

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

November 13, 2006

## Certified Mail #7002315000565802165 Return Receipt Requested

Mr. Clint Marshall Groundwater Quality Bureau New Mexico Environment Department 1190 St. Francis Dr. P.O. Box 26110 Santa Fe, New Mexico 87502

## Certified Mail #70023150000565802172 Return Receipt Requested

Mr. David Ohori Mining and Minerals Division Mining Act Reclamation Program 1220 South St. Francis Drive Santa Fe, New Mexico 87505

Dear Messrs Marshall and Ohori,

## Re: Submittal of Revised Surface Impoundment Study Work Plan, DP-1341 Condition 87, Permit GR010RE Condition 9.I.6 and L.6.

Phelps Dodge Tyrone Inc. (PDTI) is pleased to submit the enclosed Work Plans (3 copies each) entitled *Tyrone Mine Surface Impoundment Study Work Plan*, DP-1341 Condition 87. The report was prepared by Daniel B. Stephens & Associates, Inc. and MWH Americas, Inc. on behalf of PDTI. Also included is the electronic version of the report.

Should you have any questions or comments regarding this submittal, please contact Mr.Greg Schoen at (505) 574-6359.

Very truly yours,

Lee a. Mix For

Thomas L. Shelley, Manager Environment, Land and Water

TLS:gs Attachments 20061113-100

# Tyrone Mine Surface Impoundment Study Work Plan DP-1341 Condition 87

**Prepared for** 

Phelps Dodge Tyrone, Inc. Tyrone, New Mexico

November 13, 2006



Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109



## **Table of Contents**

Se	ction P	age				
1.	Introduction					
2.	Background	4				
3.	Scope of Work Items	6				
4.	<ul> <li>Surface Impoundment Closure Methodology.</li> <li>4.1 Characterization of Soils</li></ul>	9 10 11 12 14 15 15 16				
5.	Implementation and Reporting Schedule	18				
Re	References19					

## List of Figures

## Figure

- 1 Surface Impoundments in the Northern Mangas Valley Tailing Area
- 2 Surface Impoundments in the Southern Mangas Valley Tailing Area
- 3 Surface Impoundments in the Mine/Stockpile Area
- 4 Schematic of Proposed Soil Sample Siting Methodology



## List of Tables

## Table

- 1 Tyrone Mine Preliminary Surface Impoundment List
- 2 Laboratory Tests for Soil Samples
- 3 Parameters, Associated Standards, and Analytical Methods for Groundwater Samples

## List of Appendices

## Appendix

A NMED Comments and Responses



## 1. Introduction

On April 8, 2003, the New Mexico Environment Department (NMED) issued discharge permit (DP) 1341 to Phelps Dodge Tyrone, Inc. (PDTI) in its letter to Phelps Dodge New Mexico Operations (NMED, 2003). Section III of the permit requires PDTI to conduct scientific studies of the Tyrone Mine (Tyrone) and mine closure actions as a condition of compliance. PDTI submitted a DP-1341 Condition 87 work plan to NMED on September 25, 2003 (PDTI, 2003) and received comments on the work plan in a NMED letter dated May 26, 2006 (NMED, 2006). Both of these documents are included in Appendix A along with a response document to the NMED comments regarding the work plan. Daniel B. Stephens & Associates, Inc. (DBS&A) and MWH Americas, Inc. have prepared this updated and expanded work plan on behalf of PDTI. This revised work plan describes PDTI's proposed study to address the NMED's comments and fulfill the requirements of DP-1341 Condition 87, which states that:

In accordance with the schedule approved under Condition 74, Tyrone shall submit to NMED for approval, a work plan and implementation schedule for a Surface Impoundment study. The study shall be designed to determine which of the existing Surface Impoundments will be needed during closure and post-closure for stormwater retention or seepage interception and an implementation schedule for completion of reclamation.

DP-1341 Condition 23 identifies the requirements for closure of surface impoundments identified in the surface impoundment inventory:

Tyrone shall close all Surface Impoundments identified in the study described in Condition 87. All Surface Impoundments shall be closed in a manner that ensures that the requirements of the WQA and WQCC Regulations and that the conditions of this Supplemental Discharge Permit are met. Closure activities shall include draining the Surface Impoundments, characterization and abatement of sediments that may impact ground water quality and characterization of ground water to determine if abatement is necessary. Unless needed for water management during closure and post closure, or unless otherwise approved by NMED, Surface Impoundments, which may include backfilling or regrading. Where the characterization results show materials remaining within or beneath any Surface Impoundment to be a source or potential source of ground water



contamination, the Surface Impoundment shall be covered and revegetated as specified in Conditions 16 through 20. Final cover placement shall be completed as soon as practicable but no later than one year after completion of construction activities necessary to create positive drainage. Design specifications contained in this condition may be modified during final engineering design with NMED approval.

In addition, this updated work plan addresses the requirements of Section 9.I.6 of Permit Revision 01-1 to Permit No. GR010RE issued by the Mining and Mineral Division (MMD) of the New Mexico Energy, Mineral and Natural Resources Department, which states that:

The Permittee shall reclaim Surface Impoundments located within wildlife habitat PMLU areas to meet wildlife habitat PMLU requirements. The Permittee shall reclaim Surface Impoundments located within industrial PMLU areas, if approved by MMD, to meet industrial PMLU requirements. In addition to PMLU requirements, Surface Impoundments shall be reclaimed to meet the following requirements:

Where soil contamination exists in Surface Impoundment soils, the Permittee shall reclaim the Surface Impoundments as required by NMED and to a condition allowing for reestablishment of a self-sustaining ecosystem or approved post-mining land use. The Surface Impoundments shall be graded for stormwater control. The Permittee shall cover the Surface Impoundment area with 24 inches minimum of topdressing, and revegetate according to the requirements of Appendix C. Where Surface Impoundments are lined; liners will be either removed, or completely buried with 36 inches of suitable cover material.

This updated work plan presents PDTI's proposed methodology for completion of the Tyrone Mine Surface Impoundment Study and provides a consistent approach in compliance with the permit requirements to characterization and closure of existing surface impoundments that will not be used under closure and post-closure conditions. In accordance with NMED's suggestion (Appendix A), rather than completing the entire study and attempting to address all of the existing or proposed surface impoundments at once, PDTI proposes to address the surface impoundments by individual facility areas as closure designs are developed and submitted to the NMED and MMD. The proposed facility areas are shown in Figures 1 through 3, and the approximate order of assessment is as follows:



- 1. Northern Mangas Valley tailing area (No. 2, 3, and 3X Tailing)
- 2. Southern Mangas Valley tailing area (No. 1, 1A, and 1X Tailing)
- 3. No. 1 stockpile area
- 4. No. 3A stockpile area
- 5. No. 1A, 1B, and 1C stockpile area (Upper Oak Grove Wash)
- 6. No. 2 stockpile area (Deadman Canyon)
- 7. Shop area (Upper Mangas Wash)
- 8. Internal mine/stockpile unit area

As closure planning progresses, the facility areas in the mine area (stockpiles and pits) may be further refined and subdivided. At this time the boundaries and areas should be considered preliminary. Significant work or closure of surface impoundments in facility areas 1, 3, 5, and 7 has already occurred or is underway, and closure activities in facility areas 2 and 4 are being planned.

Note that this proposed sequence and grouping by facility area may change due to a number of factors. If the proposed grouping and/or order of analysis provided above are altered, PDTI will notify NMED during standard progress and planning meetings regularly held at the mine. Although Condition 87 study results will be provided to NMED for approval in a phased sequence, this work plan will serve as the basis for a consistent approach to characterization and closure of all surface impoundments.

