR009RE, due to expire June 30, 2014.

NMED also requested information concerning the status of monitor well GH-97-02. In 2010, Chino was able to collect an alluvial water sample but due to low volume and access limitations, the well could not be purged and has been filling with sediment due to its location in the active stream channel of Bayard Canyon. NMED's comments in a letter dated February 23, 2011 concerning the 2010 sampling results, was to focus sampling of the well located at the toe of the stockpile in attempt to characterize water quality from stockpile.

Please contact Mr. Ned Hall at (520) 393-2292 if you have any questions regarding this proposed draft workplan.

Sincerely,

Sherry Burt-Kested

Sherry Burt-Kested, Manager
Environment Services

SBK:pp
20140425-002

c. Matt Schultz, NMED (via email)
Joseph Fox, NMED (via email)
Petra Sanchez, EPA (via email)
Chris Eustice, NMEMNRD MMD (via e-mail)
Ned Hall, FCX (via e-mail)
Tom Shelley, FCX (via e-mail

REPORT

DRAFT

GROUNDHOG NO. 5 STOCKPILE

Interim Remedial Action Work Plan for Additional Characterization and Controls

Hanover and Whitewater Creek Investigation Units

Submitted To: Freeport-McMoRan Chino Mines Company
PO Box 10
Bayard, New Mexico 88023 USA

Submitted By: Golder Associates Inc.
301 W. College Avenue, Suite 8
Silver City, NM 88061 USA

April 28, 2014 **140-3873**

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1.0 INTRODUCTION

This work plan for additional controls and characterization the Groundhog No. 5 stockpile was prepared by Golder Associates Inc. (Golder) for Freeport-McMoRan Chino Mines Company (Chino) to comply with a request by the New Mexico Environment Department (NMED) in a letter dated March 12, 2014. This request by NMED followed discussions with Chino representatives about water quality samples collected in 2013 from the shallow well at the toe of the stockpile (GH-97-04) which exceeded the New Mexico Water Quality Control Commission groundwater quality standards for sulfate and total dissolved solids (TDS). The NMED requested a Work Plan to include additional characterization, monitoring, and mitigation of potential impacts to groundwater associated with the stockpile.

This Work Plan is organized into the following six sections as follows:

- Section 1 – Introduction - provides the context and organization of this Work Plan.
- Section 2 – Site Description - summarizes the history and physical setting of the stockpile.
- Section 3 – Conceptual Hydrogeologic Model – describes the groundwater and surface water flow paths based on the current understanding of the stockpile area.
- Section 4 – Surface Water and Seepage Collection Upgrades – presents the additional controls that will be constructed to reduce infiltration into the stockpile and collect representative samples of seepage from the toe of the stockpile.
- Section 5 – Additional Proposed Characterization – describes additional data collection and geochemical modeling proposed to determine the source and nature of the seepage collected at the toe of the stockpile.
- Section 6 – References – includes references cited in the text.

2.0 SITE DESCRIPTION

The Groundhog No. 5 Stockpile is a small waste rock stockpile (footprint of less than 2 acres) associated with the Groundhog No. 5 Shaft located on the north wall of Lucky Bill Canyon near its confluence with Bayard Canyon (Figure 1). The primary ores extracted from the Groundhog No. 5 Shaft consist of lead and zinc sulfides occurring in mineralized veins below the Sugarlump and Kneeling Nun Tuff Formations that are exposed along the surface in the canyon. The tuffs overlie Cretaceous-Tertiary sediments (the Colorado Formation), which in turn overlie a series of Paleozoic limestones and shales. Stockpile material types at the site include limestone, granodiorite, diorite, quartz monzonite, and tuff (Hernon, R., et al 1964). Iron staining is minimal and restricted to small, isolated locations in the stockpile associated with finer-grained, mineralized material. The stockpile was regraded in 2006. The current stockpile configuration is shown on Figure 2.

The previous site configuration and details of the November 10, 2004 site investigation were presented in the Site Investigation Report (Golder, 2005). The previous investigation included three test pits in the stockpile prior to regrading. The purpose of the 2004 site test pit investigation was to estimate the lateral and vertical extent of the stockpile material and to characterize the chemical nature of the material with respect to expected environmental behavior and suitability of the stockpile material for vegetation substrate.

