phelps dodge Tyrone, Inc. P. O. Drawer 571, Tyrone, New Mexico 88065 • (505) 538-5331

March 31, 2006

Certified Mail #70041350000007502488
Return Receipt Requested

Ms. Mary Ann Menetrey
Program Manager
New Mexico Environment Department
Mining Environmental Compliance Section
P.O. Box 26110
Santa Fe, New Mexico 87502

Dear Ms. Menetrey:

Re: Phelps Dodge Tyrone, Inc., DP-1341, Condition 85,
Tailing Transport and Deposition Impacts Investigation Report

Phelps Dodge Tyrone, Inc., submits the attached Tailing Transport and Deposition Impacts Investigation Report prepared by Golder Associates. This report is in fulfillment of Condition 85 of Discharge Plan 1341. A CD containing the electronic version of this report is also provided.

Should you have questions, please contact Mr. Mike Jaworski at (505) 538-7181.

Very truly yours,

Ned Hall

E. L. (Ned) Hall, Manager
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DP-1341 CONDITION 85
TAILING TRANSPORT AND DEPOSITION
IMPACTS INVESTIGATION REPORT

Submitted to:
Phelps Dodge Tyrone, Inc.
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Tyrone, New Mexico 88065

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Distribution:

8 Copies - Phelps Dodge Tyrone, Inc.
3 Copies - Golder Associates Inc.

March 31, 2006

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1.0 INTRODUCTION

Phelps Dodge Tyrone, Inc. (Tyrone) operates an open pit copper mine and solution extraction/electrowinning facility 10 miles southwest of Silver City, New Mexico (Figure 1). Tyrone is evaluating reclamation options with respect to meeting applicable requirements of the New Mexico Water Quality Control Act, the Water Quality Control Commission (NMWQCC) Regulations, and the New Mexico Mining Act. The Tyrone Mine is permitted as an existing mine (No. GR010RE) with the New Mexico Mining and Minerals Division (MMD).

Golder Associates Inc. (Golder) prepared this report on behalf of Tyrone in response to Condition 85 of the Supplemental Discharge Permit 1341 (DP-1341). Section III of DP-1341 requires Tyrone to conduct scientific studies related to mine closure and closeout actions. This report describes Tyrone's efforts to fulfill the requirements of DP-1341 Condition 85, which states:

> *Tyrone shall perform a study to investigate the extent of deposition of tailings transported by wind or water off the Tailing Impoundments. In accordance with the schedule approved under Condition 74, Tyrone shall submit to NMED for approval a work plan, including an implementation schedule for a study to investigate the extent of deposition of tailings transported by wind or water off the Tailing Impoundments. The investigation shall address potential impacts to surface water, ground water and abatement and closure of areas containing the tailings.*

Tyrone submitted a work plan to satisfy Condition 85 in April 2004 (Tetra Tech, 2004). Following review of the work plan by the NMED, Tyrone submitted a sampling and analysis plan (SAP) for collection of sediments (Golder, 2005a). This SAP was approved by the NMED in October 2005 and field work commenced in the fall of 2005.

1.1 Background

Six tailing impoundments (1, 1A, 1X, 2, 3 and 3X), occupying about 2,300 acres, occur in the northwest portion of the Tyrone permit area (Figure 2). Tailing consists of sand to clay-size particles of crushed rock produced during the milling and concentrating process. During operations between 1969 and 1992, the tailing was delivered as slurry to the impoundments and the water was decanted and returned to the mine to be reused. Tailing deposition ceased when the concentrator shut down in 1992. Reclamation of the tailing impoundments was initiated in 2004 in accordance with the DP-27 Settlement Agreement. A considerable amount of historical, geochemical, and hydrologic data has been collected regarding the tailing impoundments since they were closed (DBS&A, 1997a, 1997b, and 1997c; DBS&A, 1998; SARB, 1999; and PDTI, 2001).

1.2 Objectives

The intent of this investigation is to evaluate the effectiveness of existing controls and collect additional data necessary to determine whether sediment has been transported off-site into the ephemeral drainages near the impoundments and whether abatement may be necessary to meet the applicable water quality standards.

More specifically, the primary objectives of this study are to:

1) Evaluate the extent of tailing deposition from water and wind erosion from the No. 1, 1A, 1X, 2, 3 and 3X tailing impoundments,

2) Assess potential impacts of these deposits on surface water and ground water quality; and

3) Assess the need for abatement and reclamation of any areas containing fugitive tailing.

This document is structured in sections. The methods used in this investigation are detailed in Section 2.0. The results of the investigation are presented in Section 3.0. Golder's recommendations for mitigation and closure of the wind and water deposited materials and monitoring are outlined in Section 4.

2.0 METHODS

The methods used to assess the extent and impacts of wind and water transported materials are discussed herein. Section 2.1 addresses the evaluation of wind transported materials, while water transported materials are discussed in Section 2.2. Section 2.3 outlines the laboratory methods used in this assessment. The approach for impacts analysis is discussed in the Section 2.4.

2.1 Wind Transported Materials

A combination of field mapping and soil sampling was used to evaluate the nature and extent of tailing transported by wind from the tailing ponds to the surrounding soils. The nature and extent of wind blown tailing was determined in the field by traversing the perimeter of the impoundments and mapping and describing the surface conditions. A certified professional soil scientist mapped the wind blown tailing deposits. Accumulations of the tailing were delineated on 1:6,000 scale aerial photographs from the 2004 flight of the Tyrone Mine. The wind deposited tailing areas were delineated in the field because photo-interpretation was only marginally successful. In particular, we were unable to consistently identify areas with thin accumulations of tailing on the photographs. A mapping legend was developed to classify the tailing accumulation areas according to the thickness and surface coverage of the tailing (See Section 3.1).

The degree of tailing impacts on the soils was evaluated through the use of soil testing within and downwind of the tailing accumulation zones. Tailing and/or soil samples were collected along transects that were generally oriented parallel to the dominant wind direction (from the southwest and west) as determined during the fieldwork (Tetra Tech, 2004). Three representative tailing deposition areas were sampled at each pond to determine the extent and degree of impact associated with the wind-blown tailing deposits. A total of 18 transects were sampled at the 6 tailing ponds. The transects were initiated in areas representative of the main tailing accumulation zones and additional soil samples were taken 25 feet on either side of the field determined tailing limit. The final sample was collected about 75 feet downwind from the tailing limit.

Soil samples were collected from the upper 6 inches of the soil along each transect. Where tailing was present, the tailing and underlying soil were sampled separately. The entire thickness of the tailing deposit was sampled. After taking the tailing sample, the soil surface was gently brushed to remove excess tailing and the 0 to 6 inch soil interval was sampled. This approach was used to determine if the surficial tailing deposits were affecting the underlying soils. The pH and electrical conductivity of the soil and tailing samples was measured in the laboratory (Section 2.3).

2.2 Water Deposited Tailing

Tyrone maintains a system of catch basins below the tailing impoundments to control off-site sedimentation resulting from erosion of the tailing impoundment slopes. The extent of impacts associated with potential tailing deposition was evaluated in the major ephemeral stream channels that drain the watersheds below the tailing impoundments and their respective catch basins.

Composite sediment samples were collected from three shallow excavations at 61 locations according to a SAP (Golder, 2005a) approved by the NMED on October 13, 2005. The approved SAP for Mangas Valley sediment is included in Appendix A. The sediment sampling involved the systematic collection of stream sediment from 31 down gradient and 30 background sites in the Mangas Valley. The excavations were spaced at about 2,000 foot intervals in Mangas Wash and its major tributaries. The sediment samples were collected from the upper 6 inches of the soil or at greater depth if tailing was observed in the profile (Appendix A). Saturated paste pH and paste extract electrical conductivity (EC) of the soil and tailing samples were measured in the laboratory to determine if gross changes in chemistry had occurred (Section 2.3).

2.3 Soil Testing Methods

The tailing, soil, and sediment samples were submitted to Energy Laboratories in Billings Montana for analysis in accordance with the methods approved by NMED. The soil and sediment samples were analyzed for saturated paste pH and EC using the methods outlined in the United States Department of Agriculture Handbook No. 60 (Salinity Laboratory Staff, 1954). The samples were air-dried and passed through a 2mm sieve prior to preparation of the saturated paste. Thus, the data reflect the chemistry of the fine-earth fraction of the materials.

2.4 Impact Analysis

Evidence of impacts from the tailing deposits on the soils and sediment is expected to be manifested by a substantial reduction in the pH and an increase in the EC, which are signature features of materials affected by acid rock drainage. In addition, we reviewed available surface water and groundwater quality data associated with the DP-27 monitoring program. The scope of the surface water and groundwater assessments are provided in Sections 2.4.1 and 2.4.2, respectively

2.4.1 Surface Water Monitoring

Following individual storm flow events, surface water samples are routinely collected from flow samplers located within Mangas Wash. As part of the DP-27 monitoring program, surface water samples have been collected from two locations since 1990 and analyzed by ACZ Laboratories, Inc.

of Steamboat Springs, Colorado; Inter-Mountain Laboratories, Inc. of Farmington, New Mexico; or SVL Laboratory in Idaho. Surface water quality monitoring has been conducted from July 1990 to February 2006 for the FS-5 and FS-6 stations. As part of the surface water assessment, water quality results were compared to the New Mexico livestock watering standards (NMWQCC, 2002b). These data were previously used to evaluate whether surface water impacts had occurred in association with the tailing repositories as part of the Condition 84 requirements (Golder, 2005b).

2.4.2 Groundwater Monitoring

The groundwater assessment included evaluation of data from 36 wells in the Mangas Valley. The sampling of these wells was conducted as part of the routine DP-27 monitoring requirements. Prior to collecting samples for laboratory analyses, approximately three casing volumes of water are purged from each well using a submersible pump (with the exception of wells MS-8 and MS-10, which were sampled from residential taps). Field water quality parameters (electrical conductivity [EC], temperature, and pH) were repeatedly measured during purging to ensure that representative samples were collected for laboratory analysis. Water samples collected from the individual wells were filtered at Tyrone's environmental laboratory and shipped to ACZ Laboratories, Inc., Inter-Mountain Laboratories, Inc, or SVL Laboratory depending on the time period involved. The water samples were analyzed for total dissolved metals, major anions, and several other parameters in accordance with the DP-27 monitoring requirements.

3.0 RESULTS

The results of the field mapping and sampling and analysis for the wind and water transported tailing are discussed in this section. Section 3.1 pertains to the wind deposited materials, whereas Section 3.2 deals with sediment sampling in the Mangas Valley. Section 3.3 summarizes the results of water quality monitoring in the Mangas Valley around the tailing dams.

3.1 Wind Deposited Tailing

Wind erosion occurs whenever bare, loose, dry tailing is exposed to wind of sufficient velocity to cause particle movement. Overall, tailing erodability depends largely on the mechanical stability of exposed tailing, which is dependent on the size, density, and shape of the particles and the agents that bind the particles into aggregates. Other important factors in wind erosion include climate, surface roughness, degree of crust formation, water content, fetch, and orographic factors. In the field, erodibility is extremely dynamic and varies seasonally, yearly, and as the result of management operations (Fryrear and Saleh, 1993; Skidmore, 1994).

Tailing may be transported by wind in one of three modes: surface creep, saltation, and suspension. The specific mode of transport depends on the aerodynamic properties of the particle including size, shape, density, and the transport capacity of the wind as influenced by turbulence, velocity, and viscosity (Bagnold, 1943; Zobeck et al., 2000). Surface creep occurs when large particles that are too heavy to be entrained into the air move across the surface by rolling or sliding. Surface creep typically accounts for a relatively minor fraction of the materials moved by the wind. Saltation occurs when particles move by bouncing along the soil surface. Once initiated, the bouncing particles transfer momentum to other grains by collisions causing these particles to be temporarily entrained in the air. Saltating particles have diameters of about 0.2 to 1.0 mm and generally account for the major fraction of soil moved by the wind (Fryrear et al. 1991). Suspension affects particles that are smaller than 0.2 mm, which are entrained by upward components of atmospheric eddies. The suspended fraction is dust that may grade to extremely fine particulate matter (haze) that can be carried long distances.

At the Tyrone tailing dams, vegetation and orographic barriers have limited the redistribution of tailing. The extent of redistribution was accessed using a combination of field mapping (Section 3.1.1) and soil sampling (Section 3.1.2).

3.1.1 Tailing Mapping

Orographic barriers and surface roughness (vegetation) were important in limiting the redistribution of tailing at Tyrone, which was affected primarily by saltation processes. Areas with wind transported tailing were grouped into map units differentiated on the basis of coverage and thickness. The map units are described below and the differentiating criteria are listed in Table 1. Laboratory data and representative photographs of the map units are included in Appendix B. Figures 3 through 7 show the extent and distribution of wind-blown tailing deposits identified in the Mangas Valley.

Map Unit 10 is represented by areas with 75 to 100 percent coverage by tailing. The tailing in this map unit are 0.25 to 10 inches thick in the inter-dune areas. The dunes or accumulation zones are typically associated with shrubs and vary from 0.5 to 3 feet thick. The dunes occupy about 25 percent of the area. This map unit occurs mostly on the northeast and eastern parts of the tailing dams immediately downwind of exposed tailing with extensive fetches. This map unit generally transitions to lower coverage map units (i.e., 20, 30, or 40) in a northeasterly to easterly direction, reflecting the dominant wind direction. This map unit occupies about 17 acres. Grasses and forbs are impacted by burial in the thickest accumulation areas. Figure B-1, B-2, and B-5 are representative of the conditions in map unit 10.

Map Unit 20 is represented by areas with 50 to 75 percent coverage by tailing. The tailing are generally 0.1 to 4 inches thick in the inter-dune areas with dunes ranging from 0.5 to 2.5 feet thick. The dunes cover about 15 percent of the area. The dunes in this unit tend to be somewhat isolated and associated with shrubs. (Figure B-3). This map unit occurs adjacent to the tailing ponds or in association with Map Unit 10 and occupies about 16 acres. Vegetation impacts are restricted mainly to grasses and forbs in thickest accumulation zones.

Map Units 30 is represented by areas with 25 to 50 percent cover by tailing. The tailings are usually 0.1 to 1 inches thick in the inter-dune areas. The dunes are 0.2 to 1.5 feet thick and cover less than 10 percent of the area. Figure B-4 shows typical conditions in map unit 30. This map unit occupies about 52 acres. Impacts to vegetation are minimal in this map unit.

Map Unit 40 is represented by areas with 5 to 25 percent cover by tailing. The tailings are generally 0.1 to 1 inches thick in the inter dune areas. The dunes are 0.5 to 1 feet thick and cover less than 5 percent of the area. Figures B-5 and B-6 illustrate the conditions in map unit 40. This map unit occupies about 47 acres. The vegetation impacts in this map unit are minimal.

Map Unit 50 is an undifferentiated unit represented by miscellaneous accumulations of tailing deposited by water (Figures B-7 and B-8). This map unit was incidentally identified in the course of mapping the wind deposited tailing. Secondary wind redistribution of tailing was apparent in some instances. This map unit occupies about 16 acres. It is difficult to generalize the impacts of tailing on vegetation in this map unit because it has experienced concentrated runoff. Thus, in some cases the impacts may be related to water erosion rather than direct impacts from tailing. The delineation on the starter dam on the east side of pond 2 is a good example of the confounding effects of wind and water erosion on plant performance.

3.1.2 Tailing Transects and Soil Sampling

The soil sampling revealed that impacts to the surface soils outside the tailing deposition areas were limited. The analytical results are summarized in Table 2 and the field descriptions and laboratory reports are in Appendix B. The data in Table 2 are arranged by distance from the main deposition area. The “Central” samples were taken in the main accumulation area; the “Fringe” samples were taken about 25 feet upwind from the tailing limit; the “Near” downwind samples were taken 25 feet from the tailing limit; and the “Far” downwind samples were collected 75 feet from the visible tailing limit. The distance from the Central to Fringe sample varied from 40 to 290 feet depending on the size of the area.

The pH of the wind deposited tailing ranged from 2.3 to 6.9 with corresponding EC’s ranging from about 0.2 to 7.0 dS/m (Table 2). The tailing with higher pH values were associated with the thinner deposits, suggesting some mixing with soil materials during transport or inadvertently during sampling. The pH of the soils underlying the tailing ranged from 2.6 to 7.5 with EC’s ranging from about 0.2 to 5.5 dS/m.

The soil pH outside the tailing deposition area generally ranged from 5.5 to 7.9, although a few samples had pH’s as low as 4.5. Soil pH generally, but not always, increased with distance from the central tailing deposition area. The EC was low (< 3.5 dS/M) in all samples, with the majority of the samples having EC’s less than 1 dS/m. Based on soil survey data from Tyrone, the EC in the surface soils are typically less 1 dS/m (Table C-3 in DBS&A, 1997b).

The tailing mapping revealed that the tailing redistribution process was limited in extent and restricted primarily to the perimeter of the tailing dams. The magnitude of tailing accumulation tends to decrease with distance from the source area. The relatively thin accumulations of tailing are not expected to impact groundwater given the depth of groundwater (40 to > 80 feet) in this area and attenuation capacity of the soils (Section 3.3.1). Substantive impacts to the soils are primarily restricted to the main zone of deposition, with little or no impacts to the soils outside the zone of deposition.

3.2 Water Deposited Tailing

Incident precipitation on the tailing impoundments may result in runoff and erosion of the tailing. Berms, diversions, and catch basins were constructed and are maintained to contain these sediments. The top surfaces of the impoundments slope to the back, and all runoff and sediment from the top surfaces is retained on the impoundments. Water and sediment from the dam faces is collected in catch basins designed to capture runoff around the perimeters of the impoundments. Ultimately, the tailing will be protected from erosion by capping and revegetation of the surfaces and construction of water management facilities.

The sediment sample locations are shown on Figure 8 and the data are summarized in Table 3. Sediment samples collected from areas that do not receive drainage from the tailing impoundments are considered to represent background conditions. The background sediment samples in the Mangas Valley ranged from pH 6.0 to 7.8 with an average of 7.2. The pH of sediment samples collected down-gradient from the tailing impoundments ranged from 4.2 to 7.8 with an average of 7.2. Only two down-gradient locations had samples with pH values less than the lowest background pH (pH = 6), indicating localized, rather than systemic impacts. The impacted down-gradient samples were identified at the MS-5 and MS-21 sites. The MS-5 sample is located just above the confluence of Mangas Wash and Wind Canyon near the South Main tailing repository. The MS-21 samples were collected south of the No. 2 Tailing Pond immediately below the catch basins.

All background sediment samples were nonsaline with EC values ranging from 0.10 to 0.68 dS/m (average 0.26 dS/m). Down-gradient sediments were nonsaline to slightly saline, ranging from 0.14 to 2.47 with an average of 0.68 dS/m. The increase in EC in downgradient samples is not considered significant from a practical perspective since EC’s of native soils and Gila Conglomerate in the Mangas Valley may exceed 3.0 dS/m (DBS&A 1997c). The highest EC value (2.47 dS/m) was associated with the MS-5 site, which was identified as impacted on the basis of pH. The samples at the MS-21 site did not have similar increases in saturated paste EC.

3.3 Impacts Analysis

The wind blown tailing, including water deposited materials, occupy about 150 acres around the perimeter of the tailing ponds, which cumulatively cover than 2,300 acres. These deposits are relatively thin and in many cases occur upstream of the sediment containment systems. Section 3.3.1

discusses geochemical considerations related to the potential for impacts associated with the tailing deposits. Sections 3.3.2 and 3.3.3 provide surface and ground water data, respectively.

3.3.1 Geochemical Considerations

The surface layers of the tailing ponds are exposed to oxidizing conditions and pyrite in the tailing have oxidized to create acidic conditions (Evangelou, 1998). Based on the testing of 36 samples from the 6 Mangas Valley tailing impoundments, the acid base accounts of the tailing range from -15 to -69 tons of $CaCO_3$ equivalent per kiloton (t/kt) [Table C-11 of DBS&A, 1997b]. The average ABA for this group of tailing samples is -31 t/kt. A 6 inch thick layer over an acre is roughly equivalent to a kiloton. Simplistically, a 6-inch layer of tailing with this average composition spread over 1 acre would require 31 t of $CaCO_3$ to neutralize the potential acidity assuming full oxidation of the material.

Soils and geologic materials in the Mangas Valley have the capacity to neutralize acidity. The soils, alluvium, and Gila Conglomerate Formation in the Mangas Valley contain free $CaCO_3$ throughout their profiles (DBS&A, 1997b and 1997c). The $CaCO_3$ contents in these materials ranges from approximately 0.4 to 9.2 percent, which is equivalent to a neutralization potential of 4 to 92 t/kt (Table C-3 of DBS&A, 1997b). The average $CaCO_3$ content for the soils tested in the Mangas Valley is 2.2 percent, which equals an NP of 22 t/kt. Thus, from a simplistic perspective the acidity generated from a 6 inch layer of fully oxidized tailing could be neutralized by a 9 inch layer of soil with average $CaCO_3$ content. Tailing weathering kinetic limitations and soil hydraulic considerations would likely further reduce the potential for groundwater impacts if a more rigorous evaluation was performed.

The reaction of the tailing leachate with $CaCO_3$ in the soils is likely to result in the formation of gypsum, which will control the level of soluble salts in the soil solution through precipitation reactions. Secondarily, the neutralization of acidity by the soils and the attenuation of metals on charged surfaces are expected to reduce the mobility and bioavailability of cationic metals, which could otherwise result in changes in water quality.

Groundwater generally occurs at depths of 40 to more than 80 feet below ground surface in the Mangas Valley. A soil column of this thickness would have substantial neutralization capacity relative to the relatively thin deposits of wind-blown tailing identified in this investigation. Thus, the wind blown tailing deposits are not considered substantive threats to groundwater.

3.3.2 Surface Water Monitoring

Surface water quality data from FS-5 and FS-6 support the conclusion from the sediment sampling that there is limited evidence of systemic impacts from tailing in the stream system down gradient of the tailing dams. FS-6 is located within the Wind Canyon Drainage west/northwest of the No. 3 Tailing Impoundment. FS-5 is located downgradient (northwest) of the South Main repository, west of the No. 3 Tailing Impoundment. Surface water samples have been collected from these two locations as part of the DP-27 monitoring program since 1990. Laboratory analytical reports for the surface water samplers are presented in quarterly and biannual DP-27 monitoring reports.

