NO. 1 STOCKPILE TEST PLOT ANNUAL REPORT
REPORT NO. 1

PHELPS DODGE TYRONE INC.

Submitted to:

Phelps Dodge Tyrone, Inc
P.O. Box 571
Tyrone, NM 88065

Submitted by:

Golder Associates Inc.
5200 Pasadena NE, Ste. C
Albuquerque, NM USA 87113

Distribution:

4 Copies – Phelps Dodge Tyrone Inc.
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1.0 INTRODUCTION

Phelps Dodge Tyrone Inc. (Tyrone) operates a copper mining facility near Silver City, New Mexico (Figure 1). Tyrone is evaluating reclamation options with respect to meeting pertinent applicable requirements of the New Mexico Water Quality Control Act (WQA), the Water Quality Control Commission (WQCC) Regulations, and the New Mexico Mining Act (NMMA). The New Mexico Mining and Minerals Division (MMD) regulate Tyrone (Permit No. GR010RE) as an existing mine. The New Mexico Environment Department (NMED) issued Discharge Permit 1341 (DP-1341) to Tyrone to regulate closure related issues.

Condition 76 (DP-1341) and Condition 9.L.1.b (GR010RE) require the development and interpretation of cover, erosion, and revegetation test plots. The purpose of the test plots is to “evaluate: net infiltration [drainage] through the store and release cover with differing cover thicknesses; feasibility of construction and construction techniques required during cover placement; erosion rates of covered and uncovered slopes; vegetation success; and the potential for upward migration of acidic solutions from the Tailing Impoundments, Waste Rock Piles and Leach Ore Stockpiles.”

1.1 Background

Cover design is an important component of the reclamation plans for the Tyrone Mine. Tyrone identified the need for cover design studies in the initial development of their closure/closeout plan (DBS&A, 1997). Through meetings and discussions with the NMED and the MMD during the spring of 1998, Tyrone prepared and submitted cover design work plans for regulatory review. Based upon agency comments, a revised work plan was submitted on October 23, 1998 and work was initiated on the cover design studies in early November 1998.

Implementation of the initial work plan and subsequent work led to the development of the Cover Design Study Status Report (CDSSR) (DBS&A, 1999). The CDSSR presented the results of the materials characterization, soil water balance simulations, and technical reviews of various types of cover systems. Based on this work and subsequent interactions with the NMED and MMD, a capacitive type cover (water storage cover) was selected as the most appropriate for use in this region.

In May 2003, Tyrone submitted a test plot study work plan to address the requirements of DP-1341 and GR010RE. The work plans were ultimately approved by the NMED in May 2004. The MMD granted final approval for the Tyrone test plot work plans related to Condition 9.L.1 (Permit GR010RE) in February 2006.

1.2 Goals and Objectives

Condition 76 (DP-1341) requires submission of an annual report for the stockpile test plots. Condition 9.L.1.d of Permits GR010RE requires that annual reports be submitted beginning in year 2 of the study. This document represents the first annual report detailing the status of the test plots. Section 2 of this document contains responses to comments from the MMD and NMED concerning the As-Built Report-Cover, Erosion, and Revegetation Test Plot Study-No. 1 Stockpile Test Plots that was submitted in September 2006 (Golder, 2006).

The primary objective of this report is to provide an overview of the status of the test plots (Section 3). Data acquisition is ongoing but substantive results are not yet available. The preliminary results will be presented in the second annual report in accordance with the approved work plans.

Section 4 identifies outstanding issues and presents a schedule for the completion of additional work required at the stockpile test plots. Section 5 presents a summary of issues encountered at the test plots and recommendations for improving the test plot program.

2.0 RESPONSES TO COMMENTS ON AS-BUILT REPORT

In a November 8, 2006 letter, the MMD and NMED provided comments on the report titled, *"As-Built Report-Cover, Erosion, and Revegetation Test Plot Study-Tyrone Mine Stockpiles."* The MMD and NMED conditionally approved the report pending satisfactory responses to the conditions listed below. This section details responses to the Agencies' comments.

Agency Comment #1

PDTI shall clarify the text in Section 2.1.1 and Table 4 with respect to the percentage of rock fragments. It is unclear whether the weight percent cited in Table 4 representative of the entire sample or after excluding greater than 75 millimeter fraction.

Tyrone Response to Comment #1

The values listed in Table 4 are representative of the rock fragments (> 2mm) contained in the sample as measured by the laboratory. These data are reported on a weight or mass basis. The soil samples were collected in 1 gallon plastic bags and the fragments larger than about 75 mm (cobbles) were excluded, if they occurred in the soil profile. Field estimation of rock fragments volume and removal of oversize materials is a standard practice that is employed in sampling soils containing rock fragments.

Agency Comment #2

PDTI shall clarify the conversion of weight percent to volumetric percent, which would allow comparisons to be made more readily between Tables 3 and 4.

Tyrone Response to Comment #2

The conversion from weight percent rock fragments to volume percent rock fragments was determined using the following formula and assumptions:

$\text{Volume \%} = [(W\%/SG_r)/((W\%/SG_r)+((100-W\%)/BD_{<2mm}))]*100$ where,

$W\%$ = weight percent rock fragments retained on the No. 10 sieve,
SG_r = specific gravity of rock fragments (assume 2.65 g/cm^3),
$BD_{<2mm}$ = soil bulk density (assume 1.5 g/cm^3).

Agency Comment #3

PDTI must clarify the discrepancies between Figure 4, Figure 5, Figure 6 and Table 3 because the mean, highest, and lowest values do not agree.

Tyrone Response to Comment #3

Figures 4, 5, and 6 illustrate the mean and 95% confidence intervals about the mean for the respective cover thickness and slope treatments. The thickness values in Table 3 represent the range of cover thicknesses measured at each site. The mean and 95% confidence intervals were calculated using the data in Table 3. Figures 4, 5, and 6 are not intended to illustrate the range of measured cover thickness on the test plots, which is represented by the data in Table 3.

Agency Comment #4

PDTI must include photographs of the test plots, preferably following the seeding of the test plots in the summer or fall of 2005 and following the installation of erosion monitoring locations in the fall of 2006.

Tyrone Response to Comment #4

Photo documentation of various aspects of the test plot construction is included in Appendix A of this report. The erosion monitoring locations will be individually photographed once the stations are completed.

Agency Comment #5

PDTI must include updated maps with the addition of erosion monitoring instrumentation (i.e., pin locations) and the subsidence areas associated with any lysimeters.

Tyrone Response to Comment #5

Figure 2 is an updated map showing the proposed location of the erosion transects and the approximate lysimeter subsidence zones.

Agency Comment #6

PDTI must include a description of the initial vegetation success.

Tyrone Response to Comment #6

Please see Section 3.3 for a description of the vegetation on the test plots.

Agency Comment #7

PDTI should identify the location and depth interval for soil hydraulic samples included in Table 6, so that comparisons can be made with Table 4. As is, Table 6 sample identification is insufficient.

Tyrone Response to Comment #7

The locations of cover samples for soil hydraulic testing are provided on Figure 3 in the As-Built report (Golder, 2006). Samples were collected primarily in the vicinity of the lysimeters and/or instrument nests from the top foot of the cover materials. No corresponding chemical data exist for these samples.

Agency Comment #8

Table 6 values tested primarily top surface samples (i.e., six of seven). Based on Section 2.2.1and Table 3, the cover has a higher rock fragment content on slopes than top surfaces. PDTI should clarify the rationale for testing only the top surface values instead of additional testing of some of the slope samples, which have had prescribed different rock content elsewhere at Tyrone. Based upon the construction, design and the height of piles, the slope areas will be considerably larger for Stockpiles than Tailing Impoundments.

Tyrone Response to Comment #8

The soil hydraulic analyses were performed on the fine earth fraction (< 2mm) of disturbed and repacked samples. These data are subsequently corrected to account for rock fragments representative of the whole soil. In this context, the source of the samples is immaterial since the samples were collected from materials that were believed to be representative of test plot covers. In general, the rock fragment content and texture of the cover materials on the top surface and slope treatments on the No. 1 Stockpile are relatively consistent across treatments as documented in Table 3.

Agency Comment #9

Monitoring is mentioned in the as-built reports, and the tailing test plots require annual monitoring summaries. PDTI should clarify the reporting schedule when in the calendar year the annual summaries would be presented. For consistency with other test plot summaries, PDTI must submit the test plot summary by the end of January of each year.

Tyrone Response to Comment #9

Tyrone proposes to provide an annual report for the stockpile test plots at the end of February in subsequent years. This date is requested to avoid simultaneous submittal of the tailing test plot report and stockpile test plot report.