Applicable background information on existing operations and closure activities at Tyrone is presented in Section 2. Section 3 presents updated key scope of work requirements. The proposed methodologies for conducting surface impoundment assessments and closure design are provided in Section 4, and the proposed implementation and reporting schedule is presented in Section 5.



## 2. Background

The Tyrone Mine is an open-pit copper mine located just off State Highway 90 approximately 10 miles southwest of Silver City in Grant County, New Mexico. The general layout of the existing mining facilities at Tyrone is shown in Figures 1 through 3. The current mine setting and other background information regarding mine closure/closeout are provided in the report *End of Year 2001 through Year 2006 Closure/Closeout Plan* (CCP) (M3, 2001), which is partially incorporated in the NMED's Supplemental Discharge Permit for Closure DP-1341 and the MMD Permit Revision 01-1 to Permit No. GR010RE.

To support the CCP, baseline and closure design related studies were conducted to ensure that groundwater, surface water, and air quality standards are met after mining ceases and that effective reclamation and use of disturbed land are conducted in accordance with the requirements of the NMMA and Rules 69 36-1 to 69-36-20 (NMSA, 1978). The intent of the baseline supporting studies needed to fulfill these requirements was first described in the original CCP, *Closure/Closeout Plan, Tyrone Mine* (DBS&A, 1997), was updated in the *Revised Closure/Closeout Plan, Tyrone Mine* (RCCP) (DBS&A, 1999), and was revised again in the most recent CCP (M3, 2001).

Various surface impoundments are used during current operations for both impacted and nonimpacted surface waters and seeps. Surface impoundments at Tyrone were previously identified in Table 5.6 of the CCP (M3, 2001). A more comprehensive (although not necessarily final) surface impoundment list is provided in Table 1, with impoundments grouped into the 8 facility areas listed in Section 1. Figure 1 shows the surface impoundments at the No. 2, 3, and 3X tailing ponds in facility area 1. Figure 2 shows the surface impoundments at the No. 1, 1A, and 1X tailing ponds in facility area 2. Figure 3 shows facility areas 3 through 8 at the open pits and stockpiles.

In general, the majority of the surface impoundments will not be needed after closure. One exception would be any impoundments that will be needed for residual water management and treatment, such as seepage collection. In some areas of the mine, closure activities have already begun. For example, the Mangas Valley tailing impoundments must be reclaimed by



the end of 2008 to comply with the deadline set in MMD Permit Revision 01-1 to Permit No. GR010RE.

Three methods have been and are currently in use for closure of surface impoundments surrounding the tailing facilities. Application of a given method has been dependent on the location of the impoundment relative to the final (post reclamation) toe, structures (e.g., channels), and characterization and quantity of material. Surface impoundments located totally or partially within the toe of the final tailing facility have typically been left in place and covered either by slope or borrow material. Surface impoundments outside the final tailing facility footprint have either been excavated and consolidated with tailing or covered in place. Material is excavated when (1) the surface impoundment interferes with the stability of the tailing pond, (2) removal of the surface impoundment material is required for construction of a channel or roadway, (3) where surface impoundment material could be destabilized by erosion of a channel, or (4) where the surface impoundment material is of small enough quantity that excavation and haulage is more economical than covering. Surface impoundments that do not meet one of these criteria have been covered in place in such a manner as to create a free draining surface that does not collect water. Where surface impoundments have already been reclaimed or closed as part of reclamation activities, relevant closure activities will be documented as part of the surface impoundment inventory of each facility area (Section 3) as required under specific comment 1 in NMED's May 26, 2006 comment letter (Appendix A).



## 3. Scope of Work Items

This section defines the scope of work for this study. The following tasks are proposed to be completed for each facility area at closure:

- Prepare an inventory of surface water impoundments that includes:
  - Location
  - Construction materials
  - Size (impoundment area and capacity)
  - Use or purpose
  - Pumping system
  - Overflow design
  - Liner type and condition
  - Identification of any special features
  - Reclaim status
- Specify in the inventory what closure activities were conducted for any surface impoundments that have already been reclaimed, regraded, and/or buried.
- Identify any known future impoundments that will be needed post-closure and will be constructed during closure activities.
- Identify existing impoundments that will be needed post-closure.
- Develop and submit to NMED and MMD a review document that contains surface impoundment design criteria and specifications. This document will be submitted in conjunction with the construction design quality assurance (CDQA) plan for the facility area and will include, at a minimum:
  - The results of soil and groundwater characterization beneath each surface impoundment



- Stipulation that surface impoundments be drained, any sludge removed, and backfilled with clean material and/or regraded to create positive drainage
- Stipulation that where soil characterization indicates that materials within or beneath the impoundment are a source or potential source of groundwater contamination, surface impoundments will be covered with 3 feet of non-acid-generating material and revegetated
- Stipulation that if alternate closure procedures are deemed necessary, PDTI will request a variance from NMED and MMD to the standard closure methodology proposed in this work plan
- Upon completion and NMED and MMD acceptance of the Design Criteria and Specifications and Surface Water Impoundment Inventory, a schedule for the design and closure of the impoundment will be developed and provided to NMED and MMD

As each facility area is addressed, surveys will be conducted for surface impoundments not yet closed to determine more precise holding volumes and key elevations, and drawings will be prepared as necessary. Contributing watersheds will be determined from maps and drawings. Stormwater volumes reporting to post-closure impoundments will be calculated based on standard protocol employed for reclamation.

A site visit will be scheduled between PDTI and/or its representatives and NMED and MMD according to proposed facility area. Each surface impoundment will be visited and inspected by prioritized groups. The identification of each surface impoundment and any special features will be entered in the inventory defined above. Meeting notes will be submitted with the inventory for review by the agencies. This preliminary document will be updated as design information is further developed, and as written review comments from NMED and MMD are received and addressed.

PDTI will issue a technical report for each facility area (or group of facilities undergoing reclamation design) summarizing the effort for this study and conclusions that will be submitted in conjunction with the CDQA plan. The facility area report will contain the investigation results



for each surface impoundment and will include information on soils characterization, groundwater quality issues, and surface water drainage following the methodology presented in Section 4.



## 4. Surface Impoundment Closure Methodology

Closure and post-closure impoundments required for water management may consist of selected existing surface impoundments as well as new impoundments proposed as part of reclamation design. The purpose of this section is to provide a consistent approach to characterization and closure of existing surface impoundments that will not be used under closure and post-closure conditions. The DP-1341 Condition 23 and Section 9.I.6 of MMD Permit Revision 01-1 to Permit No. GR010RE requirements pertinent to the surface impoundment study and PDTI's proposed closure methodology presented in this section include the following activities:

- Drainage of the surface impoundment
- Characterization and abatement of sediments that may impact groundwater quality
- Characterization of groundwater to determine if abatement is necessary
- Closure of surface impoundments in a manner that creates positive drainage away from the impoundments, which may include backfilling or regrading
- Cover and revegetation of surface impoundments, and removal or cover of the liner (if applicable) according to permit conditions if materials remaining within or beneath the impoundment are a source or potential source of groundwater contamination

These general requirements may be modified as appropriate with NMED and MMD approval. Sections 4.1 and 4.2 present the methodology for characterization of soils and groundwater beneath the surface impoundments, respectively. Section 4.3 discusses the closure design methodology.

## 4.1 Characterization of Soils

The purpose of the proposed sampling methodology presented in this section is to characterize the soils beneath the surface impoundments relative to the potential for groundwater



contamination. The physical and chemical characteristics of the surface impoundment sediments will be determined by visual inspection and field testing, and in some cases laboratory testing. For any surface impoundment that will be covered by stockpile or tailing material during closure, no soil sampling will be conducted. Section 4.1.1 presents PDTI's proposed approach for selection of the number and location of soil samples. Section 4.1.2 presents PDTI's proposed sampling methodology for impoundments where soil sampling will be conducted.

