REPORT

CHINO MINE CLOSURE/CLOSEOUT PLAN UPDATE BASIS OF COST ESTIMATE FOR WATER MANAGEMENT AND TREATMENT

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Submitted to:

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1.0 INTRODUCTION

This Freeport-McMoRan Chino Mines Company (Chino) report describes the cost basis for the updated closure mine water management and treatment system for the Chino Closure Closeout Plan (CCP). Chino operates an open-pit copper mine, concentrator, and solution extraction-electrowinning (SX/EW) plant located approximately 10 miles east of Silver City in Grant County, New Mexico (Figure 1). For the purposes of the updated CCP, the Chino Mine is separated into three geographical areas including; the North Mine Area (NMA), Pipeline Corridor Area (PCA), and South Mine Area (SMA). The principal mine facilities and main mine components within each of these three areas at Chino include:

- The NMA is comprised of the Santa Rita Open Pit, waste rock and leach ore stockpiles, maintenance facilities, the SX/EW Plant, and the Ivanhoe Concentrator. Most of the water management systems in the area are located in the Santa Rita Pit.
- The PCA, also referred to as the Middle Whitewater Creek Area (MWWCA), extends from the Ivanhoe Concentrator (in the NMA) to the north end of Lake One and the Hurley Operation Area. The PCA includes three tailing pipelines, one process water pipeline, one concentrate pipeline and associated infrastructure running between the Ivanhoe Concentrator and the SMA.
- The SMA includes: Lake One; Axiflo Lake; reclaimed Older Tailing Ponds 1, 2, 4 East, 4 West, B, and C; partially reclaimed Older Tailing Ponds 6 East and 6 West; active Tailing Pond 7; and the Hurley Operation Area. The SMA encompasses the tract from the north end of Lake One to the confluence of Whitewater Creek with San Vicente Arroyo, approximately 12 miles to the south.

The associated water management system includes wells, tanks, pipelines, pumps, and process water ponds. The ancillary infrastructure includes roads/railway, fuel storage tanks, power lines, and stormwater controls.

1.1 Sources of Water to be Treated and/or Managed

There are ten sources of water (consisting of both process and non-process waters) that are likely to be sent to the proposed water treatment systems. Process waters are generally those waters that have been used in the leach circuit and exhibit elevated total dissolved solids (TDS) and sulfate levels. Non-process waters are those flows that are natural quality within the mineralized zones, such as pit inflow seepage, and runoff from the pit walls and stockpiles. Non-process waters are separated into both high TDS (>10,000 mg/L) and high sulfate (>7,500 mg/L) source waters and low TDS (<10,000 mg/L) and low sulfate (<7,500 mg/L) waters. At the end of mining there will be reclamation activities that will result in significant source control and this source control will reduce the volume and mass of pollutants that will have to be removed via water treatment over time. The process and non-process water streams to be sent to the proposed water treatment systems are assumed to include the following:

Process Waters:

- Residual process solutions from the leach operation (pregnant leach solution [PLS] and raffinate).

Non-Process Waters (High TDS and Sulfate):

- Meteoric water that infiltrates through the leach stockpiles to seepage collection.

Non-Process Waters (Low TDS and Sulfate):

- Impacted waters from the Cobre Mine;

- Meteoric water that infiltrates through the waste rock stockpiles to seepage collection;
- Storm water runoff that comes into contact with un-reclaimed waste rock stockpiles;
- Storm water runoff that comes into contact with un-reclaimed leach stockpiles;
- Storm water runoff that comes into contact with un-reclaimed pit walls;
- Dewatering water from the existing open pit sumps;
- Impacted groundwater captured in seepage collection and interceptor well systems in the NMA; and
- Impacted groundwater captured in the Tailing Pond 7 interceptor well system in the SMA.

1.2 Performance Objectives

The primary performance objectives for water management and treatment are to collect impacted waters associated with mine operations and to treat these waters to meet the applicable New Mexico Water Quality Control Commission (NMWQCC) criteria for discharge. To meet the performance objectives the following strategy will be utilized:

- A short-term evaporative treatment system (ETS) will be utilized to evaporate all process and non-process waters for the first 6 years following closure.
- A long-term ETS will be utilized to evaporate all leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles beginning in year 7 and continuing to year 100 after closure.
- A combined High Density Sludge (HDS) and membrane system will be utilized beginning in year 6 and continuing to year 100 following closure to treat impacted waters collected in the SMA and NMA. This system is referred to as the South Treatment System (STS).
- Minimization of impacted surface runoff requiring treatment. Storm water runoff will be managed through surface reclamation to preclude potential for contact with stockpiles and tailing. Impacted storm water runoff will be collected and treated for a period of 100 years following closure.
- Diversion of non-impacted meteoric water and storm water surface runoff, to the extents practicable, away from potentially impacted sources, which will allow for discharge to an approved surface discharge area in accordance with state regulations. Non-impacted water sources will not require treatment prior to discharge.
- Storage of stockpile seep water and groundwater from interceptor systems in surface impoundments will allow for sampling and analysis prior to final disposition. Water that is shown to be in compliance with applicable NMWQCC water quality standards (Title 20, Chapter 6, Part 2, Subparts II and III), will be discharged. Impacted water will be conveyed to the proposed water treatment systems.
- Pit water will be pumped to the short-term ETS through year 5, and to the STS beginning in year 6.

This strategy will maximize the quantity of non-impacted water and minimize the quantity of impacted water that must be treated prior to release. These sources will be managed and/or treated during reclamation activities and for a duration of 100 years following cessation of mining operations.

This report includes the following components:

- Characterization of the influent design basis (IDB) from flow and water quality predictions;
- Description of processes for water management and treatment;
- Capital and operating and maintenance (O&M) cost development assumptions and strategies for closure water management and treatment;
- Capital and O&M cost detail for the closure water management and treatment components; and
- Summary costs for 100-year closure period.

2.0 BACKGROUND

The mining operation envisioned under a default scenario, discontinues operation at a point in time under the most expensive closure scenario within the discharge permit period. This water treatment and management plan supports financial assurance cost estimates for closure/closeout based on the most expensive year scenario (end of year (EOY) 2018) as agreed upon by Chino and the Agencies early in the closure planning process (September 3, 2014) and represents the year with the greatest volume of regrading and cover placement required during this closure closeout plan period. The New Mexico Environment Department (NMED) requires a water management plan in the event of mine closure that includes water collection, handling, and treatment for 100 years. Impacted waters are to be treated to ensure compliance with applicable NMWQCC water quality standards (Title 20, Chapter 6, Part 2, Subparts II and III).

The Chino water treatment and management plan in part is based on previous evaporative treatment studies (M3 2004), water treatment studies (Van Riper Consulting [VRC] 2002 and 2008), and sludge handling plans (Phelps Dodge Mining Company 2004; Van Riper Consulting 2004), with updated projected water flows and water quality for the various sources of water to be treated. The components of the Chino water management and treatment plan include the following:

- Water conveyance systems that include pipelines and pumps required to move water to one of the water treatment and management facilities (ETS, STS) and discharge treated water from the STS;
- A short-term ETS for treatment of all process and non-process waters for the first 6 years following closure;
- A long-term ETS for treatment of all high TDS and sulfate non-process waters beginning in year 7 and continuing to year 100 after closure;
- Membrane and lime HDS treatment processes included in the planned STS. The HDS system will be used to pretreat water from the NMA and to treat the brine from the membrane system. The membrane system will treat the pre-treated NMA water plus the SMA water. This strategy will be used for treatment of all low TDS and sulfate non-process water streams from Year 6 through Year 100 during the closure period; and
- A Sludge Disposal Facility for sludge produced by the HDS system, and a Salt Disposal Facility for salt produced by the long-term ETS.

The proposed concept and other associated information for the ETS and STS is presented in the following sections.

3.0 ETS SYSTEM

The following sections present information on previous evaporative treatment studies for Chino, and details of the current ETS plans for the mine associated with the Chino CCP.

3.1 Background

The NMED issued Supplemental Discharge Permit for Closure, DP-1340 to Chino on February 24, 2003 (NMED, 2003). Condition 88 of DP 1340 required that Chino perform a process solution elimination study. The purpose of the process elimination solution study was to evaluate alternatives and identify proven and cost-effective methods to treat or eliminate the process solutions following cessation of operation or closure at the Chino Mine Facility.

In accordance with Condition 88, an evaporative treatment study was conducted in 2004 (M3, 2004) based on post-mining water management and water treatment flow rates provided in the End of Year 2001 through Year 2006 Closure/Closeout Plan for the Chino Mine (M3, 2001). The study proposed process solution elimination (evaporation) by natural (passive) and forced evaporation on previously disturbed stockpile areas. The inventoried solutions to be handled by the evaporative treatment system were comprised of residual mine process solutions, and process water from stockpile seepage collections, stormwater runoff from stockpiles, and groundwater from interceptor wells and open pit sumps. The study assumed that processing of residual fluids for copper recovery ceases at the close of operations. In practice leach stockpiles will continue to operate and generate copper production for many years after ore shipment to stockpiles ends. Over time the copper production rate will decrease until leaching is no longer economic; therefore, this is a conservative water treatment plan only intended for closure/closeout planning.

The two options previously examined included:

- Option 1: Recirculation; Forced Spray Evaporation and Drip Irrigation System; and
- Option 2: Pit Option with all Waters Transferred to the Estrella Pit with Forced Spray Evaporation.

The previous study projected both alternatives as capable of evaporating the inventoried process solutions within the prescribed 5-year time period. Option 1 was the recommended alternative due to the smaller stockpile surface areas required, higher evaporative loss rates, and overall lower costs.

3.2 Current ETS Plan

This report provides an update to the previous Condition 88 study (M3, 2004) and is based on the EOY 2018 mine plan and more current estimates of the volume and sources of residual fluids that would be required to be handled upon cessation of mining operations. In addition, updated information on new spray evaporative technologies have been obtained, estimates of the volume of impacted water that will be required to be treated have been updated, and the impoundments available for use in the ETS have been updated as part of this CCP Update.

The updated ETS is based on recirculation of process water and residual process solutions with the existing drip irrigation systems at the mine and operation of new forced spray evaporation systems over a 6-year period (short-term ETS program). Additionally, this updated ETS analysis includes a long-term ETS program (years 7 through 100) for treating all high TDS and sulfate concentration process waters (leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles). These high TDS and sulfate concentration waters will be collected and treated over the 100-year closure period to provide life cycle operational cost benefits and reduce the quantity of residual solids generated by alternative treatment methods such as chemical precipitation.

3.3 Influent Design Basis

3.3.1 Climate

The Chino Mine is located in a semiarid region in southwestern New Mexico, with elevations ranging from about 5,200 to 7,700 feet above mean sea level. The climate at Chino is warm and dry, with mean annual precipitation of approximately 16 inches (400 mm) and a mean annual temperature near 50°F (10°C) as reported for the Fort Bayard weather station. Precipitation falls mainly as rain, but snow may occur from November to March. Most of the precipitation in the area falls during July through October in the form of rain during short, intense, thunderstorms. Monthly precipitation is generally less than an inch per month from November through June, peaks from July through September with between two and three inches per month, and generally falls to about one inch in October.

Evaporative demand in this region is high and annual evaporation far exceeds annual precipitation. The average annual precipitation in the area is about 16 inches while the average annual pan evaporation rate is estimated at 89.40 inches for the NMA (measured at former Reservoir 3A). After applying a factor of 0.7 to the annual pan evaporation rate to approximate evaporation losses from free water surfaces, an evaporation rate of 62.58 inches per year is used in this updated analysis.

3.3.2 Estimated Quantity of Residual Process Solutions to be Evaporated

The first step of the updated ETS analysis is to identify the volume of the process solutions requiring treatment or elimination. During the mining and copper leaching operations approximately 21,000 gallons per minute (gpm) of leach solution is circulated through the copper production system (Chino, 2015). Figure 2 outlines the projected configuration of the stockpiles at the EOY 2018 from the Chino Mine Planning group and the associated areas that will be utilized for the short-term ETS program in the NMA. Table 1 presents the estimated volumes of residual process solutions to be evaporated from the individual sources at the mine, including:

- Residual process solutions from the leach operation [Average Circulated Inventory (ACI)]; and
- Surface impoundments, overflow ponds, tanks, and pit lakes.

Estimates of the volume of residual process solutions to be evaporated are assumed to be accurate within plus or minus 25 percent. Actual inventory fluctuates with seasonal variations in precipitation and other climatic conditions such as temperature and humidity and with the production goals of the SX/EW plant. Table 1 identifies the total estimated quantity of residual process solutions to be evaporated at the beginning of the ETS operation at 2,575,110,200 gallons. Sections 3.3.2.1 and 3.3.2.2 provide a description of the methods used to estimate the volumes of residual process solutions to be evaporated.