Our review of the historical analytical results for surface water sample points FS-5 and FS-6 indicates that in general, the surface water has low concentrations of dissolved constituents. Copper was detected at a concentration exceeding the NMWQCC standard for livestock watering of 0.5 milligrams per liter (mg/L) in one sample collected at FS-5 in 1992 (1.17 mg/L). Lead was also detected at a concentration slightly above the NMWQCC standard for livestock watering of 0.1 mg/L in one sample collected at FS-5 in 2000 (0.11 mg/L). No other constituents were detected in FS-5 or FS-6 at concentrations above NMWQCC standards for livestock watering.

Increases in the concentration of several constituents were observed in the October 2004 surface water sample from FS-5, which was probably associated with the reclamation efforts being conducted on the repositories at that time (Golder, 2005b). Tailing may have been temporarily exposed during reclamation that resulted in the increased constituent concentrations observed at this site. There are no other trends shown in the data for flow samplers FS-5 and FS-6 that are indicative of sustained and consistent impacts from surface drainage.

3.3.3 Groundwater Monitoring

Ascertaining potential water quality impacts from the wind blown tailing deposits is problematic on the basis of the existing groundwater data. The wells with constituent concentrations that are consistently above applicable standards are not well correlated with the deposits of wind blown tailing. The interpretation of the water quality data is further complicated by potential contributions from other upstream sources along the Mangas Wash and its tributaries. Nonetheless, we reviewed the available water quality data for the Mangas Valley, which is contained in the DP-27 monitoring record on file with the NMED.

Of the 36 groundwater wells evaluated, 7 wells consistently exceeded NMWQCC standards for sulfate and/or total dissolved solid (TDS), 23 contained anomalous spot exceedances of one or more constituents above applicable standards, and 6 had no exceedances over the period of record for the individual wells (Figure C-1). Laboratory analytical reports for the individual monitoring wells are contained in quarterly and biannual DP-27 monitoring reports submitted to the NMED. The wells with consistent sulfate and/or TDS exceedances include 18, 39, 45, 46, MVR-1, 27-2004-01, and 27-2005-06 (Figure C-1).

Anomalous exceedances of NMWQCC standards were noted in Wells 10, 11, 12, 13, 14, 15, 19, 20, 37, 38, 40, 41, 42, 43, 44, 47, G, MS-5, MVR-2, MVR-3, P1-21, 27-2004-2, and 27-2005-2. The exceedances noted in these wells are considered anomalous values rather than demonstrating a consistent decrease in water quality associated with potential impacts from the tailing dams (Golder, 2005b). For instance, in Well 15, cadmium was detected a total of five times, copper a total of three times, and iron a total of two times above their associated water quality standards since January 1978. This represents five concentration spikes out of 113 samples analyzed for cadmium, three spikes out of 116 samples for copper, and two spikes out of 84 samples analyzed for iron. These metal concentrations return to pre-spike levels in the intervening periods indicating that these anomalous values are probably related to sampling or laboratory errors, rather than from impacts from mine-related facilities.

4.0 SUMMARY AND RECOMMENDATIONS

Condition 85 requires an evaluation of potential impacts to surface water, groundwater, and abatement and closure of areas containing tailing. Golder's recommendations for mitigation of the wind deposited tailing are discussed in Section 4.1. Future monitoring for surface water quality is discussed in Section 4.2 and groundwater is discussed in the Section 4.3.

4.1 Wind Deposited Tailing

Existing vegetation and orographic barriers have effectively limited the redistribution of the wind blown tailing. Based on geochemical considerations, the relatively limited volume of tailing is unlikely to affect groundwater quality given the character of the underlying soils and depth to groundwater (Section 3.3.1). Redistribution and movement of this material by storm water runoff could potentially result in transport to the fluvial system; however, the sediment and surface water quality data are not indicative of the impacts associated with acid mine drainage and suggest that the impacts are localized. Some classes of vegetation have been impacted by burial and abrasion processes in major zones of wind blown deposition. Even though water quality impacts are not contemplated in association with wind blown deposits, these areas are easily identified and can be mitigated as part of the on-going reclamation of the Mangas Valley Tailing facilities. Thus, we have developed recommendations for mitigation as discussed below.

Golder recommends that Tyrone mitigate areas with the more extensive deposits of tailing as part of ongoing tailing reclamation activities. In particular, we recommend mitigation of the areas with the thickest tailing deposits in map units 10 and 20. The tailing coverage in these areas is fairly extensive and impacts to vegetation are apparent. We recommend treating the areas represented by map unit 30 on a case-by-case basis. We don't believe that the areas presented by map unit 40 represent a threat to groundwater and disturbance associated with reclamation of these areas will have limited environmental benefit. We recommend treating the map unit 50 areas on a case by case basis, with particular attention given to mitigating the causative factors leading to the erosion and deposition of the tailing.

In general, we recommend removal of the tailing with minimal soil disturbance. Following tailing removal, the soils should be deeply ripped (at least 12 to 18 inches) to promote mixing with $CaCO_3$ containing layers deeper in the soil profile. We recommend at least two ripping passes oriented at perpendicular angles. Seeding and mulching should be conducted using the techniques currently practiced on the tailing dams.

4.2 Water Deposited Tailing

The current system of catch basins at the toes of the impoundments appears to be effective in containing the runoff from the tailing impoundments. With few exceptions, the sediment and water quality data are not indicative of systems affected by acid mine drainage and no systemic impacts to the Mangas stream system associated with the operation of the tailing dams are apparent. The planned and on-going reclamation activities will further reduce the long-term potential for exposure of the tailing to water erosion. The MS-21 and MS-5 sites should be treated as part of the Dam 2 reclamation and finalization of the South Main repository work associated with the adjacent Forest Service lands.

4.3 Water Quality Monitoring

Water quality data from wells in the Mangas Valley indicate that some areas do not meet NMWQCC standards. Golder believes that determining the source of the impacts and appropriate abatement for these areas is beyond the scope of this investigation. As part of the Stage 1 Abatement Plan for DP-1341 Condition 34 (DBS&A, 2004), Tyrone installed four additional regional aquifer monitoring wells. Monitoring of these wells is expected to improve the understanding of the water quality conditions in the Mangas Valley. Beyond these wells, the analytical data from the DP-27 wells and former/current residential water supply wells do not suggest a need for additional wells within the No. 3 Tailing Impoundment area or downstream. It is recommended that groundwater quality monitoring continue within the existing DP-27 monitoring network, and future water quality monitoring of the Condition 34 wells be conducted in accordance with Conditions 44 and 45 of DP-1341.

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TABLES

TABLE 1
MAP UNIT LEGEND FOR WIND BLOWN TAILING

Map Unit #	Tailing Surface Cover (%)	Inter-Dune Thickness (inches)	Dune Area Cover (%)	Dune Thickness (feet)	Total Area (acres)
10	75 to 100	0.25 to 10	25	1.5 to 3	17
20	50 to75	0.10 to 4	15	0.5 to 2.5	16
30	25 to 50	0.10 to 1	10	0.25 to 1.5	52
40	5 to 25	0.10 to 1	5	0.10 to 1	47
50	5 to 100	varies	NA	NA	16

TABLE 2
CHEMICAL PROPERTIES OF TAILING AND SOILS ALONG TRANSECTS

Transect ID	Material	Tailing Deposition Area				Downwind Area			
		Central		Fringe		Near		Far	
		pH	EC (dS/m)	pH	EC (dS/M)	pH	EC (dS/m)	pH	EC (dS/m)
1A-T1	Tailing	6.8	2.59	5.9	0.64	--	--	--	--
	Soil	7.3	1.58	5.9	1.50	7.6	0.53	7.5	1.06
1A-T2	Tailing	5.2	2.66	--	--	--	--	--	--
	Soil	7.1	2.96	7.5	0.71	7.6	0.72	7.5	0.92
1A-T3	Tailing	3.0	2.37	4.6	0.28	--	--	--	--
	Soil	4.9	1.37	6.4	0.40	5.3	0.42	5.5	0.38
1-T1	Tailing	3.6	1.54	3.9	0.71	--	--	--	--
	Soil	5.4	0.96	4.9	0.66	5.0	0.41	5.4	0.49
1-T2	Tailing	6.9	0.58	3.5	0.83	--	--	--	--
	Soil	7.4	0.69	4.1	0.66	4.7	0.38	5.8	0.51
1-T3	Tailing	3.9	1.31	4.9	0.41	--	--	--	--
	Soil	3.9	0.69	7.5	0.65	6.3	0.61	5.7	0.71
1X-T1	Tailing	3.8	2.99	5.1	0.65	--	--	--	--
	Soil	7.5	2.56	6.9	0.64	7.9	0.38	7.8	0.44
1X-T2	Tailing	3.0	0.96	--	--	--	--	--	--
	Soil	6.3	2.71	5.4	1.32	4.5	1.65	6.2	0.95
1X-T3	Tailing	3.0	1.34	3.6	0.55	--	--	--	--
	Soil	4.9	0.89	4.4	0.66	5.6	0.42	5.3	0.61
2-T1	Tailing	2.3	6.51	3.4	3.28	--	--	--	--
	Soil	2.6	5.47	7.1	0.95	7.7	1.05	7.8	0.85
2-T2	Tailing	2.8	2.81	6.4	2.74	--	--	--	--
	Soil	2.8	3.47	7.5	0.67	7.8	0.43	7.7	0.51
2-T3	Tailing	2.3	7.03	--	--	--	--	--	--
	Soil	2.9	3.69	6.9	0.60	7.7	0.52	7.9	0.49
3-T1	Tailing	3.9	0.20	--	--	--	--	--	--
	Soil	4.4	0.18	5.3	0.38	5.4	0.38	5.6	0.31
3-T2	Tailing	3.8	2.66	5.0	2.82	--	--	--	--
	Soil	4.3	1.88	6.1	2.78	6.5	0.39	6.2	0.22
3-T3	Tailing	3.4	0.93	--	--	--	--	--	--
	Soil	4.1	0.69	6.5	0.34	5.6	0.30	4.9	0.25
3X-T1	Tailing	3.0	0.93	3.8	3.04	--	--	--	--
	Soil	3.7	3.18	5.4	1.77	6.1	0.88	5.8	0.86
3X-T2	Tailing	4.1	3.57	--	--	--	--	--	--
	Soil	4.9	2.99	5.3	1.91	5.8	0.90	7.4	0.60
3X-T3	Tailing	2.7	1.78	--	--	--	--	--	--
	Soil	2.8	1.92	5.7	0.68	5.9	0.77	4.5	3.10

Note:
EC = electrical conductivity; dS/m = deciSiemens per meter

TABLE 3
CHEMICAL PROPERTIES OF MANGAS VALLEY SEDIMENTS

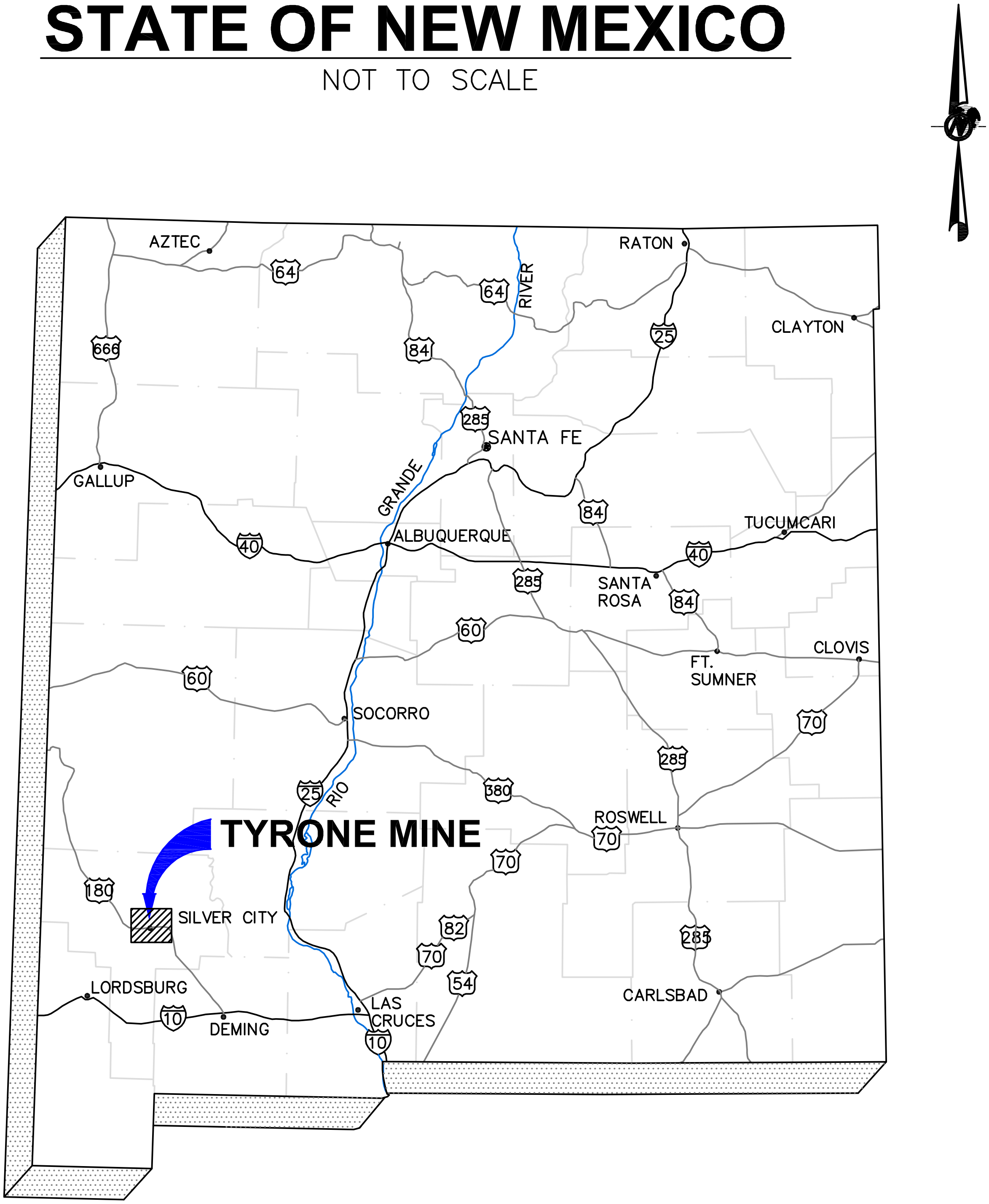
Background			Down Gradient		
	Saturated Paste			Saturated Paste	
Sample ID	pH	EC (dS/m)	Sample ID	pH	EC (dS/m)
MS B1 0-0.5'	7.5	0.35	MS1 0-0.5'	7.8	0.50
MS B2 0-0.5'	7.7	0.25	MS2 0-0.5'	7.8	0.44
MS B3 0-0.5'	7.6	0.36	MS2 0.5-1'	7.5	1.77
MS B4 0-0.5'	7.6	0.29	MS3 0-0.5'	7.7	0.74
MS B5 0-0.5'	7.5	0.38	MS4 0-0.5'	7.7	0.42
MS B6 0-0.5'	7.6	0.35	MS5 0-0.5'	7.2	1.57
MS B7 0-0.5'	7.8	0.18	MS5 0.5-1'	4.6	2.47
MS B8 0-0.5'	7.5	0.68	MS6 0-0.5'	7.5	0.43
MS B9 0-0.5'	7.6	0.35	MS7 0-0.5'	7.4	0.74
MS B10 0-0.5'	7.6	0.33	MS8 0-0.5'	7.6	0.61
MS B11 0-0.5'	7.6	0.29	MS9 0-0.5'	7.8	0.49
MS B12 0-0.5'	7.6	0.22	MS10 0-0.5'	7.7	0.54
MS B13 0-0.5'	6.8	0.16	MS11 0-0.5'	7.8	0.48
MS B14 0-0.5'	7.3	0.32	MS12 0-0.5'	7.3	0.67
MS B15 0-0.5'	7.6	0.22	MS13 0-0.5'	7.9	0.53
MS B16 0-0.5'	7.0	0.19	MS14 0-0.5'	7.8	0.27
MS B17 0-0.5'	6.4	0.14	MS15 0-0.5'	8.0	0.30
MS B18 0-0.5'	7.1	0.24	MS16 0-0.5'	7.8	0.68
MS B19 0-0.5'	7.1	0.14	MS17 0-0.5'	7.6	0.80
MS B20 0-0.5'	6.3	0.10	MS18 0-0.5'	7.1	0.16
MS B21 0-0.5'	6.9	0.19	MS19 0-0.5'	6.9	1.43
MS B22 0-0.5'	6.9	0.27	MS20 0-0.5'	6.3	1.53
MS B23 0-0.5'	7.0	0.21	MS21 0-0.5'	4.4	0.14
MS B24 0-0.5'	6.8	0.12	MS21 0.5-1'	4.2	0.23
MS B25 0-0.5'	6.1	0.10	MS22 0-0.5'	7.0	0.77
MS B26 0-0.5'	7.5	0.24	MS23 0-0.5'	7.3	0.73
MS B27 0-0.5'	6.0	0.17	MS24 0-0.5'	6.9	0.60
MS B28 0-0.5'	7.6	0.39	MS24 0.5-1'	6.8	1.17
MS B29 0-0.5'	7.8	0.25	MS25 0-0.5'	7.3	0.21
MS B30 0-0.5'	7.8	0.28	MS26 0-0.5'	7.8	0.24
			MS27 0-0.5'	6.5	0.76
			MS28 0-0.5'	7.7	0.25
			MS29 0-0.5'	7.6	0.35
			MS30 0-0.5'	7.7	0.35
			MS31 0-0.5'	7.8	0.35

Note:
EC = electrical conductivity; dS/m = deciSiemens per meter

FIGURES

STATE OF NEW MEXICO

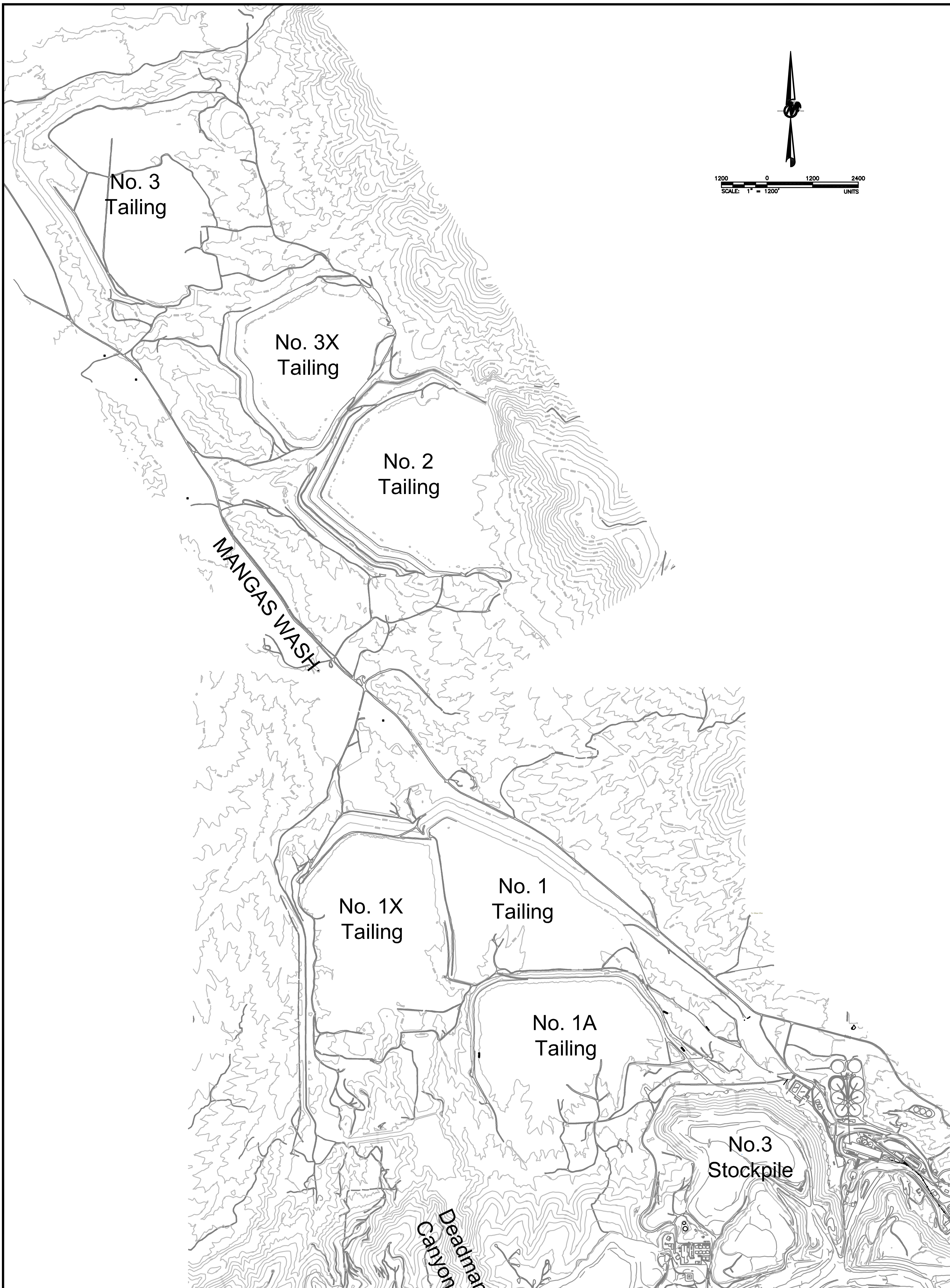
NOT TO SCALE



PROJECT	PHELPS DODGE TYRONE, INC. TYRONE TAILINGS SILVER CITY, NEW MEXICO
TITLE	**GENERAL OVERVIEW**

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053-2025	FILE No.	Figure01
DESIGN	LM	03/14/06	SCALE AS SHOWN	REV. A
CADD	CM	03/14/06	FIGURE 1	
CHECK	LM	03/24/05		
REVIEW				