Results of the 2004 investigation demonstrated that the stockpile material is non-acid generating, with minor amounts of mineralized materials present. Prior to regrading, the upper layer of the stockpile was composed primarily of angular limestone gravel with minor sulfide mineralization and iron staining. The limestone was generally underlain by unmineralized granodiorite and quart monzonite stockpile material and the pre-mining surface (tuff bedrock and colluvium). The acid-base-accounting (ABA) results showed that the stockpile materials are not acid generating. The synthetic precipitation leaching procedure (SPLP) leach test results did not yield leachate constituent concentrations (metals or other constituents) above New Mexico surface water or groundwater standards, with the exception of one exceedance of TDS. The TDS exceedance was likely due to laboratory analytical error, as the TDS value could not be reproduced by summing all of the dissolved ions (Golder, 2004).

No saturated zones were observed in test pits, and no seeps were identified during the 2004 investigation. A shallow seepage collection well (GH-97-04) is located at the toe of the stockpile. This well was installed under the Administrative Order on Consent (AOC) in 1997 to collect samples of shallow groundwater (Daniel B. Stephens and Associates, Inc. [DBS&A], 1997). The well was installed using a backhoe to excavate to bedrock and installing horizontal perforated pipe attached to a riser pipe. The DBS&A report includes the following description of the materials encountered during installation of GH-97-04:

"Overbank alluvium of well-graded poorly sorted fine sands to angular subangular boulders, less than 1 ft in size, slightly moist, no evidence of subsurface water flow, no staining or alteration."

A supplemental investigation test pit investigation was conducted in 2006 after the stockpile was regarded to a 3 Horizontal to 1 Vertical slope. The regrading had the effect of mixing and thinning the stockpile materials and increasing the footprint area of the stockpile. The results of this supplemental investigation confirmed the conclusions and recommendations of the Site Investigation Report (Golder, 2005). Based on ABA results, the stockpile materials near the regraded surface are not acid generating and exhibit a high neutralization capacity. The stockpile materials are not a significant source of leachable metals. SPLP leachate concentrations did not exceed any WQCC groundwater or surface water standards.

GH-97-04 often contains no water, or not enough water to purge the well prior to sampling. However, in 2013, after a typical monsoon season, the well contained enough water to purge and collect a sample. The sample indicated exceedances for New Mexico Water Quality Control Commission groundwater quality standards for sulfate and TDS.

3.0 HYDROGEOLOGIC CONCEPTUAL MODEL

The Groundhog No. 5 Stockpile is a coarse textured waste rock pile. Based on test pits excavated after the stockpile was regarded, the materials on the top of the stockpile are generally finer in texture (oversize fraction less than 10 percent in Test Pits GH5-4 and GH5-5) and predominantly angular limestone gravel. The fraction of oversize material and the amount of quartz monzonite gravel is greater on the regraded slope than on the top of the stockpile. Some finer soils have formed or been deposited by wind on the stockpile surface.

Figure 3 shows a conceptual model for water inflows and outflows for the area of the Groundhog No. 5 Stockpile. The stockpile is underlain by colluvium on the hillside, which is underlain by bedrock (Sugarlump Tuff). Groundwater is expected to be several feet below the colluvium in the bedrock based on site wide groundwater studies (Golder, 2008). Water was not observed in the colluvium during test pit excavation, and there are no springs daylighting on the hillsides adjacent to the stockpile. Therefore, upwelling of groundwater into the stockpile is unlikely. The degree to which groundwater may flow into the colluvium when groundwater levels are high is uncertain. However, this may occur near the stockpile toe, and where depth to groundwater is shallow.

Upgradient surface water has been diverted around the stockpile in diversion ditches constructed during regrading of the stockpile in 2006. Therefore the only known inflow of water to the stockpile is incident precipitation. Precipitation onto the stockpile surface will either evaporate (evapotranspiration), infiltrate into the stockpile, or run off the stockpile surface. Infiltration into the stockpile that reaches a depth below the influence of evaporation will migrate downward to the colluvium, and either flow along the top of the colluvium or along the colluvium/bedrock contact toward the stockpile toe, or downward into the regional groundwater. The two test pit investigations were performed during winter months when there had been no recent rainfall, and the colluvium, underlying the stockpile material was fairly dry. No water was present in the well at the stockpile toe during these investigations.

Groundwater near the stockpile exhibits an upward gradient along the stream channel in Lucky Bill Canyon as illustrated on Figure 3. This upward gradient beneath the drainages in the North Mine Area has been determined from the installation of numerous monitoring wells along Hanover Creek, Whitewater Creek, and in the Lampbright Area (Tributaries 1 and 2) (Golder, 2008). This characteristic upward gradient along major drainages is further demonstrated by the site wide groundwater modeling results that includes the Lucky Bill Canyon area (Golder, 2008), and as evidenced by intermittent flow in the stream and a thick riparian zone along the centerline of the valley. A large portion of the shallow groundwater along the riparian zone and surface water in the stream channel is lost to evapotranspiration.