3.3.2.1 Solutions in Surface Impoundments, Overflow Ponds and Tanks

The estimated volume of process solutions contained within the surface impoundments, overflow ponds, tanks, and pit lakes that will require elimination after operations cease is calculated according to the following methodology:

- Volumes of process solutions contained within the surface impoundments, storage tanks, and pit lakes at the start of the evaporation program are based on the following:
  - Volumes are assumed to be near their current levels for most surface impoundments and tanks (taken as the average volume of water within the individual surface impoundments, storage tanks, and reservoirs measured between May 2011 and December 2013).

- For Reservoir 8, values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D 172 (NMOSE, 2011) with a stage 10 feet below the spillway crest was used.
- For reservoirs with no storage data (5900 Sump, Lee Hill Sump #1 and #2, East Headwall Impoundment, East Lampbright Sumps), it was assumed that they were at 60% of their capacity at closure.
- For the East Pit, Estrella Pit, Reservoirs 6, 7, 2, 4A values from EOY 2018 projections provided by Chino (2016b) were used.

- It is assumed that PLS will be added to the impoundments and tanks at the start of the evaporation program from the PLS circuit (i.e., to get to their permit allowed levels from there estimated levels at closure).
  - For Reservoirs 6 and 7, DP-591 requires a reserve capacity of 40,000,000 gallons for storm water between July and September, and operate at a 22,000,000 pre-runoff capacity the rest of year. Assumed 40,000,000 reserve capacity to handle storm water flows for the entire year, with the remaining capacity filled with added PLS.
  - For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D 172 (NMOSE, 2011) with a stage 10 feet below spillway crest was used.
  - For tailing thickeners, PLS will be added to 80% of their capacity.

A summary of the surface impoundments, overflow ponds, tanks, and pit lakes included in the short-term ETS analysis are provided in Table 2 along with the estimated annual evaporation from each. A summary of the surface impoundments, overflow ponds, and tanks included in the long-term ETS analysis are provided in Table 3. The total volume of process solutions contained in the surface impoundments, tanks, and the pit lakes is estimated to be approximately 1,399,379,000 gallons, and the estimated volume of process solutions added to, and maintained within, the surface impoundments and tanks is approximately 86,017,900 gallons.

3.3.2.2 Average Circulated Inventory (ACI)

The initial ACI is calculated based on experience with leach operations at Chino. During mining and copper leaching operations, approximately 21,000 gpm of leach solution (raffinate) is circulated through the copper leach circuit and onto the leach stockpiles, referred to as the initial raffinate flow rate. The make-up water requirement during leaching operations typically averages four percent of the initial raffinate flow rate. Therefore, after cessation of the mining operations, leaching operations are expected to be shut down and the process leach solution flow rate is estimated at 96 percent of the initial raffinate flow rate. Additionally, based on experience at Chino, the flow rate at a leach stockpile diminishes to approximately ten percent of the full flow rate in 45 days after leaching operations are halted. Based on these assumptions, the total estimated initial ACI is approximately 1,175,731,200 gallons (Table 1).

3.3.3 Estimated Process Water Flows to be Evaporated

Estimated flows for the individual sources contributing process water to the ETS systems are provided in Attachment A. The individual sources contributing process water to the ETS systems include the following:

- Water inflow to the system related to the groundwater inflows into the Santa Rita Open Pit: estimated flow rates are based on NMA groundwater flow model simulations conducted as part of the NMA Groundwater Flow Model Re-Calibration (Golder, 2016). The re-calibrated estimate of groundwater discharge to the open pit under EOY 2018 operational conditions is 377 gpm. Currently this groundwater is removed via operational pit sumps and via evaporation. The model estimated groundwater discharge to the open pit after closure was

352 gpm for the re-calibrated model. The stockpiles are planned to be regraded, covered and revegetated in a progressive manner, beginning in year 1 with the reclamation of the North, Northeast, and Northwest stockpiles, and ending in year 18 with reclamation of the reclamation cover material stockpiles (STS2 and Upper South stockpiles). Golder has applied a conservative approach with stockpile drainage estimates by applying a transition from uncovered to covered recharge rates over a 20-year period, with a linear rate decrease between years 12 and 32.

- Water inflow to the system related to storm water run-on within the Santa Rita Open Pit: estimated average flow rates from the Condition 93 Feasibility Study (FS) (Golder, 2007b) were based on a catchment area of 1,610 acres (pit rim area) and a curve number (CN) of 75. The EOY 2018 pit perimeter covers an area of approximately 1,626 acres, which represents a 1% increase in area. The Condition 93 FS flow estimates were increased by 1% (32 gpm to 32.3 gpm) to account for the increased catchment area.
- Water inflow to the system related to storm water run-off from all stockpile outslopes outside the open pit watershed area (pit perimeter): estimated average flow rates from the Condition 93 FS (Golder, 2007b) were used as the basis. The Condition 93 FS used a CN of 85 for uncovered stockpiles. The EOY 2018 stockpile outslope areas cover approximately 1,842 acres with Lee Hill and approximately 1,815 acres without Lee Hill, which represents a 17% increase in the area previously used in the Condition 93 FS. Uncovered outslopes following reclamation cover an area of approximately 196 acres w/o Lee Hill, which represents 12.6% of the area previously used. The Condition 93 FS flow estimates were increased by 17% for the EOY 2018, and decreased by 87% after year 12. The proportion of leached to unleached (waste) stockpiles were accounted for to scale current runoff estimates. Runoff from reclaimed stockpile and tailing dam surfaces are assumed to be non-impacted and can be discharged to an approved surface discharge area in accordance with state regulations. These water sources will not require treatment prior to discharge.
- Water inflow to the system from the NMA interceptor wells and the estimated average flow rate from this source: estimated at 8.65 gpm combined from water extracted from the West Stockpile and the Lampbright areas (Chino, 2016a). Pumping from the Lampbright Cut (25.25 gpm) and Lampbright East (8.1 gpm) is for mine production and would be discontinued at closure (Birch, 2016).
- Water inflow to the system related to leach stockpile seepage and the estimated average flow rates from Condition 93 FS UNSAT-H Model Runs (Golder, 2007b): stockpiles are assumed to be regraded, covered and revegetated in a progressive manner, beginning in year 1 with the reclamation of the North, Northeast, and Northwest stockpiles, and ending in year 18 with reclamation of the reclamation cover material stockpiles (STS2 and Upper South stockpiles). Golder has applied a conservative approach with stockpile drainage estimates by applying a transition from uncovered to covered drainage rates over a 20-year period, with a linear rate decrease between years 12 and 32. Long term average drainage rates of 2.67 cm/yr (1.05 in/yr) for uncovered stockpiles and 0.14 cm/yr (0.055 in/yr) for 3-foot cover stockpile surfaces were applied.
- Water inflow to the system related to the Tailing Pond 7 Interceptor Well System: initial flow of 1,480 gpm based on John Shoemaker and Associates (JSAI) Recommendations for 2016 Pond 7 Interceptor Well Pumping (JSAI, 2016). Tailing ponds 6E, 6W, and 7 are assumed to be regraded, covered and revegetated in year 12, and annual reduction in pumping of 5% each year after reclamation until you get to a steady-state closure flow. The revised SMA groundwater flow model has an estimated closure flow of 533 gpm (Golder, 2015).

3.3.4 Water Quality

The water quality of the process waters is estimated to be the same as that which is currently collected from the individual sources listed in Sections 3.3.2 and 3.3.3.

3.3.5 Operational Periods

There are two ETS programs and associated operational periods. The short-term ETS analysis is based on an operational period of years 1 through 6 and includes recirculation of all process solutions with drip irrigation systems, operational spigots, and forced spray evaporation systems. Following cessation of the short-term ETS operation at the end of year 6, the long-term ETS program will be initiated for treatment of all high TDS and sulfate process waters (leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles) and will operate for the remainder of the 100-year closure water management and treatment period. All of the remaining process water sources will be treated through the closure water treatment system (membrane and lime/HDS treatment systems) for the remainder of the 100-year closure water management and treatment period. The ETS schedule for the 100-year closure treatment period is provided in Table 4.

3.4 Short-Term ETS Recirculation System

As part of the recirculation system in the NMA, the existing mine process solution distribution system (drip system) will be utilized to recirculate all residual process solutions to the top surface areas of the Lee Hill, Main Lampbright, South Lampbright, South, and West leach stockpiles for a period of six years (Figure 2). These waters will be collected and treated by evaporation by the short-term ETS system to allow time for construction of the STS and to reduce the volume of impacted waters requiring treatment with the STS during the initial years of closure. Using the short-term ETS for residual process solutions allows for minimization of secondary waste generation and associated optimization of operational costs. Evaporation will mostly occur at the top surface of the leach stockpiles and to a lesser amount at the surface impoundments, overflow ponds, tanks, and pit lakes listed in Table 2. The residual process solutions will drain through the leach stockpiles and then will be recirculated through the existing mine process solution distribution system.

At the onset of the short-term ETS system operation in the NMA, residual process solutions will drain from the active leach stockpiles into their respective surface impoundments or tanks. Initially the drain down water will be transferred to the SX/EW feed pond. Once the level in each of the surface impoundments, overflow ponds, and tanks have stabilized at sixty to eighty percent of their maximum capacities, or to their Operation Discharge Plan allowed levels, the transfer is complete. This is the assumed maximum fill level and operational level for these facilities for the 6-year short-term ETS operation.

Water from the SX/EW feed pond will be transferred to the existing raffinate tanks. From the raffinate tanks the water will be pumped to the Lee Hill, Main Lampbright, South Lampbright, and South leach stockpiles through the existing raffinate distribution system. Residual process solutions that are not evaporated during this process will drain through the stockpiles and be pumped through the existing distribution systems back to the existing PLS collection pond/tanks located adjacent to the leach stockpiles to complete the recirculation loop. All the high TDS and sulfate sources listed in Section 3.3 will also be distributed within this system for the duration of the short-term ETS operation. Beginning in year 6, all of the low TDS and sulfate non-process and process waters will be conveyed to the STS.

Within the SMA, the existing Tailings Pond 7 interceptor well system will continue to operate. Water from this system will be recirculated back to the top of Tailings Pond 7 and allowed to evaporate (Figure 3). This process will continue for a period of 5 years at which point the Tailings Pond 7 interceptor water will be treated through the STS for the remainder of the 100-year closure water management and treatment period.

3.5 Short-Term ETS Forced Spray and Drip Irrigation System

The short-term ETS program in the NMA will utilize the existing PLS drip systems and a new forced spray evaporation system to maximize the evaporation rate of the impacted water and residual process solutions distributed to the top surface areas of the leach stockpiles. Evaporation of the process waters during the first year of the NMA short term program will occur through drip irrigation alone. During this first year, a mechanical forced spray system will be installed on top of the leach stockpiles and will be fully operational by the beginning of year 2 of ETS operation. Forced evaporation of these waters will be accomplished with mechanical spray systems designed to handle flows up to 123 gpm per unit. The forced spray evaporation and drip irrigation evaporation systems are expected to operate concurrently for years 2 through 6; however, the time of operation may be slightly shorter or longer based on actual results. Additional evaporation will occur from the surfaces of the surface impoundments, overflow ponds, tanks, and pit lakes. The stockpile areas that will be utilized for both drip irrigation and forced spray evaporation are shown on Figure 2. The surface impoundments, overflow ponds, tanks and pit lakes to be utilized in the short-term ETS program are included in Table 2. The flow rate of the evaporation system will initially be as high as the flow rate during leaching operations and will be reduced each year thereafter as the water in storage is depleted. Attachment A outlines the estimated quantity of impacted water and residual process solutions that will be handled as part of the NMA short term ETS. Table 4 provides a summary of the ETS schedule. Capital cost estimates for the short-term ETS will include spray evaporation units, piping, and pumps.

3.6 Long-Term ETS Forced Spray System

The long-term ETS program in the NMA will utilize forced evaporation systems and wetted surface evaporation from the surface impoundments, tanks, and thickeners to maximize the evaporation rate of the high TDS and sulfate process waters beginning in year 7. These waters will be collected and treated over the 100-year treatment period to reduce the quantity of residual solids generated by alternative treatment methods such as chemical precipitation. The leach stockpile seepage contains the highest concentrations of sulfate and TDS of all water sources to be treated following completion of the short-term ETS program.