## 4.1.1 Selection of Sampling Locations

The number of samples collected at a surface impoundment will depend on the historically wetted area of the surface impoundment. At a minimum, one sample will be collected for laboratory analysis at the lowest elevation within the surface impoundment as determined in the field. The proposed number of samples to be collected for each surface impoundment is based on 0.25-acre increments as follows:

- Surface impoundment area of 0.25 acre or less: one sample from beneath lowest topographic point (maximum ponding) as determined in the field. In this case, at least one confirmatory field sample will be collected approximately 5 to 10 feet from the selected sample location.
- Surface impoundment area greater than 0.25 acre but less than or equal to 0.5 acre: two samples
- Surface impoundment area greater than 0.5 acre but less than or equal to 0.75 acre: three samples, and so on

Note that the proposed 0.25-acre increment leads to 100-foot spacing for sample locations. The proposed sample locations will be discussed with NMED as part of the site visit to each facility area, but a schematic diagram of the general approach is provided in Figure 4. As illustrated in the figure, the general approach to the selection of sample locations is to prioritize samples where the most frequent and maximum depths of ponding have occurred, based on field



observation of current surface impoundment conditions and configuration. Additional sample locations will be added upgradient of regions of lowest topography as required. The proposed distribution of sample locations may therefore vary significantly from impoundment to impoundment.

## 4.1.2 Soil Sampling Methodology

Soil samples will be collected using non-dedicated sampling equipment that will be decontaminated between sample locations. Typical soil sampling equipment may include spoons, shovels, hand augers, hand corers, core barrels, backhoe, auger rig, or other equipment to be determined in the field as necessary.

The coordinates of each sampling location will be obtained using a handheld global positioning system (GPS) unit and recorded in a field logbook. Each sample location will be photographed both before and during sampling activities. The overlying cover material and underlying soil/sediment will be described by a field geologist during the excavation at the sample location in accordance with ASTM D 2488, Standard Practice for Description and Identification of Soil (Visual-Manual Practice). A geologic log will be developed at each sample location that documents the color based on the Munsell color chart, texture, odor, moisture content, degree of cementation, reaction to 10 percent hydrochloric acid, and rock fragment content (i.e., greater than 2 millimeter) of the materials encountered. The sediment material will be segregated during the sample excavations and placed on plastic sheeting.

The proposed approach to characterize the sediment vertically at each sample location will be to:

- 1. Excavate to the base of the surface impoundment if it contains soils, sediment, and/or sludge.
- 2. If the thickness of soils, sediment, and/or sludge is less than 2 feet, collect one sample at the midpoint of the soil column.



- 3. If the thickness of soils, sediment, and/or sludge is greater than 2 feet, collect two samples: one at the base of the surface impoundment (at top of liner or at the natural ground surface) and one at the midpoint of the soil column.
- 4. Collect two samples beneath the base of the surface impoundment: one at 1 foot below the base of the surface impoundment and one at 3 feet below the base of the surface impoundment. For some sample locations, this step will require going through a surface impoundment liner.

The soil samples collected will be analyzed in the field for paste pH. If the paste pH is less than 5, a soil sample for that location and depth will be sent to an analytical laboratory for additional testing. If field analyses of multiple soil samples in the same vertical column show impacts (i.e., pH less than 5), then only the deepest sample that does not meet the field screening criteria will be sent to the laboratory at that sample location. In addition, a soil sample will be collected for laboratory analysis even if the paste pH is greater than 5 where (1) an impoundment is less than or equal to 0.25 acre in size, or (2) all field screening indicates paste pH values greater than 5. The purpose of this procedure is to ensure that at least one laboratory sample is collected for each surface impoundment.

The collected soil samples will be air dried and passed through a 2-millimeter sieve prior to laboratory analysis for paste pH, paste electrical conductivity, and total metals (Table 2). The analytical results will be used to evaluate the potential for these materials to cause groundwater quality impairment where soils or other materials would remain within or beneath a surface impoundment. If analyses indicate the potential for exceedances in New Mexico Water Quality Control Commission (NMWQCC) groundwater quality standards, the materials within or beneath that impoundment will be considered a potential source of groundwater contamination.

## 4.2 Characterization of Groundwater

This section provides PDTI's proposed approach to characterization of groundwater beneath each surface impoundment. PDTI will conduct the following activities as part of the standard closure process for each surface impoundment that has contained leachate or other fluids that



may have been a potential source of impacts to groundwater beneath or adjacent to the impoundment. PDTI's proposed approach was developed considering the various modes of occurrence of subsurface water at Tyrone, as well as the variety of potential sources of impacts to groundwater. At some locations, it may not be feasible to determine whether observed groundwater impacts occurred due to leakage from a surface impoundment or some other type of mine unit, such as stockpile. The proposed approach is as follows:

- PDTI will identify and examine the available water quality information for all monitor wells in the general vicinity of a given surface impoundment, and will make a determination as to (1) whether the existing distribution of monitor wells is sufficient for a determination of impacts to groundwater attributable to the surface impoundment, and (2) whether groundwater at a given well or wells may have been impacted by seepage from the surface impoundment.
- 2. Where there is no existing monitor well sufficiently close to a given surface impoundment to evaluate the potential effects of the impoundment on groundwater, and where perched alluvial water exists or is believed to exist beneath the surface impoundment, a groundwater sample will be collected downgradient of the impoundment, as close to the impoundment as practical. The groundwater sample will be collected using a cone penetrometer or a temporary boring. Field parameters will be taken for the water sample, and the sample will be analyzed by an analytical laboratory for the constituents listed in Table 3. If no groundwater is encountered in the alluvium adjacent to the surface impoundment, no further groundwater investigation will be conducted.
- 3. Where (1) there is no existing monitor well sufficiently close to a given surface impoundment to evaluate the potential effects of the impoundment on groundwater, (2) the first groundwater encountered is regional, and (3) the impoundment occurs outside a known region of groundwater impacts, a groundwater sample will be collected downgradient of the impoundment as close to the impoundment as practical. The groundwater sample will be collected using a temporary boring. Field parameters will be measured for the water sample, and the sample will be analyzed by an analytical laboratory for the constituents listed in Table 3.



4. Where (1) there is no existing monitor well sufficiently close to a given surface impoundment to evaluate the potential effects of the impoundment on groundwater, (2) the first groundwater encountered is regional, and (3) the impoundment occurs within a known region of groundwater impacts, a groundwater sample will not be collected. This scenario would apply, for example, throughout much of the interior portion of the Mine Stockpile unit (Facility Area 8 in Figure 3).

Where groundwater quality adjacent to a surface impoundment exceeds one or more NMWQCC groundwater quality standards, and where the surface impoundment is the most likely or only source of groundwater impacts, the surface impoundment will be considered to be a source or potential source of groundwater contamination, regardless of the results of soil sampling.

## 4.3 Closure Design Criteria

Each of the surface impoundments not used under post-closure conditions and those that fall outside the final reclamation footprint of a tailing facility or stockpile will be closed per Condition 23 of DP-1341 and Section 9.I.6 of MMD Permit Revision 01-1 to Permit No. GR010RE, which outline the requirements for the process of permanently closing all surface water impoundments at Tyrone (Section 1). Based on the results of the groundwater and soil sampling programs, closure of these facilities can be broken into two distinct groups. The first group will be those surface impoundments that do not have soils within or beneath the footprint of the surface impoundment that may serve as a potential source of groundwater contamination. The second group will be those surface impoundment that may be a source of potential groundwater contamination. There is a third group of surface impoundments, which are those that fall within the final reclamation toe of a tailing facility or stockpile. The closure design criteria of surface impoundments that fall within each of these three groups are outlined in the following sections.