Groundwater impacts throughout the North Mine Area are being addressed specifically as part of the site wide groundwater abatement investigation. This includes specifically the Lucky Bill Canyon area. Chino anticipates submitting a revised final stage 1 site wide abatement investigation report this year.

4.0 SURFACE WATER DIVERSION AND SEEP COLLECTION UPGRADES

Chino proposes to install additional controls to enhance surface water drainage from the stockpile and collection of stockpile seepage. Additional surface water drainage channels are in the process of being constructed at the top of the stockpile where the surface gradient is shallow to shed incident precipitation more quickly during rainfall events. These channels will be field fit and the final configuration surveyed and presented in updated as-built drawings as currently defined in Figure 2, incorporating the seepage collection trench as well.

The seepage collection trench will be constructed along the toe of the stockpile to increase the collection of seepage water from the single point at well GH-97-4 to the entire length of the stockpile toe that is practical (Figure 4). The trench will extend from the soil surface at the base of the stockpile material to the top of bedrock, profiling the colluvium interval. Perforated lateral piping will be installed along the length of the trench. The trench will be filled with drain rock filter pack and will drain to two collection points accessible through standpipes (Figure 5).

5.0 ADDITIONAL PROPOSED CHARACTERIZATION

Additional characterization of the groundwater and geochemical modeling are proposed to evaluate the stockpile as a source of sulfates and TDS to the groundwater. Currently, the only groundwater sampling location available to evaluate the potential impacts of the stockpile to the groundwater is well GH-97-4, which has only produced enough water to allow purging and sampling once since its installation in 1997. The representativeness of this sample to evaluate the impacts of seepage from the stockpile is therefore uncertain. The water sample collected from the well in September 2013, indicating elevated sulfate and TDS concentrations may be affected by the stockpile, the colluvium, or the bedrock, and concentrations may be high due to evapoconcentration in the stockpile and shallow groundwater at the stockpile toe.

During the excavation of the seepage collection trench, the stockpile materials, colluvium, and bedrock surface will be visually inspected to check for any indication of stockpile impacts and seepage or groundwater flow paths. The trench will be logged for soil classification, lithology of rock fragments, zones of moisture, and presence of secondary mineralization or precipitates.

The seepage collection trench will be installed prior to the summer monsoon rains, which will allow opportunities to observe the response in the trench to storm events and collect more representative samples of seepage water at the stockpile toe. The seepage water will be sampled and analyzed following high magnitude storm events, typically in the summer and fall for three consecutive years. Seepage water will be analyzed for aluminum, arsenic, cadmium, cobalt, chromium, copper, iron, manganese, nickel, lead, zinc, calcium, chloride, fluoride, potassium, magnesium, sodium, sulfate, TDS, pH, and alkalinity. Once representative seepage water samples have been collected and analyzed during the first year of monitoring, a geochemical model will be developed to evaluate the relationship of the stockpile on the final water quality at the toe of the stockpile. The geochemical model approach to be used to evaluate the stockpile water quality involves the construction of a simple mass balance and mass loading model as follows:

- Estimates of stockpile mass, volume, and surface area, and site precipitation data will be used to develop a range of possible water/rock ratios in the stockpile.
- Estimates of infiltration through the stockpile will be made based on the quantity of water reporting to the seepage collection trench following rainfall events.
- Mass loading from the stockpile to its leachate will be quantified using existing field and laboratory data (including but not limited to SPLP results from previous test pit investigations in 2004 and 2006).

Chino anticipates submitting results of this additional characterization as well as water quality data to NMED by the end of December 2014, provided representative seepage samples can be collected in 2014 given the current drought conditions cycle.

6.0 REFERENCES

Daniel B. Stephens and Associates, 1997. Shallow Groundwater Monitoring Wells at the Groundhog Site. Prepared for Chino Mines Company, Hurley, New Mexico. October 17, 1997.

Golder Associates Inc., 2005. Interim Remedial Action, Groundhog No. 5 Stockpile, Site Investigation Report, Hanover and Whitewater Creeks, Investigation Units. Prepared for Chino Mines Company, Hurley, New Mexico. June 3, 2005.