PROJECT

PHELPS DODGE TYRONE, INC.
TYRONE TAILINGS
SILVER CITY, NEW MEXICO

TITLE

TYRONE TAILING IMPOUNDMENTS
MANGAS VALLEY

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053-2025	FILE No.	Figure02
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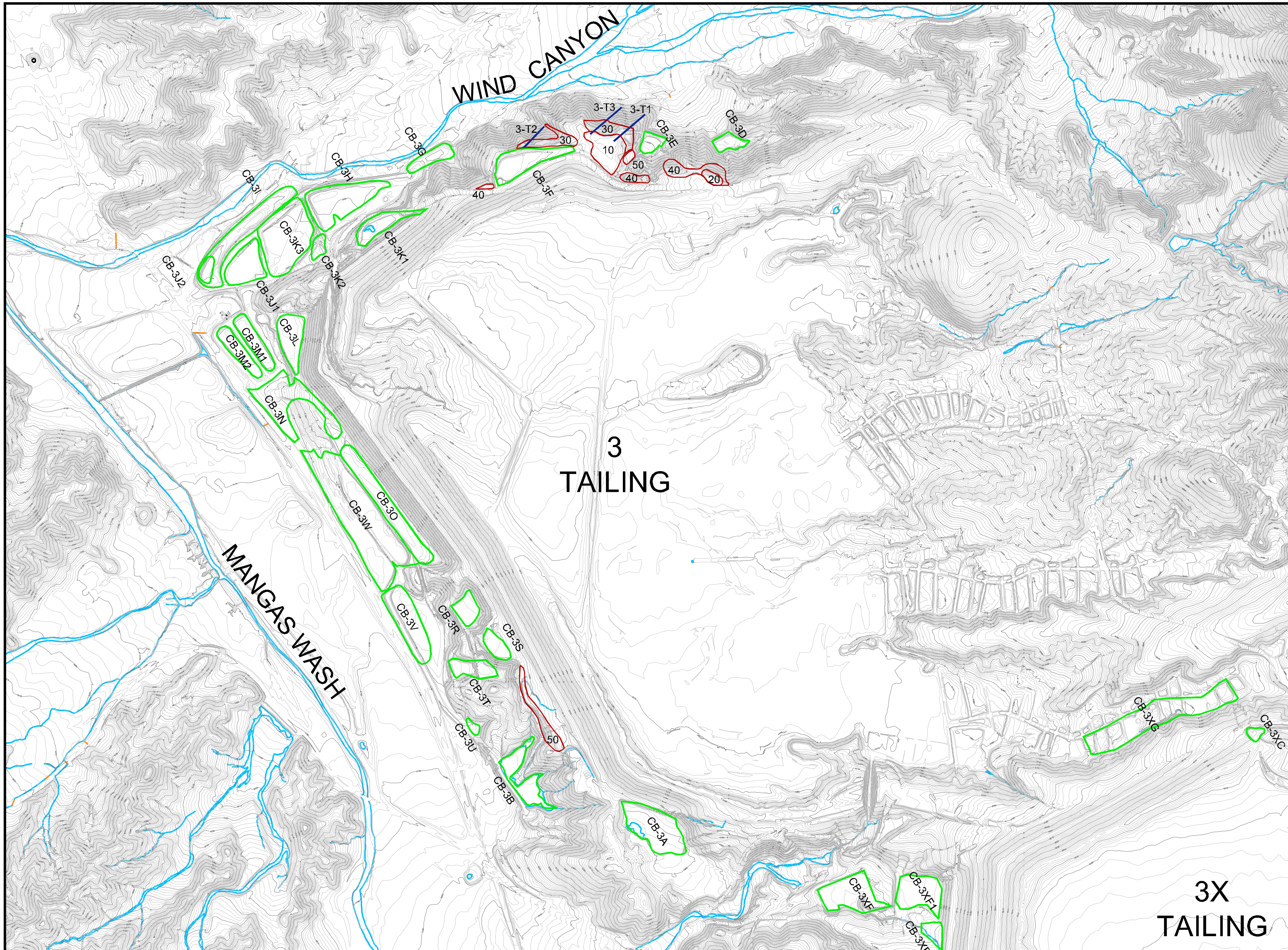
CADD	CM	03/14/06	**FIGURE 2**	
CHECK	LM	03/24/06		
REVIEW				



LEGEND

CATCH BASIN (CB-3XG)
WIND BLOWN TAILING MAP UNITS

MAP UNIT	TYPE	COVERAGE
10	EOLIAN	75-100%
20	EOLIAN	50-75%
30	EOLIAN	25-50%
40	EOLIAN	5-25%
50	MISCELLANEOUS WATER	VARIES

NOTE: SEE TEXT IN REPORT FOR MAP UNIT DESCRIPTION

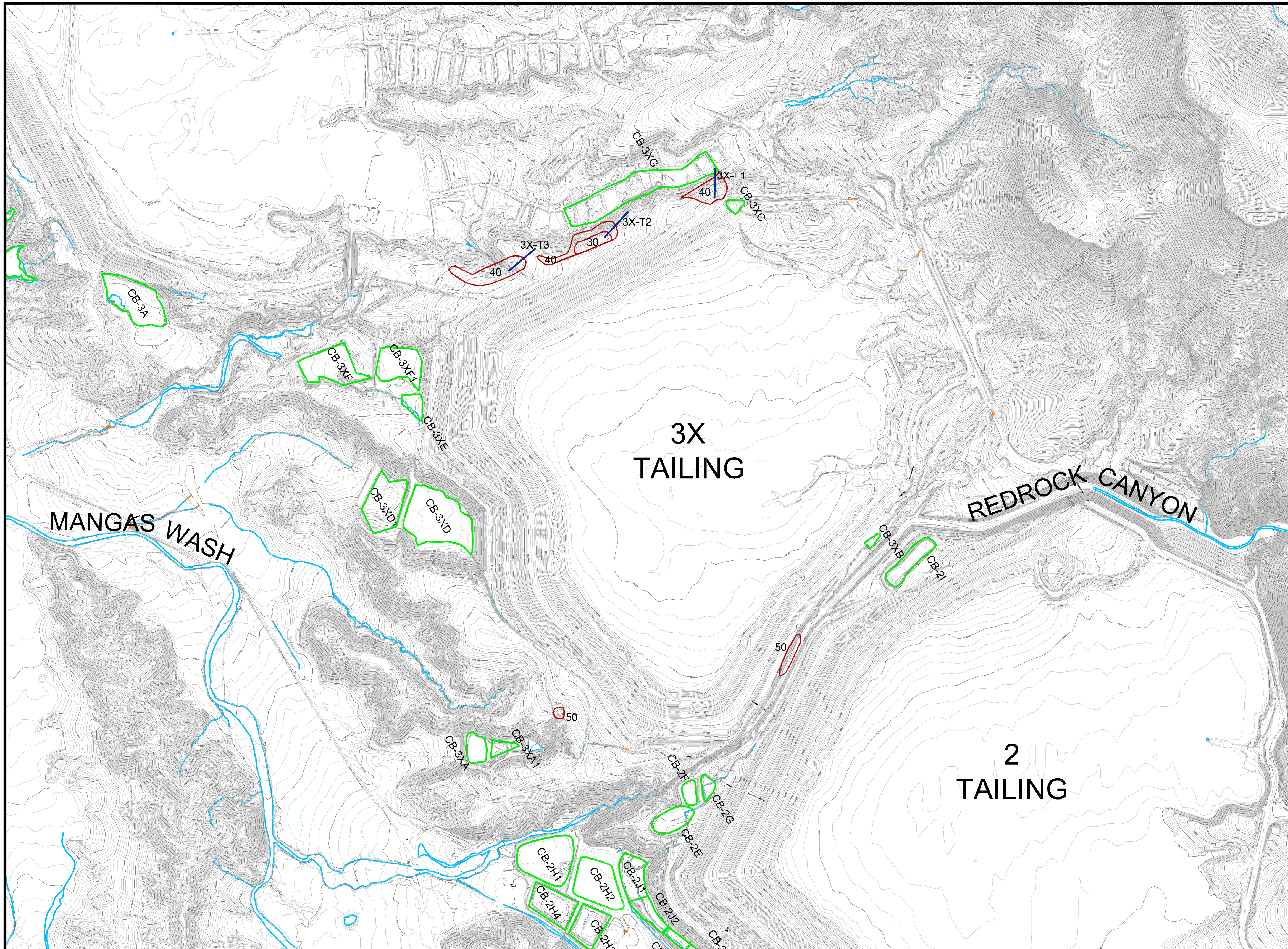
TRANSECTS (3X-T1)

PROJECT
PHELPS DODGE TYRONE, INC.
TYRONE TAILINGS
SILVER CITY, NEW MEXICO

TITLE
WIND BLOWN TAILING AND CATCH BASINS NO.3 TAILING AREA

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053-2025	FILE No.	Figure03
DESIGN	LM	03/14/06	SCALE AS SHOWN	REV. A
CADD	CM	03/14/06		
CHECK	LM	03/24/06	FIGURE 3	
REVIEW				



LEGEND

CATCH BASIN (CB-3XG)

WIND BLOWN TAILING MAP UNITS

MAP UNIT	TYPE	COVERAGE
10	EOLIAN	75–100%
20	EOLIAN	50–75%
30	EOLIAN	25–50%
40	EOLIAN	5–25%
50	MISCELLANEOUS WATER	VARIES

NOTE: SEE TEXT IN REPORT FOR MAP UNIT DESCRIPTION

TRANSECTS (3X-T1)

450 0 450 900
SCALE FEET
SCALE B SIZE: 1" = 900'

PROJECT

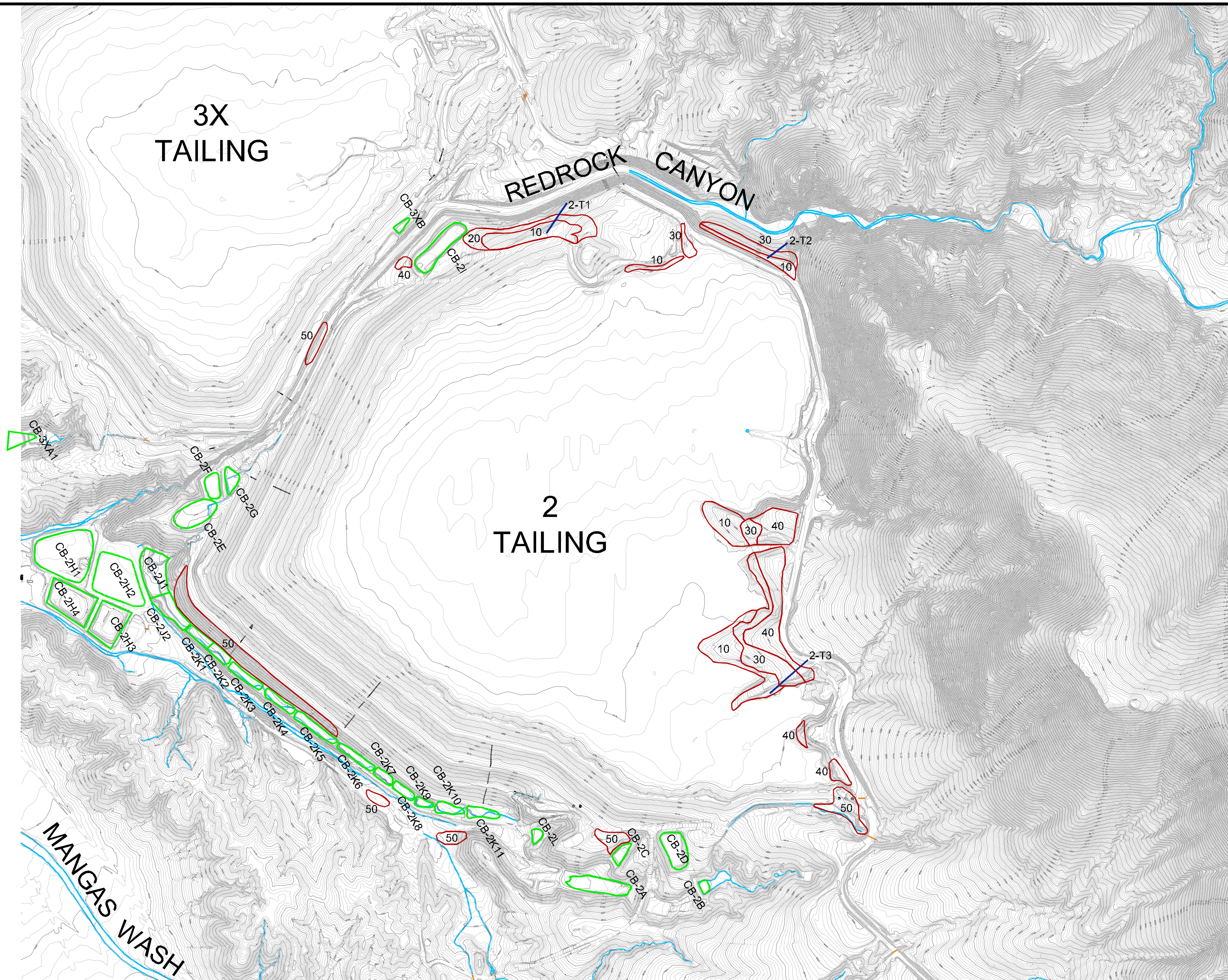
PHELPS DODGE TYRONE, INC.
TYRONE TAILINGS
SILVER CITY, NEW MEXICO

TITLE

WIND BLOWN TAILING AND CATCH BASINS 3X TAILING AREA

PROJECT No.		053-2025	FILE No.	Figure04
DESIGN	LM	03/14/06	SCALE AS SHOWN	REV. A
CADD	CM	03/14/06		
CHECK	LM	03/24/06	FIGURE 4	
REVIEW				

Golder Associates
Albuquerque, New Mexico



LEGEND

CATCH BASIN (CB-3XG)

WIND BLOWN TAILING MAP UNITS

MAP UNIT	TYPE	COVERAGE
10	EOLIAN	75–100%
20	EOLIAN	50–75%
30	EOLIAN	25–50%
40	EOLIAN	5–25%
50	MISCELLANEOUS WATER	VARIES

NOTE: SEE TEXT IN REPORT FOR MAP UNIT DESCRIPTION

TRANSECTS (3X–T1)

450 0 450 900
SCALE FEET
SCALE B SIZE: 1" = 900'

PROJECT

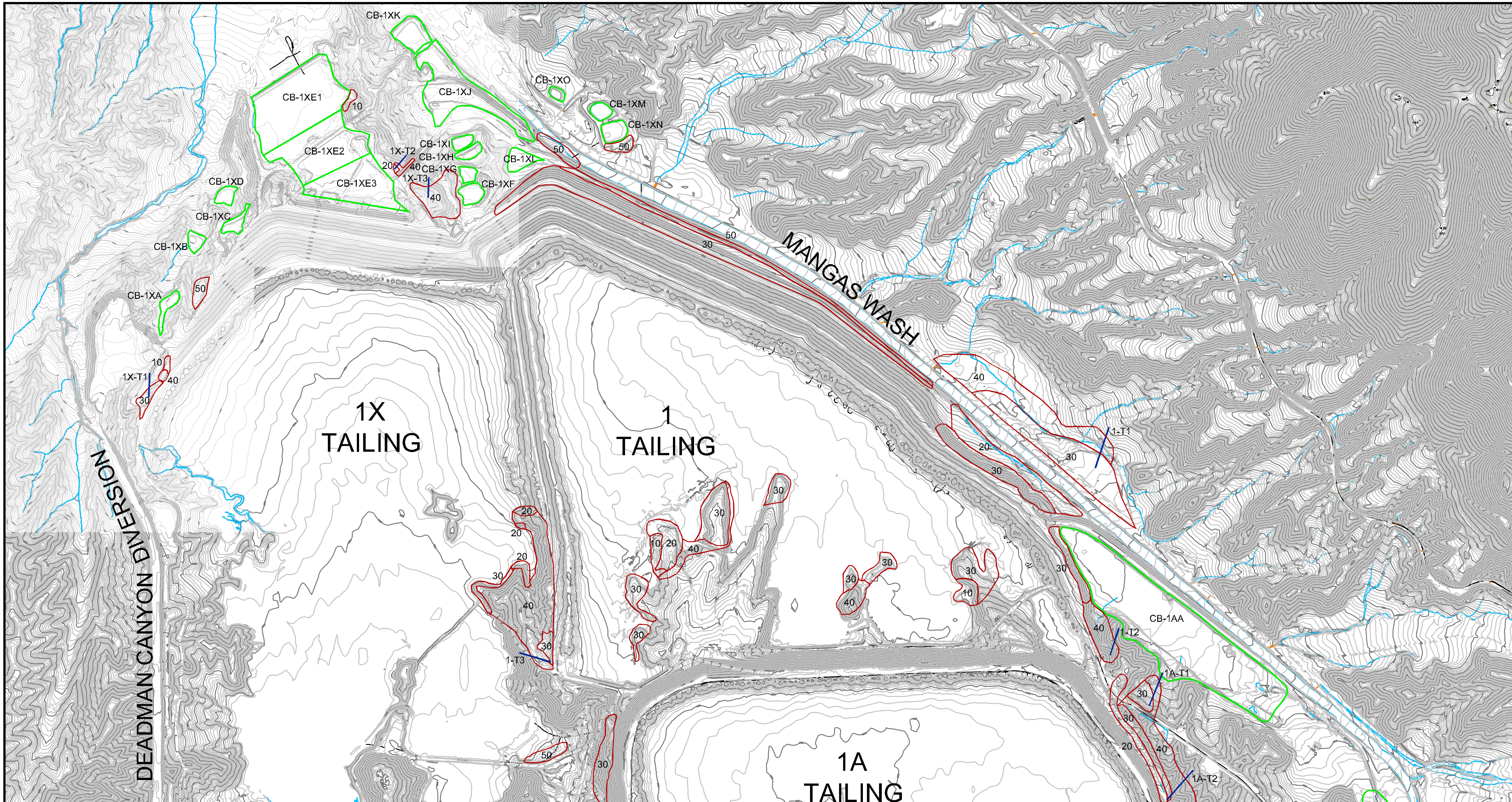
PHELPS DODGE TYRONE, INC.
TYRONE TAILINGS
SILVER CITY, NEW MEXICO

TITLE

WIND BLOWN TAILING AND CATCH BASINS NO.2 TAILING AREA

PROJECT No.		053-2025	FILE No. Figure05
DESIGN	LM	03/14/06	SCALE AS SHOWN REV. A
CADD	CM	03/14/06	
CHECK	LM	03/24/06	FIGURE 5
REVIEW			

Golder Associates
Albuquerque, New Mexico



LEGEND

CATCH BASIN (CB–3XG)

WIND BLOWN TAILING MAP UNITS

TRANSECTS (3X–T1)

MAP UNIT	TYPE	COVERAGE
10	EOLIAN	75–100%
20	EOLIAN	50–75%
30	EOLIAN	25–50%
40	EOLIAN	5–25%
50	MISCELLANEOUS WATER	VARIES

NOTE: SEE TEXT IN REPORT FOR MAP UNIT DESCRIPTION

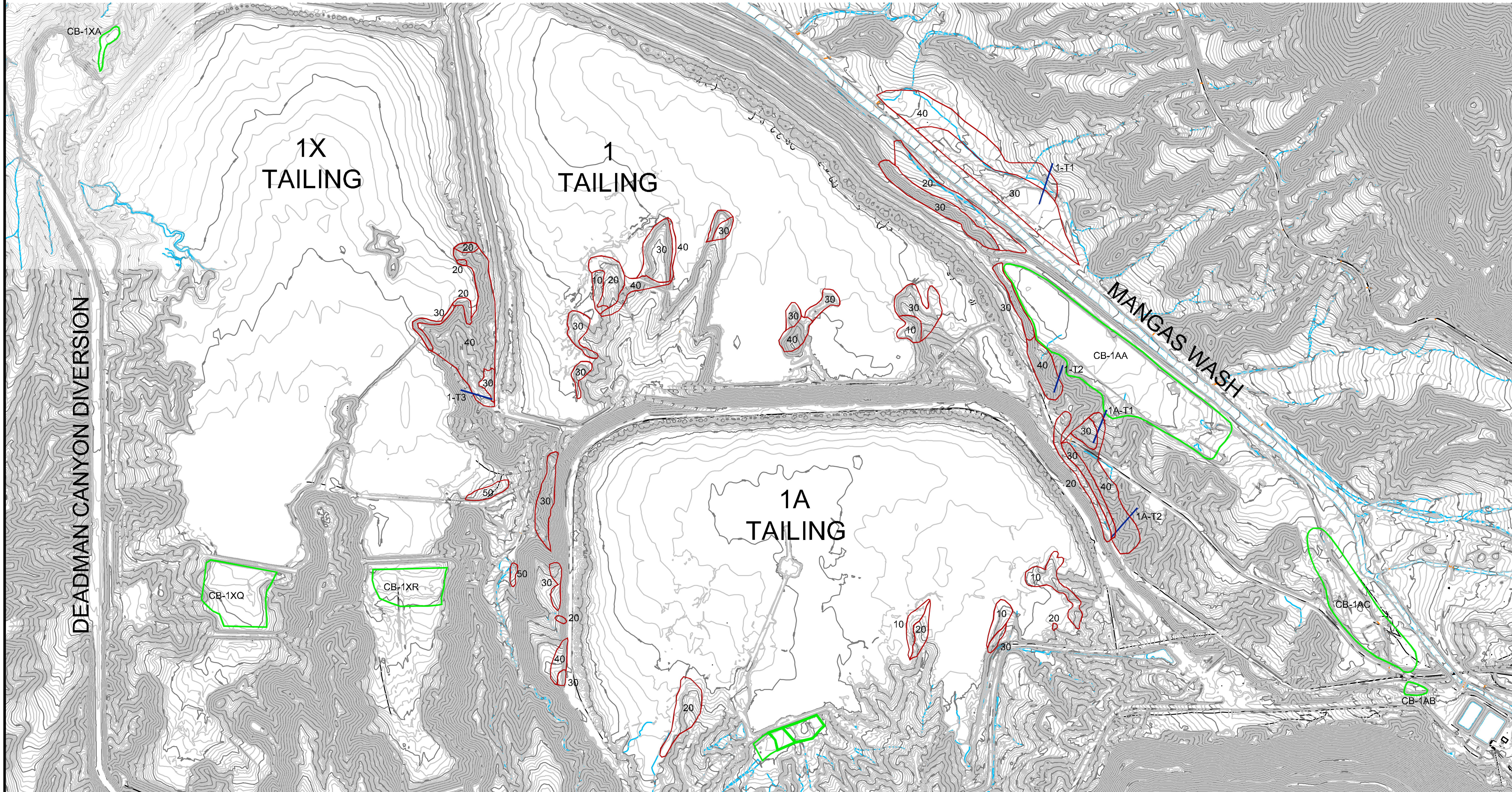
450 0 450 900 FEET
SCALE
SCALE B SIZE: 1" = 900'

PROJECT
PHELPS DODGE TYRONE, INC.
TYRONE TAILINGS
SILVER CITY, NEW MEXICO

TITLE
WIND BLOWN TAILING AND CATCH BASINS 1X AND 1 TAILING AREA

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053–2025	FILE No.	Figure06
DESIGN	LM	03/14/06	SCALE AS SHOWN	REV. A
CADD	CM	03/14/06		
CHECK	LM	03/24/06	FIGURE 6	
REVIEW				