## 4.3.1 Closure of Surface Impoundments within a Facility Footprint

Surface impoundments located within the toe of the final closure design for a tailing or stockpile facility will be left in place and covered either by slope or borrow material. The following steps outline the proposed approach to closing these surface impoundments.

- Remove all solutions from within the surface impoundment. If the solution meets the minimum requirements of stormwater, then it may be released downgradient of the impoundment. If the solution does not meet the minimum requirements of stormwater, the solution must be disposed of in a manner that is acceptable to the NMED.
- 2. For surface impoundments constructed by blockage of the historical drainage, the obstruction will be breached.
- The surface impoundment will be covered and revegetated as specified in DP-1341 Conditions 16 through 20 and Section 9.D.2 or 9.E.2 of MMD Permit Revision 01-1 to Permit No. GR010RE as an integral part of the adjacent facility (either tailing or stockpile).
- 4. Mechanical or electrical systems will be removed from the impoundment area.
- 5. Existing liners, if any, will be left in place.

## 4.3.2 Closure of Non-Potential Source Surface Impoundments

The following steps outline the process for closing a surface impoundment that does not have soils or sediments within or beneath the footprint of the surface impoundment that may be a source or potential source of groundwater contamination.

1. Remove all solutions from within the surface impoundment. If the solution meets the minimum requirements of stormwater, then it may be released downgradient of the



impoundment. If the solution does not meet the minimum requirements of stormwater, the solution must be disposed of in a manner that is acceptable to the NMED.

- 2. Remove any sediment and/or sludge from the surface impoundment with a paste pH value below 5, as determined in the field.
- 3. Regrade the surface impoundment in a manner that creates positive drainage away from the impoundment. For surface impoundments constructed by blockage of the historical drainage, the obstruction will be breached. For surface impoundments constructed by creating a surface depression, the depression will either be filled to the surrounding elevation or capped in such a way that prevents the ponding water from becoming contaminated.
- 4. Remove or leave in place synthetic liners based on site-specific conditions. For example, impoundments with liners constructed in natural drainages will in many cases have the liner removed, whereas reclamation of depression type impoundments outside of natural drainages will in most cases leave the liner in place or folded in and left in place. Where liners are left in place they will be buried as the result of backfilling and regraded to create positive drainage.
- 5. Revegetate the surface impoundment area as specified in DP-1341 Conditions 16 through 20 and Section 9.I.6 of MMD Permit Revision 01-1 to Permit No. GR010RE.
- 6. Remove mechanical or electrical systems that do not provide any further facility support from the impoundment area.

## 4.3.3 Closure of Potential Source Surface Impoundments

The following steps outline the process for closing a surface impoundment that has soils or sediments within or beneath the footprint of the impoundment that may be a source or potential source of groundwater contamination.



- Remove all solutions from within the surface impoundment. If the solution meets the minimum requirements of stormwater, then it may be released downgradient of the impoundment. If the solution does not meet the minimum requirements of stormwater, the solution must be disposed of in a manner that is acceptable to the NMED.
- 2. Remove any sediment and/or sludge from the surface impoundment if characterized as having the potential to impact groundwater.
- 3. Remove the contaminated soil until grab sample paste pH values are greater than 5.0 or up to a maximum depth of 3 feet below the surface impoundment bottom.
- 4. Regrade the surface impoundment in a manner that creates positive drainage away from the impoundment. For surface impoundments constructed by blockage of the historical drainage, the obstruction will be breached. For surface impoundments constructed by creating a surface depression, the depression will be filled with clean fill material to the surrounding elevation.
- 5. Deal with liners on an impoundment-by-impoundment basis. In general, liners will have to be removed or breached to facilitate sampling and over-excavation of the impoundment bottom. Disposal of synthetic liners will be off-site, on-site, or by folding over and burial in the impoundment, as approved by NMED and MMD.
- 6. For impoundments where the removal of potential contaminant source materials is not complete, cover and revegetate the surface impoundment as specified in DP-1341 Conditions 16 through 20 and Section 9.I.6 of MMD Permit Revision 01-1 to Permit No. GR010RE. For surface impoundments where removal is demonstrated, alternative cover may be proposed. All closed surface impoundments will be revegetated.
- 7. Remove mechanical or electrical systems that do not provide any further facility support from the impoundment area.



## 5. Implementation and Reporting Schedule

Results of the surface impoundment study will consist of a series of individual reports that will be submitted in conjunction with the CDQA plan for each proposed facility area. Each report will be provided to NMED and MMD in draft form for review and comment. The surface impoundment report for each facility area will include:

- An inventory of surface water impoundments within the facility area
- Closure design criteria and specifications
- Analysis of water quality for runoff and seepage to impoundments, if available
- Results of soil and groundwater sampling, including sample locations
- Closure details of surface water impoundments
- Schedule of closure activities
- Engineering report for closure and post closure of surface water impoundments

The surface impoundment study shall be completed for each facility area, in accordance with the schedule submitted as required by Condition 74 of DP-1341 and the permit modification to Permit GR010RE. Except for the tailing pond areas that will be reclaimed by December 31, 2008, the schedule for the other facility areas will be dependent upon cessation of operation.



## References

American Society for Testing and Materials (ASTM). 2001. Standard practice for description and identification of soils (Visual-manual procedure). D 2488-00 in *Annual book of ASTM standards 2001, Soil and rock I: D 420 - D 5779*, p. 258-268.

- Daniel B. Stephens & Associates, Inc. (DBS&A). 1997. *Closure/closeout plan, Tyrone Mine*. Prepared for Phelps Dodge Tyrone, Inc., Tyrone, New Mexico. December 19, 1997.
- DBS&A. 1999. *Revised closure/closeout plan, Tyrone Mine*. Prepared for Phelps Dodge Tyrone, Inc., Tyrone, New Mexico. April 30, 1999.
- M3 Engineering & Technology Corporation (M3). 2001. *End of year 2001 through year 2006 closure/closeout plan*. Prepared for Phelps Dodge Tyrone, Inc., Tyrone, New Mexico. March 2001.
- New Mexico Environment Department (NMED). 2003. Supplemental discharge permit for closure DP-1341 for Phelps Dodge Tyrone, Inc., Tyrone Mine Facility. April 8, 2003.
- NMED. 2006. Letter from Clint Marshall to Thomas Shelley, Phelps Dodge Tyrone, Inc., regarding Comments on the surface impoundment study work plan, DP-1341, Condition 87, Phelps Dodge Tyrone, Inc. May 26, 2006.

New Mexico Statutes Annotated (NMSA). 1978. New Mexico Mining Act. 69-36-1 to 69-36-20.

- New Mexico Water Quality Control Commission (NMWQCC). 2002. New Mexico water quality control regulations. September 15, 2002. 48p.
- Phelps Dodge Tyrone, Inc (PDTI). 2003. *Condition 87 surface impoundment study work plan*. September 25, 2003.