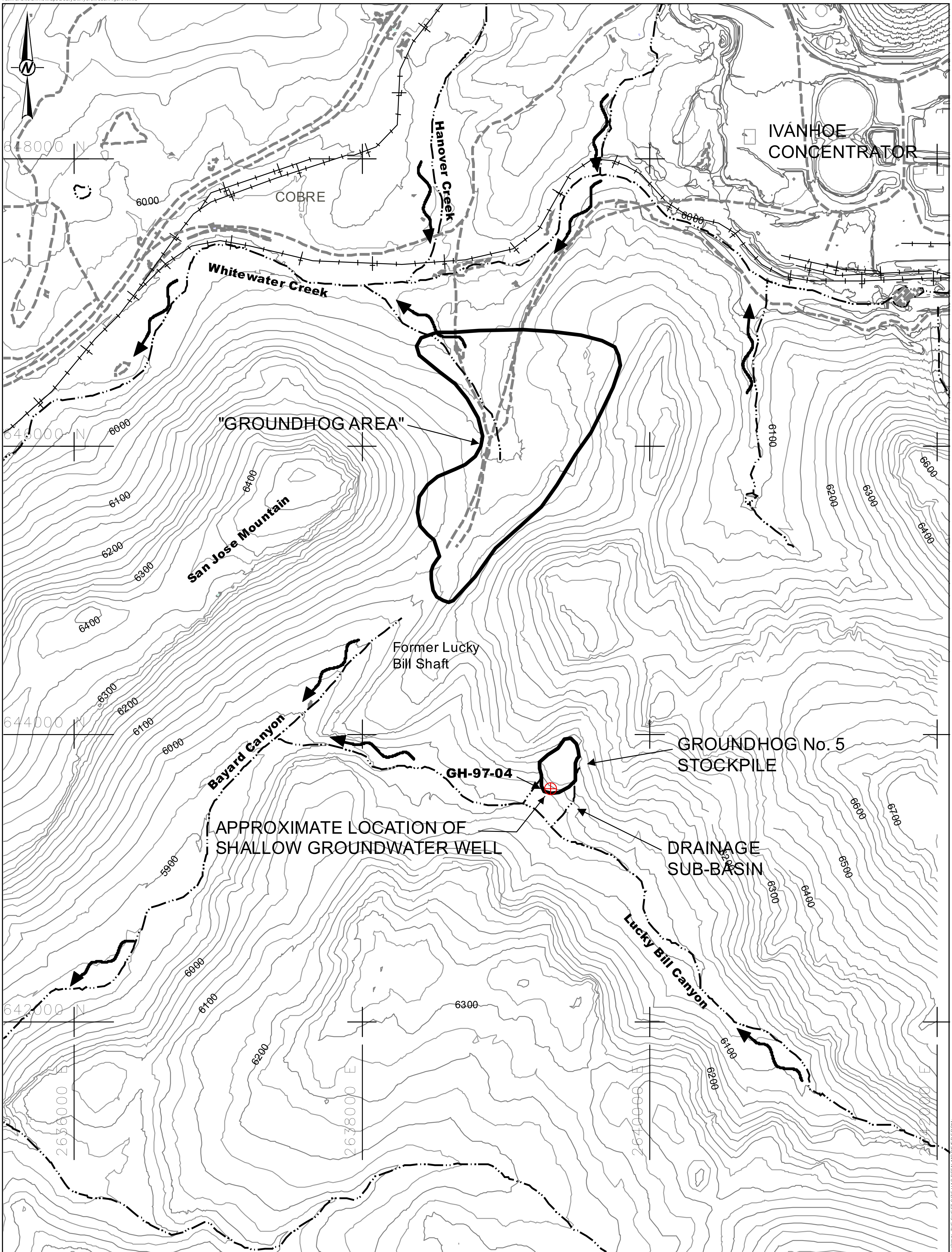
Golder Associates Inc., 2008. Chino Mines Company Site Wide Stage 1 Abatement Final Investigation Report. Prepared for Freeport McMoRan Chino Mines Company Hurley New Mexico . July 18, 2008.

Golder Associates Inc., 2009. Site Investigation Report Addendum, Groundhog No. 5 Stockpile, Hanover and Whitewater Creeks, Investigation Units. Prepared for Chino Mines Company, Hurley, New Mexico. June 3, 2005.

Hernon, R., Jones, W. and Moore, S., 1964. Geology of Santa Rita Quadrangle, New Mexico. 1964.