LEGEND

CATCH BASIN (CB-3XG)

WIND BLOWN TAILING MAP UNITS

TRANSECTS (3X-T1)

MAP UNIT	TYPE	COVERAGE
10	EOLIAN	75-100%
20	EOLIAN	50-75%
30	EOLIAN	25-50%
40	EOLIAN	5-25%
50	MISCELLANEOUS WATER	VARIES

NOTE: SEE TEXT IN REPORT FOR MAP UNIT DESCRIPTION

450 0 450 900 FEET

SCALE
SCALE B SIZE: 1" = 900'

PROJECT

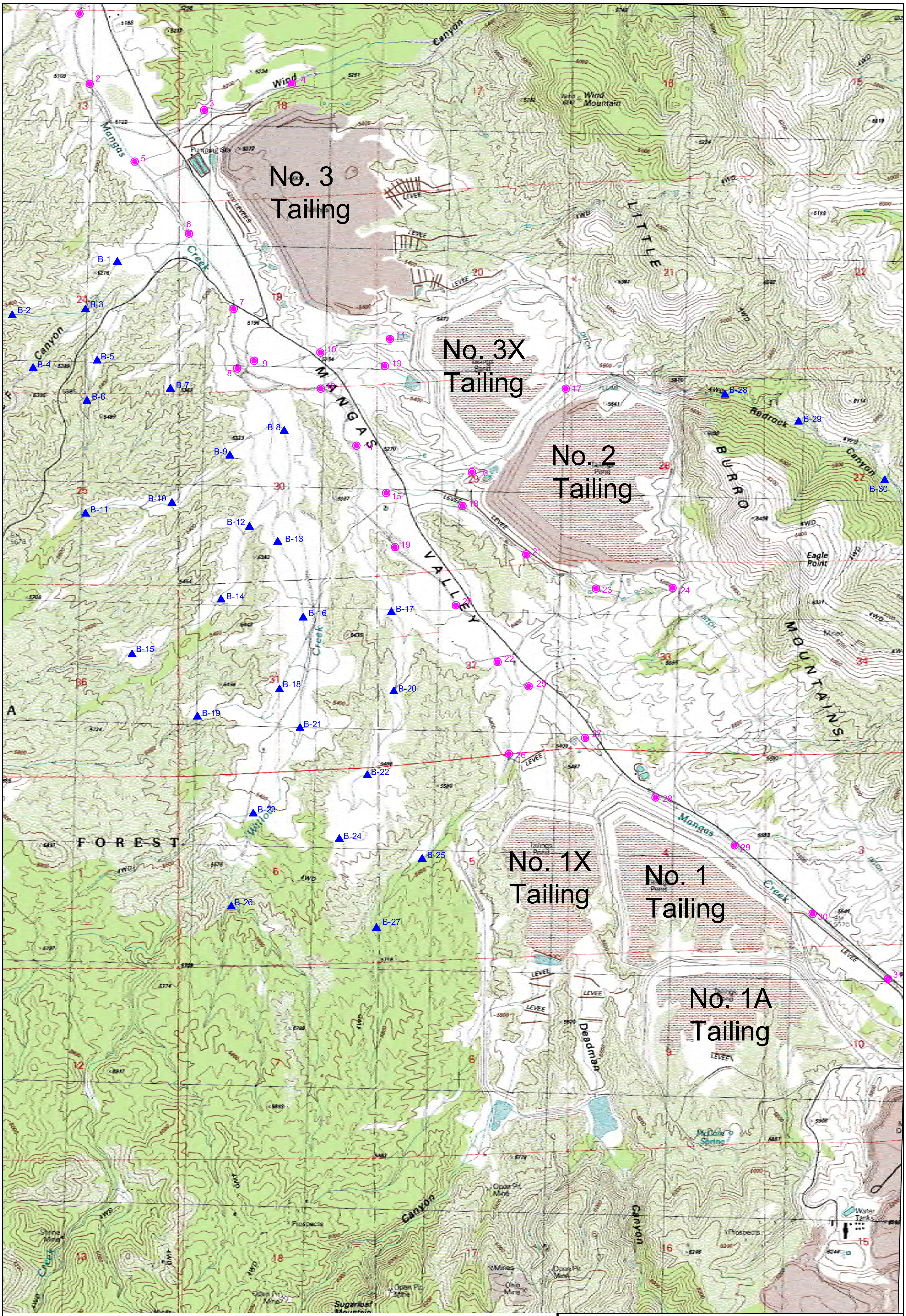
PHELPS DODGE TYRONE, INC.
TYRONE TAILINGS
SILVER CITY, NEW MEXICO

TITLE

WIND BLOWN TAILING AND CATCH BASINS 1A TAILING AREA

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053-2025	FILE No. Figure07
DESIGN	LM	03/14/06	SCALE AS SHOWN REV. A
CADD	CM	03/14/06	
CHECK	LM	03/24/06	FIGURE 7
REVIEW			



SEDIMENT SAMPLE LOCATION

BACKGROUND SEDIMENT SAMPLE LOCATION

1250 0 1250 2500
B SIZE: 1" = 300' FEET

DP1341-CONDITION 85

K:\2005 Projects\053-2025\Figure08.dwg

PROJECT
PHELPS DODGE TYRONE INC.
TYRONE TAILINGS
SILVER CITY, NEW MEXICO

TITLE
SEDIMENT SAMPLE LOCATIONS IN THE MANGAS VALLEY TAILING UNIT

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053-2025	FILE No.	Figure08
DESIGN	LM	03/24/06	SCALE AS SHOWN	REV. A
CADD	CM	03/24/06		
CHECK	LM	03/24/06	**FIGURE 8**	
REVIEW				

APPENDIX A

MANGAS VALLEY SEDIMENT

SEDIMENT SAMPLING AND ANALYSIS PLAN

Sampling and Analysis Plan for Mangas Valley Sediment

Condition 85 of DP-1341 requires investigation of the extent of wind and water transported tailing from the Mangas Valley Tailing Unit with the intent of evaluating the potential for groundwater impacts. Golder Associates Inc. (Golder) developed this sampling and analysis plan (SAP) in response to a request from the NMED to provide additional details on the sediment investigation. This SAP can be considered an addendum to the *Investigation of Tailing Transport and Deposition Impacts Work Plan* (Tetra Tech, 2004). Approximately 60 composite sediment samples will be collected in Mangas Valley to accommodate Condition 85 of DP-1341. Sediment samples will be collected from the Mangas Wash and its tributaries in Mangas Valley (Figure 1). Background samples (30 samples) will collected in tributary channels upstream of the tailing impoundments or from watersheds that are not directly influenced by the tailing impoundments. The composite sediment samples will be collected according to the procedure outlined below.

1.0 Field Methods

a. Locate the sample site at about 2000 foot intervals downstream from the starting point or previous sample location as indicated on Figure 1. Establish a 3-point transect perpendicular to the stream channel to acquire subsamples at each sample location. The subsample locations will be systematically spaced across the channel. One subsample will be in the center of the channel with the 2 remaining subsamples located equidistance between the center sample and the ordinary high water mark.

b. Document the characteristics of the sample site. Describe and/or sketch the sampling site in the field logbook with respect to channel characteristics. Photograph the sample site with an identification placard such that the surrounding conditions are documented.

c. Obtain the coordinates of each sample point. Determine the northing and easting (i.e., NAD 83, West Zone, New Mexico State Plane) of each sample point using a handheld Global Positioning System (GPS). Record the GPS measurements at each sample location. In addition, locate the sample location on the map or aerial photograph of the area.

d. Using a shovel, excavate an approximately 1-foot diameter by 1-foot deep hole at each transect point. A sediment subsample will be collected using a sterile disposal scoop from the upper 0.5 foot interval of the pit face. An equal volume of sediment will be obtained from the entire depth interval and placed on a clean plastic sheet for mixing and quartering. If tailing is observed in the lower 0.5 feet of the excavation, a separate sample will be collected using the same technique described above. This approach will yield one composite sample if no tailing is observed below the first 0.5 foot interval and 2 composite samples if tailing are observed in the lower 0.5 foot interval.

e. Thoroughly mix all subsamples together. Describe the sediment according to the USDA System. Record the color (Munsell color chart), texture, odor, moisture, cementation, reaction to 10% hydrochloric acid, and of rock fragments (i.e., > 2mm). Note material that appears to be mine rock or tailing.

f. Cone and halve the sediment to collect a sample of suitable size for analysis (i.e., about 2 kg). From the first half, pick out rocks larger than approximately 1 inch and discard. Then cone and halve again. Fill one 2-liter plastic bag for chemical analyses as listed in Section 2.0. Finally, assign separate sample numbers to the bag and record sample numbers. Discard any remaining material.

Disposable sampling equipment will be used to avoid cross-contamination from other sampling locations. Thus, decontamination techniques are not described.

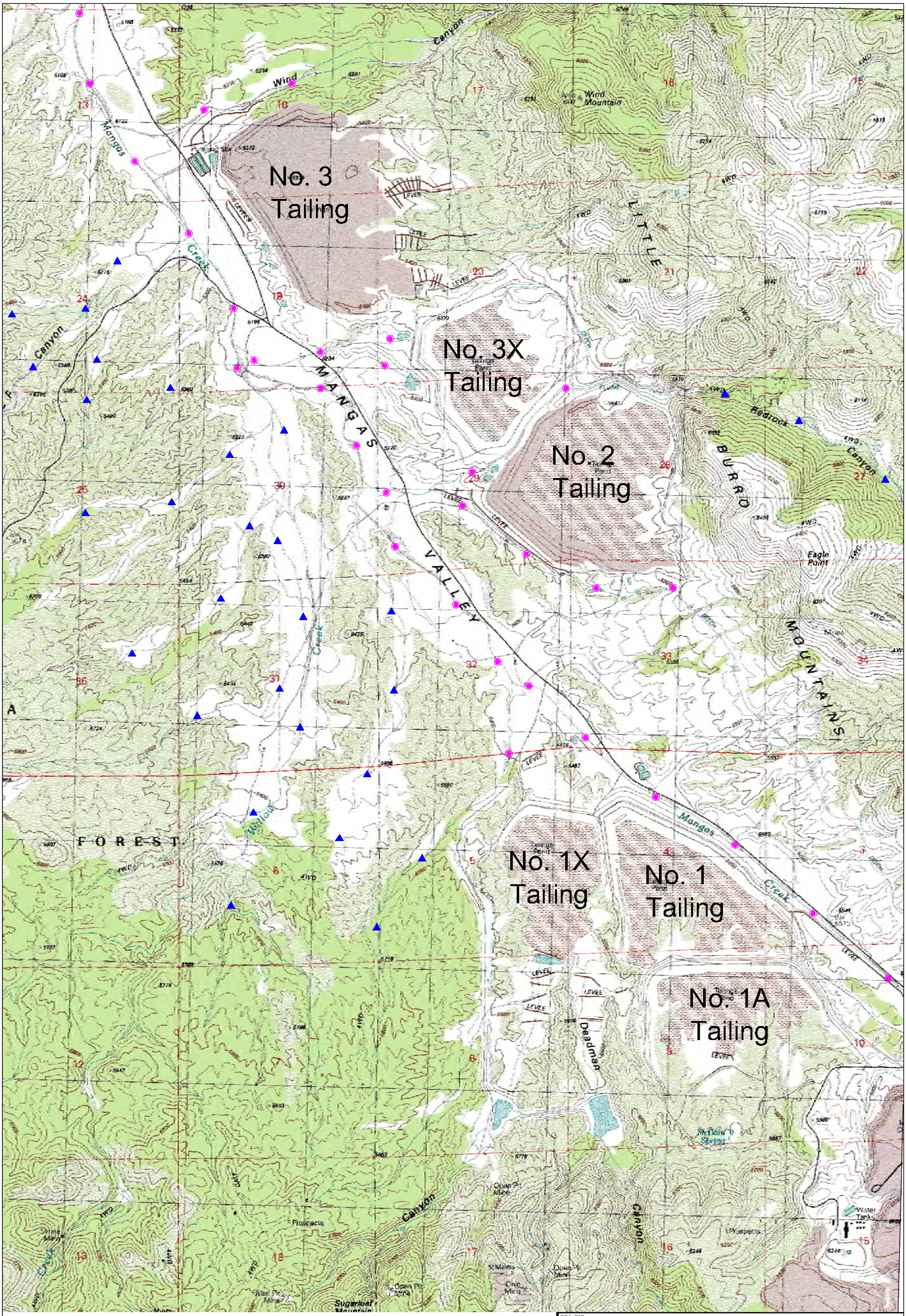
2.0 Laboratory Methods

The occurrence of tailing will be indicated based on field identification and laboratory analysis of samples. The sediment samples will be analyzed for saturated paste pH and electrical conductivity (EC) according to the approved work plan (Tetra Tech, 2004). The samples will be air-dried and passed through a 2 mm sieve prior to the preparation of the saturated paste. The saturated paste pH and extract EC will be measured using the methods prescribed by USDA Handbook 60 (Salinity Laboratory Staff, 1954).

3.0 References

Salinity Laboratory Staff. 1954. Diagnosis and Improvement of Saline and alkali soils. Handbook 60. U.S. Government Printing Office. Washington D.C.

Tetra Tech. 2004. Investigation of tailing transport and deposition impacts work plan. Prepared for Phelps Dodge Tyrone Inc. April 2, 2004.



- SEDIMENT SAMPLE LOCATION
- BACKGROUND SEDIMENT SAMPLE LOCATION

1250 0 1250 2500
B SIZE: 1" = 300' FEET

DP1341-CONDITION 85

K:\2004 Projects\Tyrone Cond 85\Figure 4.dwg

PROJECT

PHELPS DODGE TYRONE INC.
GRANT COUNTY, NEW MEXICO

TITLE

SEDIMENT SAMPLE LOCATIONS IN THE MANGAS VALLEY TAILING UNIT

Golder Associates
Albuquerque, New Mexico

PROJECT No.	XXXXXXXXXXX		FILE No.	XXXXXXXXXXX	
DESIGN	LM	-/-/-	SCALE AS SHOWN	REV.	A
CADD	CM	-/-/-	FIGURE 1		
CHECK	--	DATE			
REVIEW	--	DATE			

LABORATORY DATA

ENERGY LABORATORIES, INC. * 1120 S 27th St * PO Box 30916 * Billings, MT 59107-0916
Toll Free 800.735.4489 * 406.252.6325 * FAX 406.252.6069 * eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Golder Associates Inc
Project: Mangas Valley Sediment 053-2025
Workorder: B05111713

Report Date: 12/16/05
Date Received: 11/30/05

		Analysis		pH, Sat Paste	Cond_ Paste
		Units		s_u_	mmhos/cm
Sample ID	**Client Sample ID**	**Up**	**Low**	**Results**	**Results**
B05111713-001	MS B1 0-0.5'	0	0	7.50	0.35
B05111713-002	MS B2 0-0.5'			7.70	0.25
B05111713-003	MS B3 0-0.5'			7.60	0.36
B05111713-004	MS B4 0-0.5'			7.60	0.29
B05111713-005	MS B5 0-0.5'			7.50	0.38
B05111713-006	MS B6 0-0.5'			7.60	0.35
B05111713-007	MS B7 0-0.5'			7.80	0.18
B05111713-008	MS B8 0-0.5'			7.50	0.68
B05111713-009	MS B9 0-0.5'			7.60	0.35
B05111713-010	MS B10 0-0.5'			7.60	0.33
B05111713-011	MS B11 0-0.5'			7.60	0.29
B05111713-012	MS B12 0-0.5'			7.60	0.22
B05111713-013	MS B13 0-0.5'			6.80	0.16
B05111713-014	MS B14 0-0.5'			7.30	0.32
B05111713-015	MS B15 0-0.5'			7.60	0.22
B05111713-016	MS B16 0-0.5'			7.00	0.19
B05111713-017	MS B17 0-0.5'			6.40	0.14
B05111713-018	MS B18 0-0.5'			7.10	0.24
B05111713-019	MS B19 0-0.5'			7.10	0.14
B05111713-020	MS B20 0-0.5'			6.30	0.10
B05111713-021	MS B21 0-0.5'			6.90	0.19
B05111713-022	MS B22 0-0.5'			6.90	0.27
B05111713-023	MS B23 0-0.5'			7.00	0.21
B05111713-024	MS B24 0-0.5'			6.80	0.12
B05111713-025	MS B25 0-0.5'			6.10	0.10
B05111713-026	MS B26 0-0.5'			7.50	0.24
B05111713-027	MS B27 0-0.5'			6.00	0.17
B05111713-028	MS B28 0-0.5'			7.60	0.39
B05111713-029	MS B29 0-0.5'			7.80	0.25
B05111713-030	MS B30 0-0.5'			7.80	0.28
B05111713-031	MS1 0-0.5'			7.80	0.50
B05111713-032	MS2 0-0.5'			7.80	0.44
B05111713-033	MS2 0.5-1'			7.50	1.77
B05111713-034	MS3 0-0.5'			7.70	0.74
B05111713-035	MS4 0-0.5'			7.70	0.42
B05111713-036	MS5 0-0.5'			7.20	1.57
B05111713-037	MS5 0.5-1'			4.60	2.47
B05111713-038	MS6 0-0.5'			7.50	0.43

LABORATORY ANALYTICAL REPORT

Client: Golder Associates Inc
Project: Mangas Valley Sediment 053-2025
Workorder: B05111713

Report Date: 12/16/05
Date Received: 11/30/05

		Analysis		pH, Sat Paste	Cond_ Paste
		Units		s_u_	mmhos/cm
Sample ID	**Client Sample ID**	**Up**	**Low**	**Results**	**Results**
B05111713-039	MS7 0-0.5'			7.40	0.74
B05111713-040	MS8 0-0.5'			7.60	0.61
B05111713-041	MS9 0-0.5'			7.80	0.49
B05111713-042	MS10 0-0.5'			7.70	0.54
B05111713-043	MS11 0-0.5'			7.80	0.48
B05111713-044	MS12 0-0.5'			7.30	0.67
B05111713-045	MS13 0-0.5'			7.90	0.53
B05111713-046	MS14 0-0.5'			7.80	0.27
B05111713-047	MS15 0-0.5'			8.00	0.30
B05111713-048	MS16 0-0.5'			7.80	0.68
B05111713-049	MS17 0-0.5'			7.60	0.80
B05111713-050	MS18 0-0.5'			7.10	0.16
B05111713-051	MS19 0-0.5'			6.90	1.43
B05111713-052	MS20 0-0.5'			6.30	1.53
B05111713-053	MS21 0-0.5'			4.40	0.14
B05111713-054	MS21 0.5-1'			4.20	0.23
B05111713-055	MS22 0-0.5'			7.00	0.77
B05111713-056	MS23 0-0.5'			7.30	0.73
B05111713-057	MS24 0-0.5'			6.90	0.60
B05111713-058	MS24 0.5-1'			6.80	1.17
B05111713-059	MS25 0-0.5'			7.30	0.21
B05111713-060	MS26 0-0.5'			7.80	0.24
B05111713-061	MS27 0-0.5'			6.50	0.76
B05111713-062	MS28 0-0.5'			7.70	0.25
B05111713-063	MS29 0-0.5'			7.60	0.35
B05111713-064	MS30 0-0.5'			7.70	0.35
B05111713-065	MS31 0-0.5'			7.80	0.35

APPENDIX B

WIND BLOWN TAILING

MAP UNIT PHOTOGRAPHS

Figure B-1. Thick accumulation area in map unit 10 (Transect 2-T1).

Figure B-2. Inter-dune area in map unit 10 (Transect 3-T3)


Figure B-3. Wind scoured area in map unit 20 (Transect 3-T1)


Figure B-4. Thin tailing deposits and vegetation in map unit 30 (west of 1A Dam)

Figure B-5. Map unit 10 (foreground) transitioning to map unit 40 (Transect 2-T3). Tailing limit between 2nd and 3rd stake

Figure B-6. Typical surface conditions in unit 40 (Transect 1A-T2).

Figure B-7. Water deposited tailing (map unit 50) on the southwest face of the No. 2 starter dam. Tailing in foreground is contained by the catch basins below the starter dam.