Figures





\$;/PROJECTS/PDTI\_DB\_GIS/GIS/MXDS/LT05.0045/CONDITION 87/AREA2.MXD 609101





Daniel B. Stephens & Associates, Inc. -10/20/2006 JN LT05.0045 DP-1341 CONDITION 87 Surface Impoundments in the Mine/Stockpile Area



Tables



# Table 1. Tyrone Mine Preliminary Surface Impoundment ListPage 1 of 6

	Surface			
Pond Designation	(acres)	Туре	Liner	Status/Comments
Facility Area 1 - Northern Mang	gas Valley Ta	ailing	I	
CB-2A	0.61	Perimeter stormwater		Closed
CB-2B	0.16	Perimeter stormwater		Closed
CB-2C	0.31	Perimeter stormwater		Closed
CB-2D				Closed
CB-2E	0.20	Perimeter stormwater		Closed
CB-2F	0.08	Perimeter stormwater		Closed
CB-2G				Closed
CB-2H1	0.20	Perimeter stormwater		
CB-2H2	0.60	Perimeter stormwater		
CB-2H3	0.56	Perimeter stormwater		
CB-2H4	0.58	Perimeter stormwater		
CB-2I	0.51	Perimeter stormwater		Closed
CB-2J1	0	Perimeter stormwater		Closed
CB-2J2				Closed
CB-2K1				Closed
CB-2K2				Closed
CB-2K3				Closed
CB-2K4				Closed
CB-2K5				Closed
CB-2K6				Closed
CB-2K7				Closed
CB-2K8				Closed
CB-2K9				Closed



# Table 1. Tyrone Mine Preliminary Surface Impoundment ListPage 2 of 6

	Surface						
Pond Designation	(acres)	Туре	Liner	Status/Comments			
Facility Area 1 - Northern Mang	Facility Area 1 - Northern Mangas Valley Tailing (cont.)						
CB-2K10				Closed			
CB-2K11				Closed			
CB-2L	0.19	Perimeter stormwater		Closed			
CB-3A	0.56	Perimeter stormwater		Closed			
CB-3B	0.50	Perimeter stormwater		Closed			
CB-3D	0.14	Perimeter stormwater		Closed			
CB-3E	0.13	Perimeter stormwater		Closed			
CB-3F	0.14	Perimeter stormwater		Closed			
CB-3G	0.35	Perimeter stormwater		Closed			
СВ-3Н	0.60	Perimeter stormwater		Closed			
CB-3I	0.62	Perimeter stormwater		Closed			
CB-3J1	1.97	Perimeter stormwater		Closed			
CB-3J2	0.19	Perimeter stormwater		Closed			
CB-3K1	0.49	Perimeter stormwater		Closed			
CB-3K2	0	Perimeter stormwater		Closed			
СВ-3К3	0	Perimeter stormwater		Closed			
CB-3L	0.67	Perimeter stormwater		Closed			
CB-3M1	0.70	Perimeter stormwater		Closed			
CB-3M2	0.70	Perimeter stormwater		Closed			
CB-3N	0.82	Perimeter stormwater		Closed			
CB-30	0.60	Perimeter stormwater		Closed			
CB-3R	0.17	Perimeter stormwater		Closed			
CB-3S	0.19	Perimeter stormwater		Closed			



# Table 1. Tyrone Mine Preliminary Surface Impoundment ListPage 3 of 6

	Surface						
Pond Designation	(acres)	Туре	Liner	Status/Comments			
Facility Area 1 - Northern Man	Facility Area 1 - Northern Mangas Valley Tailing (cont.)						
CB-3T	0.21	Perimeter stormwater		Closed			
CB-3U	0	Perimeter stormwater		Closed			
CB-3V	0.67	Perimeter stormwater		Closed			
CB-3W	1.23	Perimeter stormwater		Closed			
CB-3XA	0.30	Perimeter stormwater		Closed			
CB-3XA1	0.19	Perimeter stormwater		Closed			
CB-3XC				Closed			
CB-3XD	0.40	Perimeter stormwater		Closed			
CB-3XD1				Closed			
CB-3XE	0.36	Perimeter stormwater		Closed			
CB-3XF	0.41	Perimeter stormwater		Closed			
CB-3XF1	0.46	Perimeter stormwater		Closed			
CB-3XG	0.41	Perimeter stormwater		Closed			
CB-3XL1	0	Perimeter stormwater		Closed			
Facility Area 2 - Southern Man	gas Valley T	ailing					
CB-1AA	2.12	Perimeter stormwater					
CB-1AB							
CB-1AC							
CB-1XA	0.05	Perimeter stormwater					
CB-1XB	0.06	Perimeter stormwater					
CB-1XC	0.12	Perimeter stormwater					
CB-1XD	0.09	Perimeter stormwater					
CB-1XE1	1.41	Perimeter stormwater					



# Table 1. Tyrone Mine Preliminary Surface Impoundment ListPage 4 of 6

	Surface			
Pond Designation	(acres)	Туре	Liner	Status/Comments
Facility Area 2 - Southern Man	gas Valley T	ailing (cont.)		
CB-1XE2	0.64	Perimeter stormwater		
CB-1XE3	0.59	Perimeter stormwater		
CB-1XF	0.16	Perimeter stormwater		
CB-1XG	0.05	Perimeter stormwater		
CB-1XK	0.27	Perimeter stormwater		
CB-1XM	0.7	Perimeter stormwater	Clay	
CB-1XQ	1.33	Perimeter stormwater		
CB-1XR				
Facility Area 3 - No. 1 Stockpile	Э			
BMCC 2 a	0.86	Stormwater	None	Reclaimed
BMCC 2 b (C Sump)	1.08	Stormwater	Clay	
No. 1 PLS Pond (4 Sump)	0.90	PLS	Clay	Reclaimed
Facility Area 4 - No. 3A Stockp	ile			
No. 3 (a)	0.11	Stormwater	None	
No. 3 (b) small PLS pond	0.01	PLS	Clay	
No. 3 (c) small PLS pond	0.01	PLS	Clay	
No. 3 (d) small PLS pond	0.01	PLS	Clay	
No. 3 (e) small PLS pond	0.01	PLS	Clay	
No. 3 (f) small PLS pond	0.01	PLS	Clay	
No. 3 (h) small PLS pond	0.01	PLS	Clay	
No. 3 PLS	1.22	PLS	Synthetic	
No. 3 PLS Overflow	0.58	PLS	Synthetic	



	Surface			
Pond Designation	(acres)	Туре	Liner	Status/Comments
Facility Area 5 - No. 1A, 1B, an	d 1C Stockp	ile		
7C Seep Pond	0.16	Stormwater	Synthetic	
Historic 1A PLS Pond	0.50	PLS	Clay	Replaced by 1A overflow pond in 1999 (not shown on map)
No. 1A Stormwater Pond	0.11	Stormwater	Clay	
No. 1A PLS Overflow Pond	0.50	PLS	Synthetic	
Historic 1B PLS Pond	0.33	PLS	Clay	Replaced by 1B overflow pond in 1999 (not shown on map)
No. 1B Overflow Pond	0.60	PLS	Synthetic	
No. 1C Stormwater Pond	0.09	Stormwater	Synthetic	Removed or filled in
Oak Grove Pond	0.18	Stormwater	Synthetic	
Precipitation Plant Launders	0.10	Stormwater	Synthetic	Concrete lined
Facility Area 6 - No. 2 Stockpile	e			
2B Stormwater	0.65	Stormwater	Clay	
5E Pond 1		Stormwater	Synthetic	Original 5E stormwater pond
5E Pond 2	0.36	Stormwater	Synthetic	New 5E stormwater pond recently constructed
Copper Mtn a (DC2-1)	0.02	Stormwater	Synthetic	
Copper Mtn b (4 Seep)	0.02	Stormwater	Clay	
Copper Mtn c (3 Seep)	0.02	Stormwater	Clay	
Copper Mtn d (concrete				
headwall)	0.002	Stormwater	None	
Copper Mtn Pit (e)	0.44	Stormwater	None	
No. 2A (a)	0.10	Stormwater	None	
Seep 8	0.005	Stormwater	Clay	