The long-term ETS system consists of forced evaporation and wetted surface evaporation. Prior to the start of the long-term ETS program, 5 acres of the existing Reservoir 7 surface will be prepared, and an HDPE-liner installed. Water conveyance pipelines and associated pumping systems will be installed to direct leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles to the HDPE-lined portion of Reservoir 7. Forced evaporation will be conducted through a network of mechanical spray systems designed to handle flows up to 66 gpm per unit installed at the newly lined portion of Reservoir 7. Forced evaporation will also be conducted at the HDPE-lined Lee Hill Sump #1 impoundment through a single mechanical spray system designed to handle flows up to 25 gpm. Wetted surface evaporation will occur from the surfaces of the impoundments and open top tanks that will be utilized for the long-term ETS program as shown on Figure 4 and summarized in Table 3. The flow rates of the evaporation system will drop off over time as the stockpiles are reclaimed. Runoff from the covered portions of the leach stockpiles will be released. Stockpile seepage flows will also be reduced following reclamation of the leach stockpiles. The transition from uncovered to covered seepage rates is spread over a 20-year period with a linear rate decrease between year 12 and 32. Tables 4 and 5 outline the estimated quantity of residual process solutions that will be handled as part of the long-term ETS. Capital cost estimates for the long-term ETS will include spray evaporation units, piping, pumps, and construction of the HDPE-lined evaporation pond at Reservoir 7.

3.7 Salt Disposal Facility

Salts produced from the long-term ETS will be periodically removed from the Reservoir 7 evaporation treatment area and hauled to and stored at an HDPE-lined salt disposal facility. The proposed salt disposal facility will be constructed within the Reservoir 6 footprint. Approximately 10.5 acres of existing Reservoir 6 will be lined (80 mil HDPE) and an earthen berm constructed around the perimeter. The remaining portion of Reservoir 6 will be reclaimed in accordance with the procedures described in Section 6.0 of the CCP Update.

An estimated 740,500 cubic yards (cy) salt will require storage at the salt disposal facility during the 94-year long-term ETS operational period. The capacity of the disposal facility is adequate for salt produced for 94 years of operation of ETS. Salt generation rates and volumes are based on the estimated water quality of the combined flow stream from high TDS and sulfate non-process waters and the estimated amount of evaporation from the mechanical spray systems and surface impoundments over the 94 years of long-term ETS operation. The predictions show lower flow rates and changes in water chemistry, which decrease the rate of salt production through the operational life of the long-term ETS.

The total estimated amount of salts produced annually is summarized in Table 6 and is based on the estimated water quality and flows associated with the leach stockpile seepage and runoff over the 100-year closure period. As shown on Table 6, the amount of salt generation begins to drop off in year 12 and reaches a steady generation rate of approximately 4,035 cy/year beginning in year 32. The capacity of the disposal facility is adequate for salt produced for 94 years of operation of the long-term ETS.

Capital cost estimates for the salt disposal facility include construction of the HDPE-lined salt disposal facility at Reservoir 6.

4.0 STS AND ASSOCIATED SLUDGE DISPOSAL FACILITY

The proposed primary treatment processes and associated primary and ancillary equipment sizing for the STS was based on the treatability studies conducted by VRC (2008), Hazen Research (VRC 2008), and HW Process Technologies (VRC 2008). Construction of the STS will be completed in year 5 of the 100-year period, and operations started in year 6. A Sludge Disposal Facility will be constructed and associated with the STS for the management of dewatered sludge from the HDS system. An overview of the STS and the Sludge Disposal Facility is provided in the following sections along with flow and quality information for water to be treated in the STS and used in the development of the capital and annual operations and maintenance costs. The conveyance system (pipeline and tank) and energy dissipation structure for treated water discharged from the STS are also included in this section and the costs are included with the STS costs.

4.1 Influent Design Basis

Surface water, groundwater, seepage water, and residual PLS and raffinate will be managed and/or treated for 100 years following cessation of mining operations. All process and non-process waters will be treated by the short-term ETS during years 1 through 5. The short-term ETS will continue to treat any residual process solutions that remain and the high TDS and sulfate waters in year 6. During years 7 through 100, the leach stockpile seepage and runoff flow streams (high TDS and sulfate waters) will continue to be treated by the long-term ETS. Beginning in year 6 and continuing through year 100, the remaining low TDS and sulfate non-process water streams will be sent to the STS facility for treatment. A summary table of the post-mining water management and water treatment flow rates for the STS is included in Attachment A.

4.1.1 Water Treatment and Sludge Systems

Tables 6, 7, and 8 present a summary of the modeled flow rates and sulfate predictions in years 0 through 100 for the NMA, SMA, and the HDS feed streams (some high-sulfate stream plus reject), respectively.

Estimated sludge volumes to be sent to the Sludge Disposal Facility were calculated from the projected sulfate concentrations. Table 9 presents the sludge mass predictions to be sent to the Sludge Disposal Facility; an estimated 1,389,023 cy of sludge (50% solids by weight) will require storage at the Sludge Disposal Facility during the 95-year STS operation period.

4.2 STS Water Treatment System

The Chino long-term STS water treatment system will include both membrane filtration and HDS lime precipitation systems located at the southern end of Pond 6W (Figure 5). A flow diagram of the proposed water management system is presented in Figure 6. This conceptual treatment configuration optimizes capital and operating costs while meeting regulatory limits for discharge of treated effluent. The concept and process development of the HDS and membrane filtration treatment components and associated primary and ancillary equipment sizing is based on the treatability studies conducted by VRC (2008), Hazen Research (VRC 2008), and HW Process Technologies (VRC 2008).

All non-process waters in the NMA (with the exception of the leach stockpile seepage and runoff flow streams) will be sent to the HDS system to increase the pH and remove metals and sulfate that could limit the production of treated water (permeate) in the membrane system. Effluent from the HDS system and a portion of the SMA waters will be sent to the membrane system consisting of microfiltration (MF) and reverse osmosis (RO) for treatment. A portion of the SMA waters will bypass the membrane treatment system and be recombined prior to effluent equalization. The MF unit provides suspended solids removal to prevent fouling of the RO membrane. Treated effluent (permeate) from the MF unit will be sent to the RO unit. The RO unit uses a series of semi-permeable membranes that removes primarily dissolved monovalent and divalent (and higher valences) constituents including some metals and sulfate.

The MF and RO reject streams will be sent back to the HDS system to be treated by chemical precipitation using calcium hydroxide (lime) addition with sludge recycle to form HDS. Chemical precipitation is a conventional and widely used treatment for the removal of metals. A portion of the sulfate concentration will also be removed. With the addition of lime, the pH is adjusted to approximately 10 in order to achieve the minimum solubility for the target compounds. The dissolved contaminant forms an insoluble precipitate which can then be removed from the water by clarification. A flocculent is added to increase the settling rate of precipitated solids.

A portion of the HDS effluent will bypass the membrane treatment system and be recombined with the SMA bypass and the RO permeate prior to effluent equalization to ensure compliance with applicable NMWQCC water quality standards (Title 20, Chapter 6, Part 2, Subparts II and III) for discharge. Acid will be added to the clarified process stream to reduce the pH to the target range (7.5 to 9) prior to discharge.

Precipitated solids removed during clarification will be further dewatered by pressure filtration. The treatment of the highest concentration sulfate solutions in the ETS reduces the sulfate load to the HDS plant reducing overall chemical requirements and the quantity of sludge produced. Based on operations of similar HDS systems and the VRC test work, it is expected that dewatering in a filter press will achieve approximately 50% solids by weight in the dewatered sludge. Dewatered sludge will be sent to the on-site Sludge Disposal Facility.

4.2.1 Membrane System

One membrane system is currently included to treat both the NMA and SMA sources at the STS. Recovery for the membrane system is projected based on the treatability studies conducted by Van Riper Consulting and HW Process Technologies (VRC 2008), and adjusted based on current projected influent sulfate concentrations for the individual treatment streams. Based on the STS water quality, it is assumed that it can be treated in a conventional membrane system using pretreatment by microfiltration and removal of dissolved constituents by RO similar to the system proposed in the Tyrone Mine CCP Update (Golder 2013). The recoveries and other information from the HW Process Technologies treatability study are assumed to be applicable to the more conventional membrane system (RO) with the MF pretreatment.

The NMA water has high concentrations of scaling and fouling constituents (aluminum, iron, manganese, sulfate, hardness) and very low pH, and so pretreatment to remove these constituents is included to allow higher recoveries in the RO system. For this CCP Update, Chino assumed that the NMA water will be pretreated using the HDS system prior to being mixed with the STS water for treatment through the membrane.

4.2.2 HDS System Assumptions

It is assumed that the NMA waters and the brine from the membrane system will be sent to an HDS system located at the STS. Capital cost for the lime HDS system was determined by obtaining new vendor quotes for major equipment and engineering experience based on recent construction of new HDS facilities for the Colorado Department of Public Health and Environment (CDPHE) for the Summitville Mine site (2009 construction) and the Central City/Clear Creek OU4 Water Treatment Plant (2018 construction).

Both the lime handling system and the sludge management systems have been resized to reflect the lower lime usage and sludge production expected from the segregation of the leach stockpile seepage and runoff streams in the ETS. The CCP cost estimates for sludge dewatering include a filter press to dewater the sludge to approximately 50% solids before disposal in the sludge disposal facility located adjacent to the STS. The 50% dewatered solids value was provided by Van Riper Consulting based on experience with other sludges that were primarily calcium sulfate. Table 10 shows a comparison of the sludge quantities produced and the proportion of calcium sulfate to the major metal hydroxide sludges. As shown, the assumption that the sludge will dewater similar to calcium sulfate is still valid.

A belt press was selected for sludge dewatering in the previous CCP evaluation due to the high quantity of sludge produced which requires an associated polymer dose to aid in dewatering. With the reduced quantity of sludge projected for this revision to the CCP, a filter press will be used instead of a belt press. There will be a slight increase in operational labor but a large decrease in polymer requirements over the operational period.

4.3 Sludge Disposal Facility

Dewatered sludge will be hauled to and stored at the Sludge Disposal Facility. The proposed Sludge Disposal Facility will cover an area of approximately 25 acres on the unreclaimed portion of Pond 6E, and the STS will be located nearby on the unreclaimed portion of Pond 6W (Figure 5). The sludge volume is calculated based on the results of HDS treatability studies conducted by Hazen Research under the direction of Van Riper Consulting (VRC 2008). The quantities are scaled based on revised projections of flow and sulfate concentration. The predictions show lower flow rates and changes in water chemistry, which decrease the rate of sludge production through the operational life of the treatment plant. The capacity of the disposal facility is adequate for sludge produced for 95 years of operation of lime/HDS treatment plant.

4.4 Discharge Pipeline and Structure

The treated effluent from the STS will be conveyed in a new pipeline from the treatment plant to a selected discharge point located within a tributary arroyo to Whitewater Creek south of Tailing Pond 7. The discharge system includes a steel transfer tank, a 14-inch DR-17 HDPE conveyance pipeline, and an energy dissipation structure constructed with articulated concrete block. The system costs are developed in the same manner as described in Section 5 for the ETS and STS raw water conveyance systems, and the energy dissipation structure costs were developed by Telesto Solutions Incorporated as part of the Chino CCP reclamation cost estimate.

5.0 WATER CONVEYANCE

Existing pumps, pipelines, tanks and reservoirs will be utilized to the extent practical to modify existing systems to convey the various water sources to the ETS or STS. Where new pipelines and pumps are required, the associated capital costs have been included. Specific cost details for the water conveyance systems are provided in Attachment B, and additional cost backup details are provided in Attachment C.

6.0 COST ESTIMATION

Capital and O&M cost estimates have been developed using similar methodology as previous CCP Updates for Chino and Tyrone. Costs have been updated as appropriate according to the sources used including vendor quotes, RS Means, State of New Mexico Department of Labor Rates, and Public Service Company of New Mexico rate schedules for costs gathered in late 2018 and early 2019. In addition, modifications to cost factors based on the agreement reached in December 2018 in the Financial Assurance (FA) Work Group and approved by the State of New Mexico in January 2019 have been incorporated. The capital and O&M cost estimates are provided in Attachment B, and a separate Excel spreadsheet file is included on the CD attached to this report. The spreadsheet contains several worksheets which are organized by color with a set of worksheets prepared for each major system and a set of summary sheets. Cost-specific assumptions not discussed in previous sections are outlined in the following sections and provide additional background for how the spreadsheets were developed.

6.1 Capital Cost Development

Equipment and material cost estimates have been developed based on the information presented in Sections 2.0 through 5.0. Quotes were obtained for equipment, materials, consumables and other cost items associated with the STS, ETS, conveyance system, STS discharge system, and sludge and salt disposal facilities. The backup equipment and material quotes are included in Attachment C. Equipment installation and site construction have been estimated based on craft personnel, labor hours, and prevailing wage rates. The 2019 prevailing wage rates for Heavy Industry were used for the STS construction as follows:

- 2019 NM Department of Labor Type H (Heavy Engineering) 2019 labor rates. Rates include base hourly wage, fringe benefit, and apprenticeship contribution.