Agency Comment #10

In Section 3.2 and Plate 1, there is some indication that the sloped test plots were flatter and shorter in length than is defined in the permit language. PDTI must explain the causes for the change in grade from the proposed design and if these are due to construction limitations.

Tyrone Response to Comment #10

Slope profiles on the 3:1 slopes are within a few feet of the specified 300 foot slope length. Slope gradients range from 32.1 to 33.2 percent (3 to 3.1(h):1(v)). Slope lengths in the 2.5:1 test plots are very close to the required 175 feet except for those in TP#5 where the existing native topography at the base of the slope limited slope lengths to about 160 feet. Slope gradients in the 2.5:1 plots range from 2.5 to 2.8:1 and are a within the limits of construction. Plate 1 provides additional cross-sections.

Agency Comment #11

As part of the annual summary report (progress report) for the test plots due on January 31, 2007, PDTI must submit responses to the above conditions as well as the five unfinished items in Section 4 Schedule of Future Work cited on page 16. The five items are installation of erosion monitoring points, fertilization of a section of top surface, neutron probe licensing, neutron probe calibration, cost summary.

Tyrone Response to Comment #11

The status of the five unfinished items is detailed in Section 4 of this report.

3.0 RESULTS

The following sections present a summary of the first year of monitoring associated with the stockpile test plot study. The status of the vadose zone and erosion monitoring programs are outlined in Sections 3.1 and 3.2, respectively. The preliminary assessment of vegetation success on the test plots is presented in Sections 3.3.

3.1 Vadose Zone Monitoring

The configuration of the test plots and instrumentation was detailed in the As-Built Report for the Tyrone Mine Stockpiles (Golder, 2006). Stacked nests of heat dissipation sensors (HDS), frequency domain reflectometers (FDR), and electrical resistance sensors (ERS) were installed using a downhole emplacement and reconstruction method in each test plot. The installation method involved installing a 4-inch diameter, schedule 40, PVC pipe vertically in the stockpile material following subgrade preparation. The pipe was installed so that the terminal depth was about 220 cm in a covered condition. Following cover placement and seeding operations, the individual sensors were lowered into the PVC pipe annulus to the target depths in a step wise manner; a section of the pipe was lifted out of the hole and the void space was backfilled with either stockpile or cover material as appropriate and the material was then compacted. At completion the entire length of pipe was removed and only the cable extended from the soil surface. This method resulted in the installation of sensors with minimal disturbance of the surrounding cover and waste material. The sensor cables were then routed through 1.5-inch diameter, schedule 40, PVC pipes to the tripods used to house the data loggers and solar panels. The pipes were then buried to protect them from solar degradation. The sensor cables were connected to data loggers that are powered by 86 amp-hour batteries and charged by 20W or 40W solar panels. Volumetric lysimeters were installed at three test plot locations. The vadose monitoring program is complemented by on-site meteorological measurements.

Data from the individual sensors are collected on an hourly basis and manually downloaded from the dataloggers on an approximate weekly basis. Comprehensive database files have been developed for each vadose zone monitoring nest and are routinely updated as new data is downloaded. Data obtained during the test plot study is currently stored in both the Golder Silver City and Albuquerque offices in a manner that promotes data integrity and expedites both retrieval and entry. The quality of the raw data is initially assessed immediately following individual data downloads. Subsequent, more detailed assessments of the raw data from the test plot study are currently being conducted as the data is being integrated into the database files. Protocols for program-wide data management are also currently being evaluated and integrated into the test plot program. Once the quality of the data has been confirmed, it will be used to evaluate various vadose zone parameters (e.g., soil moisture contents, soil matric potentials), meteorological parameters (e.g., rainfall, wind speed, solar radiation, etc.), and ultimately drainage beneath the individual test plots.

A radio telemetry system was recently installed at the No. 1 Stockpile test plots, which allows continuous data transmission to a centralized server. However, manual downloads of the data are still being performed until a fully integrated electronic access system is established. The following sections provide a detailed description of the stockpile test plot vadose zone monitoring program.

3.1.1 Heat Dissipation Sensors

A total of 52 individual HDS were installed within the 13 vadose zone monitoring nests at the No. 1 Stockpile test plots. Initial monitoring and optimization of the HDS network began in December 2005. The primary activities following installation included troubleshooting the primary and backup power systems for the data loggers, sensor cable and wiring installations, and data logger program optimization. Data from this initial monitoring period were evaluated to determine the approximate time when the moisture content of the backfill material in which the sensors were bedded came into equilibrium with the surrounding waste and cover material. Based on the analysis of the HDS data, the majority of the sensors appear to have reached equilibrium with the surrounding cover and waste material by about March 2006. In general, the data collected prior to this time is not considered reliable.

Individual database files have been developed for each vadose zone monitoring nest. The HDS files include the raw hourly data (i.e., initial soil temperature [T_0] and change in temperature [ΔT] following heating of the porous ceramic body of the HDS), associated HDS laboratory calibration information and, ambient temperature corrections (Flint et al., 2002). Once corrected the HDS data may then be used to estimate soil matric potentials (ψ). The database files are currently undergoing a thorough QA review.

3.1.2 Frequency Domain Reflectometers

A total of 12 individual FDR were installed within three vadose zone monitoring nests at the No. 1 Stockpile test plots. Monitoring and optimization of the FDR network began in December 2005. Database files have been developed for each FDR nest. The files include all hourly raw FDR data (i.e., voltage readings) and associated FDR laboratory calibration information. Soil water contents (θ) may be calculated from the FDR data. The database files are currently undergoing a thorough QA review.

3.1.3 Electrical Resistance Blocks

A total of 8 ERS were installed within eight vadose zone monitoring nests. Monitoring and optimization of the ERS network began in December 2005. Individual database files have been developed for each ERS that include all hourly raw ERS data (i.e., water potentials in bars). These data will be used to evaluate the variability of soil matric potentials in the near-surface cover materials. The database files are currently undergoing a thorough QA review. Once the QA review is completed, soil matric potential data from the ERS will be combined with the soil matric potential data from the HDS to provide a complete profile of the matric potentials at each vadose zone monitoring nest.

3.1.4 Volumetric Lysimeters

Three volumetric lysimeters were installed to evaluate cumulative drainage below the base of the covers (Golder, 2006). The lysimeters consist of polyethylene cone bottom tanks (84-inch diameter and 48-inch height) with a 2-inch diameter Schedule 80 HDPE discharge pipe connected to the bottom of the tank. The discharge pipe is connected to a 55-gallon closed-top polyethylene drum that acts as a reservoir for drainage water. Fluid levels have been measured in gauging tubes with a Druck model CS-420 pressure transducers on an hourly basis since December 2005. Water that accumulates in the gauging tubes or reservoirs is purged from the surface with a pump during the routine data downloads. Water quality monitoring of accumulated fluids is also conducted as part of the purging process. The monitoring consists of field measurements of the pH, electrical conductivity, and temperature.

Individual database files have been developed for each lysimeter. The files include all hourly reservoir water level data from the pressure transducers, manual purge volumes, and field water quality data. The database files are currently undergoing a thorough QA review.

3.1.5 Neutron Moisture Monitoring

Special licensing, operator training, handling, shipping, and storage procedures are required because of the potential radiation safety hazards associated with neutron probes. Golder has completed the Radioactive Materials License application. Pending approval by the Radiation Control Bureau of the NMED, calibration of the neutron probe and routine monitoring of the individual neutron access tubes at the stockpile test plots will be conducted. Calibration should be completed within 60 days of issuance of the Radioactive Materials License by the NMED.

3.1.6 Meteorological Stations

A fully automated meteorological (met) station was assembled and installed at the No. 1 Stockpile in December 2005. The met station consists of a tipping bucket rain gage (Texas Electronic model TE525); relative humidity/air temperature probe (Vaisala model HMP45AC); wind speed and direction sensor (R.M. Young model 05103); and silicon pyranometer for measuring solar radiation (Kipp & Zonen SP-LITE). The sensors are mounted on a 10-foot tripod anchored in place. The sensors and gauges are connected to Campbell Scientific, Inc. CR-1000 data logger that is powered by an 86 amp-hour battery and charged by a 40W solar panel. Initial monitoring and optimization of the meteorological station began in December 2005. This phase of monitoring included troubleshooting primary power and backup power systems, sensor cable wiring, and data logger program optimization. Average hourly values for relative humidity, air temperature, solar radiation, wind speed and wind direction; and hourly total rainfall measurements are currently being recorded with the data logger.