# Table 1. Tyrone Mine Preliminary Surface Impoundment ListPage 5 of 6



	Surface			
Pond Designation	(acres)	Туре	Liner	Status/Comments
Facility Area 7 - Shop Area			1	
Crusher Pond	0.37	Stormwater	None	
Keener Pond a	0.15	Stormwater	Clay	
Keener Pond b	0.39	Stormwater	Clay	
Land Farm and Stage Pond	0.62	Stormwater	Synthetic	Concrete lined
Lube Shop Pond	0.09	Stormwater	None	
Niagara Stormwater	0.16	Stormwater	None	
No. 3 (g)	0.06	Stormwater	None	
Other Thickeners (five)	0.46	Stormwater	Synthetic	Concrete lined
Plant Oxidation Pond (a)	0.28	Stormwater	Synthetic	
Plant Oxidation Pond (b)	0.30	Stormwater	Synthetic	
SPCC Pond	0.96	Stormwater	Synthetic	
Facility Area 8 - Internal Mine/S	Stockpile Uni	it		
7B PLS Pond	0.06	PLS	Synthetic	
East Main Booster Pond	0.05	PLS	Synthetic	
Gettysburg Pit (a)	0.17	Stormwater	Synthetic	
No. 2A (b) (surge pond)	0.46	PLS	Synthetic	
No. 2A East PLS Overflow	0.12	PLS	Synthetic	
No. 2A West PLS	0.08	PLS	Synthetic	Tank
No. 2 PLS Pond	0.46	PLS	Synthetic	Shotcrete
North Racket Sump	0.64	PLS	None	
PLS Feed Pond	0.25	PLS	Synthetic	
Savanna Pit Seepage Sump	0.07	Stormwater	Synthetic	

# Table 1. Tyrone Mine Preliminary Surface Impoundment ListPage 6 of 6



Analysis	Analytical Method
Saturated paste pH	ASA Mono. #9, Part 2, Method 10-3.2
Electrical conductivity	ASA Mono. #9, Part 2, Method 10-3.3
Total copper (Cu)	SW 3050, EPA method 6010B
Total iron (Fe)	
Total lead (Pb)	
Total zinc (Zn)	

## Table 2. Laboratory Tests for Soil Samples



Chemical and Physical	NMWQCC Groundwater Quality Standard	Field		Detection Limit	Analytical
Characteristics	(mg/L <sup>a</sup> )	Measurement	Laboratory	(mg/L <sup>a</sup> )	Methods
Specific conductance	NA	X		1.0 µS/cm	EPA 120.1
рН	6 to 9 s.u.	X	X	0.1 (s.u.)	EPA 150.1
Temperature	NA	X		0.1°C	
TDS	1,000		Х	10.0	EPA 160.1
Anions		<u>.</u>			
Total alkalinity	NA		Х	1.0	SM 2320B
Bicarbonate	NA		Х	1.0	SM 2320B
Carbonate	NA		Х	1.0	SM 2320B
Chloride	250		Х	1.0	EPA 300.0
Fluoride	1.6		Х	0.1	EPA 300.0
Sulfate	600		Х	2.0	EPA 300.0
Cations		·			
Calcium	NA		Х	1.0	EPA 200.7
Magnesium	NA		Х	1.0	EPA 200.7
Potassium	NA		Х	1.0	EPA 200.7
Sodium	NA		Х	1.0	EPA 200.7
Metals					
Aluminum	5.0		Х		EPA 200.7
Arsenic	0.1		X	0.04	EPA 200.7
Cadmium	0.01		X	0.005	EPA 200.7
Chromium	0.05		Х	0.01	EPA 200.7
Cobalt	0.05		Х	0.02	EPA 200.7
Copper	1.0		X	0.01	EPA 200.7
Iron	1.0		X	0.05	EPA 200.7
Lead	0.05		X	0.02	EPA 200.7
Manganese	0.2		X	0.03	EPA 200.7
Nickel	0.2		Х	0.01	EPA 200.7
Zinc	10.0		Х	0.01	EPA 200.7

## Table 3. Parameters, Associated Standards, and Analytical Methods for Groundwater Samples

<sup>a</sup> Unless otherwise noted.

mg/L = Milligrams per liter

= Microsiemens per centimeter µS/cm

= Standard units s.u.

EPA = U.S. Environmental Protection Agency NMWQCC = New Mexico Water Quality Control Commission (2002)

= Not applicable NA

= Total dissolved solids TDS

Appendix A

NMED Comments and Responses

**PDTI Work Plan** 



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

<del>July 25, 2003 -</del> September 25, 2003

### Via Certified Mail #70993400000643514827 Return Receipt Requested

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

Dear Ms. Monetrey:

### Re: Phelps Dodge Tyrone, Inc. - DP-1341, Condition 87, Surface Impoundment Study Work Plan

Attached please find the Pheips Dodge Tyrone, Inc. (PDTI) proposed work plan and implementation schedule as required in Condition 87.

PDTI looks forward to your comments and to meeting with you and your staff as needed to obtain your approval of the work plan proposal. Please contact Mr. John Gearhart at 505-537-4382 if you have questions or require additional information.

Very truly yours, J. Shelley For

Joseph A. Brunner, Manager Environment, Land & Water New Mexico Operations

JAB:jg Attachment 20030925-100

#### Condition 87 Surface Impoundment Study Work Plan

#### September 25, 2003

#### 1, Introduction

- 1.1. The NMED issued Supplemental Discharge Permit for Closure DP-1341 to Phelps Dodge Tyrone Inc. (PDTI) in its April 8, 2003 letter to Phelps Dodge New Mexico Operations (Leavitt, 2003). Section III of the permit defines Conditions 1- 117, which include study requirements to remain In compliance with the permit.
- 1.2. This work plan addresses Condition 87, repeated below for ease of reference:

"In accordance with the schedule approved under Condition 74, Tyrone shall submit to NMED for approval, a work plan and Implementation schedule for a Surface Impoundment study. The study shall be designed to determine which of the existing Surface Impoundments will be needed during closure and post-closure for stomwater retention or seepage interception and an implementation schedule for completion of reclamation."

- 1.3.Condition 23 identifies requirements for closure of surface impoundments. In part, the requirements pertinent for the surface impoundment study include the following activities:
  - 1,3.1.drainage
  - 1.3.2.characterization and abatement of sediments
  - 1.3.3. positive drainage away from impoundments
  - 1.3.4.possible backfilling or regrading
  - 1.3.5.possible covering and revegetation

## 2. Background Information on Existing Operations

2.1. Various surface impoundments are used during current operations for both impacted and non-impacted surface waters and seeps. These impoundments have been previously identified in the Tyrone Closure/Closeout Plan. See attached copy of Table 5.6, Section 5, Tyrone CCP, submitted July 2001. 2.2. Closure and post-closure impoundments will utilize some existing and potentially future impoundments needed for water management as final design of mine site closure is completed.

## 3. Scope of Work Items

- 3.1. This section defines the scope of work and implementation schedule for the study.
- 3.2. The work plan is proposed to comprise the following tasks to be completed for the study.
  - 3.2.1.PDTI will issue for NMED review a document entitled, "Inventory of Surface Water Impoundments, Tyrone Facility". The inventory document will update the location, materials of construction, capacities, and usage of each existing surface impoundment included under DP-1341. Any special features of the impoundment will be defined, e.g., pumping system, overflow design, and condition of liners.
  - 3.2.2. Identify any known future impoundments. This information will be provided in a separate section of the same inventory table identified in 3.2.1 above.
  - 3.2.3. Identify which impoundments will be needed for post closure with reasons for such. This information will also be provided in a separate section of the inventory table.
  - 3.2.4. Develop and provide a review document for design criteria and specifications. This will be issued for review and titled as "Design Criteria and Specifications for Closure of Surface Water Impoundments".
  - 3.2.5. Upon completion and acceptance of the Design Criteria and Specifications and Inventory of Surface Water Impoundments a schedule that outlines the design and closure of the impoundments will be developed and provided.

#### 4. Plan of Approach

4.1. All formal submittals are to be by email, with hard copy to follow. The following review and approval periods are based on the time of email transmittals and not the receipt of mailed or hand carried documents.