Other costs, including freight on process equipment and the STS building, and commissioning, have been estimated as lump sums.

For the STS, the specific treatment train and associated primary and ancillary equipment sizes have been calculated based on the treatability studies conducted by Van Riper Consulting (2008), Hazen Research (2007), and HW Process Technologies (2007). The results of the treatability studies have been updated with current water quality and water flow projections for the individual treatment streams, and updated treatment trains have been developed by the Freeport-McMoRan Inc. water treatment group. Other cost elements have been based on engineering judgment, updated cost quotes, and previous Golder experience with treatment plant construction and equipment installation projects.

A similar strategy was used for development of the short-term ETS cost, the long-term ETS cost, the conveyance system, the Salt Disposal Facility associated with the ETS, and the Sludge Disposal Facility associated with the STS.

It is assumed that indirect costs in total are at 30% of the estimated direct capital cost based on the December 2018 FA Work Group meetings and agreement and the associated approval letter issued by the State of New Mexico in January 2019. Indirect costs include but are not limited to:

- Mobilization and demobilization;
- Contingency;
- Engineering redesign;
- Contractor profit and overhead;
- Project management fee; and
- State procurement fee.

6.2 Operations and Maintenance Cost Development

O&M cost estimates have been developed for the 100-year closure period and are included in Attachment B. Costs are presented as current costs and include labor, reagents, maintenance, sampling and analysis costs, and electrical power for all treatment and management systems for which a capital cost was developed. The cost basis for these items is described in the following sections.

6.2.1 Labor Rates

Labor rates and markup for benefits for all categories of operations personnel were based on New Mexico Dept. of Labor's prevailing wage rate for Type "A" work as follows:

- 2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. All Operator groups. https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf

Staffing levels were estimated based on Golder's experience.

Assumptions include:

- Overtime – up to 10% of straight-time hours for supervisors and 15% for operators
- Overtime wages – 1.5 times the base rates
- Base hourly wage listed in Table 11
- Fringes are based on $5.94/hr for all labor categories

6.2.2 Reagents

Lime, flocculent, and acid will be used at the STS for the HDS system, and anti-scalent and cleaning chemicals for the membrane system as discussed in Section 4.2. Assumptions include:

- Lime:
  - Lime consumption was calculated based on the Van Riper Consulting treatability study and metal hydroxide removal rates, and adjusted based on the influent sulfate concentrations.
  - Lime cost was obtained from a current vendor price from L'hoist North America (2018) using a street price strategy without benefit of any FMI preferred pricing for bulk deliveries.
- Flocculent:
  - Flocculent consumption for solid–liquid separation and clarification was calculated based on previous engineering experience and adjusted based on the influent sulfate concentrations and associated sludge projections.
  - Flocculent cost was on a late 2018 vendor quote obtained without benefit of FMI preferred pricing.
- Acid:
  - Acid consumption was calculated based on the Van Riper Consulting treatability study and adjusted based on the influent sulfate concentrations.
  - Acid cost was obtained from a current street price from Univar.

6.2.3 Membrane System

The membrane system requires cleaning chemicals and anti-scalent to prevent membrane fouling and increase removal efficiency of the contaminants of concern.

- Membrane chemical quantity has been estimated based on previous engineering experience and conversations with chemical suppliers.
- Chemical costs have been obtained from a current vendor price quote for a street price.

6.2.4 Maintenance

Replacement O&M and routine maintenance are both included as separate cost categories and both are based on a percentage of the total capital cost. The routine maintenance is set at 1.5% annually of the total capital cost for each component with the exception of the Sludge Disposal Facility and the Salt Disposal Facility. These two components of water treatment and management are not expected to required routine maintenance. The replacement O&M is also a percentage of the total capital for each component except the short-term ETS which is not expected to be replaced. The replacement O&M factor for the other components is set between 0.25% and 1.8% depending on the expected system life, initial cost, and whether new or used equipment was included. The replacement O&M is set at 1.5% for the STS, at 1.8% for the long-term ETS and water conveyance systems, at 1% for the Sludge Disposal Facility, and at 0.25% for the Salt Disposal Facility.

6.2.5 Sampling and Analysis

The frequency of sampling and analysis associated with the water management and treatment system is as follows:

- Sampling is not required as part of the O&M of the short-term ETS. The only sampling required during the short-term ETS operational period is associated with the NPDES compliance points (1 in the NMA and 7 in the SMA);

- The high TDS and sulfate water sources will not need to be sampled as part of the O&M for the long-term ETS;
- STS performance monitoring including influent and effluent discharge from water treatment plant: monthly beginning in Year 6 and continuing though Year 100;
- NPDES compliance points: quarterly from Year 1 through Year 12, semiannual from Year 13 through Year 32, and annual thereafter (through Year 100);
- Tailings (1 sample for interceptor system, and 7 NPDES sample points): quarterly from Year 6 through Year 12, semiannual from Year 13 through Year 32 (20-year transition period between uncovered and covered flows), and annual thereafter (through Year 100). The Tailing Pond Interceptor system will be sampled at the point that all 18 wells are combined into one pipeline;
- Stockpiles (12 seep/interceptor well locations and one NPDES point): quarterly from Year 6 through Year 12, semiannual from Year 13 through Year 32 (20-year transition period between uncovered and covered flows), and annual thereafter (through Year 100); and
- Pit (3 sample points): quarterly from Year 6 through Year 12, semiannual from Year 13 through Year 32 (20-year transition period between uncovered and covered flows), and annual thereafter (through Year 100).

Costs for sampling and analysis have been escalated from previous CCP updates and include shipping and materials based on an updated 2018 quote from a local analytical laboratory. Additional site-wide monitoring and sampling is included in the reclamation cost estimate developed by Telesto Solutions Inc.

6.2.6 Electrical Power Consumption

The unit cost for electric power is based on the most currently available Public Service Company of New Mexico Electrical Services 20th Revised Rate No. 4B Large Power Service - Time of Use Rate (Effective Date February 1, 2018). Specific cost backup details for the power consumption and rates are provided in Attachment C.

6.2.7 Sludge Disposal

Sludge volume has been projected based on the Van Riper Consulting treatability study and adjusted based on the influent sulfate concentrations. The sludge is expected to dewater to 50% solids by using a filter press, based on the experience of Van Riper Consulting. Costs for loading, hauling, unloading, and disposal was based on RS Means values on a quantity basis.

6.2.8 Salt Disposal

Salt volumes are based on the estimated concentration of the uncovered leach stockpile runoff and leach stockpile seepage and the estimated evaporation rates over the long-term ETS operational period. The total salt residual is calculated based on the TDS of the water evaporated and the total quantity evaporated annually with a 50% additional factor to account for waters of hydration expected during natural evaporation of salts. Costs for excavating, loading, hauling, unloading, and disposal have been based on RS Means values on a quantity basis.

6.2.9 Indirect Costs

It is assumed that indirect O&M costs in total are estimated at 17.5% of the estimated direct O&M cost consistent with the FA Work Group agreement on all O&M cost items. Indirect O&M costs include but not limited to:

- Contingency;

- Profit and overhead;
- Project management fee;
- Engineering redesign; and
- State procurement cost.

7.0 CLOSING

We trust the foregoing provides the information you need at this time. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

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https://golderassociates.sharepoint.com/sites/32319g/deliverables/deliverables/2019 ccp report and cost backup/rev 0/11301153-r-rev0-chino water treatment cost basis-20190318.docx

8.0 REFERENCES

Birch, Mark. 2016. Email communication from Mark Birch (Golder) to Todd Stein (Golder) Regarding Pumping from the Lampbright Cut and Lampbright East Interceptor Wells. March 15.

Chino. 2016a. Email communication from Christian Krueger (Chino) to Todd Stein (Golder) regarding the North Mine Interceptor Well Pumping Rates. April 1.

Chino. 2016b. Email communication from Rita Lloyd Mills (Chino) to Todd Stein (Golder) regarding Projected Water Volumes for the Open Pits and Reservoirs for the EOY 2018. June 22.

Freeport-McMoRan Copper and Gold Chino Mines Company (Chino). 2015. Email communication from Mark Horton (Chino) to Rita Lloyd-Mills (Chino) regarding Raffinate Flows at the Chino Mine. February 19.

Golder Associates Inc. (Golder). 2007a. Report on Long-Term Quality and Quantity Estimates, Chino Mines Water Treatment Feasibility Study. January 17.

Golder. 2007b. DP-1340 Condition 93 Feasibility Study. Submitted to Chino Mines Company Hurley, New Mexico. June.

Golder. 2015. Updates to the South Mine Area Model. Submitted to Freeport-McMoRan Chino Mines Company. May 12.

Golder. 2016. Updates to the North Mine Area Model. Submitted to Freeport-McMoRan Chino Mines Company. January 6

Golder Associates Inc. (Golder). 2008. Tyrone and Chino Closure Closeout Plan Updates Bases for Water Treatment Facility Cost Estimating Technical Memorandum. February 11.

Golder. 2013. Tyrone Mine Closure/Closeout Plan Update. Freeport-McMoRan Tyrone, Inc., Tyrone, New Mexico. July 21.

Hall Environmental Analysis Laboratory. 2018. Analytical Testing Quote provided by Jackie Bolte on October 5, 2018.

Hazen Research, Inc. 2007. Lime Precipitation Experiments and Analyses for Chino Ivanhoe Water Treatment Process Development (ITS), Hazen Report 10464, Revision 1. August 22.

HW Process Technologies, Inc. 2007. Bench Test Report for EMS ® Treatment of Estrella Pit Acid-Mine-Drainage. Prepared For: Van Riper Consulting and Phelps-Dodge. January 23.

HW Process Technologies, Inc. 2007. Chino North (Ivanhoe Treatment System) Water Treatment Bench Test, March 14, 2007 Engineered Membrane Separation, EMS® Treatment To Produce Surface Discharge Water. Prepared For: Van Riper Consulting and Phelps-Dodge. May 14.

John Shomaker and Associates, Inc. (JSAI). 2016. Technical Memorandum – Recommendations for 2016 Pond 7 Interceptor Well Pumping. Submitted from Steven Finch (JSAI) to Freeport-McMoRan Chino Mines Company. February 19.

L'hoist North America. 2018. Jacob Skow Budget Lime Pricing received September 28, 2018.

M3 Engineering and Technology Corporation (M3). 2001. End of Year 2001 through Year 2006 Closure/Closeout Plan, Chino Mines. March 17, 2001.

M3 Engineering and Technology Corporation. 2003. Process Solution Elimination Study Work Plan Chino Mine Facility, Chino Mines Company. Hurley, New Mexico. October 3.

M3 Engineering and Technology Corporation (M3). 2004. Process Solution Elimination Study. Prepared for Chino Mines Co., June 2004.

New Mexico Environment Department (NMED). 2003. Supplemental Discharge Permit for Closure, DP 1340, Chino Mines Company. Issued February 24, 2003.

New Mexico Office of the State Engineer (NMOSE). 2011. Permit to Alter or Rehabilitate a Dam, Chino Mines Dam No. 8, File No. D-172. May 25.

New Mexico Water Quality Control Commission (NMWQCC) Water Quality Standards. 1995. Title 20, Chapter 6, Part 2, Subpart III, Section 3103, Standards for Groundwater of 10,000 mg/L TDS concentrations or less, dated December 1, 1995.

Phelps Dodge Mining Company. 2004. Chino Mines Company DP-1340 Condition 85 Sludge Handling Plan and Cost Estimate – List of Potential Locations for Sludge Deposition. Submitted to the New Mexico Environment Department Mining Environmental Compliance Section. April 23.

Van Riper Consulting (VRC). 2002. Tyrone Post-Closure Water Treatment System Engineered Membrane Alternative. April 27.

VRC. 2004. Preliminary Sludge Handling Plan and Cost Estimate DP-1341 Condition 86. October 22.

VRC. 2008. Development of a Site-Wide Water Treatment Process for the Chino Mines Company. March.