3.2 Erosion Monitoring

Due to the recent winter weather, the erosion transects have not been established. Completion of the transects is scheduled for March 2007 as ground conditions permit.

3.3 Vegetation Success

Vegetation establishment is considered satisfactory on the No. 1 Stockpile test plots based on qualitative assessments of cover, density, and diversity. Canopy cover is relatively low, but is consistent with the levels expected for the early establishment phases of reclamation in this region. Plant density generally exceeds about 1 plant/square foot, which is considered appropriate for this stage in the reclamation. The seeding operation resulted in the initial establishment of shrubs, forbs, and warm and cool season grasses. With the exception of mountain mahogany (*Cercocarpus montanus*), all the seeded species are expressed in the test plots on the No. 1 Stockpile. Because of the nearly complete failure of mountain mahogany to establish on the No. 1 test plots and elsewhere, it was been replaced by four-wing saltbush (*Atriplex canescens*) in subsequent seeding operations after consultation with the Agencies. Colonization of the site by native species is evident through the occurrence of non-seeded species. While some weedy annuals are present in the test plots, they are not widespread. Quantitative vegetation monitoring will be conducted in accordance with the approved work plan.

4.0 STATUS AND SCHEDULE FOR FUTURE WORK

The No. 1 Stockpile test plots were constructed and seeded by the early fall of 2005. Subsequent work involved the installation of the vadose zone monitoring instruments. This section provides an update of the outstanding items identified in the As-built report (Golder, 2006).

4.1 Selection of Control Plots

Tyrone is continuing to evaluate options for siting a control plot for the stockpile test plots. This evaluation is being conducted in coordination with the site-wide mine and reclamation planning.

4.2 Installation of Erosion Monitoring Points

Figure 2 shows the proposed locations for the erosion transects. The erosion stations will be installed as soon as ground conditions permit.

4.3 Fertilization of Top Surface Plots

As indicated in the work plan, nitrogen fertilizer will be applied to the top surface test plots at a rate of 10 lbs N/acre. Ammonium nitrate fertilizer will be evenly broadcast in the treatment area shown on Plate 1. The schedule for fertilization has not changed and it will be completed in the early spring prior to the on-set of plant growth.

4.4 Acquisition of Neutron Probe License and Calibration

Golder has applied for a radioactive materials license with the New Mexico Radiation Control Bureau to use, transport, and store the neutron probe. Golder anticipates that the operating license will be granted within 60 days, at which time the probe can be used in the field. In the interim, Golder intends to obtain a CPN 530DR Hydroprobe from CPN International, Inc. Once the operating license is granted, the instrument will be calibrated to field conditions. Field calibration of the neutron probe is expected to take approximately 60 days.

4.5 Test Plot Cost Summary

The NMED and MMD requested that Tyrone summarize the costs associated with the establishment of the test plots. Table 1 presents a summary of the costs that were assigned to the No. 1 Stockpile test plots based on information supplied by the Tyrone Mine Accounting Department. The costs were grouped into the six major categories as described below.

Design, Oversight, and Permitting: The design and oversight category included consulting costs associated with the design and evaluation of the construction activities related to meeting the scientific requirements of the test plots, and incidental permitting requirements (e.g., meetings and agency correspondence). These costs would not normally be associated with routine reclamation activities.

Archeological Investigations: Archeological investigations were performed in potential borrow areas in the vicinity of the No.1 Stockpile to ensure the protection of cultural resources. The investigation area was expanded beyond the requirements of the test plots in anticipation of the reclamation planned for the No. 1 Stockpile.

Construction Management: The construction management category includes consulting service associated with engineering, survey, and quality control aspects of the test plot construction.

Equipment Operation and Maintenance: This category includes costs incurred during the project associated with equipment operation and maintenance. The primary items include fuel, repairs, leases, and depreciation. Repairs accounted for more than half the costs in this category. Charges for the replacement of a 992 loader transmission and major dozer repairs were incurred during this project. The repair costs are disproportionably high on this project because the costs were not amortized for the vehicle use hours.

Earthwork: The earthwork category primarily includes labor costs (salary, benefits, and expenses) associated with the contractor's earthmoving activities.

Vadose Zone Instrumentation: This category includes costs associated with the design, acquisition, calibration, and installation of the vadose zone and erosion monitoring equipment. Monitoring, maintenance, and repair costs incurred since installation of the instruments are also included.

TABLE 1.
Summary of Costs Accounted for During the No.1 Stockpile Test Plot Construction

Cost Category	Dollars Incurred
Design, Oversight, and Permitting	**32,254**
Archeological Investigations	**16,100**
Construction Management	**18,367**
Equipment Operation and Maintenance	**394,519**
Earthwork	**297,562**
Vadose Zone Instrumentation	**227,440**
Total Cost Incurred	**$ 986,241**

Tyrone does not consider the costs attributed to the No.1 Stockpiles test plots as summarized in Table 1 to reflect the costs that can be expected for routine reclamation of the stockpiles. Nonetheless, these values represent the best available current records for the test plots.

5.0 PERTINENT RECOMMENDATIONS

The reclamation at No.1 Stockpile test plots represents the first stockpile closure project at Tyrone. The construction and reclamation practices used at No. 1 Stockpile test plots are generally considered successful. Experience gained from this effort has resulted in improvements in techniques applied at other facilities. Overall the vadose zone and meteorological monitoring systems are performing well. The intent of this section is to outline some of the problems encountered at the test plots and identify potential solutions that can be integrated into unfinished test plots at Chino and Tyrone.

The heat dissipation sensor cables on the 2-foot cover 2.5:1 slope test plot were damaged in December 2006. The cables appeared to have been severed by wildlife, even though they were buried in PVC conduits except for short section at the nest site. The sensor cables were repaired in early January 2007 and data collection for these sensors was restored. To avoid the future loss of data, all exposed sensor cables will be completely buried or wrapped with a protective armor. All sensor cables in future test plot installations will be buried and installed in conduit to minimize the potential for cable damage.

During a field inspection in August 2006, surface depressions were observed above both lysimeters on the top surface test plots (2-foot and 4-foot cover plots). The surface depressions are believed to have been initiated by settling of the waste rock following the heavy summer rains. The subsidence area coincides with the perimeter of the excavations for the lysimeters. The subsidence occurred despite efforts made to compact the waste rock during installation of the lysimeters. Golder proposes to construct a small earthen berm upstream of the subsidence areas to prevent runon and ponding above the lysimeters.

The potential for lysimeter subsidence at future test plots may be reduced by increasing the degree of compaction of the substrate and/or slightly mounding the area immediately above the lysimeter. Both of the practices were recently implemented at the Chino Stockpile test plots.

The lysimeter reservoir access tubes on the top surface lysimeters are performing poorly, which has complicated evacuation of the reservoirs. The cause of the poor performance and the need for corrective actions are currently being investigated.

In general, there appears to be a lack of vegetation in the immediate vicinity (i.e., within a 2- to 3-foot radius) of the vadose zone monitoring nests on both the No. 1 Stockpile and Tailing test plots. The sensors are installed after seeding a mulching operation so that the cables are not damaged by the equipment and were not adequately seeded. It is recommended that the area around each existing nest be seeded and mulched by hand. For future test plot installations in other areas, it is recommended that the area around each new vadose zone monitoring nests be seeded and mulched immediately following the sensor installations.

Several head of cattle were observed on the No. 1 Stockpile test plots in April 2006 during a routine site inspection. Phelps Dodge representatives were immediately notified and a fence was constructed around the perimeter of the test plots. The perimeter fence was installed around the test plots within one week of the initial cattle sighting.

6.0 REFERENCES

Daniel B. Stephens & Associates. (DBS&A). 1997. Revised closure/closeout plan, Chino Mine. Prepared for Chino Mines Company, Hurley, NM.

DBS&A. 1999. Cover design study status report, Tyrone Mine. Prepared for Phelps Dodge Tyrone Inc., Tyrone, NM.