- 4.2. All meeting minutes will be documented and submitted for review and approval. Approval of minutes will signify formal approval of activities . identified in the minutes.
- 4.3. Review and approval deadlines will be agreed to and maintained. The review documents will be considered approved in the event of missed deadlines by either party within the prescribed and agreed to review periods. Review and approval time periods are recommended as follows:

4.3.1. Meeting minutes	5 days
4.3.2. Design Criteria	15 days
4.3.3. Preliminary submittals	30 days
4.3.4. Final submittals	30 days

- 4.4. A site visit will be scheduled between PDTI and/or its representatives and NMED. Each impoundment will be visited and inspected. The identification of each impoundment and any special features will be entered in the inventory spreadsheet as defined in paragraph 3.2.1 above. Meeting notes with the spreadsheet will be submitted for review by NMED. This preliminary document will be updated as design information is further developed. NMED written review comments and tentative approval of the impoundment listing are to be received by PDTI within the review periods as outlined and agreed to in the approved work plan.
- 4.5. As required, surveys will be carried out on impoundments to determine more precise volumes and key elevations. Drawings will be prepared as necessary.
- 4.6. Watersheds will be determined from maps and drawings. Storm volumes reporting to post-closure use impoundments will be calculated based on previously approved criteria.
- 4.7. PDTI will develop a master plan of impoundments
- 4.8. PDTI will issue a technical report summarizing the effort for this study and conclusions.

#### 5. Deliverables

5.1. Inventory of Surface Water Impoundments, Tyrone Facility.

- 5.2. Closure Design Criteria and Specifications,
- 5.3. Analysis for runoff and seepage to impoundments.
- 5.4. Closure details of surface water impoundments.
- 5.5. Schedule of closure activities.
- 5.6. Schedule of post-closure activities.
- 5.7. Engineering report for Closure and Post Closure of Surface Water Impoundments, Tyrone Facility, both in hard copy and electronic format.

#### 6. Implementation Schedule for Surface Impoundment Study

The Surface Impoundment Study shall be completed by November 30, 2004, in accordance with the schedule submitted as required by Condition 74 of DP-1341. The following schedule milestones are anticipated:

- 6.1. The work plan review and approval period is expected to take 90 working days.
- 6.2. The site visit will be scheduled within 10 working days following work plan approval.
- 6.3. A preliminary Inventory of Surface Water Impoundments will be submitted 10 working days following site visit.
- 6.4. Design criteria for closure will be submitted 120 working days following work plan approval.
- 6.5. Engineering packages for runoff and closure design will be submitted 120 days following closure design criteria approval.
- 6.6. Final report to be submitted 90 days following closure design approval.

.

•

Discharge	Facility(ics)	Retention Ponds/	Berms/Diversion	Tanks
Plan		Impoundments	Structures	
DP-27	Mangas Valley tailing ponds	Numerous retention ponds along perimeters	Pond edges	Nonc
DP-166	No. 2 stockpile	No. 2 stockpile raffinate ponds; gunite lined, scepage and storrowater ponds (2); HDPE lined	Top surface perimeter, selected areas of stockpile too	Lubrication shop (7) BA-0 service (12)
DP-166	SX/EW plant arca	PLS feed pond: HDPE lined	Oulverts/ditches	Raffinate (1) Mixer/settler (10) Acid (2) Organics (6)
DP-286	No. 3 stockpile, No. 1D stockpile	Canyon PLS catchments (11) HDPE lined PLS ponds (2): holding and overflow	Top surface perimeter, northwest and north toe perimeters	No. 2 fuel dock (9)
DP-363	No. 1A stockpile	Stormwater pond (1): clay- lined, PLS overflow pond (1): HDPB lined	Top surface perimeter, east toe perimeter	PLS tank (1)
DP-383	No. 1B stockpile	Scepage and stormwater ponds: (2) clay-lined	Top surface perimeter, east and northeast toe perimeter	PLS tank (1)
DP-396	No. 1C stockpile	Stormwater ponds (2): HDPE	Top surface perimeter, southeast toe area	None
DP-435	No. 2A stockpile	PLS catchments (2)	Top surface perimeter	None
DP-455	Gettysburg stockpile	None	Top surface perimeter	Nonc
DP-670	East Main stockpile	None	Top surface perimeter	None
DP-896	No. 1 stockpile	Stormwater ponds (2), PLS pons (1) clay-lined	Top surface perimeter, northwest toe corner, west toe perimeter (partial)	None
None	Mill/concentrator area	Keener Pond	Culverts/ditches Drain oil collector	Service station (3 gasoline) Waste oil (3) Lubrication oil (9) Reclaim water (3) Primary crusher (4)
None	Main mine facilities area	Central retention pond Keener Pond	Culverts/ditches	Truck shop: dicsel (1), waste oil (1), lubrication oil (5), spent solvent (1) Dicsel tank farm (6) Terminal tanks (2 water) Tire shop (3)
DP-896	Acid-unloading facility		Culverts/ditches	6

## Table 5-6. Impoundments, Berms and Tanks Phelps Dodge Tyrone, Inc.

**NMED Comments** 



BILL RICHARDSON Governor State of New Mexico ENVIRONMENT DEPARTMENT Ground Water Quality Bureau Harold Runnels Building 1190 St. Francis Drive, P.O. Box 26110 Santa Fe, New Mexico 87502-6110 (505) 827-2918 phone (505) 827-2965 fax



RÓN CURRY Secretary

#### CERTIFIED MAIL - RETURN RECEIPT REQUESTED

May 26, 2006

Mr. Thomas Shelley, Manager Environment, Land and Water Phelps Dodge Tyrone, Inc. P.O. Drawer 571 Tyrone, New Mexico 88065



-0060602-100

RE: Comments on the Surface Impoundment Study Work Plan, DP-1341, Condition 87, Phelps Dodge Tyrone, Inc.

Dear Mr. Shelley:

The Ground Water Quality Bureau of the New Mexico Environment Department (NMED) has received the July 25, 2003 letter containing the Surface Impoundment Study Work Plan (Work Plan) from Phelps Dodge Tyrone, Inc. (PDTI). The plan is required under Condition 87 of the Supplemental Discharge Permit for Closure, DP-1341 for the Phelps Dodge Tyrone Mine. NMED has reviewed the submittal and has the following comments. The current reclamation schedule implemented by PDTI necessitates a timely response to these comments and/or a meeting to discuss a more efficient approach to evaluating the surface impoundments soon to be closed.

#### **General Comments**

The date of the proposed work plan is July 25, 2003 and NMED regrets the late response. However, as a practical matter in light of the rapid pace of reclamation, the Work Plan will likely require modifications. Rather than submitting the study in its entirety, PDTI may choose to address the surface impoundments in groups associated with each facility as it is closed.

Recent developments have occurred regarding the closure of impoundments at the Tyrone Mine. There has been inconsistent closure methods employed for various impoundments at the mine. PDTI must develop a consistent approach to characterizing and closing impoundments that have contained leachate. At a minimum, each impoundment must be drained and any sludge removed. Impoundments must be backfilled with clean material, regarded to create positive drainage, covered with three feet of non-acid generating material, and revegetated. PDTI must Thomas Shelley, PDTI May 26, 2006 Page 2

request a variance if alternate closure procedures are deemed necessary. Different procedures may be used depending on the site specific issues such as the location of each impoundment relative to nearby tailing dams and the respective closure design. The Surface Impoundment Study must include proposals for characterizing soils and ground water beneath each impoundment.