Tables

Table 1: Inventoried Process Waters at the Beginning of the North Mine Area Short-Term Evaporative Treatment System Operation

Parameter	Volume gallons
Water In Pits	1,367,020,000
Process Waters in Reservoirs and Impoundments[1]	32,359,000
Average Circulated Inventory	1,175,731,200
Water In Open Pits	
Location	Estimated Volume at Start of Evaporation Program (gallons)
East Pit	181,933,102
Estrella Pit	1,185,086,818
Lee Hill Pit	---
Sub Total	*1,367,019,920*
Rounded Total	***1,367,020,000***
Reservoirs and Impoundments (Process Water in Storage at Start of Evaporation Program)	
Location	Estimated Volume at Start of Evaporation Program (gallons)
Reservoir 3A	0
Reservoir 6	3,391,832
Reservoir 7	11,412,298
Reservoir 9	0
Reservoir 8	0
Reservoir 5 (South)	0
Reservoir 5 (North)	0
Reservoir 4A Overflow Pond	5,486,875
Reservoir 2 Overflow Pond	684,288
Reservoir 17	0
SX/EW PLS Feed Pond	840,000
SX/EW Raff Pond	0
SX/EW Raff Tank	0
East Headwall Impoundment	273,715
East Lampbright Sumps	1,200,000
Lampright PLS Tank	371,846
6300 Booster Station	1,159,200
PLS Pond Between South SP & General Office	6,842,880
PLS Tank at Ivanhoe Concentrator	300,000
5900 Sump	299,993
Lee Hill Sump #1	60,000
Lee Hill Sump #2	36,000
Sub Total	*32,358,928*
Rounded Total	***32,359,000***
Reservoirs and Impoundments (Process Water added to Storage in First Year)	
Location	Estimated Volume of PLS Added (gallons)
Reservoir 6	49,708,168
Reservoir 7	30,587,702
Reservoir 8 (lined portion)	299,783
Tailing Thickeners (2)	5,422,168
Sub Total	*86,017,821*
Rounded Total	***86,017,900***
Average Circulated Inventory (ACI)	
Initial Raffinate Flow (gpm)	21,000
Make-Up Water Requirement	4%
PLS from Stockpile Diminish	10%
PLS from Stockpile Diminish Duration (days)	45
Sub Total	*1,175,731,200*
Rounded Total	***1,175,731,200***

Table 2: Surface Impoundment, Pond, Tank, and Pit Lake Evaporation Schedule - Years 1 through 6

Location	Calculated Reservoir Water Surface Area[1] (acres)	Estimated Reservoir Capacity[2] (Gallons)	Estimated Reservoir Volume at Start of Evaporation Program[3] (gallons)	Average Annual Evaporation (gallons per year)[4] Year 1	Estimated Reservoir Volume at Year 2 [3] (gallons)	Estimated Volume of Process Water Added at Closure[5] (gallons)	Estimated Number of Years to Compete Evaporation[6]
East Pit	6.41	---	181,933,102	8,177,291	145,546,481	---	---
Estrella Pit	36.1	---	1,185,086,818	46,053,071	948,069,455	---	---
Lee Hill Pit	0	50,000,000	---	---	---	---	---
Reservoir 6	11.50	93,100,000	3,391,832	14,670,646	53,100,000	49,708,168	3.6
Reservoir 7	7.41	82,000,000	11,412,298	9,452,999	42,000,000	30,587,702	4.4
Reservoir 8	0.09	470,000	0	114,814	299,783	299,783	2.6
Reservoir 4A Overflow Pond	1.50	15,000,000	5,486,875	1,913,563	5,486,875	---	2.9
Reservoir 2 Overflow Pond	0.22	1,140,480	684,288	280,656	684,288	---	2.4
SX/EW PLS Feed Pond	0.49	1,400,000	840,000	625,097	840,000	---	1.3
SX/EW Raff Tank	0.10	900,000	---	127,571	---	---	---
East Headwall Impoundment	0.46	456,192	273,715	590,653	273,715	---	0.5
Far East Lampbright Sump	0.51	2,000,000	1,200,000	650,611	1,200,000	---	1.8
Lampright PLS Tank	0.08	371,846	371,846	102,057	371,846	---	3.6
NE Lampright Booster Station	0.07	400,000	---	89,300	---	---	---
6300 Booster Station	0.03	1,932,000	1,159,200	38,271	1,159,200	---	30.3
6525 Raffinate Tank	0.05	100,000	---	63,785	---	---	---
PLS Pond Between South SP & General Office	1.59	11,404,800	6,842,880	2,028,376	6,842,880	---	3.4
PLS Tank at Ivanhoe Concentrator	0.05	500,000	300,000	63,785	300,000		4.7
Tailing Thickeners (2)	5.20	6,777,710	0	6,633,683	5,422,168	5,422,168	0.8
5900 PLS Sump	0.57	499,989	299,993	727,154	299,993	---	0.4
Lee Hill Sump #1	0.14	100,000	60,000	178,599	60,000	---	0.3
Lee Hill Sump #2	0.14	60,000	36,000	178,599	36,000	---	0.2
Total [7]	71.0	217,713,017	32,358,928	92,760,581	1,211,992,684	86,017,821	

Notes:

[1] - Reservoir water surface areas assuming they are at 60 percent full at the start of the evaporation program. From M3 (2004); Reservoir 8 surface area assuming stage 10 feet below spillwat crest at 6,145 ft MSL from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011). Pit Lake areas, Res 2, 4A, 17 based on Google Earth Pro areas between 8/2011 and 1/2013.

[2] - Estimated reservoir capacities provided in associated operational Dischrage Plans and from Appendix C of the Chino North Mine Area Application Requirements for a Copper Mine Facility's Discharge Permits 20.6.7.11 NMAC (FMI, 2015); Reservoir 8 Storage from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011).

[3] - Estimated reservoir/pit lake volumes at start of evaporation program. Volumes are assumed to be near there current levels for both the reservoirs and tanks (taken as the average volume of water within the individual reservoirs and tanks measured between May 2011 and December 2013). For the East Pit, Estrella Pit, Reservoirs 6, 7, 2, 4A values from EOY 2018 projections provided by FMI (Worthington, July 2016) were used. For estimated pit volumes to be evaporated for Estrella and East Pit, assumed that the volume of water in the pits gets reduced by 20% per year beginning in Year 2. For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011) with a stage 10' below spillway crest was used. For reserevoirs with no storage data (5900 Sump, Lee Hill Sump #1 and #2, East Headwall Impoundment, East Lampbright Sumps), it was assumed that they were at 60% of capacity at closure. It is assumed that process water will be added to the ponds at the start of the evaporation program from the PLS circuit (i.e., to get to there permit allowed levels from there estimated levels at closure).

[4] - Mean annual pan evaporation of approximately 89.4 inches calculated from historical pan evaporation data from the Chino Mine (Reservoir 3A). Mean annual evaporation for the reservoirs and pit lakes was estimated at 62.58 inches by applying a pan coefficient of 0.70. Total annual evaporation from reservoirs and pit lakes of 46.98 inches accounts for long-term (1897 to 2011) average annual precipitation of approximately 15.6 inches reported for the Fort Bayard weather station.

[5] - Estimates for Reservoirs 6 and 7 are for the volumes at closure plus the added volumes of process water at closure. For Reservoirs 6 and 7, DP-591 requires a reserve capacity of 40,000,00 gallons for stormwater between July and September, and operate at a 22,000,000 pre-runoff capacity the rest of year. Assumed 40,000,000 reserve capacity to handle stormwater flows for the entire year. For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011) with a stage 10' below spillway crest was used. For tailing thickeners, 80% of their capacity was used.

[6] -Estimated number of years to pasively evaporate the water from the facility. Maximum volume between years 1 and 2 used in estimate.

[7] - Total excluding the pit lakes.

Table 3: Surface Impoundment, Pond, Tank, and Pit Lake Evaporation Schedule - Years 7 through 100

Location	Calculated Reservoir Water Surface Area[1] (acres)	Estimated Reservoir Capacity[2] (Gallons)	Estimated Reservoir Volume at Start of Evaporation Program[3] (gallons)
Reservoir 8	0.09	470,000	299,783
Reservoir 4A Overflow Pond	1.50	15,000,000	5,486,875
East Headwall Impoundment	0.46	456,192	273,715
East Lampbright Sump	0.51	2,000,000	1,200,000
Lampright PLS Tank	0.08	371,846	371,846
Proposed New Reservoir 7 HDPE-Lined Evaporation Pond	4.00	51,114,560	51,114,560
PLS Tank at Ivanhoe Concentrator	0.05	500,000	300,000
Lee Hill Sump #1	0.14	100,000	60,000

Notes:

[1] - Reservoir water surface areas assuming they are at 60 percent full at the start of the evaporation program. From M3 (2004); Reservoir 8 surface area assuming stage 10 feet below spillway crest at 6,145 ft MSL from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011). Reservoir 4A based on Google Earth Pro areas between 8/2011 and 1/2013.

[2] - Estimated reservoir capacities provided in associated operational Discharge Plans and from Appendix C of the Chino North Mine Area Application Requirements for a Copper Mine Facility's Discharge Permits 20.6.7.11 NMAC (FMI, 2015); Reservoir 8 storage from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011). For proposed HDPE-lined Reservoir 7 used 4 acres x 5' deep for capacity.

[3] - Estimated reservoir volumes at start of evaporation program. Volumes are assumed to be near there current levels for both the reservoirs and tanks (taken as the average volume of water within the individual reservoirs and tanks measured between May 2011 and December 2013). For Reservoir 4A, values from EOY 2018 projections provided by FMI (Worthington, July 2016) were used. For Reservoir 8 values from OSE Permit to Alter or Rehabilitate Dam No. 8 File No. D-172 (NMOSE, May 2011) with a stage 10' below spillway crest was used. For reserevoirs with no stage-storage data (Lee Hill Sump #1, East Headwall Impoundment, East Lampbright Sump), it was assumed that they were at 60% of capacity.

Chino CCP Update
Table 4: Evaporation Treatment Schedule

Year Following Closure	EOY	Run 185 (Average Annual PE for Uncovered Stockpile in Chino Feasibility Study (Golder, 2007))			Evaporation from Drip Areas			Evaporation from 123 GPM Sprayers (SMI Mega PoleCat -25HP fan motor and 7.5 HP pump)			Evaporation from 25 GPM Sprayers (SMI 420F Evaporator -25HP fan motor and 2 HP pump)			Evaporation from 66 GPM Sprayers (SMI Super PoleCat - 25HP fan motor and 7.5 HP pump)			Evaporation from Reservoirs, Impoundments, and Pit Lakes (assume pit lake areas get reduced by 20% per year starting in year 2)			Precipitation on Drip Areas		Precipitation on Spray Areas		Precipitation on Reservoirs, Impoundments, and Pit Lakes (note, includes spray areas Yrs 7-100)		Total Evaporation	
		cm	in	ft	Drip Area (Acres)	acre-ft	gallons	No. of Spray Units (run time)	acre-ft	gallons	No. of Spray Units (run time)	acre-ft	gallons	No. of Spray Units (run time)	acre-ft	gallons	Surface Area (acres)	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons
1	2019	263.08	103.57	8.63	361	3,119.3	1,016,437,431	0	0.0	0	0	0.0	0	0	0.0	0	71.9	375.0	122,197,757	470.1	153,189,654	0.0	0	93.5	30,481,096	2,930.7	954,964,438
2	2020	263.08	103.57	8.63	342	2,950.9	961,559,935	36	3,649.4	1,189,176,664	0	0.0	0	0	0.0	0	63.4	330.7	107,750,179	444.7	144,918,939	79.6	25,941,358	82.5	26,877,282	6,324.2	2,060,749,186
3	2021	263.08	103.57	8.63	342	2,950.9	961,559,935	36	3,649.4	1,189,176,664	0	0.0	0	0	0.0	0	54.9	286.3	93,302,601	444.7	144,918,939	79.6	25,941,358	71.4	23,273,468	6,290.9	2,049,905,423
4	2022	263.08	103.57	8.63	342	2,950.9	961,559,935	36	3,649.4	1,189,176,664	0	0.0	0	0	0.0	0	46.4	242.0	78,855,023	444.7	144,918,939	79.6	25,941,358	60.4	19,669,653	6,257.6	2,039,061,659
5	2023	263.08	103.57	8.63	342	2,950.9	961,559,935	36	3,649.4	1,189,176,664	0	0.0	0	0	0.0	0	37.9	197.7	64,407,445	444.7	144,918,939	79.6	25,941,358	49.3	16,065,839	6,224.4	2,028,217,895
6	2024	263.08	103.57	8.63	342	2,950.9	961,559,935	36	3,649.4	1,189,176,664	0	0.0	0	0	0.0	0	29.4	153.3	49,959,867	444.7	144,918,939	79.6	25,941,358	38.2	12,462,025	6,191.1	2,017,374,132
7	2025	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.35	7.2	2,349,886	3.59	195.3	63,632,231	6.0	31.3	10,195,891	0.0	0	0.0	0	9.3	3,027,681	224.5	73,150,327
8	2026	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.35	7.2	2,349,886	3.59	195.3	63,632,231	6.0	31.3	10,195,891	0.0	0	0.0	0	9.3	3,027,681	224.5	73,150,327
9	2027	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.35	7.2	2,349,886	3.59	195.3	63,632,231	6.0	31.3	10,195,891	0.0	0	0.0	0	9.3	3,027,681	224.5	73,150,327
10	2028	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.35	7.2	2,349,886	3.59	195.3	63,632,231	6.0	31.3	10,195,891	0.0	0	0.0	0	9.3	3,027,681	224.5	73,150,327
11	2029	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.35	7.2	2,349,886	3.59	195.3	63,632,231	6.0	31.3	10,195,891	0.0	0	0.0	0	9.3	3,027,681	224.5	73,150,327
12	2030	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.35	7.2	2,349,886	3.59	195.3	63,632,231	6.0	31.3	10,195,891	0.0	0	0.0	0	9.3	3,027,681	224.5	73,150,327
13	2031	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.92	104.4	34,031,722	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	135.8	44,265,197
14	2032	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.92	104.4	34,031,722	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	135.8	44,265,197
15	2033	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.92	104.4	34,031,722	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	135.8	44,265,197
16	2034	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.92	104.4	34,031,722	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	135.8	44,265,197
17	2035	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.92	104.4	34,031,722	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	135.8	44,265,197
18	2036	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.86	101.2	32,968,231	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	132.6	43,201,705
19	2037	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.74	94.6	30,841,248	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	126.1	41,074,723
20	2038	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.61	87.6	28,537,017	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	119.0	38,770,492
21	2039	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.48	80.5	26,232,786	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	111.9	36,466,260
22	2040	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.36	74.0	24,105,803	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	105.4	34,339,278
23	2041	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.23	66.9	21,801,572	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	98.3	32,035,047
24	2042	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	1.10	59.8	19,497,341	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	91.2	29,730,815
25	2043	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.98	53.3	17,370,358	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	84.7	27,603,833
26	2044	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.85	46.2	15,066,127	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	77.6	25,299,602
27	2045	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.73	39.7	12,939,144	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	71.1	23,172,619
28	2046	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.60	32.6	10,634,913	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	64.0	20,868,388
29	2047	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.48	26.1	8,507,931	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	57.5	18,741,405
30	2048	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.35	19.0	6,203,699	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	50.4	16,437,174
31	2049	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.23	12.5	4,076,717	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	43.9	14,310,191
32	2050	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.33	6.8	2,215,607	0.10	5.4	1,772,486	6.5	33.9	11,045,549	0.0	0	0.0	0	9.3	3,027,681	36.8	12,005,960
33	2051	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
34	2052	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
35	2053	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
36	2054	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
37	2055	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
38	2056	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
39	2057	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
40	2058	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
41	2059	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
42	2060	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
43	2061	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
44	2062	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
45	2063	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
46	2064	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
47	2065	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
48	2066	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
49	2067	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
50	2068	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
51	2069	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
52	2070	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
53	2071	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
54	2072	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
55	2073	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
56	2074	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
57	2075	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
58	2076	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
59	2077	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
60	2078	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530