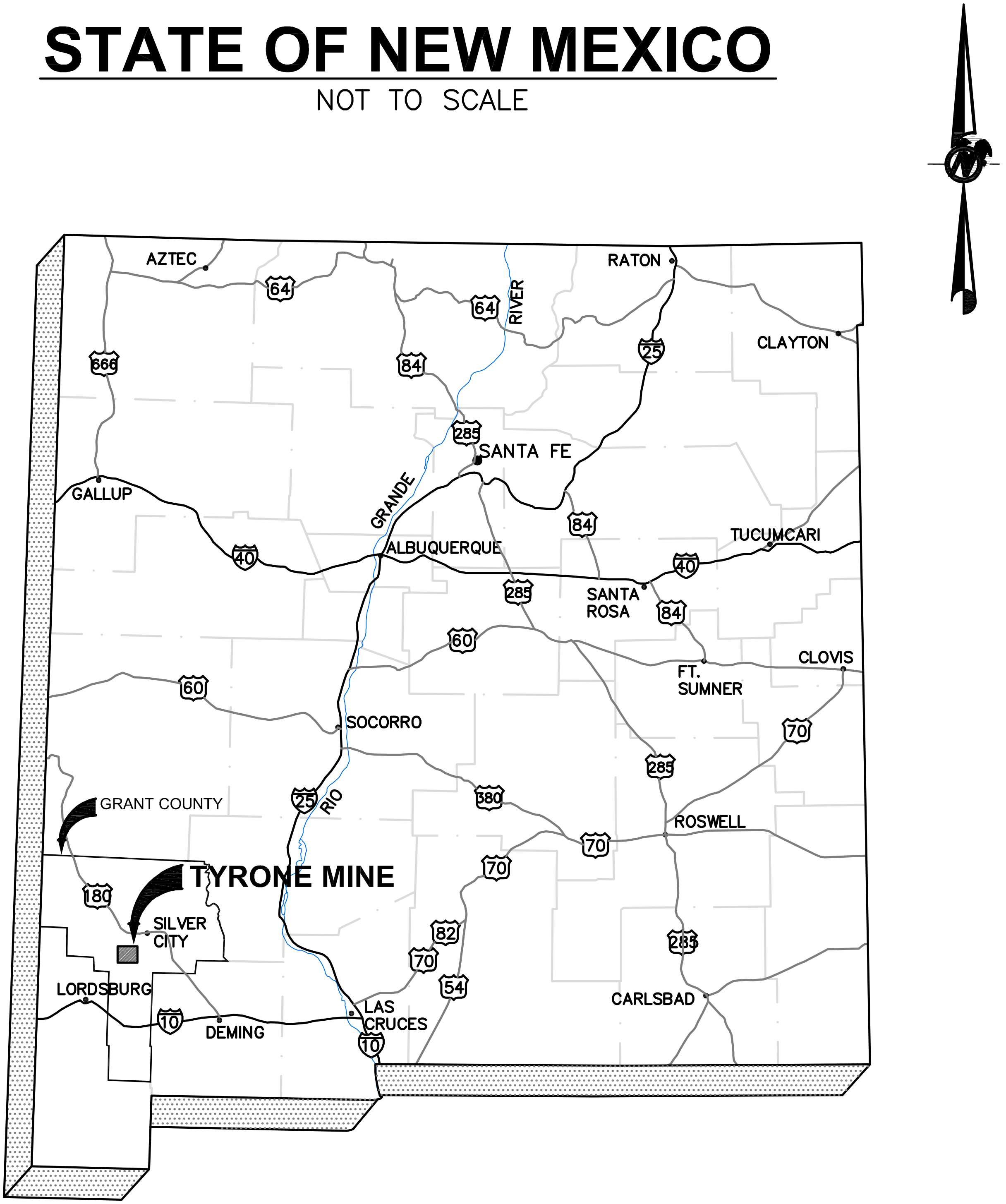
Flint, A.L., G.S. Campbell, K.M. Ellet, and C. Calissendorff. 2002. Calibration and temperature correction of heat dissipation matric potential sensors. Soil Sci. Soc. Am. J. 66:1439-1445.

Golder Associates Inc. (Golder). 2006. As-built report- cover, erosion, and revegetation test plot study- Tyrone Mine Stockpiles. Prepared for Phelps Dodge Tyrone, Inc. September 29, 2006.

FIGURES

STATE OF NEW MEXICO

NOT TO SCALE



PROJECT

PHELPS DODGE TYRONE INC.
NO.1 STOCKPILE TEST PLOTS
GRANT COUNTY, NEW MEXICO

TITLE

GENERAL LOCATION OF TYRONE MINE

Golder Associates
Albuquerque, New Mexico

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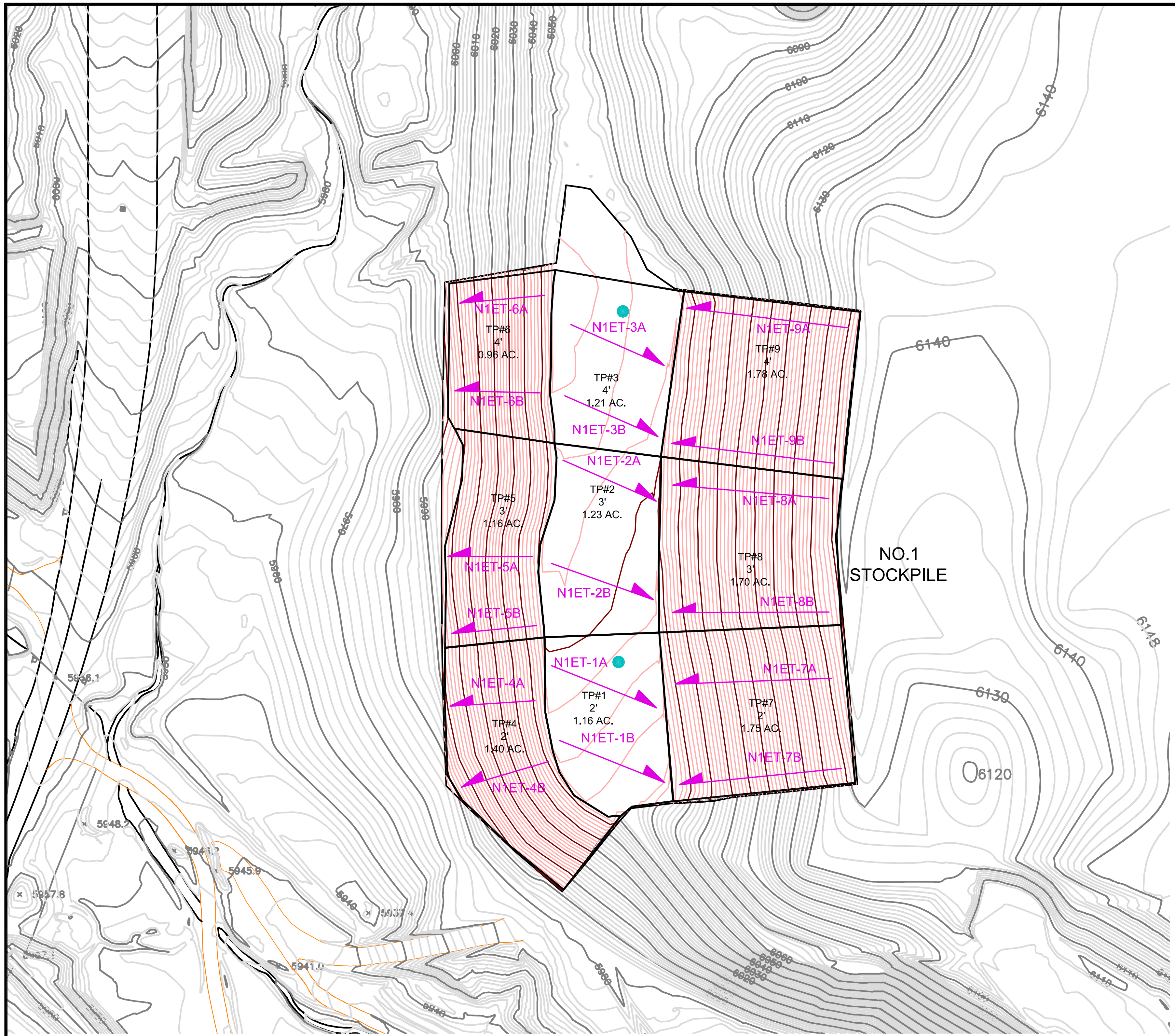

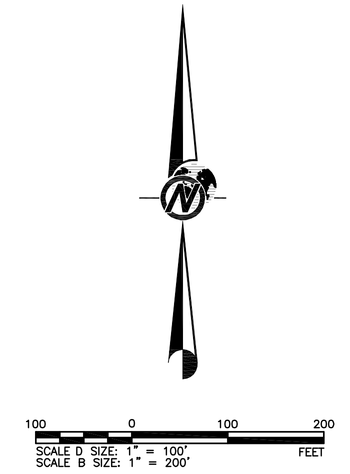

LEGEND

◄— N1ET-1A	EROSION TRANSECT (PROPOSED LOCATION)
●	LYSIMETER SUBSIDENCE (APPROXIMATE)