Figure B-8. Water deposited tailing in map unit 50 (NW side of No. 1X Dam)

LABORATORY DATA

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th Street • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • eli@energylab.com

LABORATORY ANALYTICAL REPORT

Client: Golder Associates Inc
Project: 053.2025 Condition 85 Windblown Tailing Samples
Workorder: B06021525

Report Date: 03/10/06
Date Received: 02/24/06

	Analysis	pH, Sat Paste	Cond_ Paste
	Units	s_u_	mmhos/cm
Sample ID	**Client Sample ID**	**Results**	**Results**
B06021525-001	3X-T2-1T 0-2"	4.10	3.57
B06021525-002	3X-T2-1S 0-6"	4.90	2.99
B06021525-003	3X-T2-2S 0-6"	5.30	1.91
B06021525-004	3X-T2-3S 0-6"	5.80	0.90
B06021525-005	3X-T2-4S 0-6"	7.40	0.60
B06021525-006	3X-T3-1T 0-3"	2.70	1.78
B06021525-007	3X-T3-1S 0-6"	2.80	1.92
B06021525-008	3X-T3-2S 0-6"	5.70	0.68
B06021525-009	3X-T3-3S 0-6"	5.90	0.77
B06021525-010	3X-T3-4S 0-6"	4.50	3.10
B06021525-011	1X-T3-1T 0-1"	3.00	1.34
B06021525-012	1X-T3-1S 0-6"	4.90	0.89
B06021525-013	1X-T3-2T 0-0.5"	3.60	0.55
B06021525-014	1X-T3-2S 0-6"	4.40	0.66
B06021525-015	1X-T3-3S 0-6"	5.60	0.42
B06021525-016	1X-T3-4S 0-6"	5.30	0.61
B06021525-017	1X-T2-1T 0-3"	3.00	0.96
B06021525-018	1X-T2-1S 0-6"	6.30	2.71
B06021525-019	1X-T2-2S 0-6"	5.40	1.32
B06021525-020	1X-T2-3S 0-6"	4.50	1.65
B06021525-021	1X-T2-4S 0-6"	6.20	0.95
B06021525-022	3-T3-1T 0-6"	3.40	0 93
B06021525-023	3-T3-1S 0-6"	4.10	0 69
B06021525-024	3-T3-2S 0-6"	6.50	0 34
B06021525-025	3-T3-3S 0-6"	5.60	0.30
B06021525-026	3-T3-4S 0-6"	4.90	0.25
B06021525-027	1A-T1-1T 0-5"	6.80	2.59
B06021525-028	1A-T1-1S 0-6"	7.30	1.58
B06021525-029	1A-T1-2T 0-0.25"	5.90	0.64
B06021525-030	1A-T1-2S 0-6"	5.90	1.50
B06021525-031	1A-T1-3S 0-6"	7.60	0.53
B06021525-032	1A-T1-4S 0-6"	7.50	1.06
B06021525-033	1A-T3-1T 0-2"	3.00	2.37
B06021525-034	1A-T3-1S 0-6"	4.90	1.37
B06021525-035	1A-T3-2T 0-0.25"	4.60	0.28
B06021525-036	1A-T3-2S 0-6"	6.40	0.40
B06021525-037	1A-T3-3S 0-6"	5.30	0.42
B06021525-038	1A-T3-4S 0-6"	5.50	0.38
B06021525-039	1-T2-1T 0-0.125"	6.90	0.58
B06021525-040	1-T2-1S 0-6"	7.40	0.69

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LABORATORY ANALYTICAL REPORT

Client: Golder Associates Inc
Project: 053.2025 Condition 85 Windblown Tailing Samples
Workorder: B06021525

Report Date: 03/10/06
Date Received: 02/24/06

	Analysis	pH, Sat Paste	Cond_ Paste
	Units	s_u_	mmhos/cm
Sample ID	Client Sample ID	Results	Results
B06021525-041	1-T2-2T 0-1"	3.50	0.83
B06021525-042	1-T2-2S 0-6"	4.10	0.66
B06021525-043	1-T2-3S 0-6"	4.70	0.38
B06021525-044	1-T2-4S 0-5"	5.80	0.51
B06021525-045	1A-T2-1T 0-3"	5.20	2.66
B06021525-046	1A-T2-1S 0-6"	7.10	2.96
B06021525-047	1A-T2-2S 0-6"	7.50	0.71
B06021525-048	1A-T2-3S 0-6"	7.60	0.72
B06021525-049	1A-T2-4S 0-6"	7.50	0.92
B06021525-050	1-T1-1T 0-1"	3.60	1.54
B06021525-051	1-T1-1S 0-6"	5.40	0.96
B06021525-052	1-T1-2T 0-0.25"	3.90	0.71
B06021525-053	1-T1-2S 0-6"	4.90	0.66
B06021525-054	1-T1-3S 0-6"	5.00	0.41
B06021525-055	1-T1-4S 0-6"	5.40	0.49
B06021525-056	3X-T1-1T 0-3"	3.00	0.93
B06021525-057	3X-T1-1S 0-6"	3.70	3.18
B06021525-058	3X-T1-2T 0-1"	3.80	3.04
B06021525-059	3X-T1-2S 0-6"	5.40	1.77
B06021525-060	3X-T1-3S 0-6"	6.10	0.88
B06021525-061	3X-T1-4S 0-6"	5.80	0.86
B06021525-062	3-T1-1T 0-3.5"	3.90	0.20
B06021525-063	3-T1-1S 0-6"	4.40	0.18
B06021525-064	3-T1-2S 0-6"	5.30	0.38
B06021525-065	3-T1-3S 0-6"	5.40	0.38
B06021525-066	3-T1-4S 0-6"	5.60	0.31
B06021525-067	3-T2-1T 0-3.5"	3.80	2.66
B06021525-068	3-T2-1S 0-6"	4.30	1.88
B06021525-069	3-T2-2T 0-3"	5.00	2.82
B06021525-070	3-T2-2S 0-6"	6.10	2.78
B06021525-071	3-T2-3S 0-6"	6.50	0.39
B06021525-072	3-T2-4S 0-6"	6.20	0.22
B06021525-073	1-T3-1T 0-2"	3.90	1.31
B06021525-074	1-T3-1S 0-6"	3.90	0.69
B06021525-075	1-T3-2T 0-1"	4.90	0.41
B06021525-076	1-T3-2S 0-6"	7.50	0.65
B06021525-077	1-T3-3S 0-6"	6.30	0.61
B06021525-078	1-T3-4S 0-6"	5.70	0.71
B06021525-079	2-T2-1T 0-16"	2.80	2.81
B06021525-080	2-T2-1S 0-6"	2.80	3.47

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LABORATORY ANALYTICAL REPORT

Client: Golder Associates Inc
Project: 053.2025 Condition 85 Windblown Tailing Samples
Workorder: B06021525

Report Date: 03/10/06
Date Received: 02/24/06

	Analysis	pH, Sat Paste	Cond_ Paste
	Units	s_u_	mmhos/cm
Sample ID	Client Sample ID	Results	Results
B06021525-081	2-T2-2T 0-1"	6.40	2.74
B06021525-082	2-T2-2S 0-6"	7.50	0.67
B06021525-083	2-T2-3S 0-6"	7.80	0.43
B06021525-084	2-T2-4S 0-6"	7.70	0.51
B06021525-085	2-T1-1T 0-8"	2.30	6.51
B06021525-086	2-T1-1S 0-6"	2.60	5.47
B06021525-087	2-T1-2T 0-0.5"	3.40	3.28
B06021525-088	2-T1-2S 0-6"	7.10	0.95
B06021525-089	2-T1-3S 0-6"	7.70	1.05
B06021525-090	2-T1-4S 0-6"	7.80	0.85
B06021525-091	2-T3-1T 0-12"	2.30	7.03
B06021525-092	2-T3-1S 0-6"	2.90	3.69
B06021525-093	2-T3-2S 0-6"	6.90	0.60
B06021525-094	2-T3-3S 0-6"	7.70	0.52
B06021525-095	2-T3-4S 0-6"	7.90	0.49
B06021525-096	1X-T1-1T 0-2"	3.80	2.99
B06021525-097	1X-T1-1S 0-6"	7.50	2.56
B06021525-098	1X-T1-2T 0-0.25	5.10	0.65
B06021525-099	1X-T1-2S 0-6"	6.90	0.64
B06021525-100	1X-T1-3S 0-6"	7.90	0.38
B06021525-101	1X-T1-4S 0-6"	7.80	0.44

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QA/QC Summary Report

Client: Golder Associates Inc
Project: 053.2025 Condition 85 Windblown Tailing Samples

Report Date: 03/10/06
Work Order: B06021525

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3								Batch: R72619	
Sample ID: B06021451-010A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 09:58	
Conductivity, sat. paste	6.06	mmhos/cm	0.010				0	30	
Sample ID: B06021453-010A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 09:58	
Conductivity, sat. paste	3.48	mmhos/cm	0.010				0	30	
Sample ID: LCS-0603090958	Laboratory Control Spike				Run: MISC-SOIL_060309A			03/09/06 09:58	
Conductivity, sat. paste	4.39	mmhos/cm	0.010	105	50	150			
Sample ID: B06021525-010A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 10:09	
Conductivity, sat. paste	3.01	mmhos/cm	0.010				2.9	30	
Sample ID: B06021525-020A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 10:09	
Conductivity, sat. paste	1.65	mmhos/cm	0.010				0	30	
Sample ID: B06021525-030A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 10:09	
Conductivity, sat. paste	1.56	mmhos/cm	0.010				3.9	30	
Method: ASA10-3								Batch: R72659	
Sample ID: B06021525-040A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	0.690	mmhos/cm	0.010				0	30	
Sample ID: B06021525-050A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	1.48	mmhos/cm	0.010				4.0	30	
Sample ID: B06021525-062A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	0.180	mmhos/cm	0.010				11	30	
Sample ID: B06021525-070A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	2.85	mmhos/cm	0.010				2.5	30	
Sample ID: B06021525-079A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	2.89	mmhos/cm	0.010				2.8	30	
Sample ID: B06021525-091A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	7.11	mmhos/cm	0.010				1.1	30	
Sample ID: B06021525-100A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	0.360	mmhos/cm	0.010				5.4	30	
Sample ID: LCS-0603091708	Laboratory Control Spike				Run: MISC-SOIL_060309D			03/09/06 17:08	
Conductivity, sat. paste	4.47	mmhos/cm	0.010	106	50	150			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: Golder Associates Inc
Project: 053.2025 Condition 85 Windblown Tailing Samples

Report Date: 03/10/06
Work Order: B06021525

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASAM10-3.2								Batch: R72619	
Sample ID: B06021451-010A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 09:58	
pH, sat. paste	3.60	s.u.	0.10				0	10	
Sample ID: B06021453-010A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 09:58	
pH, sat. paste	4.00	s.u.	0.10				0	10	
Sample ID: LCS-0603090958	Laboratory Control Spike				Run: MISC-SOIL_060309A			03/09/06 09:58	
pH, sat. paste	7.10	s.u.	0.10	104	90	110			
Sample ID: B06021525-010A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 10:09	
pH, sat. paste	4.60	s.u.	0.10				2.2	10	
Sample ID: B06021525-020A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 10:09	
pH, sat. paste	4.50	s.u.	0.10				0	10	
Sample ID: B06021525-030A DUP	Sample Duplicate				Run: MISC-SOIL_060309A			03/09/06 10:09	
pH, sat. paste	5.90	s.u.	0.10				0	10	
Method: ASAM10-3.2								Batch: R72659	
Sample ID: B06021525-040A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	7.40	s.u.	0.10				0	10	
Sample ID: B06021525-050A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	3.50	s.u.	0.10				2.8	10	
Sample ID: B06021525-062A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	3.90	s.u.	0.10				0	10	
Sample ID: B06021525-070A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	6.10	s.u.	0.10				0	10	
Sample ID: B06021525-079A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	2.70	s.u.	0.10				3.6	10	
Sample ID: B06021525-091A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	2.30	s.u.	0.10				0	10	
Sample ID: B06021525-100A DUP	Sample Duplicate				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	7.90	s.u.	0.10				0	10	
Sample ID: LCS-0603091708	Laboratory Control Spike				Run: MISC-SOIL_060309D			03/09/06 17:08	
pH, sat. paste	7.10	s.u.	0.10	104	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Energy Laboratories Inc

Sample Receipt Checklist

Client Name **Golder and Associates**

Work Order Number **B06021525**

Date and Time Received: **2/24/2006**

Received by nrm

Login completed by: Nathan R. McClenning — Signature; 2/24/2006 — Date

Reviewed by ____ Initials ____ Date

Carrier name UPS ARS Ground

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	NA °C
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Adjusted? ____ Checked by ____

Any No and/or NA (not applicable) response must be detailed in the comments section below.

Client contacted ____ Date contacted: ____ Person contacted ____

Contacted by: ____ Regarding: ____

Comments:

Corrective Action

FIELD SHEETS

Project: Wind Blown Tailings Sampling Site No: 1-T1 Date/Time: 1/30/06 10:35

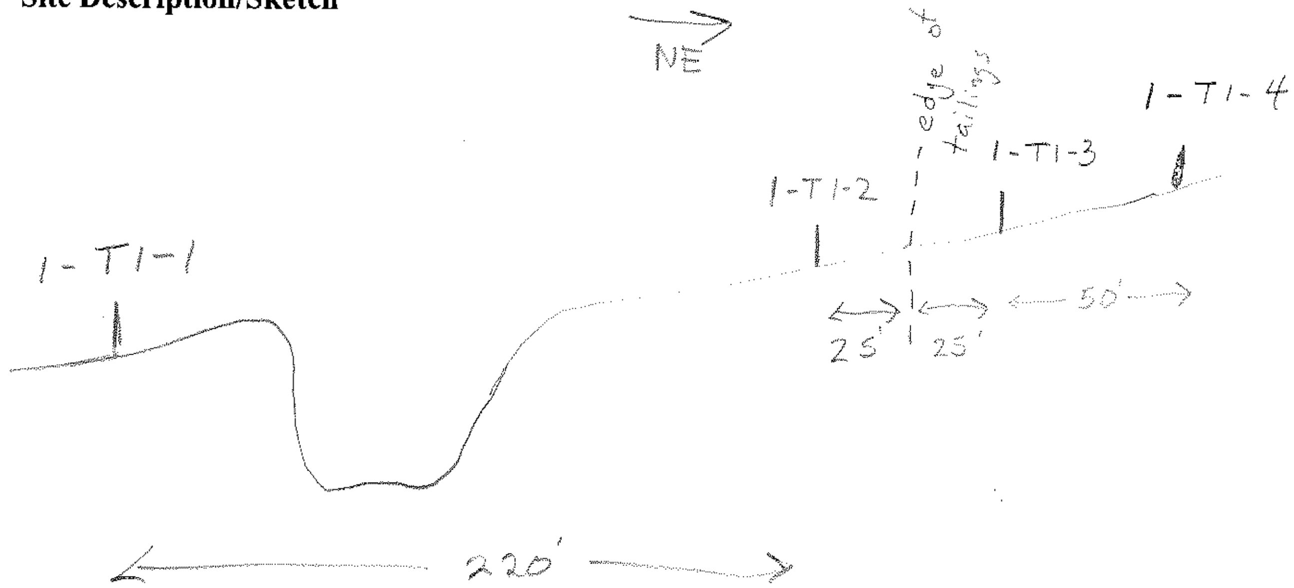
Samples: 1-T1-1T, 1-T1-1S, 1-T1-2T, 1-T1-2S, 1-T1-3S, 1-T1-4S Sampler: D. Buscher

GPS (NAD 27): 0745201E / 3618797N (center of transect) Photo No. 27-30

Location: East side of Mangas Rd, east of No. 1 tailing

MU. 30, 40

Site Description/Sketch



- moved 1-T1-1 to thicker tailings deposit.
- edge of tailings is very subtle.
- edge of tailings defined by pH.

Sample Description

1-T1-1T (tailings) 0-1", 10YR 4/3 grl fSL tailings/soil. NE, 40% grl on surface, tailings mixed with some eolian soil.

1-T1-1S (soil) 0-6", 10YR 2/2 grl SL, 20% grl, NE, 4-6" 10YR 3/3 v. grl. weathered Gila NE.

1-T1-2T (tailings/soil) 0-1/4", 10YR4/3, fSL, v. grl, 35% grl. tailings mixed with wind-blown soil + gravel, NE

1-T1-2S (soil) 0-6", 10YR 3/3, grl SL, 30% grl, 4-6" hard weathered Gila, NE (Took photo of 1/4" tailings on surface)

1-T1-3S (soil) 0-6" 10YR 3/2 grl SL, 20% grl, 0-1/2" eolian SL, 5-6" weathered Gila, all NE.

1-T1-4S (soil) 0-6", 10YR 2/2 grl SL, 15% grl, NE 4-6" weathered Gila.

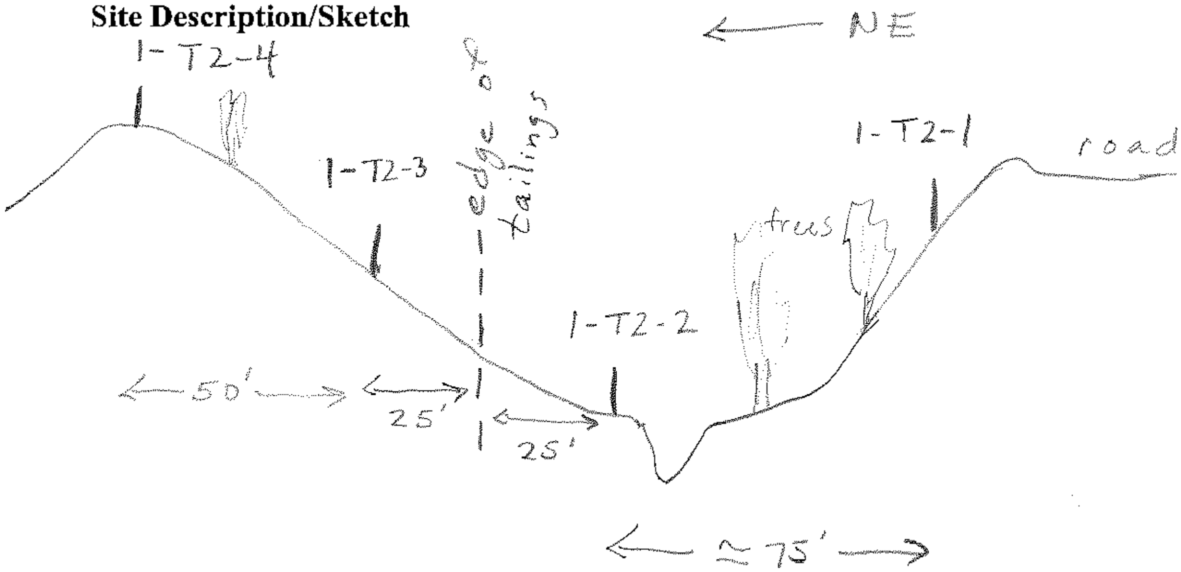
Project: Wind Blown Tailings Sampling Site No: 1-T2 Date/Time: 1/31/06 15:10

Samples: * 1-T2-1T, 1-T2-1S, 1-T2-2T, 1-T2-2S 1-T2-3S, 1-T2-4S Sampler: D. Buscher

GPS (NAD 27): 0745181E/3618208N (Center of transect) Photo No. 42-44

Location: East, in trees, of the SE corner of No. 1 tailings M.U. 40

Site Description/Sketch



- thin deposit of wind blown tailing 1/4 - 1/8" thick
- tailing edge very subtle, used pH to define limit.

* not worth analyzing.

Sample Description

1-T2-1T (tailings/soil) tailings was only 1/8" thick, collected small amt. but mixed with much soil. Soil is mod eff.

1-T2-1S (soil) 0-6" 7.5YR 4/4 v. grl SL, mod effervescent.

1-T2-2T (tailings/soil) 0-1" 10YR 4/4 fLS, tailings mixed with soil, v. grl 35% grl, minor amt. of tailings occur under edges of clots.

1-T2-2S (soil) 0-6" 7.5YR 3/3 v. grl SL, NE

1-T2-3S (soil) 0-6", 0-1.5" 7.5YR 4/6 v. grl SL, 35% grl → slopewash
1.5-6" 7.5YR 4/4 grL CL, NE ← NE

1-T2-4S (soil) 0-5", (>5" very hard Gila - on ridgetop)
5YR 3/4 v. grl SCL, 35% grl, NE.
tailing like material under nearby shrub pH = 6.5

Project: Wind Blown Tailings Sampling Site No: 1 - T3 Date/Time: 2/1/06 7:30

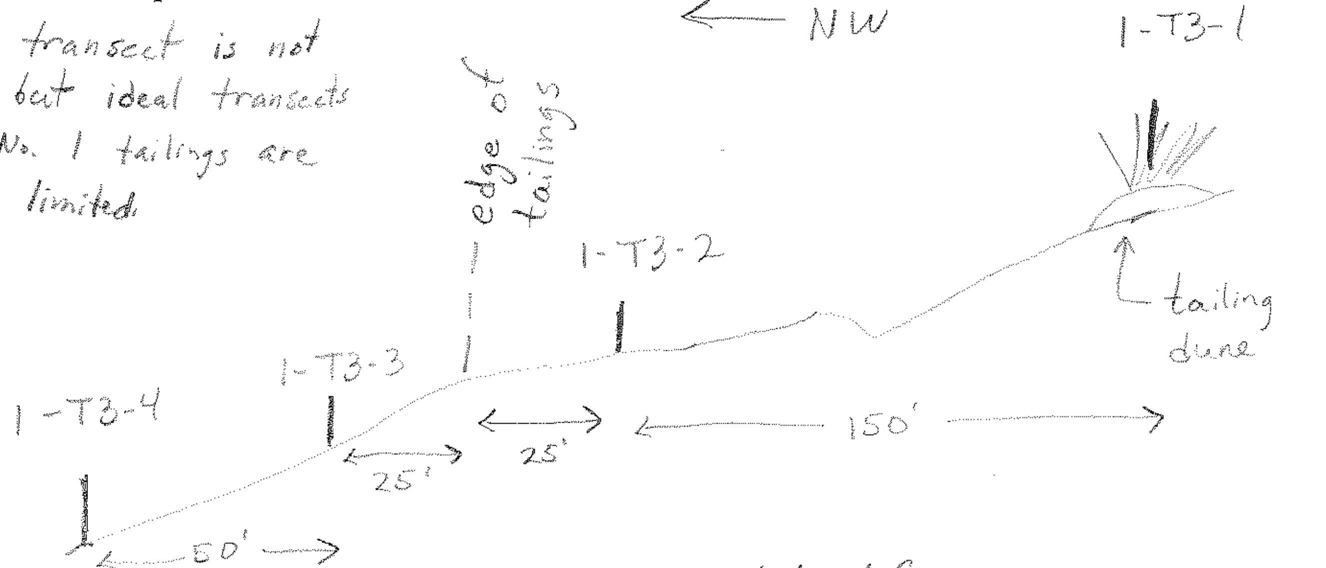
Samples: 1-T3-1T, 1-T3-1S, 1-T3-2T, 1-T3-2S, 1-T3-3S, 1-T3-4S Sampler: D. Buscher

GPS (NAD 27): Center of transect 0743520E/3618179N Photo No. 45-48

Location: Immediately west of the SW corner of No. 1 tailing dam. MU. 30, 40

Site Description/Sketch

- This transect is not ideal, but ideal transects for No. 1 tailings are very limited.



- tailing edge is very subtle, used pH to define edge.
- transect runs NW/SE to represent dominant wind direction for this deposit.
- Some of these tailings may have been from a slurry line but have been reworked by the wind.
- moved 1-T3-1 150' from 1-T3-2 to capture thicker tailing deposit.