Table 4: Evaporation Treatment Schedule

Year Following Closure	EOY	Run 185 (Average Annual PE for Uncovered Stockpile in Chino Feasibility Study (Golder, 2007))			Evaporation from Drip Areas			Evaporation from 123 GPM Sprayers (SMI Mega PoleCat -25HP fan motor and 7.5 HP pump)			Evaporation from 25 GPM Sprayers (SMI 420F Evaporator -25HP fan motor and 2 HP pump)			Evaporation from 66 GPM Sprayers (SMI Super PoleCat - 25HP fan motor and 7.5 HP pump)			Evaporation from Reservoirs, Impoundments, and Pit Lakes (assume pit lake areas get reduced by 20% per year starting in year 2)			Precipitation on Drip Areas		Precipitation on Spray Areas		Precipitation on Reservoirs, Impoundments, and Pit Lakes (note, includes spray areas Yrs 7-100)		Total Evaporation	
		cm	in	ft	Drip Area (Acres)	acre-ft	gallons	No. of Spray Units (run time)	acre-ft	gallons	No. of Spray Units (run time)	acre-ft	gallons	No. of Spray Units (run time)	acre-ft	gallons	Surface Area (acres)	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons	acre-ft	gallons
61	2079	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
62	2080	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
63	2081	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
64	2082	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
65	2083	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
66	2084	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
67	2085	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
68	2086	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
69	2087	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
70	2088	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
71	2089	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
72	2090	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
73	2091	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
74	2092	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
75	2093	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
76	2094	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
77	2095	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
78	2096	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
79	2097	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
80	2098	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
81	2099	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
82	2100	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
83	2101	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
84	2102	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
85	2103	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
86	2104	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
87	2105	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
88	2106	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
89	2107	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
90	2108	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
91	2109	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
92	2110	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
93	2111	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
94	2112	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
95	2113	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
96	2114	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
97	2115	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
98	2116	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
99	2117	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
100	2118	263.08	103.57	8.63	0	0.0	0	0	0.0	0	0.23	4.7	1,544,211	0.03	1.6	531,746	6.9	36.1	11,776,254	0.0	0	0.0	0	9.3	3,027,681	33.2	10,824,530
Total		**26,308**	**10,357**	**863**		**17,874**	**5,824,237,106**		**18,247**	**5,945,883,318**		**502**	**163,417,796**		**2,604**	**848,666,077**		**4,908**	**1,599,344,494**	**2,694**	**877,784,350**	**398**	**129,706,791**	**1,269**	**413,431,390**	**39,775**	**12,960,626,190**

Table 5: Annual Rate of Salt Generation from Long-Term Evaporative Treatment System

Year Following Closure	Salt Generation (Cubic Yards/Year)
7	27,395
8	27,395
9	27,395
10	27,395
11	27,395
12	27,395
13	26,139
14	24,976
15	23,812
16	22,649
17	21,486
18	20,322
19	19,159
20	17,995
21	16,832
22	15,669
23	14,505
24	13,342
25	12,179
26	11,015
27	9,852
28	8,689
29	7,525
30	6,362
31	5,199
32	4,035
33	4,035
34	4,035
35	4,035
36	4,035
37	4,035
38	4,035
39	4,035
40	4,035
41	4,035
42	4,035
43	4,035
44	4,035
45	4,035

Table 5: Annual Rate of Salt Generation from Long-Term Evaporative Treatment System

Year Following Closure	Salt Generation (Cubic Yards/Year)
46	4,035
47	4,035
48	4,035
49	4,035
50	4,035
51	4,035
52	4,035
53	4,035
54	4,035
55	4,035
56	4,035
57	4,035
58	4,035
59	4,035
60	4,035
61	4,035
62	4,035
63	4,035
64	4,035
65	4,035
66	4,035
67	4,035
68	4,035
69	4,035
70	4,035
71	4,035
72	4,035
73	4,035
74	4,035
75	4,035
76	4,035
77	4,035
78	4,035
79	4,035
80	4,035
81	4,035
82	4,035
83	4,035
84	4,035
85	4,035
86	4,035

Table 5: Annual Rate of Salt Generation from Long-Term Evaporative Treatment System

Year Following Closure	Salt Generation (Cubic Yards/Year)
87	4,035
88	4,035
89	4,035
90	4,035
91	4,035
92	4,035
93	4,035
94	4,035
95	4,035
96	4,035
97	4,035
98	4,035
99	4,035
100	4,035

Table 6: Summary of Water Flow and Sulfate Concentrations for NMA Streams Sent to the STS Treatment System

Year	Flow Rate (gpm)	Sulfate (mg/L)
0	0	-
6	618	6,590
10	526	7,416
15	471	4,082
25	432	3,257
32	405	2,605
40	405	2,242
100	405	2,242

Table 7: Summary of Water Flow and Sulfate Concentrations for SMA Streams Sent to the STS Membrane Treatment System

Year	Flow Rate (gpm)	Sulfate (mg/L)
0	0	-
6	784	1,100
10	638	1,100
15	418	1,100
25	267	1,100
32	267	1,100
40	267	1,100
100	267	1,100

Table 8: Summary of Water Flow and Sulfate Concentrations for HDS Feed

Year	Flow Rate (gpm)	Sulfate (mg/L)
0	0	-
6	1,057	6,295
10	902	6,858
15	723	4,589
25	621	3.936
32	581	3,453
40	577	3,178
100	577	3,178

Table 9: Annual Rate of Sludge Generation from Water Treatment Systems

Year	Sludge, 50% (tons/year)
0	-
6	53,920
10	49,568
15	27.765
25	20,684
32	17,129
40	15,753
100	15,753

Table 10: Summary Table of Solids Composition

Precipitates	2007 Van Riper Study		2016 With Leach Stockpile Flows to HDS		2016 Without Leach Stockpile Flows to HDS	
	mg/L	%	mg/L	%	mg/L	%
Projected Sludge	65,977	-	64,072	-	14,345	-
$CaSO_4$	48,086	73%	47,644	74%	9,726	68%
$Al(OH)_3$	8,869	13%	7,810	12%	1,219	9%
$Fe(OH)_3$	7,034	11%	7,052	11%	885	6%
MnO_2	610	1%	721	1%	265	2%

Table 11: Labor Costs

Labor Category	Base Hourly Wage*
Plant Operator	$18.60
O&M Supervisor	$31.10
Maintenance Technician	$19.83

Notes:

*These salaries are based on 2019 prevailing wage rates in New Mexico.

Figures

STATE OF NEW MEXICO

NOT TO SCALE

CLIENT	PROJECT
FREEPORT-McMoRan CHINO MINE COMPANY BAYARD, NEW MEXICO	CLOSURE/CLOSEOUT UPDATE

CONSULTANT			TITLE
Golder Associates	YYYY-MM-DD	2016-05-02	**MINE LOCATION MAP**
	PREPARED	CM	
	DESIGN	TS	
	REVIEW	TS	
	APPROVED	TS	

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	1

Path: \\albuquerque\Cad\2013 Projects\11301153 Chino CCP Update\Production\2016 CCP\ | File Name: Figure 1-1.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in

0

LEGEND

- RECLAIMED AREAS
- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- CHINO MINE PERMIT BOUNDARY
- AREAS TO BE USED IN EVAPORATIVE TREATMENT SYSTEM (DRIP SYSTEM AND SPRAY EVAPORATION)
- IMPOUNDMENT AREA USED FOR PASSIVE AND ACTIVE EVAPORATION

NOTE

SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COORDINATE SYSTEM.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE

TITLE
AREAS TO BE UTILIZED FOR THE NORTH MINE AREA SHORT-TERM EVAPORATIVE TREATMENT SYSTEM

CONSULTANT

GOLDER

YYYY-MM-DD	2019-02-04
PREPARED	SB
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
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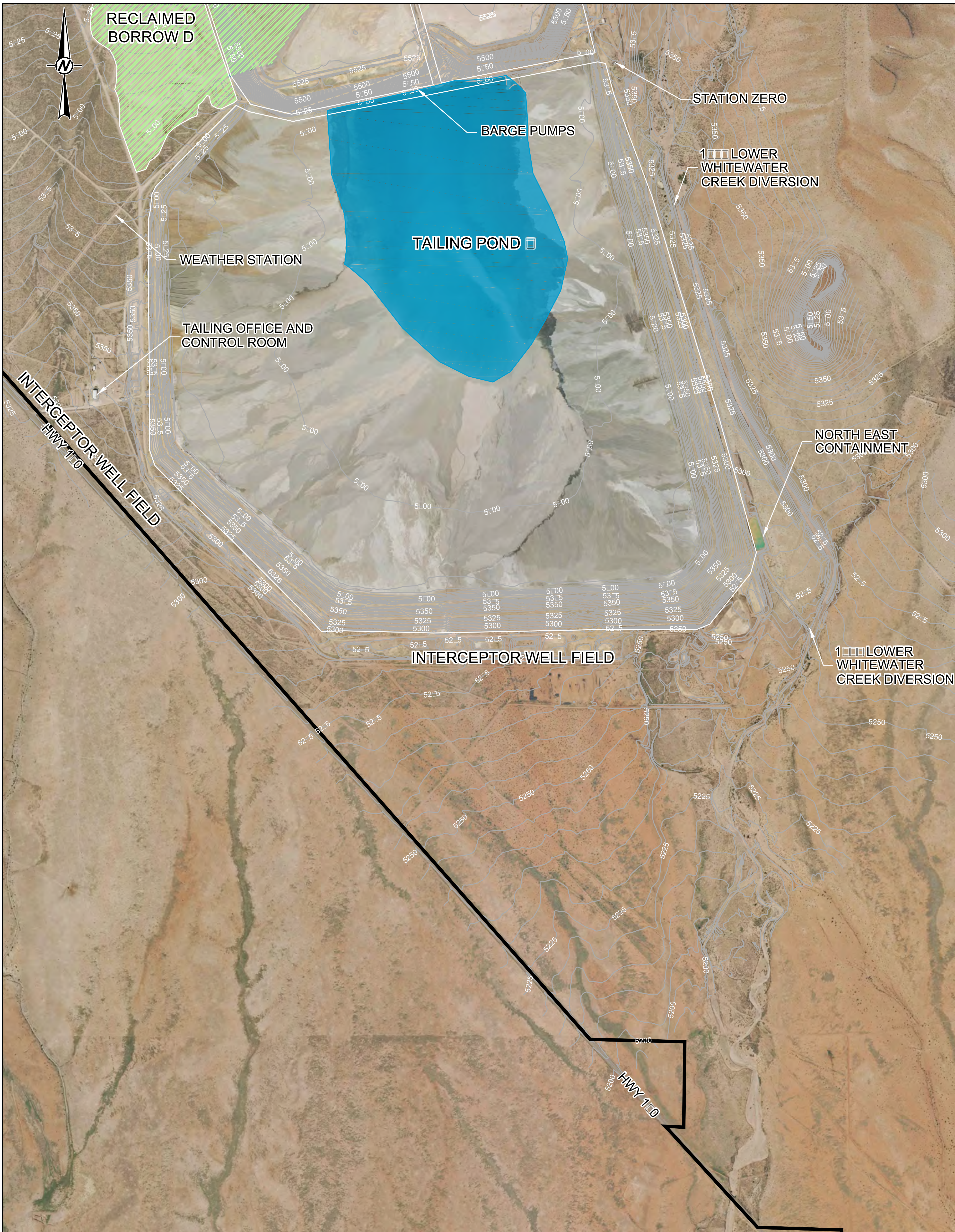
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
- 5 FOOT CONTOURS
- RECLAIMED AREAS
- CHINO MINE PERMIT BOUNDARY
- IMPOUNDMENT AREA USED FOR PASSIVE EVAPORATION

NOTES

1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
2. TOPOGRAPHY IS BASED ON 2014 DATA FROM CHINO MINE COMPANY (TOPOGRAPHY ONLY SHOWN FOR SURVEY COVERAGE.
3. ONLY PRIMARY FACILITIES THAT ARE PART OF DP-484 ARE IDENTIFIED ON FIGURE. FACILITIES OUTSIDE OF DP-484 ARE NOT IDENTIFIED ON FIGURE.
4. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

0 1500 2250
SCALE FEET

CLIENT
FREEPORT-MCMORAN
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE

TITLE
AREAS TO BE UTILIZED FOR THE SOUTH MINE AREA SHORT-TERM EVAPORATIVE TREATMENT SYSTEM

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
11301153	6	0	3

LEGEND

	RECLAIMED AREAS
	APPROXIMATE END OF YEAR 2018 FACILITY BOUNDARY
	CHINO MINE PERMIT BOUNDARY
	AREAS TO BE USED FOR THE NORTH MINE AREA LONG-TERM EVAPORATIVE TREATMENT SYSTEM (PASSIVE EVAPORATION AND SPRAY EVAPORATION)

NOTE

SOURCE: AUGUST 2016 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES ARE BASED ON CHINO MINE COORDINATE SYSTEM.

0 1000 2000 3000
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT PLAN UPDATE

TITLE
AREAS TO BE UTILIZED FOR THE NORTH MINE AREA LONG-TERM EVAPORATIVE TREATMENT SYSTEM

CONSULTANT

GOLDER

YYYY-MM-DD	2019-02-04
PREPARED	SB
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
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Path: \\albuquerque\Cad\2013 Projects\11301153 Chino CCP Update\Production\Short Term Evap\ | File Name: Figure 3.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
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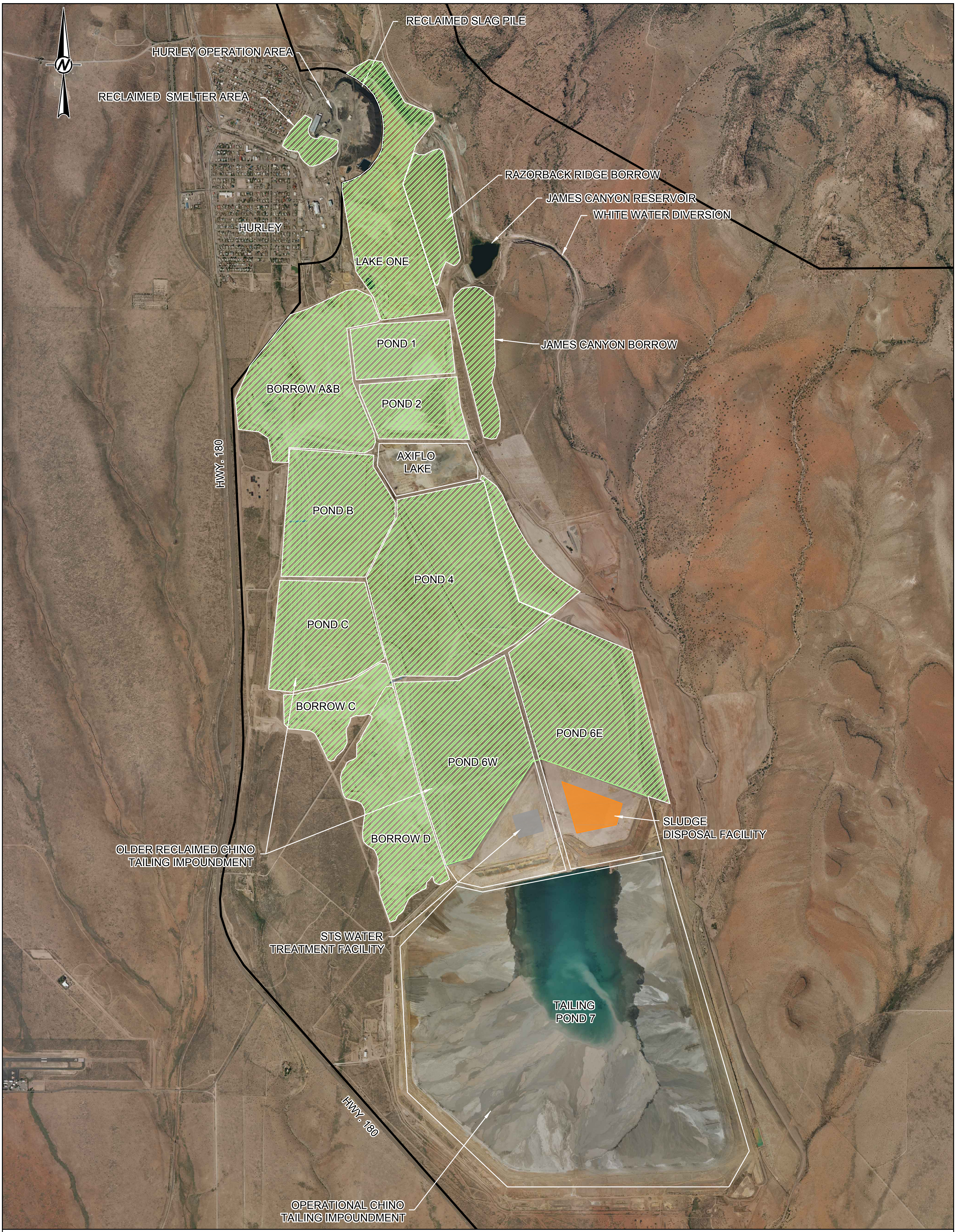

LEGEND

RECLAIMED AREAS

APPROXIMATE FACILITY BOUNDARY

CHINO MINE PERMIT BOUNDARY

NOTE

SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.
MAP COORDINATES BASED ON CHINO MINE COMPANY COORDINATE SYSTEM

2500 0 2500
SCALE FEET

CLIENT
FREEPORT-McMoRan
CHINO MINE COMPANY
BAYARD, NEW MEXICO

PROJECT
CLOSURE/CLOSEOUT UPDATE

TITLE
PROPOSED STS WATER TREATMENT SYSTEM AND SLUDGE DISPOSAL FACILITY LOCATION

CONSULTANT

GOLDER

YYYY-MM-DD	2019-02-04
PREPARED	SB
DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT No.	PHASE	Rev.	FIGURE
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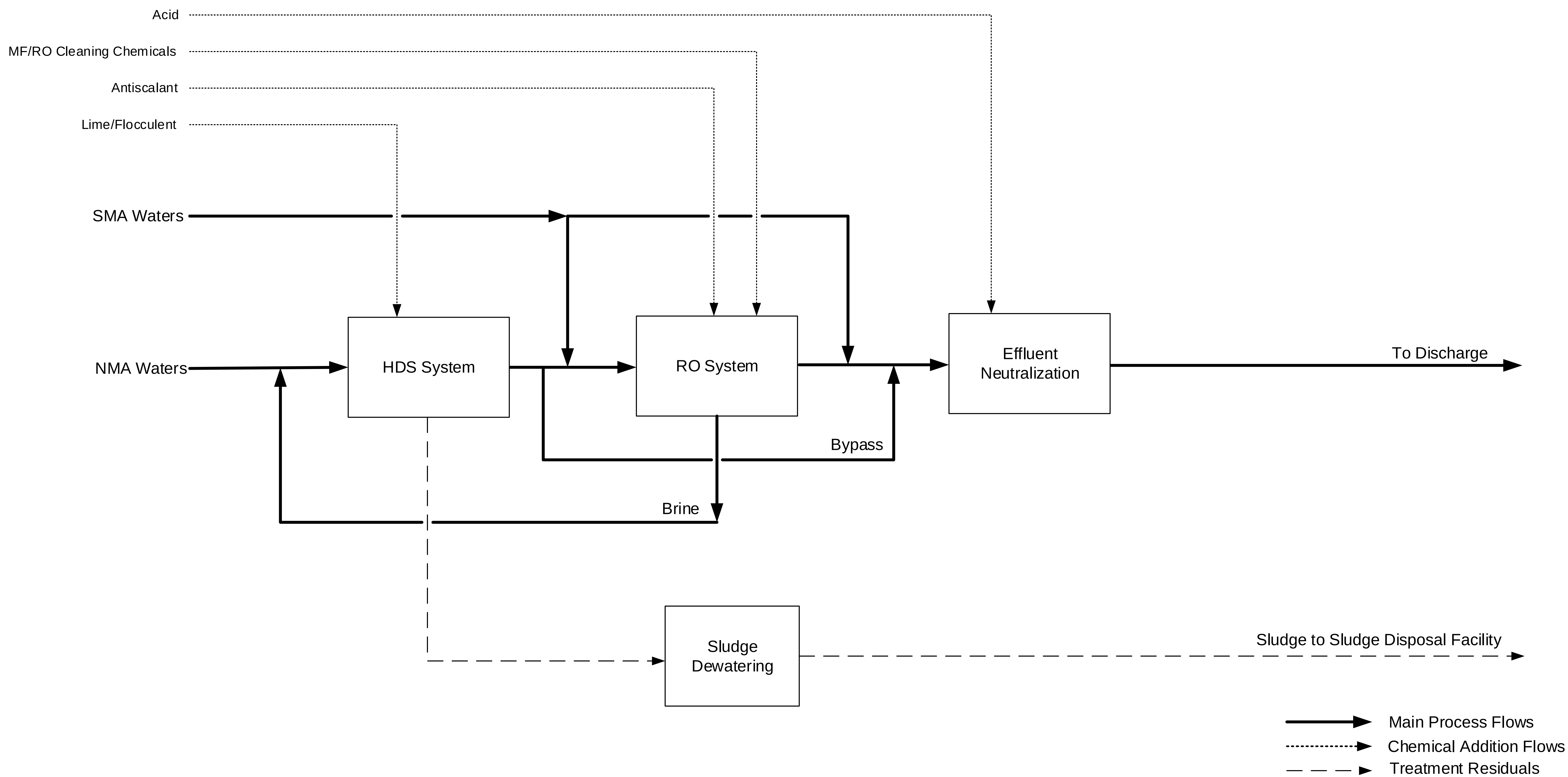

Golder Associates

Denver, Colorado

CLIENT/PROJECT

Freeport-McMoRan
Chino Mine

TITLE

Water Treatment System Block Flow Diagram Year 6

DRAWN	KMB	DATE	July 25, 2016	JOB NO.	11501153
CHECKED	BCH	SCALE	Not To Scale	DWG. NO.	REV 1
REVIEWED	TS	FILE NO.		FIGURE NO.	6