PROJECT

PHELPS DODGE TYRONE INC.
NO.1 STOCKPILE TEST PLOTS
GRANT COUNTY, NEW MEXICO

TITLE

APPROXIMATE LOCATIONS OF EROSION TRANSECTS AND LYSIMETER SUBSIDENCE

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053–2377
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CHECK	DR	09/26/06
REVIEW	LM	09/29/06

FILE No. No1 Stkp Instrument
SCALE AS SHOWN
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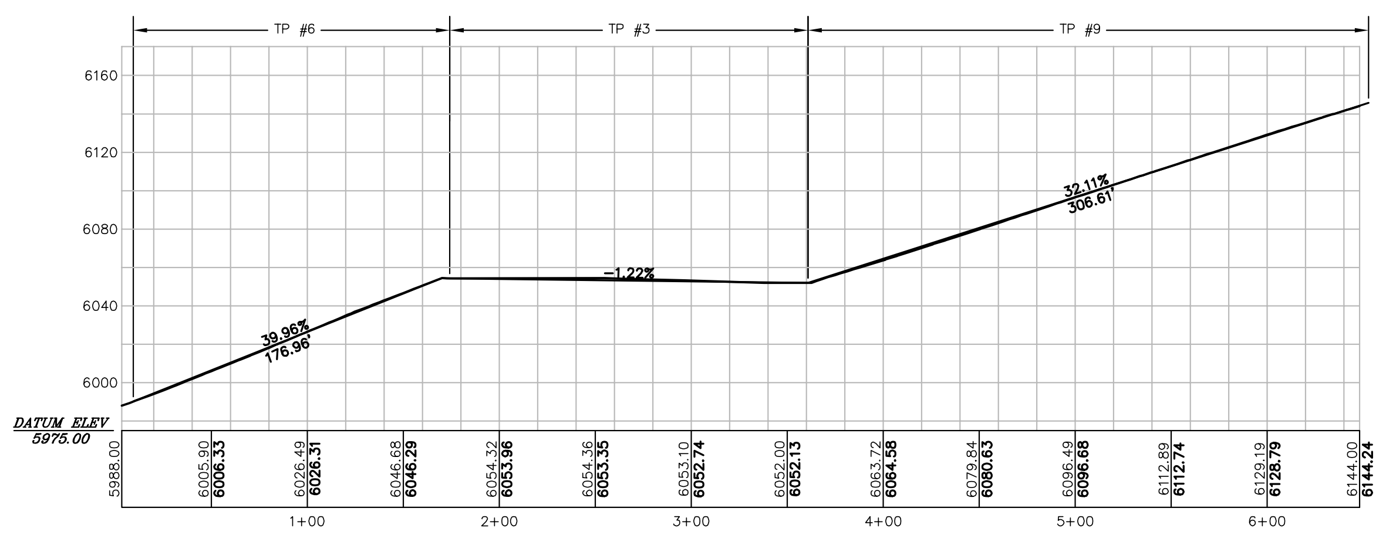
FIGURE 2

Drawing file: No1 Stkp Pro Erosion Trans.dwg Jan 31, 2007 – 1:12pm

PLATE

NOTE: AS-BUILT TOPOGRAPHY FROM M3 ENGINEERING & TECHNOLOGY INC.



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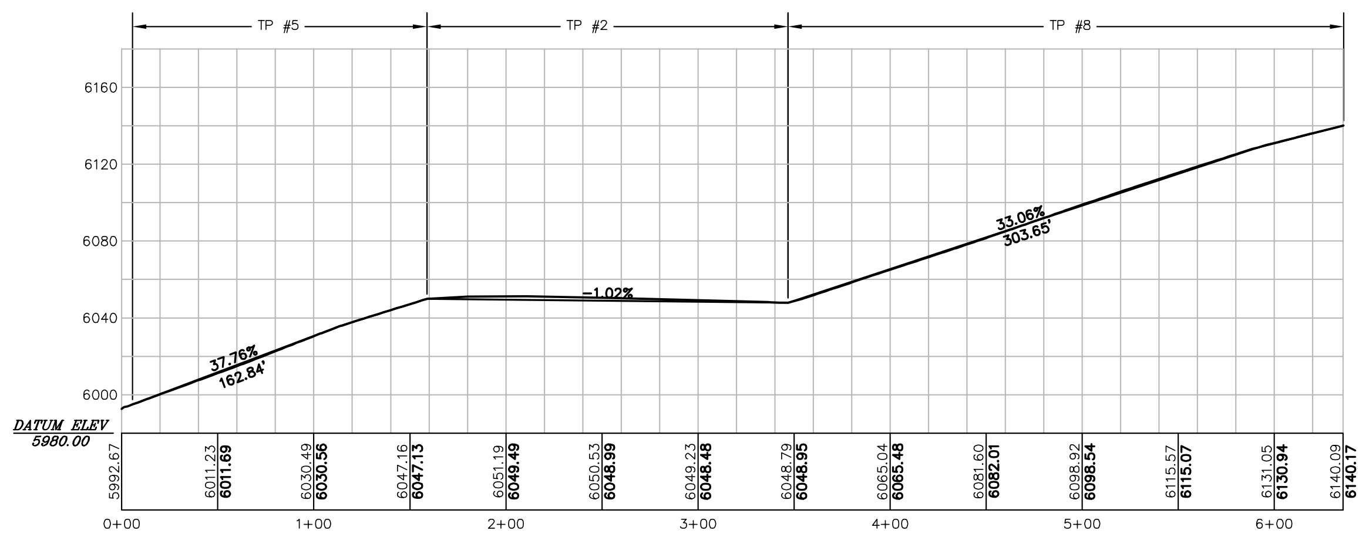

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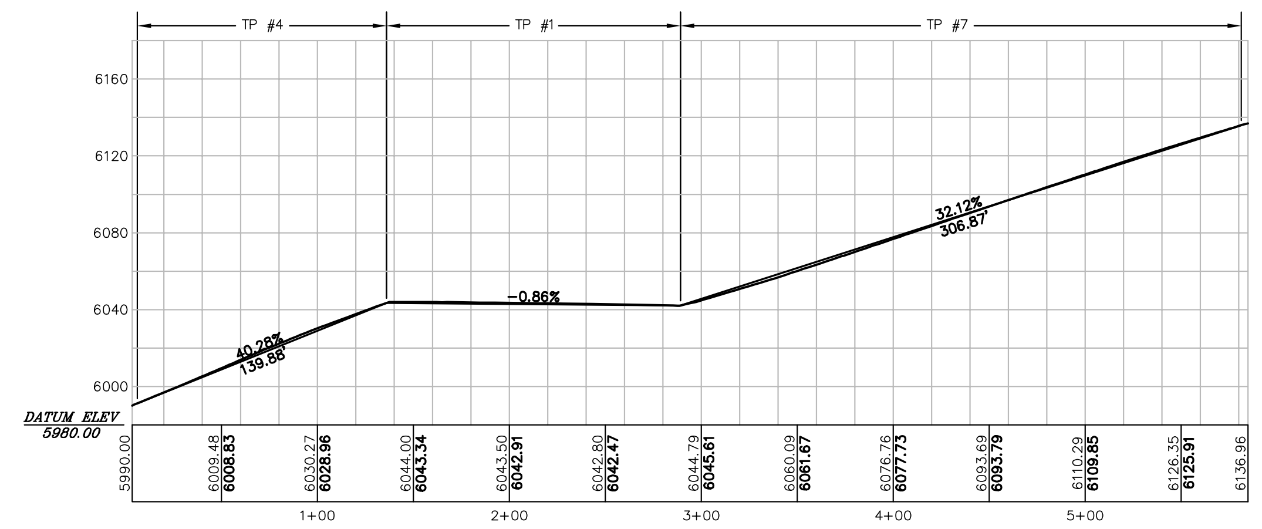