Sample Description

1-T3-1T (tailing) 0-2", 10YR6/3 fine + med. Sand, sg, NE
1-T3-1S (soil) 0-6"; 0-2" 7.5YR 3/2 SL, NE ; 2-6" 7.5YR 3/3 grl SL, NE

1-T3-2T (tailings/soil) 0-1", 10YR5/3 fine + med sand mixed with eolian soil + 30% grl on surface, pH ≈ 5.0, NE
1-T3-2S (soil) 0-6" 7.5YR4/4 v. grl SL, 40% grl, slightly effervescent

1-T3-3S (soil) 0-6"; 0-1" 7.5YR4/4 v. grL LS, NE
1-2" 7.5YR4/4 grL SCL, NE
2-6" 7.5YR 4/4 v. grL SCL → hard weathered Gila (near ridgetop) NE

some adjacent shrubs have eolian dunes with pH 5.5-6.0, possibly slightly tailings impacted
1-T3-4S (soil) 0-6"; 0-1/2" 10YR 3/3 FSL, NE, eolian, 50% grl + Cbl on surface
1/2"-3" 10YR 3/2 SL, NE
3-6" 7.5YR 3/4 grl SCL, NE

Project: Wind Blown Tailings Sampling Site No: 1A - T1 Date/Time: 1/30/06 13:30

Samples: 1A-T1-1T, 1A-T1-1S, 1A-T1-2T, 1A-T1-2S, 1A-T1-3S, 1A-T1-4S Sampler: D. Buscher

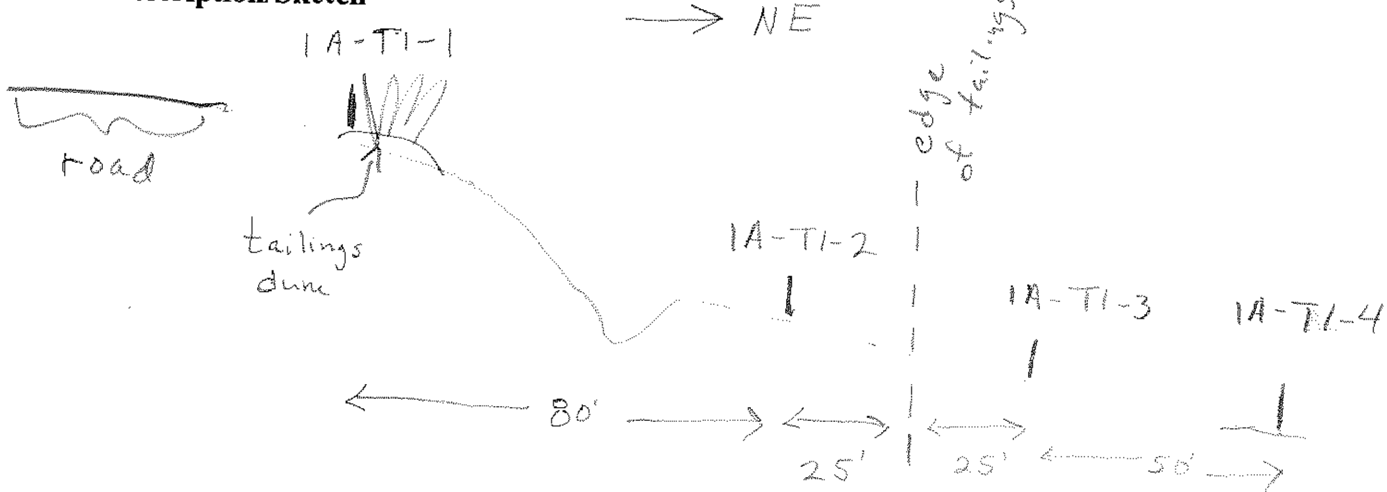
Center of transect

GPS (NAD 27): 074 5300E / 361 8045N Photo No. 31 - 34

Location: East of NE corner of 1A tailing dam. In trees.

M. U. 30, 40

Site Description/Sketch



- moved 1A-T1-1 to tailings dune (thicker tailings deposit)
- tailings edge is very subtle, use pH to define edge.
- some light coloured fine sand in the non-tailings portion but pH = 6.5
- some tailings along this transect may in part be water deposited.

Sample Description

1A-T1-1T (tailings) 0-5", 10YR 4/3 fLS, 5% gravel on surface, tailings contain some eolian soil.

1A-T1-1S (soil) 0-6": 0-1" → 7.5YR 4/4 grl SL (fill - probably from construction of adjacent road. 1-6" 10YR 2/2 grl SL → strongly eff. → mod. eff.

1A-T1-2T (tailings) 0-1/4", 10YR 5/2 grl fSL, 20% grl, tailings mixed with eolian soil, some pockets of 100% tailings but difficult to collect

1A-T1-2S (soil) 0-6" 10YR 2/1 grl SL, 20% grl, NE

1A-T1-3S (soil) 0-6" same as 1A-T1-4S

1A-T1-4S (soil) 0-6", 0-1" 10YR 4/2 grl fSL - eolian material, pH = 6.5, NE
1-6" 10YR 2/2 grl SL, 15% grl, : mod. eff.

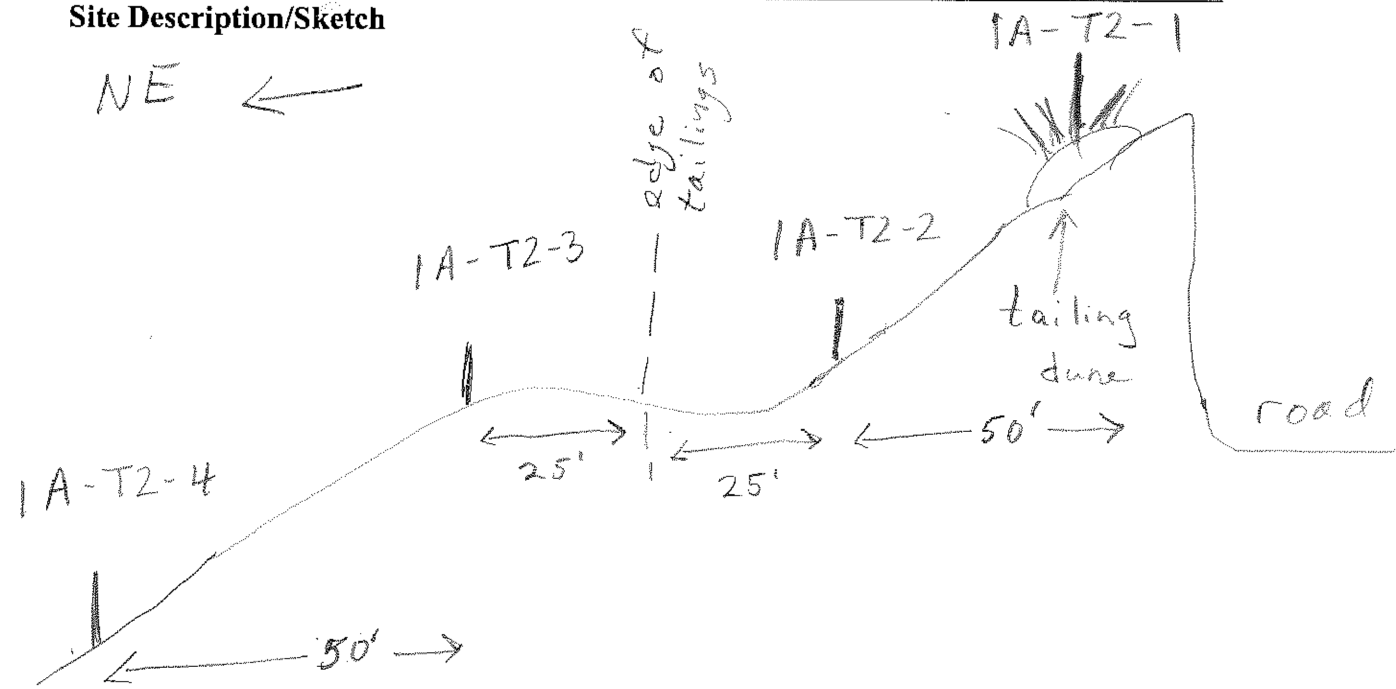
Project: Wind Blown Tailings Sampling Site No: 1A - T2 Date/Time: 1/31/06 7:30

Samples: 1A-T2-1T, 1A-T2-1S, 1A-T2-2S, 1A-T2-3S, 1A-T2-4S Sampler: D. Buscher

GPS (NAD 27): 0745384 E/3617795 N (Center of transect) Photo No. 35-38

Location: east of 1A tailing pond, in trees. NW of 1A-T1 M.U. 30, 40

Site Description/Sketch



- edge of tailings is very subtle, used pH to define boundary
- abundant eolian LS, looks like tailings but pH is 6.5-7.0
- dune near 1A-T2-2 pH = 5.0,

Sample Description

1A-T2-1T (tailings) 0-3" fine + med sand, 10YR6/3, NE, sg

1A-T2-1S (soil) 0-6" 7.5YR 3/3 v. grl SL, 40% grl NE

1A-T2-2S (soil) 0-1" 10YR4/4 FLS, sg, NE, pH=6.5, 25% grl on surface
1-6" 7.5YR 4/4 v. grl SL, strongly effervescent

1A-T2-3S (soil) 0-6", 0-1" 10YR 4/4 FLS, sg, mod. eff. 30% grl on surface.
1-6" 7.5YR 4/4 v. grl CoLS, 45% grl, strongly eff.

1A-T2-4S (soil) 0-6", 0-1" 10YR 4/4 FLS, sg, NE, 30% grl on surface, looks like tailings but pH = 6.5
1-6" 10YR 2/1 grL SL, mod eff.

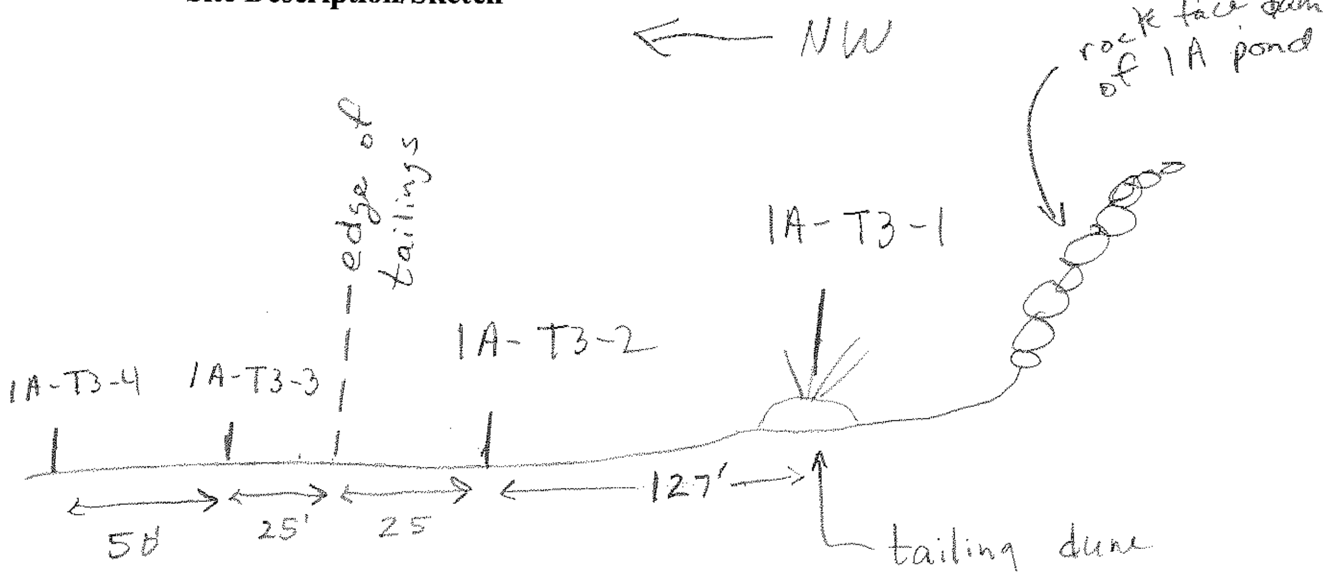
Project: Wind Blown Tailings Sampling Site No: 1A-T3 Date/Time: 11:15 1/31/06

Samples: 1A-T3-1T, 1A-T3,1S, 1A-T3-2T, 1A-T3-2S, 1A-T3-3S, 1A-T3-4S Sampler: D. Buscher

GPS (NAD 27): 0743748E/3617375N Photo No. 39-41

Location: West of SW corner of 1A tailing pond M.U. 30,40

Site Description/Sketch



- tailing boundary is very subtle, use pH to define edge.
- relocated 1A-T3-1 to tailing dune to represent thicker tailing deposit.

* Orientated transect NW/SE - parallel to dominant wind direction for this wind-blown tailing deposit.

Sample Description

1A-T3-1T (tailings) 0-2" 10YR5/2 fine + med sand with 10% grl on the surface + mixed with some eolian soil. NE

1A-T3-1S (soil) 0-6" 5YR 3/3 grl CL, NE

1A-T3-2T (tailings/soil) 10YR 4/4 LS, sg, 30% grl on surface. 0-0.25" tailings mixed with eolian soil collected small amount.

1A-T3-2S (Soil) 0-6", 0-2" 7.5YR 2.5/2 grl SL, 20% grl, NE 2-6" 5YR 3/3 v. grl SCL, NE,

1A-T3-3S (soil) 0-6", 0-1" 7.5YR 4/4 grl co. sand NE; 1-4" 7.5YR 2.5/2 grl SL, 4-6" 5YR 3/3 CL, NE.

1A-T3-4S (soil) 0-6", 0-1" v. grl 7.5YR 3/3 SL, NE; 1-3" 7.5YR 2.5/2 grl SL, NE; 3-6" 5YR 3/4 CL, NE.

Project: Wind Blown Tailings Sampling Site No: 1X-T1 Date/Time: 2/1/06 11:30

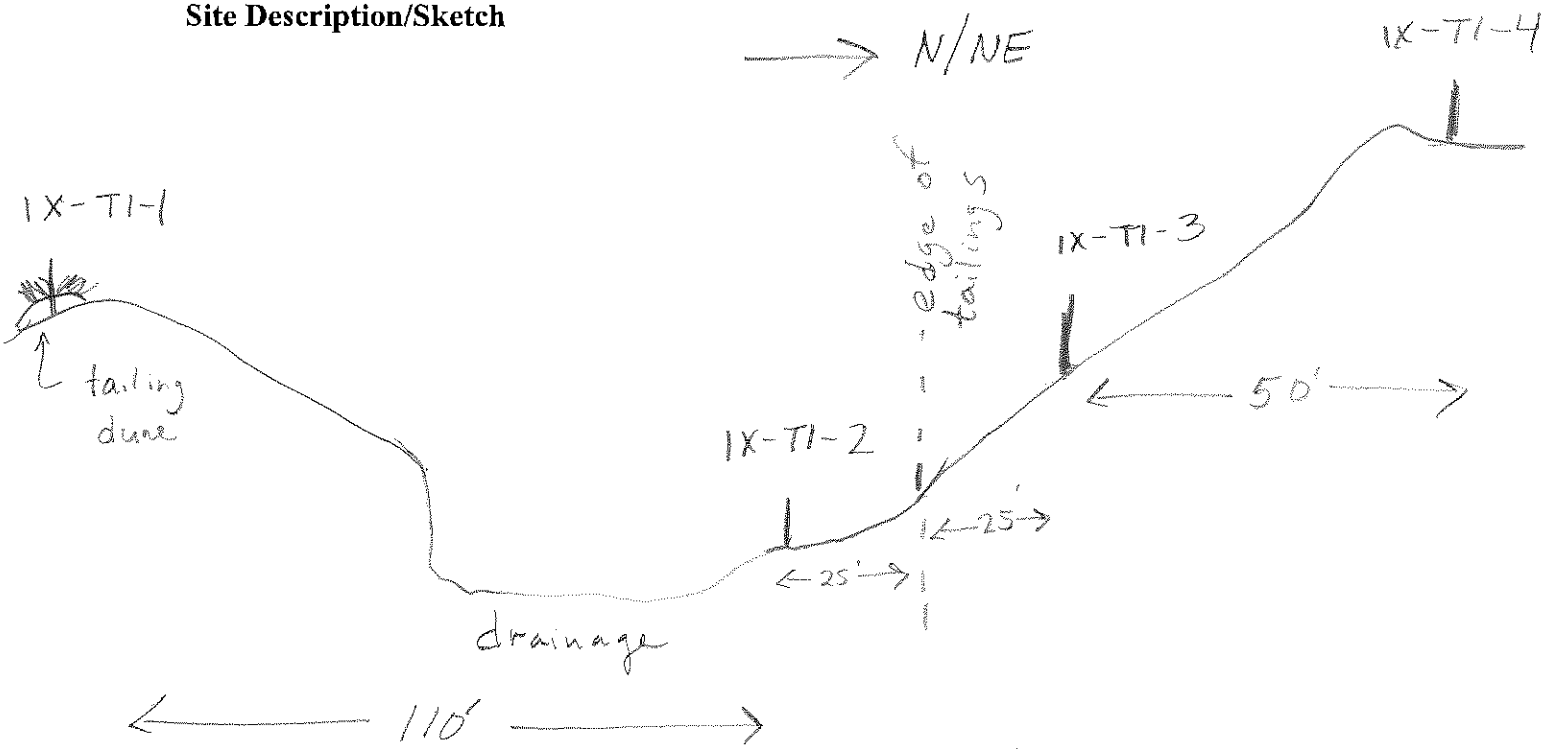
Samples: 1X-T1-1T, 1X-T1-1S, 1X-T1-2T, 1X-T1-2S, 1X-T1-3S, 1X-T1-4S Sampler: D. Buscher

GPS (NAD 27): 0742413E/3618942 N Photo No. 49-52

Location: West of west corner of 1X dam

M.U. 30

Site Description/Sketch



– moved 1X-T1-1 110' from 1X-T1-2 to capture thicker deposit of tailing.

Sample Description

1X-T1-1T (tailings) 0-2", 7.5YR5/3 fine + med. sand, some eolian soil mixed in, also some decaying organic matter (bear grass)

1X-T1-1S (soil) 0-6", 0-4" 10YR 3/3 grl SL, NE
4-6" 7.5YR 3/3 grl SCL, NE

1X-T1-2T (tailing/soil) 0-1/4", 10YR 4/2 LS, 30% grl on surface, mixed with some alluvial soil from slopewash, pH - 5.0-4.5. nearby shrub has tailings underneath. collected small amount

1X-T1-2S (soil) 0-6", 0-4" 10YR2/2 grl SL, NE
4-6" 7.5YR3/3 grl SCL, NE

1X-T1-3S (soil) 0-6", 7.5YR 4/4 v. grl SL, 35% grl, mod. effervescent. On steep berm face.

1X-T1-4S (soil) 0-6", 7.5YR 4/4 grl LS, strongly effervescent area had been disturbed (surface removed) many yrs ago.

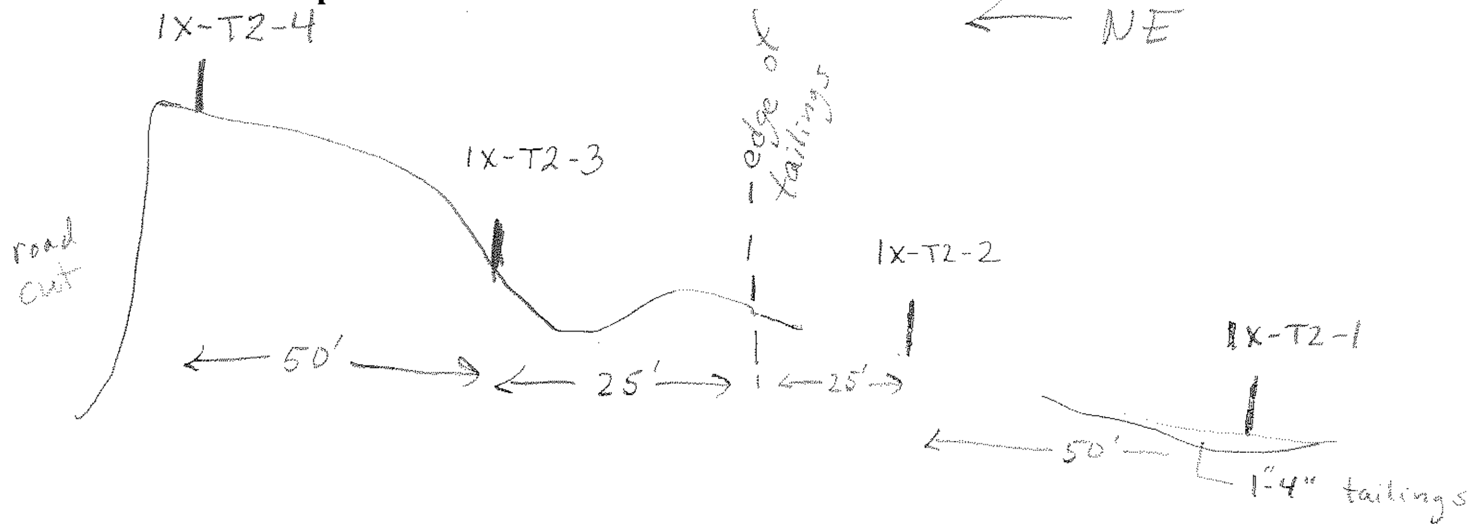
Project: Wind Blown Tailings Sampling Site No: 1X-T2 Date/Time: 2/7/06 7:45

Samples: 1X-T2-1T, 1X-T2-1S, 1X-T2-2S, 1X-T2-3S, 1X-T2-4S Sampler: D Buscher

GPS (NAD 27): Center of transect 0743136E/3619561N Photo No. 88-91

Location: Couple hundred feet N of N side of 1X dam, NE of tailing detention pond M.U. 20, 40

Site Description/Sketch



- edge of tailings is subtle, used pH to define edge,
- tailing looking material near 1X-T2-3 put pH 6.0
- 1X-T2-2 pockets of 1/8-1/4" tailings mixed in with 35% CF on surface — did not collect

Sample Description

1X-T2-1T (tailings) 0-3", 10YR 7/3 fine + med. sand, sg.
1X-T2-1S (Soil) 0-6", 7.5YR 4/4 loam, 15% grl, NE

1X-T2-2S (soil) 0-6" 7.5YR 4/4 SL, 30% grl, NE

1X-T2-3S (Soil) 0-6"; 0-3" 10YR 3/4 LS, 35% grl, NE
40% CF on surface
3-6" 10YR 2/2, SL, 10% grl, NE

1X-T2-4S (Soil) 0-6"; 0-1" 10YR 3/4 LS, 40% grl, NE
40% CF on surface
1-6" 7.5YR 3/3 SL, 20% grl, NE

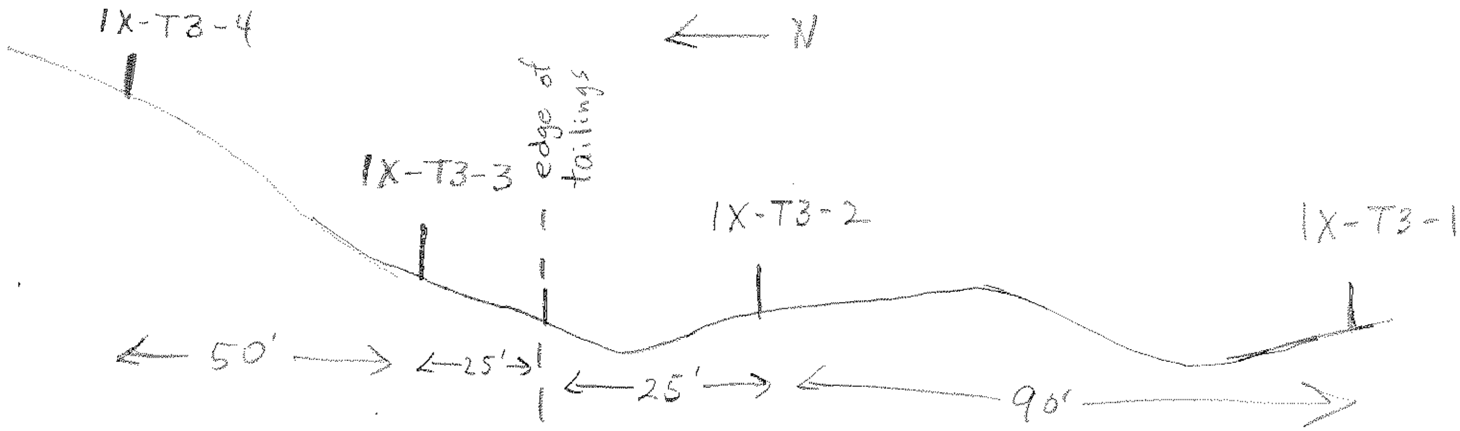
Project: Wind Blown Tailings Sampling Site No: 1X – T3 Date/Time: 2/7/06 10:10

Samples: 1X-T3-1T, 1X-T3-1S, 1X-T3-2T, 1X-T3-2S, 1X-T3-3S, 1X-T3-4S Sampler: D. Buscher

GPS (NAD 27): Center of ~~transect~~ 0743249E/3619488N Photo No. 92-94

Location: N side of 1X dam. MU 40

Site Description/Sketch



- all tailings in this unit are very mixed with eolian soil, slopewash + surface C.F.
- moved 1X-T3-1 90' from 1X-T3-2 to area where it was possibly to collect tailings/eolian soil
- transect runs N-S, only orientation that would fit because of road on top of hill + tailing detention pond to the east.
- edge of tailings is very subtle, used pH to define edge. Tailing area pH 4.5, non-tailing area pH = 5.5, Tailings is very mixed with eolian soil.