FIGURES

Path: L:\Site\Chino\Maps\LuckyBillHydroModel\Figure1.mxd



LEGEND

- SHALLOW GROUNDWATER WELL
- APPROXIMATE SURFACE WATER SAMPLING LOCATION
- WATER COURSE
- DIRECTION OF FLOW

NOTES

1. CONTOUR INTERVAL = 25 FEET

REFERENCE

COORDINATE SYSTEM: NAD 1983 STATEPLANE NEW MEXICO WEST FIPS 3003 FEET

CLIENT
FREEPORT-MCMORAN CHINO MINES COMPANY
HURLEY, NEW MEXICO

PROJECT
GROUNDHOG NO. 5 WORK PLAN FOR ADDITIONAL CHARACTERIZATION AND CONTROLS

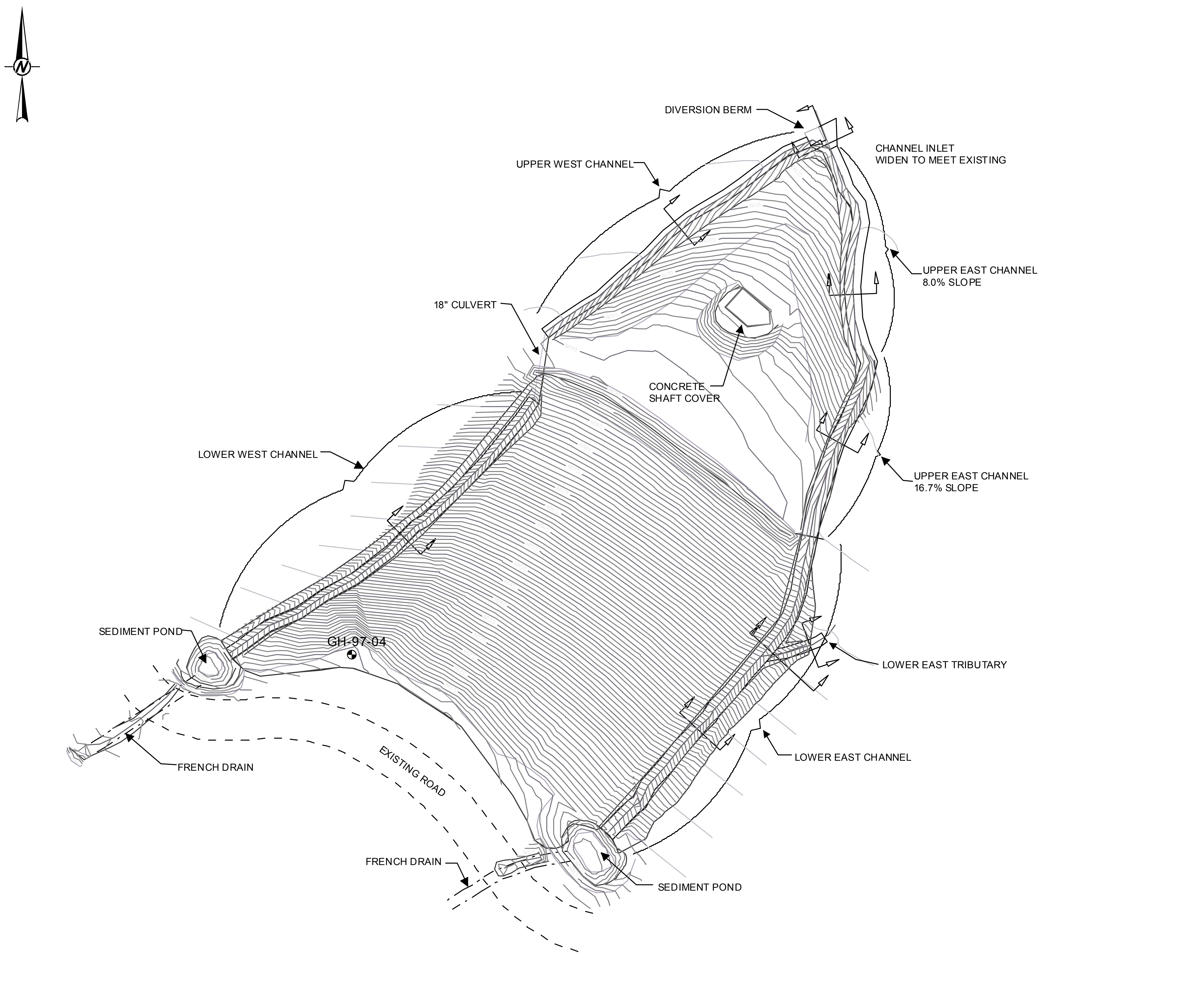
TITLE
GROUNDHOG NO. 5 STOCKPILE LOCATION