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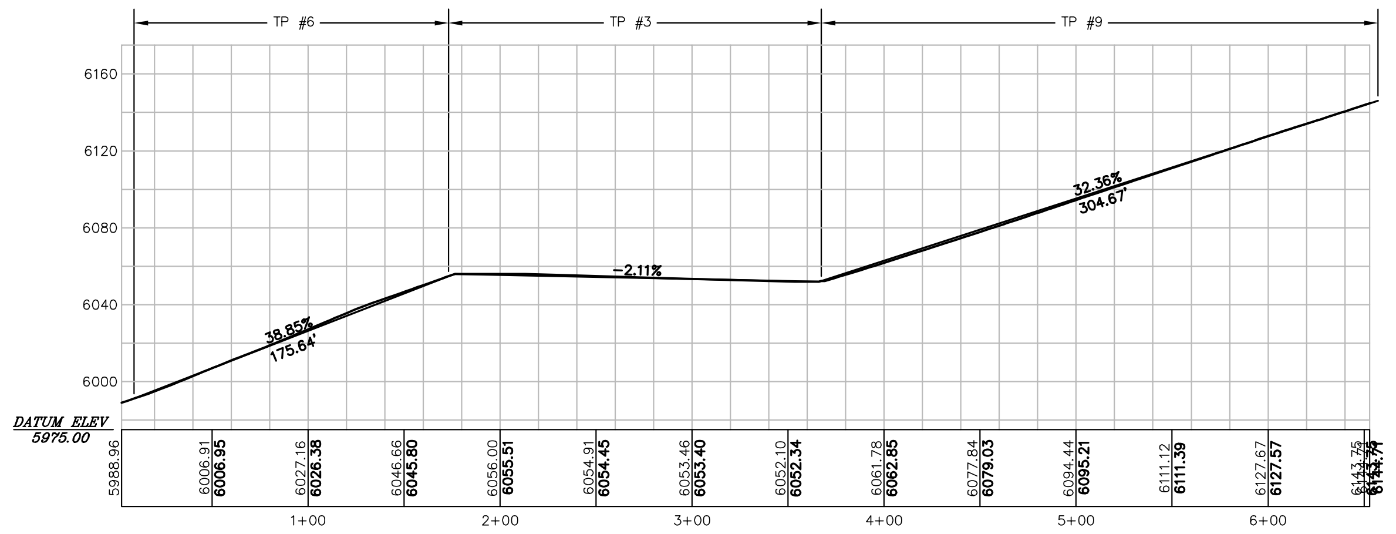

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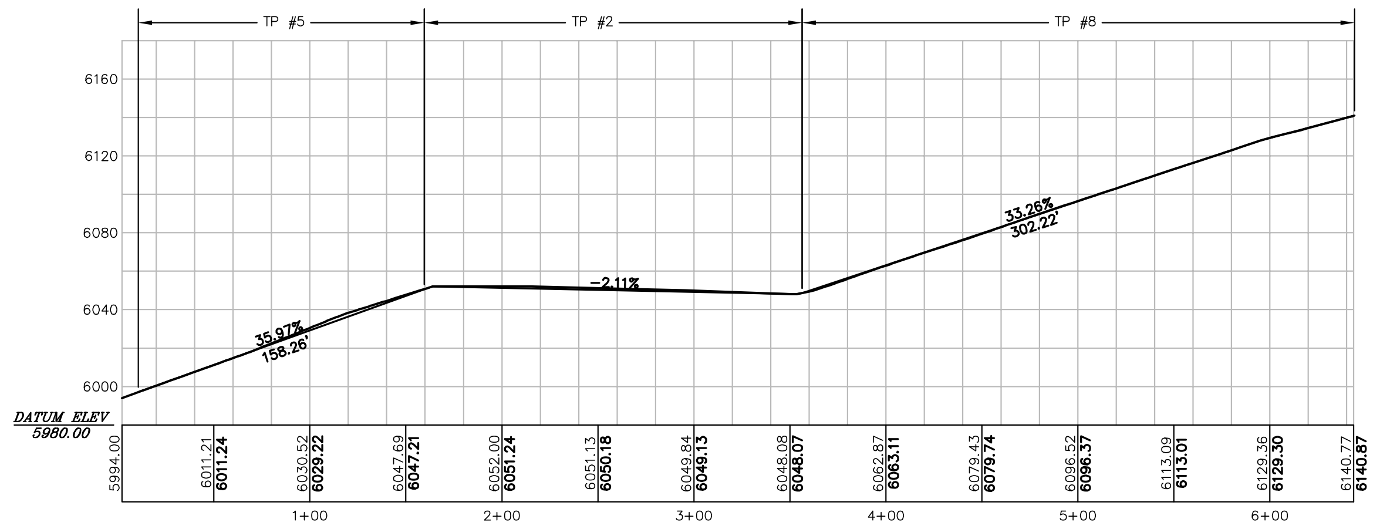

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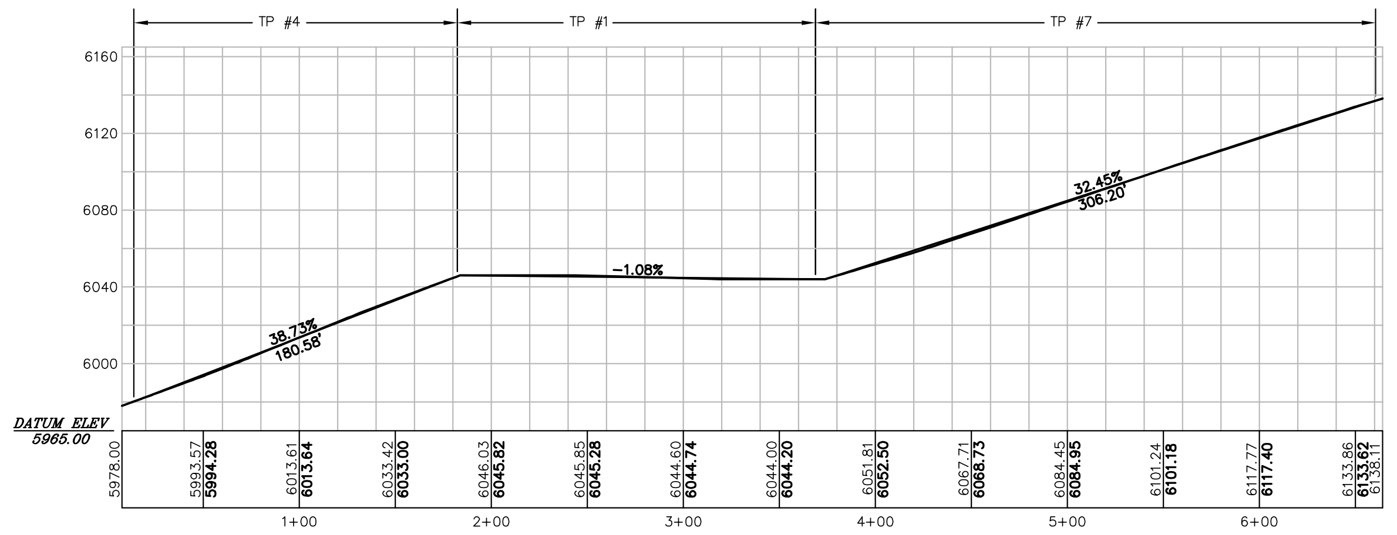