Sample Description

1X-T3-1T (tailings/eolian soil) 0-1" 10YR 4/3 LS, 30% grl, NE
tailings + eolian soil mixed in with CF on the surface. pH 4.5
* Collected small amount. 55% CF on surface.

1X-T3-1S (Soil) 0-6", 7.5YR 3/3 SL, 15% grl, NE (0-2")/2-6" 7.5YR 4/4 SCL, NE

1X-T3-2T (tailings/eolian soil/slope wash) 0-0.5" 10YR 3/4 LS, 40% grl, NE
↑ collected small amt.

1X-T3-2S (Soil) 0-6", 7.5YR 2.5/2 SL, 20% grl, NE.
50 CF on surface

1X-T3-3S (Soil) 0-6"; 0-2" 7.5YR 4/4 SL, 40% grl, NE, 60% CF on surface
2-6" 7.5YR 3/4 SCL, NE, 15% grl

1X-T3-4S (Soil) 0-6", Same as 1X-T3-3S

1/27/06 8:40

Project: Wind Blown Tailings Sampling Site No: 2-T1 Date/Time: 1/26/06 14:40

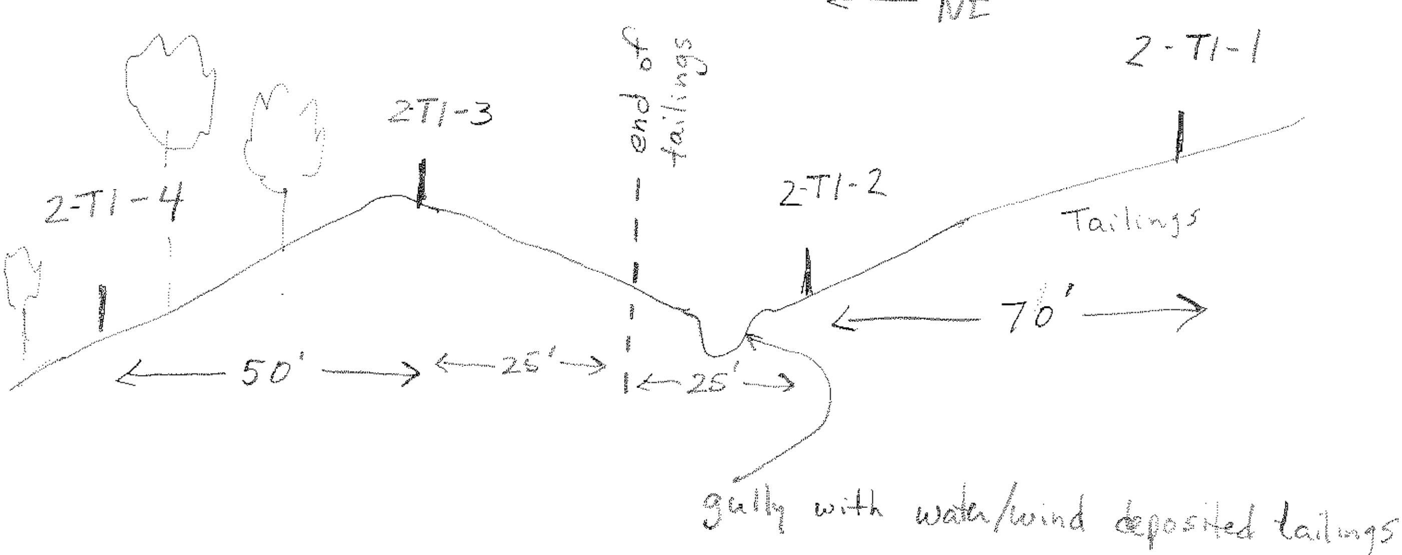
Samples: 2-T1-1T, 2-T1-1S, 2-T1-2T, 2-T1-2S, 2-T1-3S, 2-T1-4S Sampler: D. Buscher

GPS (NAD 27): 0743219 E/3622851 N Center of transect Photo No. 1, 2, 3, 4

Location: No. 2 tailings, N-NW side.

M.U. 10, 20

Site Description/Sketch



- soil under oak tree near 2-T1-4 appeared to have some tailings but pH = 7.0
- relocated 2-T1-1 to 95' away from tailings boundary to better represent the avg thickness of tailings
- transect is oblique to tailing deposit.

Sample Description

2-T1-1T (tailings) 0-8", 2.5Y 6/4 fine + med sand, single grain

2-T1-1S (soil) 0-6", 10YR3/2 gravelly scL, 25% grl, NE

2-T1-2T (tailings) 0-1/2", 2.5Y6/4 fine + med sand, single grain mixed with minor soil.
2-T1-1S (soil) 0-6", 5YR 4/4 gravelly clay, 20% grl, NE
thickness varies from <1/8" - 1".

2-T1-3S (soil) 0-6", disturbed soil, on constructed berm, mixture of 10YR 3/2 grl scL, NE + 5YR 4/4 grl scL, sl eff.

2-T1-4S (soil) 0-6", 5YR 4/4 grl scL, 25% grl, 5% cbls; 5% $CaCO_3$, slightly to strongly effervescent, on steep, forested back slope.

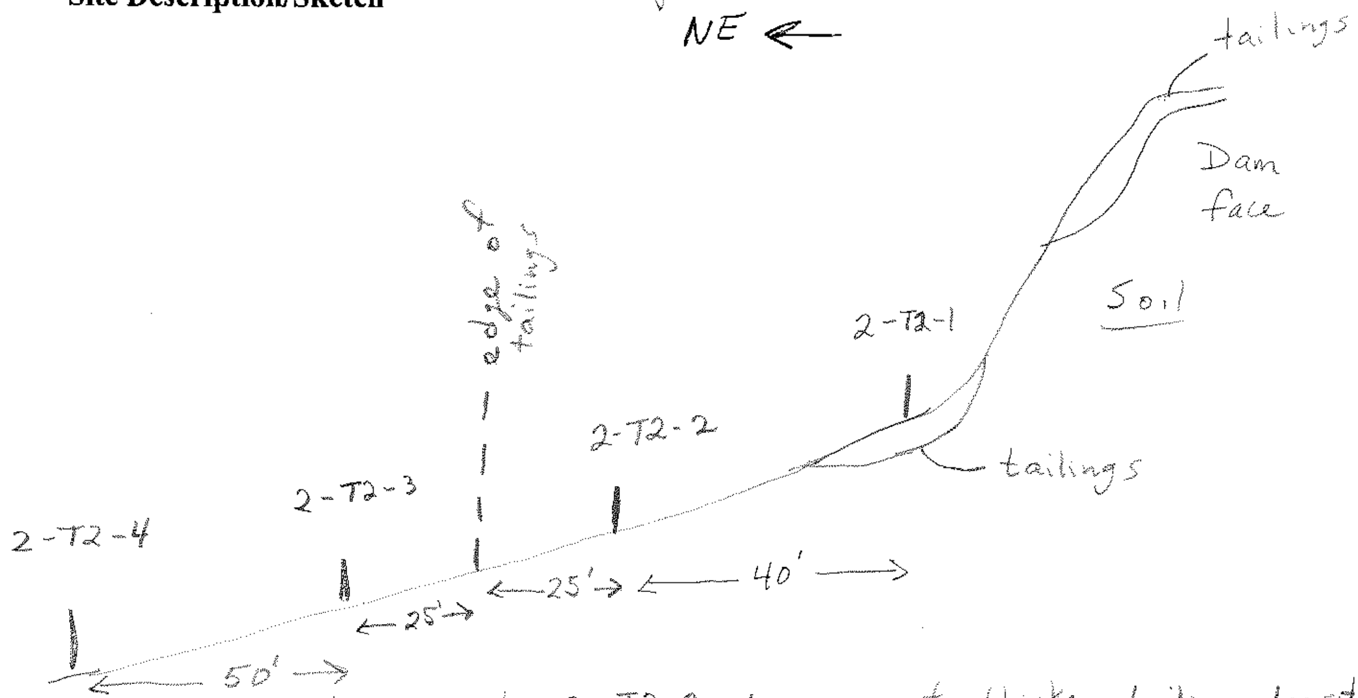
Project: Wind Blown Tailings Sampling Site No: 2 - T2 Date/Time: 1/27/06 11:00

Samples: 2-T2-1T, 2-T2-1S, 2-T2-2T, 2-T2-2S, 2-T2-3S, 2-T2-4S Sampler: D. Buscher

GPS (NAD 27): 0743372GE/3622814N Center of transect Photo No. 5 - 7

Location: N side of No. 2 tailings, Below steep dam face across from Red Rock Canyon, M.U. 10 + 30

Site Description/Sketch



— moved 2-T2-1 closer to 2-T2-2 to represent thicker tailing deposit.

Sample Description

2-T2-1T (tailings) 0 – 16" 10YR 6/4 fine + med sand, NE

2-T2-1S (soil) 0-6", 7.5YR 4/4 grl SL (fill), 25% grl, with 10% 7.5YR 6/4 iron splotches in upper 2". NE.

2-T2-2T (tailings) 0-1", 10YR 6/4 fine + med sand, NE, on edge of dune under shrub, thickness varies from 1/4" - 2". most of area has 1/8 - 1/2" tailings.

2-T2-2S (soil) 0-6", 7.5YR 4/4 grl SCL, native, strongly effervescent

2-T2-3S (soil) 0-6", 7.5YR 4/4 gravelly SCL, 25% grl, native soil strongly eff. Soil is frozen below 4"

2-T2-4S (Soil) 0-6", 7.5YR 4/4 gravelly SCL, 25% gravel, strongly effervescent, native soil.

Project: Wind Blown Tailings Sampling Site No: 2 - T3 Date/Time: 1/27/06 13:40

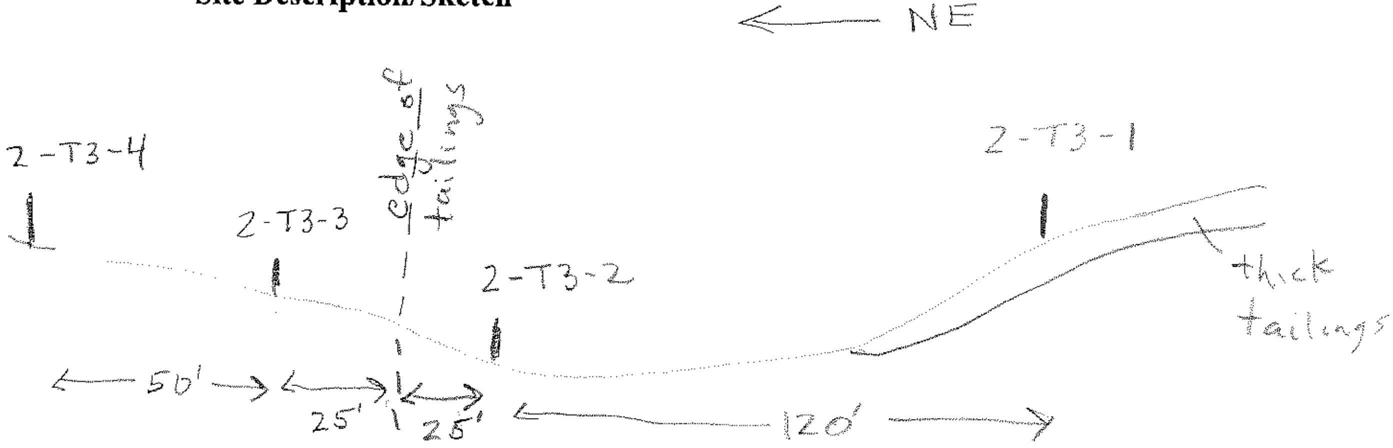
Samples: 2-T3-1T, 2-T3-1S, 2-T3-2S, 2-T3-3S, 2-T3-4S Sampler: D. Buscher

GPS (NAD 27): 0743855E / 3621725N Center of transect Photo No. 8 - 11

Location: 2 Tailings dam, SE side,

M.U. 10, 30, 40

Site Description/Sketch



- moved 2-T3-1 120' away from 2-T3-2 to represent thick tailings deposit.
- tailings edge is very subtle.

Sample Description

2-T3-1T (tailings) 0-12", 10YR 6/4 fine + medium sand, Sg, NE

2-T3-1S (soil), 5YR 4/6 gravelly SCL, NE, 20% gravel, minor 7.5YR 4/4 iron splotches upper 1/2".

2-T3-2 → 1/8 - 1/4" tailings - did not collect because mixed with 60% rocks on surface.

2-T3-2S (soil) 0-6"
0-4" 7.5YR 3/2, very gravelly CL, 45% gravel, slightly eff.
4-6" 7.5YR 4/4, gravelly CL, 30% gravel, slightly eff.

2-T3-3S (soil) 0-6", 7.5YR 4/4 grl C/CL, 25% grl. slightly effervescent

2-T3-4S (soil) 0-6", 7.5YR 4/4 gravelly clay loam/clay, 25% grl, mod eff.

Project: Wind Blown Tailings Sampling Site No: 3 - T1 Date/Time: 2/4/06 13:30

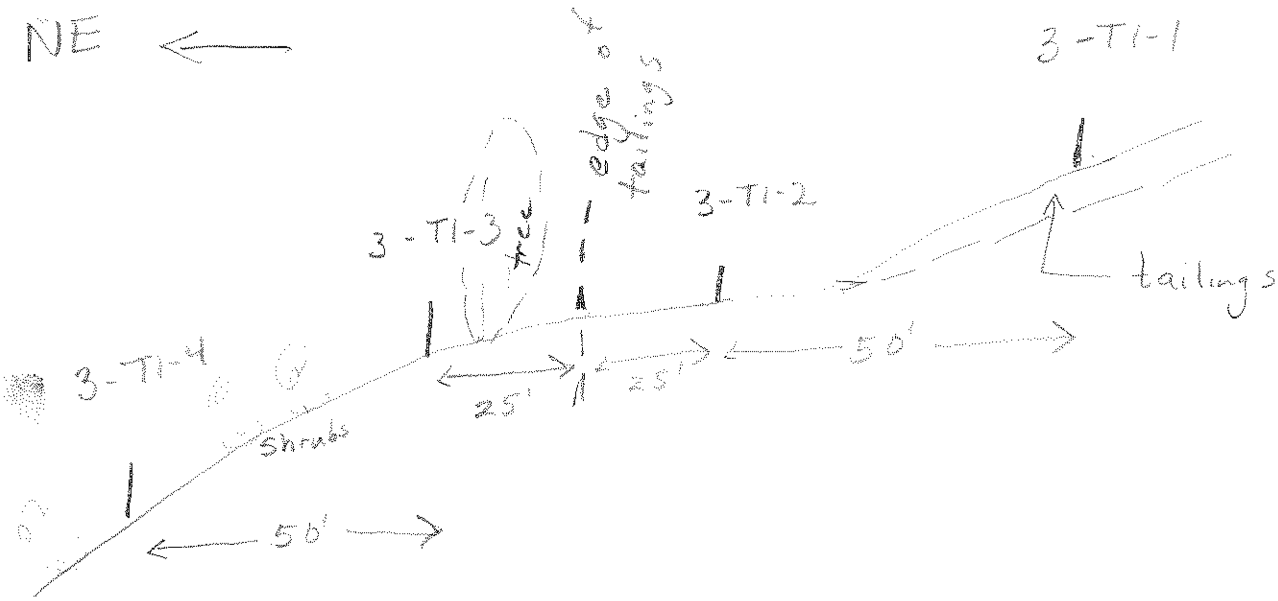
Samples: 3-T1-1T, 3-T1-1S, 3-T1-2S, 3-T1-3S, 3-T1-4S Sampler: D. Buscher

GPS (NAD 27): 0740859E/3625246N Photo No. 68 - 72

Location: N side of 3 dam.

M.U. 10, 30

Site Description/Sketch



— used pH kit to define edge of tailings

— 1/4" – 1/2" above 3-T1-2S is 55% grl with some eolian soil mixed with minor tailings → did not collect, could not get good sample without mixing with soil below.

Sample Description

3-T1-1T (tailings) 0-3.5", 10YR 6/4 fine + med sand, Sg, mixed into gravels.

3-T1-1S (soil) 0-6"; 0-2" 7.5YR 3/2 SL, 10% grl NE
2-6" 7.5YR 3/4 SCL, 10% grl, NE

3-T1-2S (soil) 0-6"; 0-2" 7.5YR 2.5/2 SL, 25% grl, NE
2-6" 7.5YR 3/4 SCL, 20% grl, NE

3-T1-3S (soil) 0-6"; 0-3" 7.5YR 2.5/2 SL, NE, 20% grl
3-6" 7.5YR 3/4 SCL, 15% grl, NE

3-T1-4S (soil) 0-6"; 0-4" 7.5YR 2.5/2, SL, 12% clay, 15% grl, NE
4-6" 7.5YR 3/4 SCL, 15% grl, NE
45% grl on surface

Project: Wind Blown Tailings Sampling Site No: 3-T2 Date/Time: 2/5/06

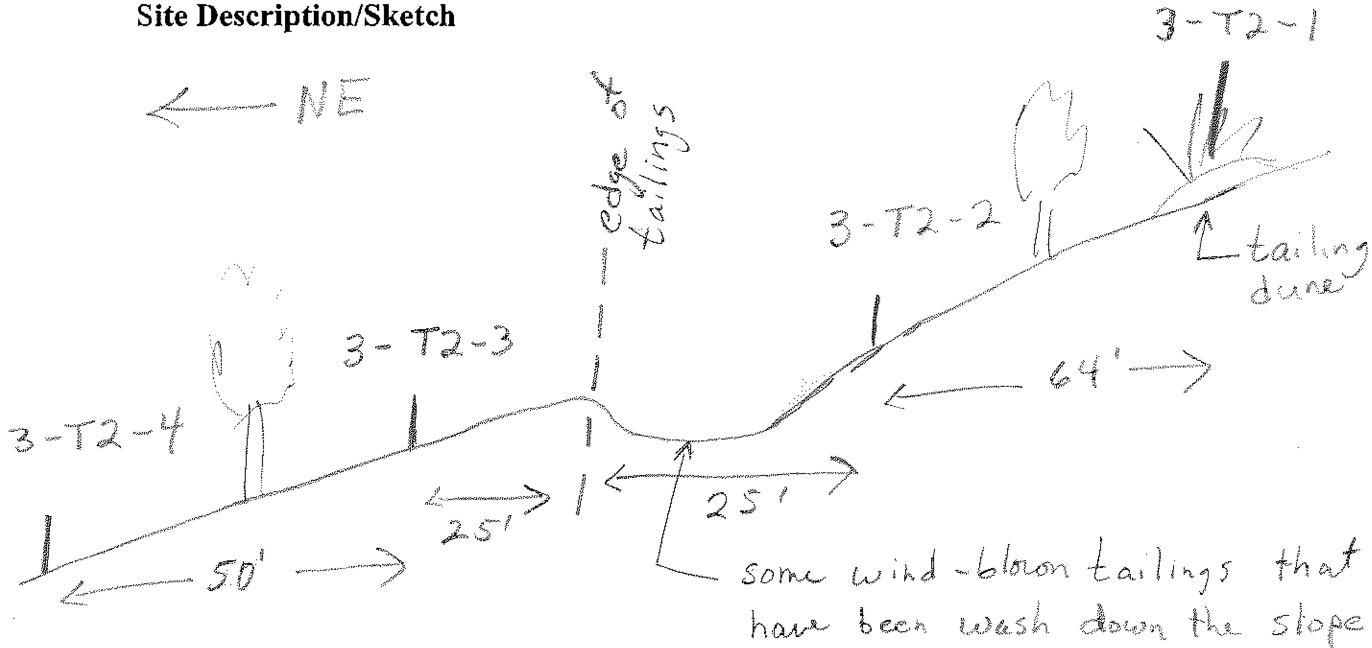
Samples: 3-T2-1T, 3-T2-1S, 3-T2-2T, 3-T2-2S, 3-T2-3S, 3-T2-4S Sampler: D. Buscher

GPS (NAD 27): 0740655E/3625223N Center of transect Photo No. 73 - 76

Location: N side of 3 dam, in trees

M.U. 30

Site Description/Sketch



- 3-T2-1 moved slightly off transect line to the SE to capture some tailings. Tailings occur predominately under trees + shrubs.
- 3-T2-2 near shrub patch.

Sample Description

3-T2-1T (tailings/soil/organic material) 0-3.5", 10YR 4/3 fLS, mixed with mod. decayed organic matter (over beargrass).

3-T2-1S (soil) 0-6", 0-1" 7.5YR 3/4 fSL, 15% grl → slopewash, NE; 1-5" 7.5YR 3/2 SL, NE 20% grl. 5-6" 7.5YR 3/4 SL, NE.