CONSULTANT

Golder Associates

YYYY-MM-DD	2014-04-28
PREPARED	DZF
DESIGN	DZF
REVIEW	JP
APPROVED	MB

PROJECT No.	REVIEW	FIGURE
1403873	0	1



LEGEND

MONITORING WELL

NOTES

REFERENCE

1. DRAWING PROVIDED BY TELESTO SOLUTIONS INCORPORATION

CLIENT
FREEPORT-MCMORAN CHINO MINES COMPANY
HURLEY, NEW MEXICO

PROJECT
GROUNDHOG NO. 5 WORK PLAN FOR ADDITIONAL CHARACTERIZATION AND CONTROLS

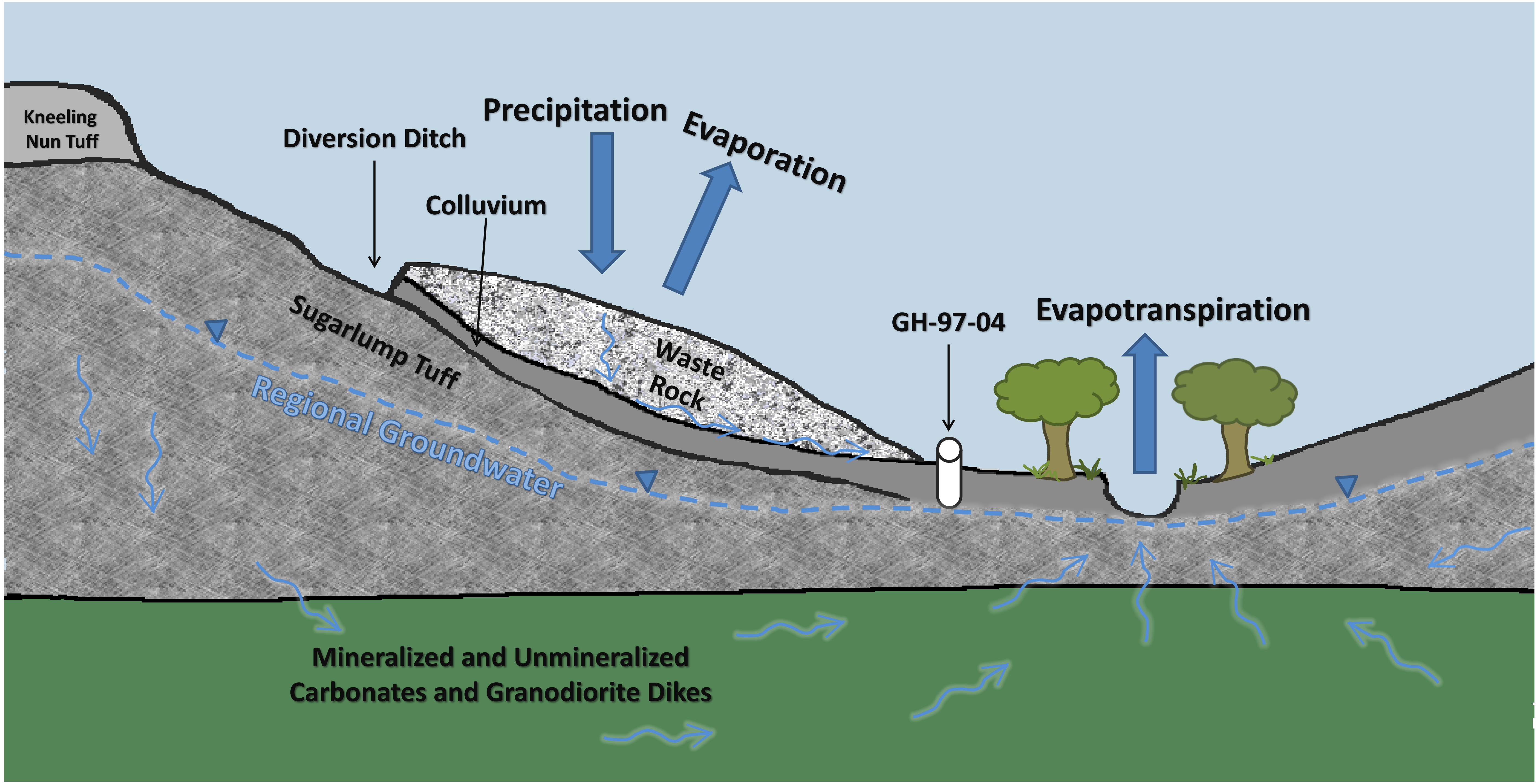
TITLE
GROUNDHOG NO. 1 STOCKPILE AFTER REGRADING IN 2006