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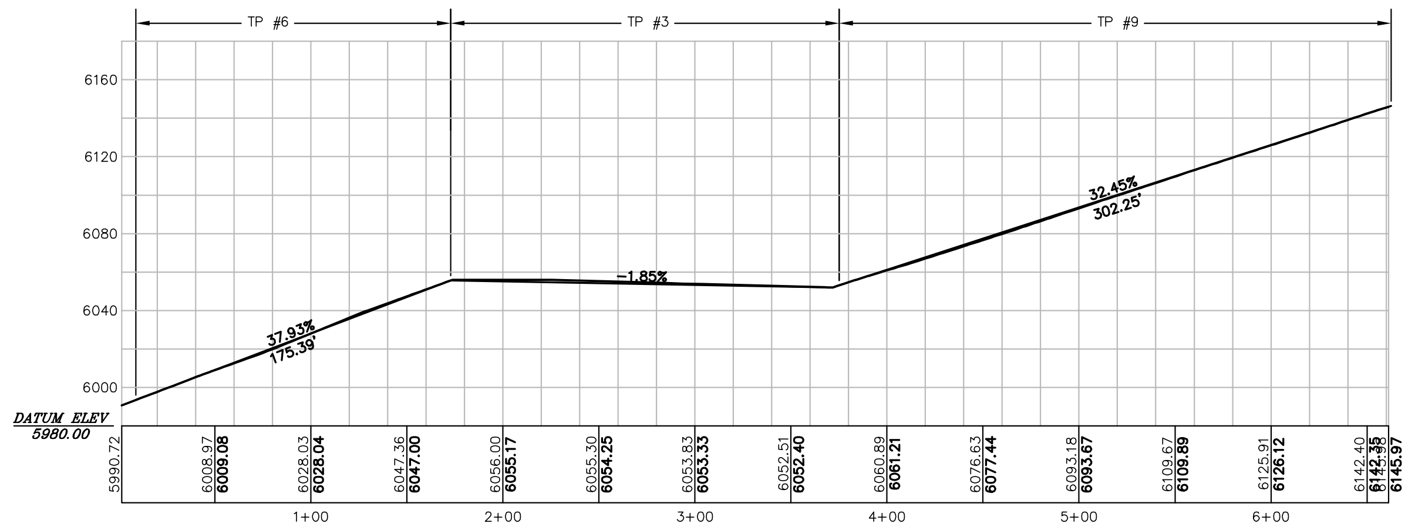
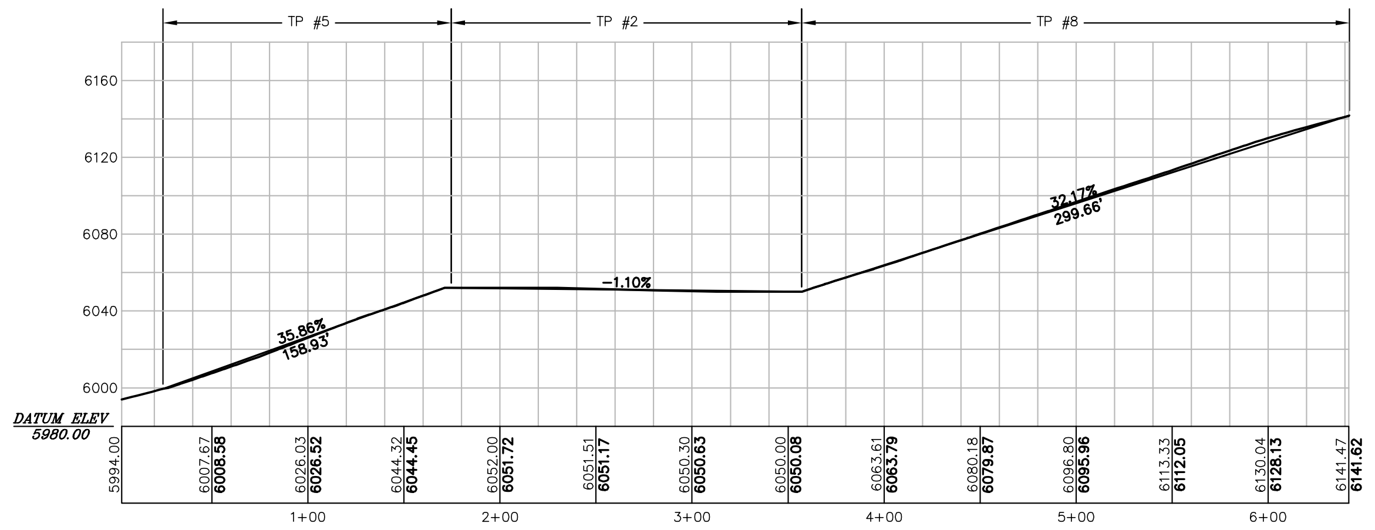
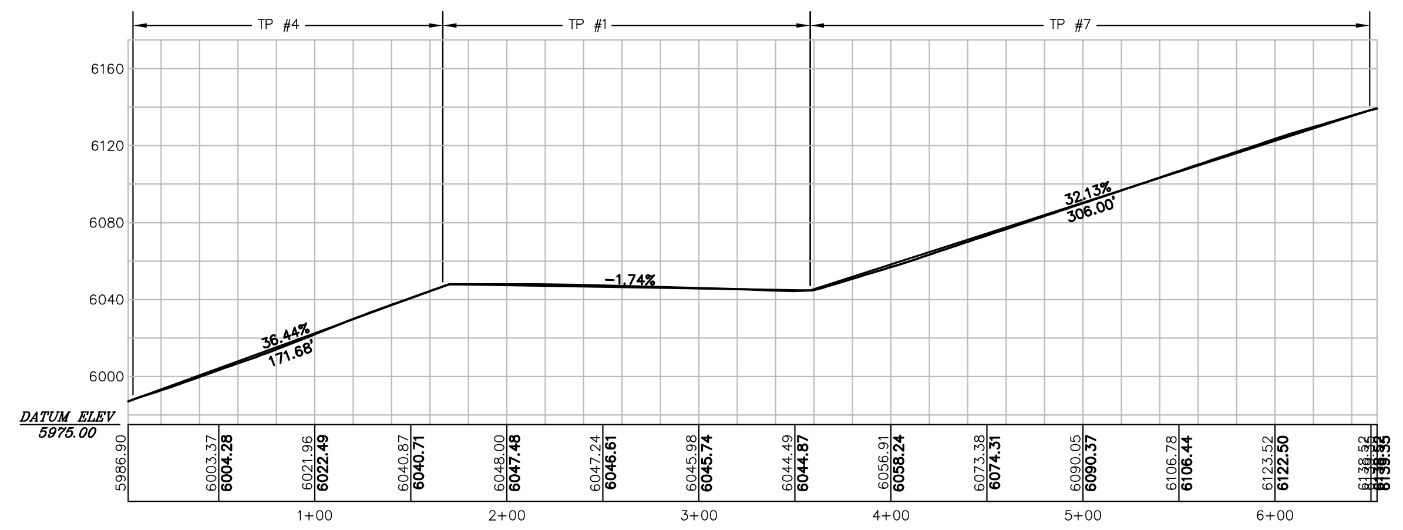


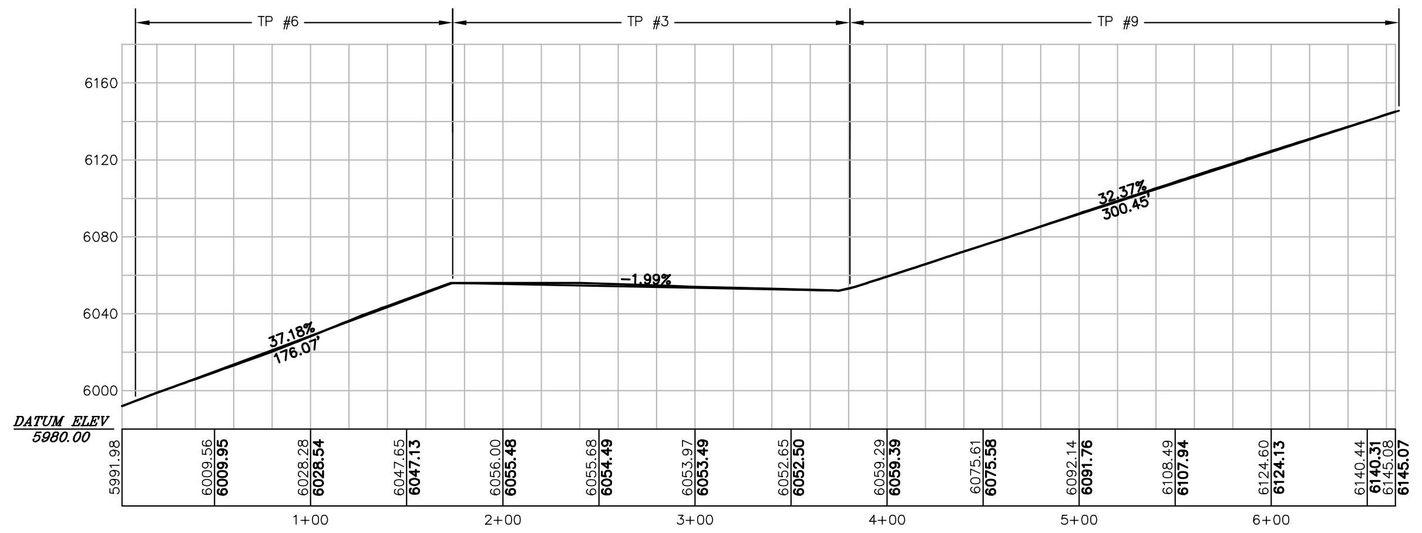
CROSS SECTION A2-A2'