## **Specific Comments**

- 1. Section 3.2.1. PDTI proposes to issue an inventory of surface water impoundments for the Tyrone Mine The inventory will include the location, construction materials, capacity and usage for each impoundment. The inventory must identify impoundments that have already been affected by current reclamation activities. This includes impoundments that have been reclaimed, regrade and/or buried under the slopes of reclaimed tailing impoundments and stockpiles. The inventory must specify what closure activities, if any, were conducted on the closed impoundments prior to covering or regarding.
- 2. <u>Section 3.2.2.</u> The task in this section is to identify any future impoundments. It is not clear as to whether this statement refers to existing impoundments to be used in the future for closure purposes, or whether these are impoundments to be constructed in the future. Please provide clarification.
- 3. <u>Section 2.3.4.</u> This section must be more specific on the types of design criteria and specifications for closure that will be used in the study. A discussion of soil characterization must also be included in the work plan.
- 4. <u>Section 4.3.</u> NMED will not be held to the deadlines presented in this section. However, in order to keep pace with the accelerated reclamation schedule, NMED is committed to working with PDTI to complete the tasks required in Conditions 87 and 23.
- Section 4.4. Site visits to each impoundment should be prioritized according to reclamation schedules set forth by PDTI. The impoundments associated with each closure unit should be addressed as a group (i.e., Tailing Dam 2, No. 1 Stockpile, etc.) NMED is committed to working with PDTI to design an inspection schedule for each group of impoundments so as not to impede ongoing reclamation efforts.
- 6. Section 4.7. Please explain what is meant by a master plan.
- 7. <u>Section 4.8.</u> Please explain what is meant by a "technical report summarizing the effort for this study and conclusions."
- 8. <u>Sections 6.5 and 6.6.</u> Given the accelerated reclamation schedule, PDTI may want to review the schedule for submitting these deliverables. As discussed above, the Surface Impoundment Study may be divided into sections to more readily address the issues with individual impoundments as each unit is closed or reclaimed.

t

r

Thomas Shelley, PDTI May 26, 2006 Page 3

 <u>Table 5-6.</u> This table is obviously to general and should be used as a starting point for the more complete inventory that is proposed in the Plan. NMED is not aware of two clay-lined ponds for DP-383, but is aware of one synthetically lined overflow pond. DP-455 includes two unlined ponds in the bottom of the pit and one synthetically lined pond on the flank of the pit. DP-435 includes a PLS tank.

Please respond to this letter within 30 days of receipt. If you have any questions regarding this matter, please call me at 505-827-0027.

Sincerely,

undry

Clint Marshall, Hydrogeologist Mining Environmental Compliance Section Ground Water Quality Bureau

cc: George Llewellyn, GWQB, Silver City Field Office David Ohori, EMNRD - MMD Keven Myers, MECS <u>, e</u>

**Responses to NMED Comments** 



## Response to May 2006 NMED Comments Surface Impoundment Study Work Plan DP-1341 Condition 87 Phelps Dodge Tyrone, Inc.

### **General Comments**

1. Rather than submitting the study in its entirety, PDTI may choose to address the surface impoundment in groups associated with each facility as it is closed.

PDTI presents a proposed sequence and grouping by facility area in Section 1 of the revised Condition 87 work plan, although the facility area boundaries could change and the proposed designations are approximate within the mine/stockpile area.

2. PDTI must develop a consistent approach to characterizing and closing impoundments that have contained leachate. At a minimum, each impoundment must be drained and any sludge removed. Impoundments must be backfilled with clean material, regraded to create positive drainage, covered with three feet of non-acid generating material, and revegetated. PDTI must request a variance if alternate closure procedures are deemed necessary. Different procedures may be used depending on the site specific issues such as the location of each impoundment relative to nearby tailing dams and the respective closure design. The Surface Impoundment Study must include proposals for characterizing soils and groundwater beneath each impoundment.

Section 4 of the revised Condition 87 work plan presents a consistent approach to characterize and close each of the existing surface impoundments that will not be utilized under closure and post-closure conditions. The proposed approach includes the requirements listed above.

## 1. Section 3.2.1

PDTI proposes to issue an inventory of surface water impoundments for the Tyrone Mine. The inventory will include the location, construction materials, capacity and usage for each impoundment. The inventory must identify impoundments that have already been affected by current reclamation activities. This includes impoundments that have been reclaimed, regraded and/or buried under the slopes of reclaimed tailing impoundments and stockpiles. The inventory must specify what closure activities, if any, were conducted on the closed impoundments prior to covering or regrading.

Section 3 of the revised Condition 87 work plan details the preparation of a surface impoundment inventory that includes all of the specifications listed above. Section 2 of the revised work plan outlines some general closure procedures used in the tailing area, although more details will be provided with the inventory for the proposed tailing impoundment facility area inventories.

### 2. Section 3.2.2

The task in this section is to identify any future impoundments. It is not clear as to whether this statement refers to existing impoundments to be used in the future for closure purposes, or whether these are impoundments to be constructed in the future. Please provide clarification.



Section 3 of the revised Condition 87 work plan details the preparation of a surface impoundment inventory that will identify any known impoundments for closure and post-closure purposes and will specify if each impoundment currently exists or would need to be built.

## 3. Section 3.2.4

This section must be more specific on the types of design criteria and specifications for closure that will be used in the study. A discussion of soil characterization must also be included in the work plan.

Section 4.3 of the revised Condition 87 work plan presents the closure design methodology, and Section 4.1 provides a discussion on soil characterization.

## 4. Section 4.3

NMED will not be held to the deadlines presented in this section. However, in order to keep pace with the accelerated reclamation schedule, NMED is committed to working with PDTI to complete the tasks required in Conditions 87 and 23.

PDTI appreciates NMED's commitment to the accelerated reclamation schedule. A revised schedule is provided in Section 5 of the revised Condition 87 work plan.

### 5. Section 4.4

Site visits to each impoundment should be prioritized according to reclamation schedules set forth by PDTI. The impoundments associated with each closure unit should be addressed as a group (i.e., Tailing Dam 2, No. 1 Stockpile, etc.). NMED is committed to working with PDTI to design an inspection schedule for each group of impoundments so as not to impede ongoing reclamation efforts.

Section 3 of the revised Condition 87 work plan discusses site visits, and Section 5 presents the proposed study implementation schedule by facility area.

### 6. Section 4.7

Please explain what is meant by master plan.

PDTI will prepare a surface impoundment inventory for each proposed facility area as discussed in Section 3 of the revised Condition 87 work plan. As mentioned previously, the proposed facility areas boundaries for the mine/stockpile area are approximate and may change in the future.

### 7. Section 4.8

Please explain what is meant by a "technical report summarizing the effort for this study and conclusions."

As presented in Section 3 of the revised Condition 87 work plan, each facility area report will contain the investigation results for every surface impoundment and will include information on soils characterization, groundwater quality issues, and surface water drainage.



## 8. Sections 6.5 and 6.6

Given the accelerated reclamation schedule, PDTI may want to review the schedule for submitting these deliverables. As discussed above, the Surface Impoundments Study may be divided into sections to more readily address the issues with individual impoundments as each unit is closed or reclaimed.

Section 5 of the revised Condition 87 work plan presents the proposed study implementation and reporting schedule by facility area. Reports will be submitted in conjunction with the construction design quality assurance (CDQA) plan for the facility area.

### 9. Table 5-6

This table is obviously to general and should be used as a starting point for the more complete inventory that is proposed in the Plan. NMED is not aware of two clay-lined ponds for DP-383, but is aware of one synthetically lined overflow pond. DP-455 includes two unlined ponds in the bottom of the pit and one synthetically lined pond on the flank of the pit. DP-435 includes a PLS tank.

Table 1 in the revised Condition 87 work plan presents an updated and more comprehensive surface impoundment list grouped by proposed facility area which will be used as the starting point for the surface impoundment studies. A final list of impoundments for each facility area will be provided as part of the deliverable for each study. The No 1B stockpile area does include a synthetically lined PLS pond (1B Overflow Pond), and the Gettysburg Pit area does include a synthetically lined stormwater pond (Gettysburg Pit [a]). The tank column has been excluded from Table 1 since these structures are not considered to be surface water impoundments.