CONSULTANT

Golder Associates

YYYY-MM-DD	2014-04-28
PREPARED	DZF
DESIGN	DZF
REVIEW	JP
APPROVED	MB

PROJECT No.	Rev.	FIGURE
1403873	0	2



CLIENT
FREEPORT-MCMORAN CHINO MINES COMPANY
HURLEY, NEW MEXICO

PROJECT
GROUNDHOG NO. 5 WORK PLAN FOR ADDITIONAL CHARACTERIZATION AND CONTROLS

TITLE
HYDROGEOLOGIC CONCEPTUAL MODEL
GROUNDHOG NO.5 STOCKPILE

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-04-28
PREPARED	DZF
DESIGN	DZF
REVIEW	JP
APPROVED	MB

PROJECT No. 1403873
Rev. 0
FIGURE 3

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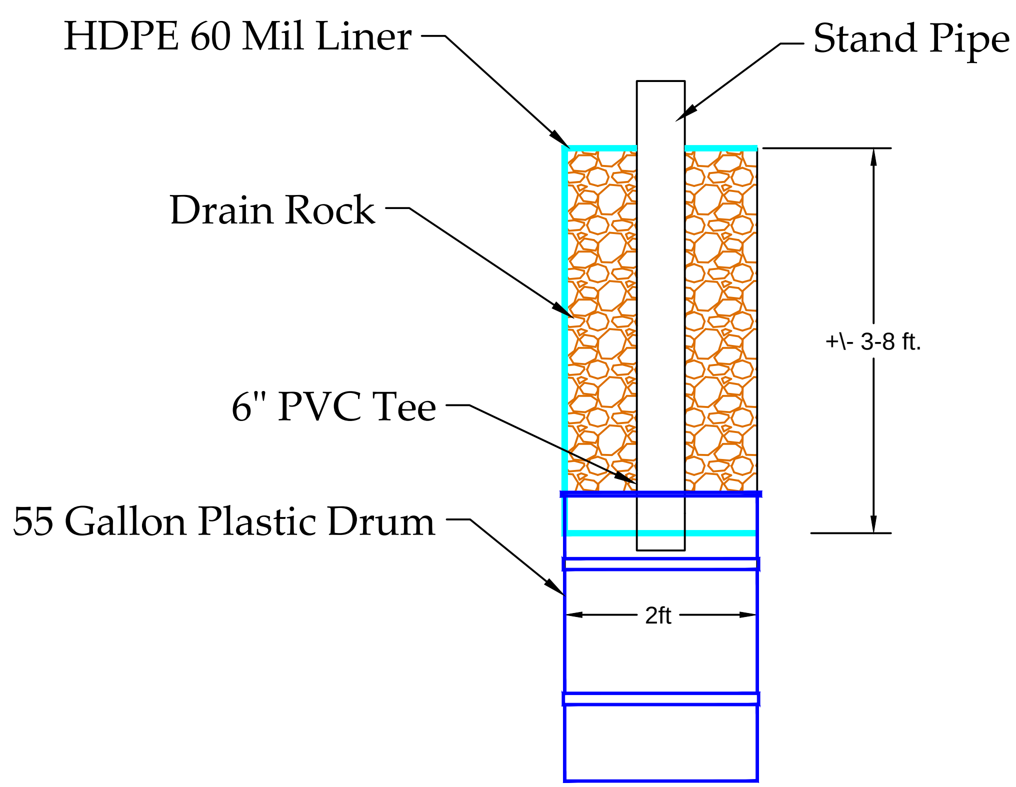
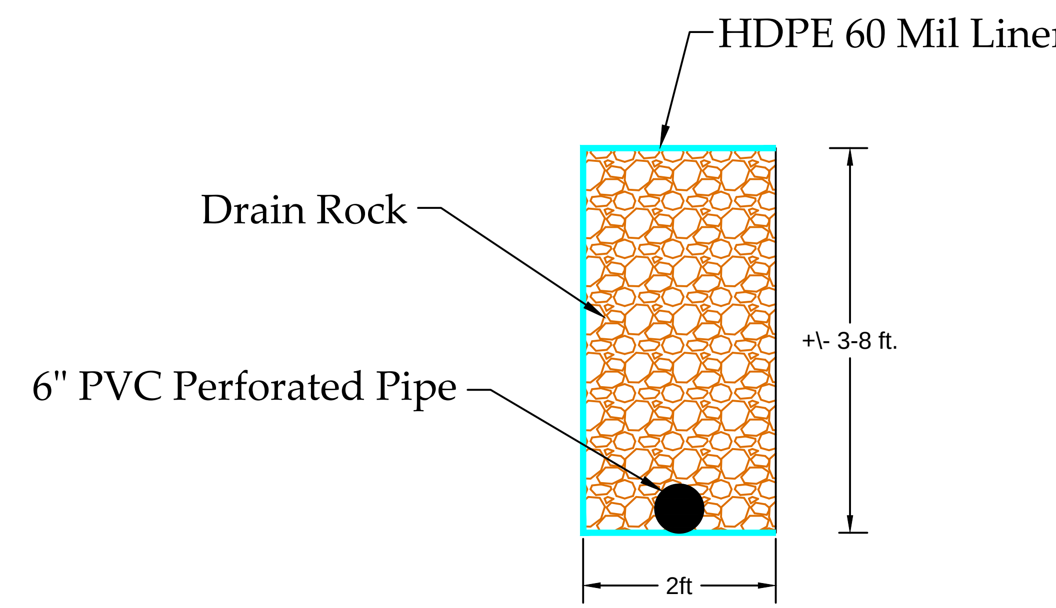
Groundhog #5 Stockpile