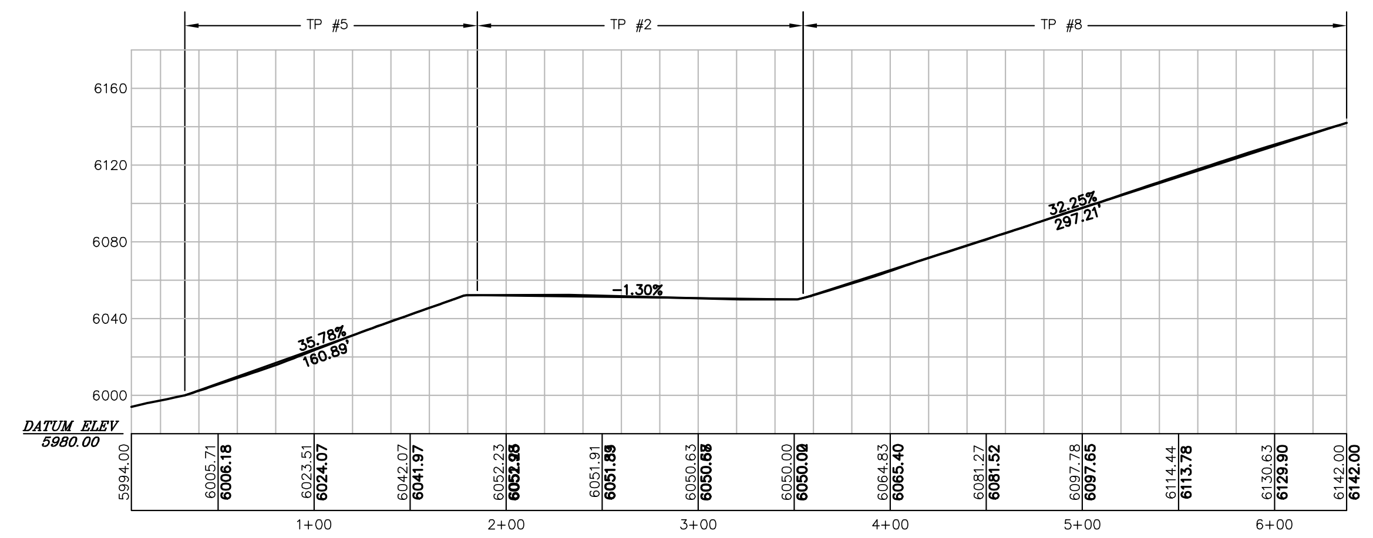
CROSS SECTION B2-B2'



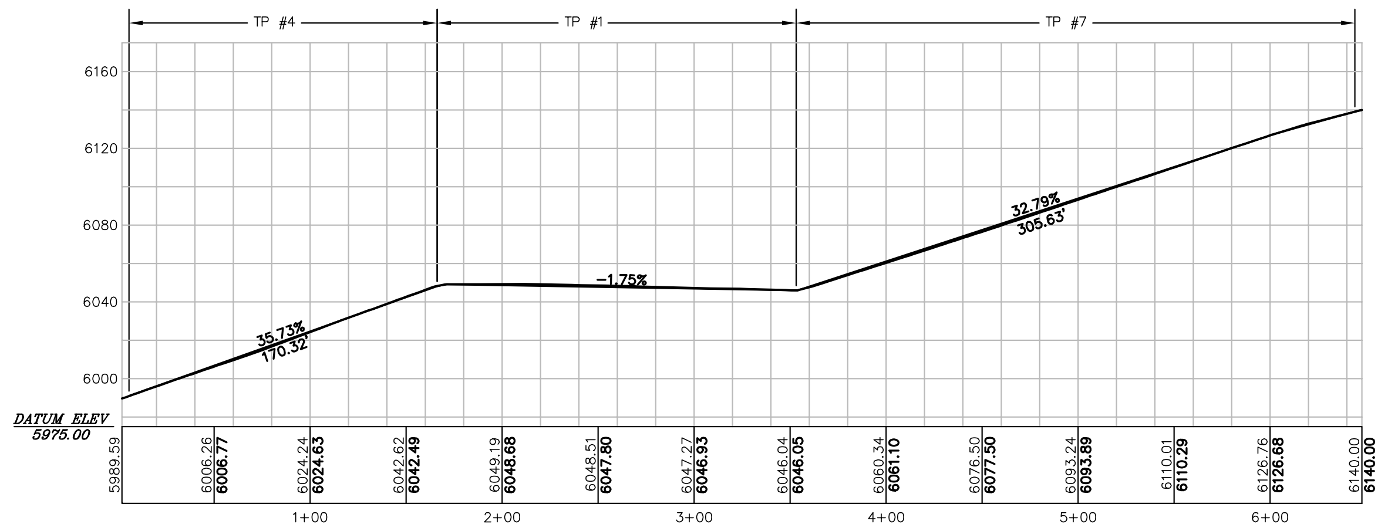
CROSS SECTION C2-C2'



CROSS SECTION A1-A1'

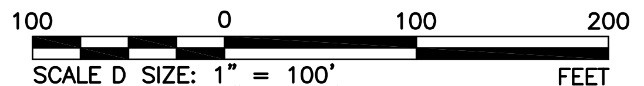


CROSS SECTION B1-B1'



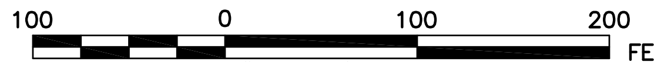
CROSS SECTION C1-C1'

PLAN VIEW SCALE



SCALE D SIZE: 1" = 100'
SCALE B SIZE: 1" = 200'

CROSS SECTION SCALE



SCALE D SIZE: 1" = 100'
SCALE B SIZE: 1" = 200'

LEGEND

——	TEST PLOT BOUNDARY
▨	PROPOSED FERTILIZER TREATMENT AREA
33.26% 302.22'	SLOPE GRADIENT & LENGTH

PROJECT

PHELPS DODGE TYRONE INC.
NO.1 STOCKPILE TEST PLOTS
GRANT COUNTY, NEW MEXICO

TITLE

SLOPE PROFILES & FERTILIZER TREATMENT AREA

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053-2377
DESIGN	LM	01/15/07
CADD	CM	01/31/07
CHECK	DR	01/31/07
REVIEW	LM	01/31/07

FILE No. No1 Stkp Cross Secs
SCALE AS SHOWN
REV. 0

PLATE 1

Drawing file: No1 Stkp Cross Secs.dwg Jan 31, 2007 - 1:11pm

APPENDIX A

TEST PLOT PHOTOS

No. 1 Stockpile surface prior to regrading – Sept 04

No. 1 Stockpile outslope prior to regrading– Sept 04

Golder Associates Albuquerque, New Mexico

TITLE

No. 1 STOCKPILE – INITIAL CONDITIONS

CLIENT/PROJ

PHELPS DODGE TYRONE, INC
NO. 1 STOCKPILE TEST PLOTS

DRAWN	DR	DATE	01/31/07	JOB NO	053-2377
CHECKED	LM	SCALE	NA	**FIGURE A-1**	
REVIEWED	LM	FILE	No. 1 PHOTOS		

Lysimeter 1A and reservoir

Lysimeter 1A - Backfilling

Lysimeter 8A

Lysimeter 8A - Backfilling

Golder Associates

Albuquerque, New Mexico

TITLE

LYSIMETER CONSTRUCTION

CLIENT/PROJ

PHELPS DODGE TYRONE, INC
NO. 1 STOCKPILE TEST PLOTS

DRAWN	DR	DATE	01/31/07	JOB NO	053-2377
CHECKED	LM	SCALE	NA		**FIGURE A-2**
REVIEWED	LM	FILE	No. 1 PHOTOS		

Drill seeding top surface – Aug 05

Mulch operation – Aug 05

Seeding and mulching – Aug 05

Completed 2.5:1 Test Plots – Aug 05

Golder Associates
Albuquerque, New Mexico

TITLE

SEEDING AND MULCHING

CLIENT/PROJ
PHELPS DODGE TYRONE, INC
NO. 1 STOCKPILE TEST PLOTS

DRAWN DR
CHECKED LM
REVIEWED LM
DATE 01/31/07
SCALE NA
FILE No. 1 PHOTOS
JOB NO 053-2377

FIGURE A-3

Down-hole FDR installation

Meteorological Station

Data Logger

Erosionometer

Golder Associates

Albuquerque, New Mexico

TITLE

TEST PLOT INSTRUMENTATION

CLIENT/PROJ

PHELPS DODGE TYRONE, INC
NO. 1 STOCKPILE TEST PLOTS

DRAWN	DR	DATE	01/31/07	JOB NO	053-2377
CHECKED	LM	SCALE	NA		**FIGURE A-4**
REVIEWED	LM	FILE	No. 1 PHOTOS		

Top Surface Test Plots – Aug 06

2.5:1 Test Plot – Oct 06

Top Surface Test Plots – Aug 06

2.5:1 Test Plot – Oct 06

Golder Associates Albuquerque, New Mexico

TITLE

VEGETATION ESTABLISHMENT

CLIENT/PROJ

PHELPS DODGE TYRONE, INC
NO. 1 STOCKPILE TEST PLOTS

DRAWN	DR	DATE	01/31/07	JOB NO	053-2377
CHECKED	LM	SCALE	NA		**FIGURE A-5**
REVIEWED	LM	FILE	No. 1 PHOTOS		