3-T2-2T (tailings/soil/organic material) 0-3", tailings mixed in with slope wash (10YR 4/2) pH 5.0 + mod. decayed leaf litter.

3-T2-2S (soil) 0-6", 0-4" 7.5YR 3/2 cbl, SL, NE, 4-6" 7.5YR 3/3 cbl SL, NE

3-T2-3S (soil) 0-6"; 0-4" 7.5YR 3/2 SL, 15% grl, NE, 40% grl on surface 4-6" 7.5YR 3/4 ScL, 15% grl (20% clay), NE

3-T2-4S (soil) 0-6", 7.5YR 2.5/1 SL, 10% grl, 40% cbls + grl on surface, NE

Project: Wind Blown Tailings Sampling Site No: 3 - T3 Date/Time: 2/6/06 15:00

Samples: 3-T3-1T, 3-T3-1S, 3-T3-2S, 3-T3-3S, 3-T3-4S Sampler: D. Buscher

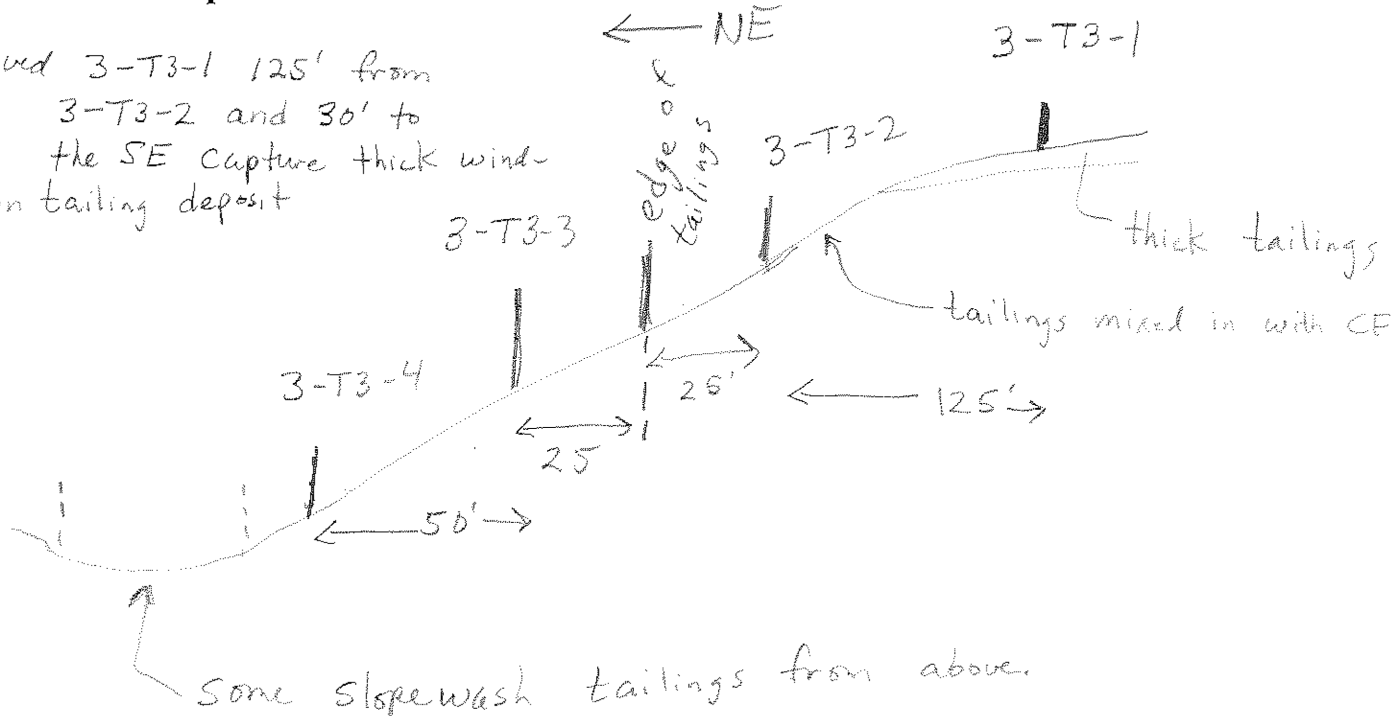
GPS (NAD 27): Center of transect 0740804 E / 3625243 N Photo No. 84 - 87

Location: N side of 3 dam in trees + shrubs

Mills 10, 30

Site Description/Sketch

– moved 3-T3-1 125' from 3-T3-2 and 30' to the SE capture thick wind-blown tailing deposit



– edge of tailings is subtle, used pH to define edge

– 3-T3-2S 0-½" minor amt. of tailings mixed in with eolian soil + surface CF — did not collect sample

Sample Description

3-T3-1T (tailings) 0-6" 10YR 6/4 fine + med sand, some mod. decomposed organic matter mixed in.

3-T3-1S (soil) 0-6", 7.5YR 3/3 SL, NE, 15% grl

3-T3-2S (soil) 0-6"; 0-2" 7.5YR 3/2 SL, NE, 15% grl; 50% CF on surface
2-4" 7.5YR 3/4 SCL, NE

3-T3-3S (soil) 0-6"; 0-1" slopewash, 10YR 4/3 SL, NE, 30% grl, surface contains 40% CF
1-2" 7.5YR 3/2 SL, NE, 15% grl
2-6" 7.5YR 3/4 SCL NE

3-T3-4S (soil) 0-6"; 0-3" 10YR 4/3 LS, 40% grl, NE; 60% CF on surface ← slopewash
3-6" 7.5YR 3/4 SCL, 15% grl NE,

Project: Wind Blown Tailings Sampling Site No: 3X-T1 Date/Time: 1/28/06 - 1/29/06

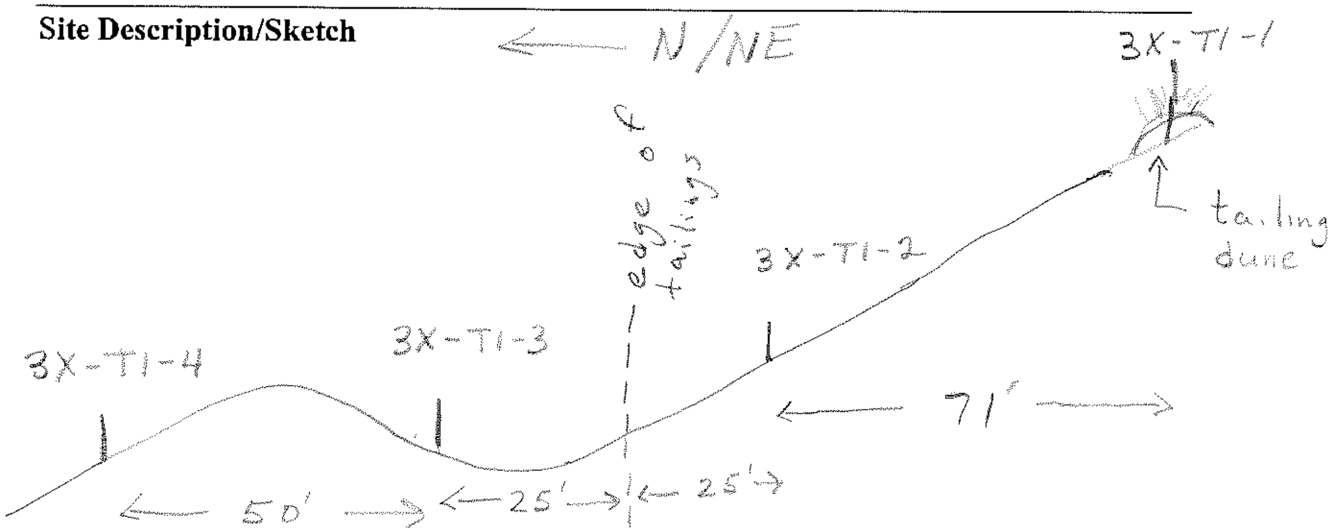
Samples: 3X-T1-1T, 3X-T1-1S, 3X-T1-2T, 3X-T1-2S, 3X-T1-3S, 3X-T1-4S Sampler: D. Buscher

GPS (NAD 27): 0742442E / 3623749N (Center of transect) Photo No. 19-22

Location: N corner of 3X, in trees

M.U. 40

Site Description/Sketch



- checked pH on several shrub-dunes to define tailings boundary,
- transect is oblique to wind-blown tailing deposit, deposit is more controlled by the hill.
- moved 3X-T1-1 up slope to a tailing dune
- laid out transect N/NE because it has been reclaimed on the NE side of this wind-blown deposit. N/NE is the only direction that the transect will fit.

Sample Description

3X-T1-1T (tailings) 0-3", 10YR 6/4 fine + med. sand mixed with 1% wind blown soil, 5% fine grl.

3X T1-1S (soil) 0-6"
0-5" 7.5YR 2.5/2 CL, 10% grl, NE
5-6" 7.5YR 3/3 CL, 10% grl, slightly effervescent

3X-T1-2T (tailings) 0-1", 10YR 4/3 grl SL, 20% grl, tailings mixed with wind-blown soil. NE

3X-T1-2S (soil) 0-6",
0-3" 7.5YR 3/2, grl CL, NE
3-6" 7.5YR 3/3 grl CL, NE

3X-T1-3S (soil) 0-6", 60% coarse fragments on surface. pH of adjacent dune = 7.0
0-1" 10YR 3/3 grl, SL, 20% grl, NE, pH = 6.0
1-6" 7.5YR 2.5/2 grl CL, 25% grl, NE

3X-T1-4S (soil) 0-6", 60% coarse fragments on surface
0-3" 7.5YR 4/4 grl CL, 20% gravel + cbls. v. slightly eff.
3-6" 5YR 3/3 clay, 5% grl, NE

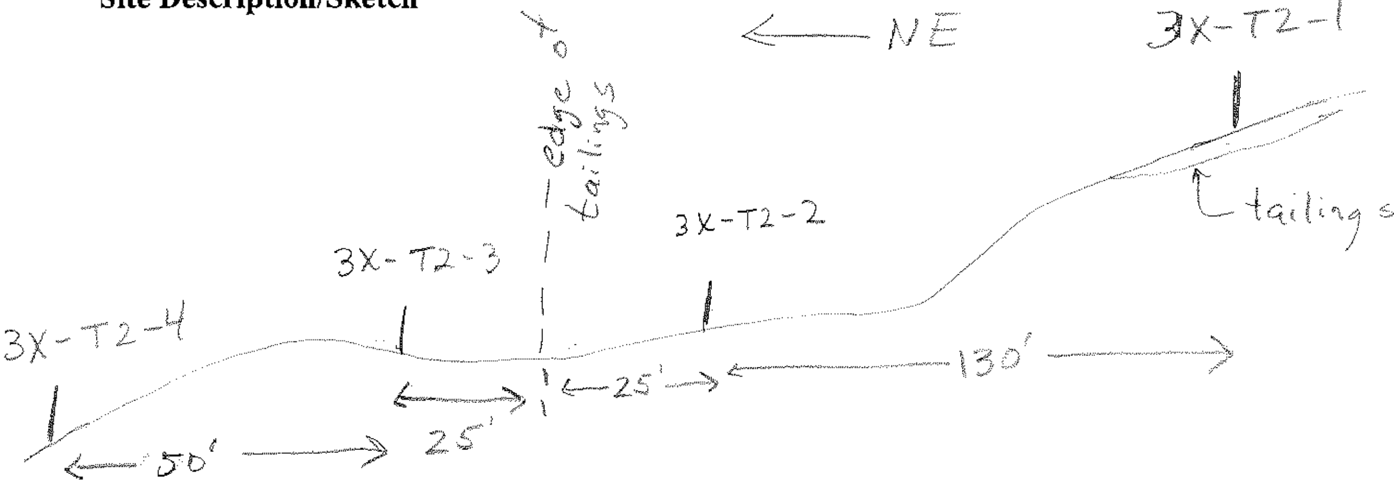
Project: Wind Blown Tailings Sampling Site No: 3X-T2 Date/Time: 2/6/05 7:50

Samples: 3X-T2-1T, 3X-T2-1S, 3X-T2-2S, 3X-T2-3S, 3X-T2-4S Sampler: D. Buscher

GPS (NAD 27): 0742225E/3623666N Photo No. 77-80
center of transect

Location: N-NW side of 3X dam, in trees
M.U. 30, 40

Site Description/Sketch



- moved 3X-T2-1 130' away from 3X-T2-2 to capture thicker wind-blown tailing deposit
- edge of tailings is very subtle, used pH to define edge
- 3X-T2 small pockets 1/8" of tailings, could not collect.
- 3X-T3 eolian soil under some shrubs appears to be in part tailings but pH is 6.0

Sample Description

3X-T2-1T (tailings/eolian soil) 0-2", in shruby area, 10YR 4/2 fLS, tailings mixed with some eolian soil + mod. decayed organic matter.

3X-T2-1S (Soil) 0-6", 10YR 3/2 SL, 15% grl, NE

3X-T2-2S (Soil) 0-6", 7.5YR 3/2 SL, 10% grl NE (0-2"), 50% grl + cbls on surface
(2-4") 7.5YR 3/3 SCL, 5% grl NE

3X-T2-3S (soil) 0-6"; 0-1" 10YR 3/3 SL, very slightly eff, 35% grl
50% grl + cbls on surface
1-6" 7.5YR 3/4 SCL, NE

3X-T2-4S (soil) 0-6"; 0-2" 10YR 3/3 SL, 40% grl. mod eff.
2-6" 10YR 2/2 SL, 15% grl. NE
50% grl + cbls on surface

Project: Wind Blown Tailings Sampling Site No: 3X - T3 Date/Time: 2/6/06

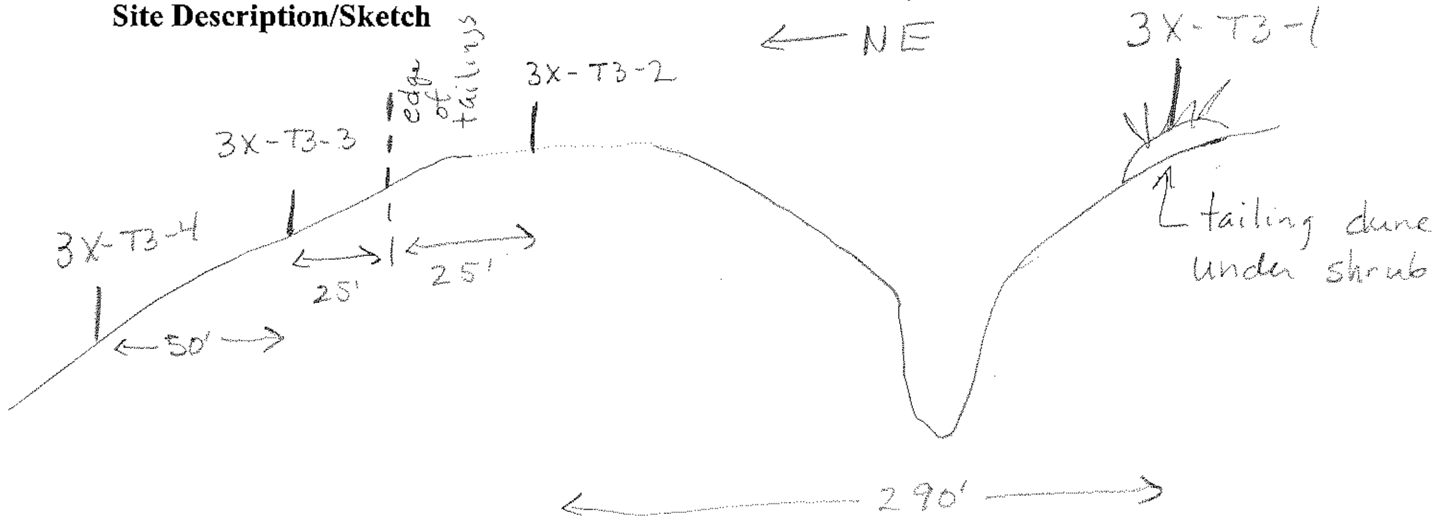
Samples: 3X-T3-1T, 3X-T3-1S, 3X-T3-2S, 3X-T3-3S, 3X-T3-4S Sampler: D. Buscher

GPS (NAD 27): 0741992E/3623577N Center of transect Photo No. 81-83

Location: NW side of 3X dam in trees

M.U. 40

Site Description/Sketch



- moved 3X-T3-1 290' from 3X-T3-2 to an area when it was possible to collect tailing sample.
- edge of tailings is subtle, used pH to define edge.
- 3X-3T-2, minor amt. of tailings mixed in with eolian soil + 50% CF. – no tailing sample.

Sample Description

3X-T3-1T (tailings) 0-3"; 10YR 6/4 fine + med sand,

3X-T3-1S (soil) 0-6"; 0-2" 7.5YR 4/4 SL, NE, 15% grl.
2-6" 7.5YR 3/2 SL, NE, 15% grl

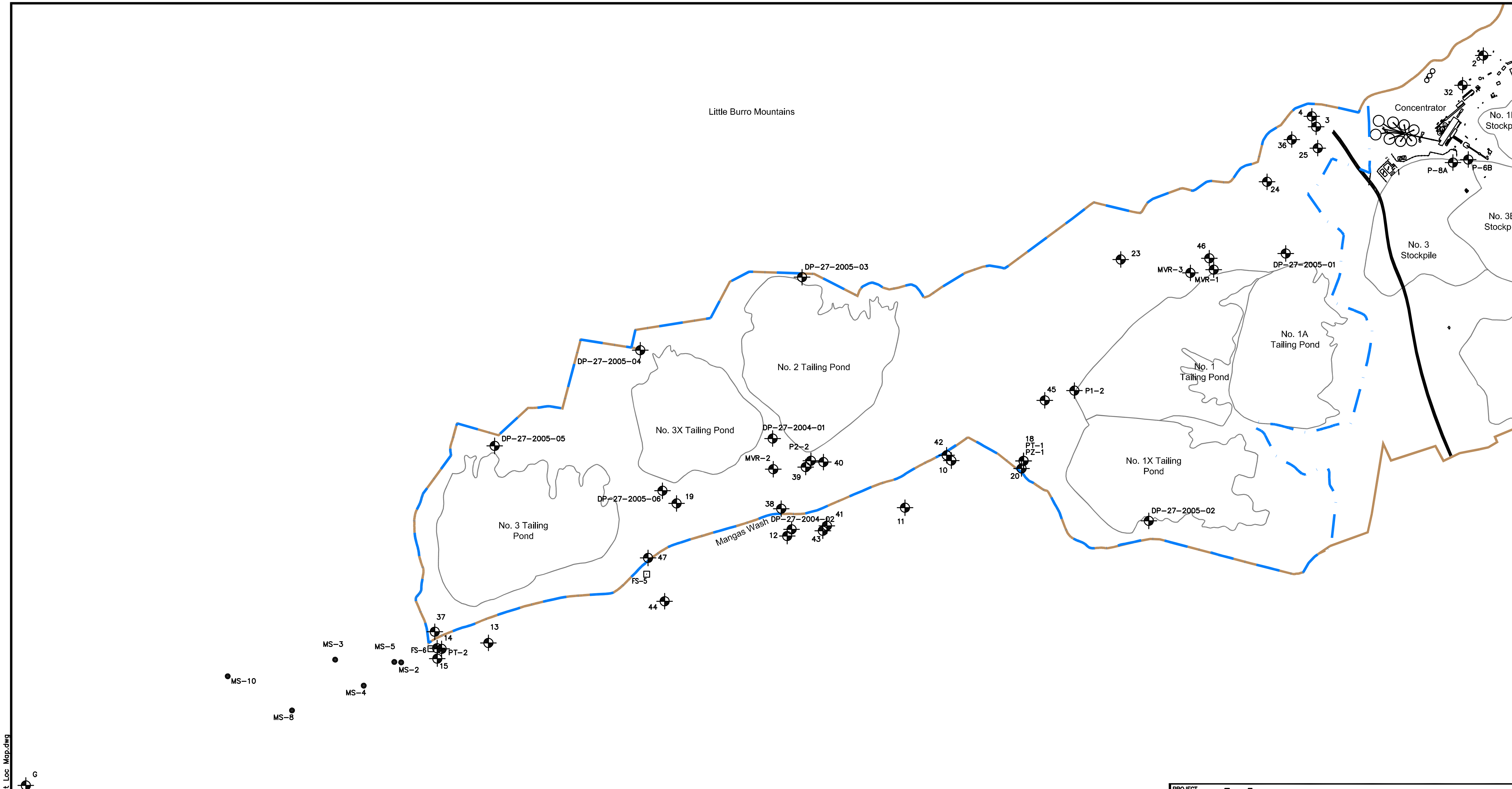
3X-T3-2S (soil) 0-6"; 7.5YR 3/2 CL, NE, 15% grl → 0-4"
4-6" 7.5YR 3/4 CL, NE

3X-T3-3S (Soil) 0-6"; 10YR 3/3 SL, NE, 30% grl; 50% grl + cbls on surface
0-1". 1-6" 7.5YR 3/3 SCL, NE, >4" ext. hard.

3X-T3-4S (soil) 0-6"; 0-1" 10YR 3/3 SL, NE, 30% grl,
1-6" 10YR 3/2 CL, NE, 10% grl
Surface contains 45% CF.

APPENDIX C

SURFACE AND GROUNDWATER MONITOING LOCATIONS



K:\2005 Projects\053-2371\Monitoring Pnt Loc Map.dwg

LEGEND

FACILITY OUTLINE

MINE PERMIT BOUNDARY

DISCHARGE PLAN PERMIT BOUNDARY

44 REGIONAL AQUIFER MONITORING WELL

MS-2 FORMER/CURRENT RESIDENTIAL WELL

FS-5 SURFACE WATER MONITORING POINT

APPROXIMATE LOCATION OF GROUNDWATER DIVIDE IN 1998 ASSOCIATED WITH MAIN PIT CAPTURE ZONE

1500 0 1500 3000

SCALE: 1" = 3000 FEET

PROJECT

phelps dodge TYRONE Inc.

PHELPS DODGE TYRONE INC.
GRANT COUNTY, NEW MEXICO

TITLE

SURFACE AND GROUNDWATER MONITORING POINTS DP-27 AREA

Golder Associates
Albuquerque, New Mexico

PROJECT No.		053-2371	FILE No.	Monitoring Pnt Loc Map
DESIGN	TS	04/22/05	SCALE AS SHOWN	REV. A
CADD	CM	03/30/06	C-1	
CHECK	TS	03/30/06		
REVIEW				