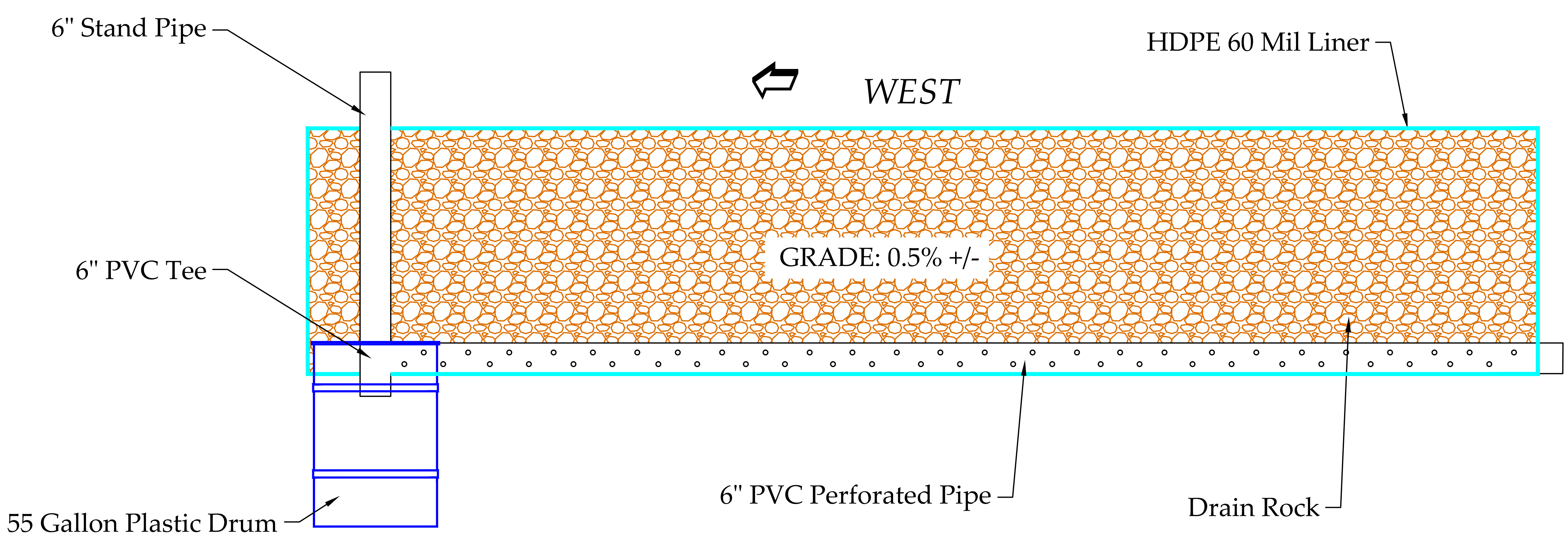
Scale: As Noted	Date: 4-24-2014	Notes:
Dept. Environmental Services		Figure 4
Drawn By: SMG	Checked By: DA/PDP	



West End of Trench



East End of Trench



North Side of Trench

FREEPORT-MCMORAN COPPER & GOLD

Groundhog #5 Collection Trench

Scale: Not To Scale | Date: 4-24-2014 | Notes:
Dept. Environmental Services
Drawn By: SMG | Checked By: DA/PDP

Figure 5

Established in 1960, Golder Associates is a global, employee-owned organization that helps clients find sustainable solutions to the challenges of finite resources, energy and water supply and management, waste management, urbanization, and climate change. We provide a wide range of independent consulting, design, and construction services in our specialist areas of earth, environment, and energy. By building strong relationships and meeting the needs of clients, our people have created one of the most trusted professional services organizations in the world.

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Golder Associates

Engineering Earth's Development, Preserving Earth's Integrity