ATTACHMENT A

Summary Table of Post Mining Process Water Management and Water Treatment Flow Rates

Chino Closure/Closeout Plan
Post Mining Process Water Management and Water Treatment Flow Rates - Combination Spray and Drip System on Leach Stockpile Top Surfaces
100-Year Water Handling Plan with Nanofiltration and HDS Water Treatment Plan

EOY	Evaporation System Water Flow Rates			System Inflows - Impacted Water; Process Water Inflows Into the Evaporative Treatment System and WTP										In-Flow to Water Treatment Systems			Storage	Treated Waters		Year Following Closure	WT Year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)		
	Evaporation System Flow Rate (gpm)	Evaporation System Water Loss (gallons per year)	Impacted Water Included In NMA Evaporation System Flow Rate (gpm)	Santa Rita Pit Groundwater Inflow (gpm)	Pit Storm Water Run-on Inflow (gpm)	Storm Water Run-Off Leached SP's Outside Pit Perimeter (gpm)	Storm Water Run-Off Waste Rock SP's Outside Pit Perimeter (gpm)	Pumping Rate of NMA Interceptor Wells (gpm)	Inflow from Cobre Sources (gpm)	Seepage from Leached SP's (gpm)	Seepage from Waste Rock SP's (gpm)	Tailing Pond 7 Interceptor Well System Flows (gpm)	Combined Impacted Water In-flow Rate (gpm)	Total Active SMA In-Flows to Membrane Water Treatment System (gpm)	Total Active NMA In-Flows to Lime HDS Water Treatment System (gpm)	Total Active In-Flows to Lime HDS Water Treatment Plant (gpm)	Water in Storage at the End of the Year (gallons)	Treated Water Flow Rate (gpm)	Total Water Flow Rate to Beneficial Use (gpm)		
2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,575,110,200	0	0	0	
2019	21,623	954,964,438	787	377	32.3	58.1	39.6	8.7	132	79.5	59.8	1,480	2,267	0	0	0	2,033,792,962	0	0	1	
2020	17,770	2,060,749,186	781	377	32.3	58.1	39.6	8.7	126	79.5	59.8	1,480	2,261	0	0	0	383,537,376	0	0	2	
2021	13,936	2,049,905,423	774	377	32.3	58.1	39.6	8.7	120	79.5	59.8	1,406	2,180	0	0	0	0	0	0	3	
2022	10,124	2,039,061,659	768	377	32.3	58.1	39.6	8.7	113	79.5	59.8	1,336	2,104	0	0	0	0	0	0	4	
2023	6,332	2,028,217,895	762	377	32.3	58.1	39.6	8.7	107	79.5	59.8	1,269	2,031	0	0	0	0	0	0	5	
2024	2,561	2,017,374,132	756	377	32.3	58.1	39.6	8.7	101	79.5	59.8	1,205	1,961	784	618	1057	0	1,402	1,824	6	1
2025	138	73,150,327	138	377	32.3	58.1	39.6	8.7	29	79.5	59.8	1,145	1,829	744	546	952	0	1,290	1,691	7	2
2026	138	73,150,327	138	377	32.3	58.1	39.6	8.7	22	79.5	59.8	1,088	1,765	707	540	936	0	1,247	1,627	8	3
2027	138	73,150,327	138	377	32.3	58.1	39.6	8.7	15	79.5	59.8	1,034	1,704	672	533	918	0	1,205	1,566	9	4
2028	138	73,150,327	138	377	32.3	58.1	39.6	8.7	8	79.5	59.8	982	1,645	638	526	902	0	1,164	1,507	10	5
2029	138	73,150,327	138	377	32.3	58.1	39.6	8.7	4	79.5	59.8	933	1,591	606	521	877	0	1,127	1,454	11	6
2030	138	73,150,327	138	377	32.3	58.1	39.6	8.7	4	79.5	59.8	886	1,545	576	521	860	0	1,097	1,407	12	7
2031	83	44,265,197	83	376	32.3	6.4	4.6	8.7	0	76.1	57.2	842	1,403	547	479	787	0	1,026	1,320	13	8
2032	79	44,265,197	79	375	32.3	6.4	4.6	8.7	0	72.7	54.6	800	1,354	520	475	766	0	994	1,274	14	9
2033	76	44,265,197	76	373	32.3	6.4	4.6	8.7	0	69.3	52.0	760	1,306	418	471	723	0	889	1,231	15	10
2034	72	44,265,197	72	372	32.3	6.4	4.6	8.7	0	65.9	49.4	722	1,261	397	467	711	0	864	1,189	16	11
2035	69	44,265,197	69	371	32.3	6.4	4.6	8.7	0	62.5	46.8	686	1,218	377	463	700	0	840	1,149	17	12
2036	66	43,201,705	66	370	32.3	6.4	4.6	8.7	0	59.2	44.1	651	1,176	358	459	688	0	817	1,111	18	13
2037	62	41,074,723	62	368	32.3	6.4	4.6	8.7	0	55.8	41.5	619	1,136	340	455	677	0	796	1,074	19	14
2038	59	38,770,492	59	367	32.3	6.4	4.6	8.7	0	52.4	38.9	588	1,098	323	451	666	0	775	1,039	20	15
2039	55	36,466,260	55	366	32.3	6.4	4.6	8.7	0	49.0	36.3	558	1,062	307	448	656	0	755	1,006	21	16
2040	52	34,339,278	52	365	32.3	6.4	4.6	8.7	0	45.6	33.7	533	1,029	293	444	646	0	737	977	22	17
2041	49	32,035,047	49	363	32.3	6.4	4.6	8.7	0	42.2	31.1	533	1,022	293	440	640	0	733	973	23	18
2042	45	29,730,815	45	362	32.3	6.4	4.6	8.7	0	38.8	28.4	533	1,014	293	436	634	0	729	969	24	19
2043	42	27,603,833	42	361	32.3	6.4	4.6	8.7	0	35.4	25.8	533	1,007	267	432	621	0	699	965	25	20
2044	38	25,299,602	38	360	32.3	6.4	4.6	8.7	0	32.0	23.2	533	1,000	267	428	615	0	695	961	26	21
2045	35	23,172,619	35	358	32.3	6.4	4.6	8.7	0	28.7	20.6	533	992	267	424	609	0	691	957	27	22
2046	32	20,868,388	32	357	32.3	6.4	4.6	8.7	0	25.3	18.0	533	985	267	421	604	0	687	954	28	23
2047	28	18,741,405	28	356	32.3	6.4	4.6	8.7	0	21.9	15.4	533	978	267	417	598	0	683	950	29	24
2048	25	16,437,174	25	355	32.3	6.4	4.6	8.7	0	18.5	12.7	533	971	267	413	592	0	679	946	30	25
2049	22	14,310,191	22	353	32.3	6.4	4.6	8.7	0	15.1	10.1	533	963	267	409	586	0	675	942	31	26
2050	18	12,005,960	18	352	32.3	6.4	4.6	8.7	0	11.7	7.5	533	956	267	405	581	0	672	938	32	27
2051	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	580	0	672	938	33	28
2052	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	580	0	672	938	34	29
2053	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	579	0	672	938	35	30
2054	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	579	0	672	938	36	31
2055	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	578	0	672	938	37	32
2056	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	578	0	672	938	38	33
2057	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	578	0	672	938	39	34
2058	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	40	35
2059	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	41	36
2060	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	42	37
2061	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	43	38
2062	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	44	39
2063	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	45	40
2064	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	46	41
2065	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	47	42
2066	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	48	43
2067	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	49	44
2068	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	50	45
2069	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	51	46
2070	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	52	47
2071	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	53	48
2072	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	54	49
2073	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	55	50
2074	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	56	51
2075	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	57	52
2076	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	58	53
2077	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	59	54

Chino Closure/Closeout Plan
Post Mining Process Water Management and Water Treatment Flow Rates - Combination Spray and Drip System on Leach Stockpile Top Surfaces
100-Year Water Handling Plan with Nanofiltration and HDS Water Treatment Plan

EOY	Evaporation System Water Flow Rates (1) Evaporation System Flow Rate (gpm)	(2) Evaporation System Water Loss (gallons per year)	(3) Impacted Water Included In NMA Evaporation System Flow Rate (gpm)	System Inflows - Impacted Water: Process Water Inflows Into the Evaporative Treatment System and WTP (4) Santa Rita Pit Groundwater Inflow (gpm)	(5) Pit Storm Water Run-on Inflow (gpm)	(6) Storm Water Run-Off Leached SP's Outside Pit Perimeter (gpm)	(7) Storm Water Run-Off Waste Rock SP's Outside Pit Perimeter (gpm)	(8) Pumping Rate of NMA Interceptor Wells (gpm)	(9) Inflow from Cobre Sources (gpm)	(10) Seepage from Leached SP's (gpm)	(11) Seepage from Waste Rock SP's (gpm)	(12) Tailing Pond 7 Interceptor Well System Flows (gpm)	(13) Combined Impacted Water In-flow Rate (gpm)	In-Flow to Water Treatment Systems (14) Total Active SMA In-Flows to Membrane Water Treatment System (gpm)	(15) Total Active NMA In-Flows to Lime HDS Water Treatment System (gpm)	(16) Total Active In-Flows to Lime HDS Water Treatment Plant (gpm)	Storage (17) Water in Storage at the End of the Year (gallons)	Treated Waters (18) Treated Water Flow Rate (gpm)	(19) Total Water Flow Rate to Beneficial Use (gpm)	Year Following Closure	WT Year
2078	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	60	55
2079	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	61	56
2080	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	62	57
2081	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	63	58
2082	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	64	59
2083	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	65	60
2084	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	66	61
2085	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	67	62
2086	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	68	63
2087	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	69	64
2088	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	70	65
2089	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	71	66
2090	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	72	67
2091	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	73	68
2092	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	74	69
2093	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	75	70
2094	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	76	71
2095	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	77	72
2096	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	78	73
2097	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	79	74
2098	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	80	75
2099	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	81	76
2100	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	82	77
2101	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	83	78
2102	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	84	79
2103	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	85	80
2104	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	86	81
2105	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	87	82
2106	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	88	83
2107	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	89	84
2108	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	90	85
2109	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	91	86
2110	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	92	87
2111	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	93	88
2112	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	94	89
2113	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	95	90
2114	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	96	91
2115	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	97	92
2116	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	98	93
2117	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	99	94
2118	18	10,824,530	18	352	32.3	6.4	4.6	8.7	0	11.7	7.6	533	956	267	405	577	0	672	938	100	95

Notes:

This table presents the water solution volumes and flow rates associated with a 100-year water handling plan. Identifed are:

a. System in-flow components of impacted water that must be handled and flow rates of the components,

b. Schedule for reduction of water in storage through operation of an evaporation system,

c. A schedule of water treatment plant operating rates that correspond to impacted water in-flow rates that require treatment

(1) During the mining and copper leaching operations approximately **21,000 gpm** of water is circulated through the copper production system. After cessation of the mining operation, the leaching operation will stop. However continued operation of the water application system as an evaporation system will deplete the leach system water contained in storage. The flow rate of the evaporation system can be as high as the flow rate during leaching operation and it will be reduced as the water in storage is depleted. During the intial 6 years of operation, PLS is added to the reservoirs to maximize passive evaporation from these facilities and this volume is taken out of the evaporative system flow rate. Beginning in Year 6, the ETS will only handle leach stockpile seepage and runoff from the uncovered portions of the leach stockpiles.

(2) "Evaporation Sytem Water Water Loss" (EWL) is based on daily potential evaporation from UNSAT-H Model Run 185 (uncovered stockpile) from Chino DP-1340 Condition 93 Feasibility Study (Golder 2007b), and associated area under drip system. Spray evaporation based on daily evaporation chart for Model 1210 evaporator systems provided by Duane Thompson of Minetek on June 28, 2012. Fifth degree polynomial fit through data set. Number and type of spray units varies thoughout the post closure period. Evaporation from PLS surface impoundments/tanks, and pit lakes is also included as well as the average annual precipitation (15.61 inches) on the stockpile areas under drip, PLS surface impoundments/tanks, and pit lakes.

(3) For Years 1 through 5, Process Water In-flow (columns 4 through 11) will be included in the evaporation system. Tailing Pond 7 Interceptor Well System water (column 12) will be recirculated onto Tailing Pond 7 during the first 5 years following closure. For Years-6 through Year-100, all Process Water In-flows with the exception of leach stockpile seepage and runoff from uncovered portions of leach stockpiles will be included in the Flow Rate to the STS Water Treatment Plant (column-15). A portion of the Tailing Pond 7 Interceptor Well System water (column 12) will be sent to the STS membrane treatment system (column 14), and the remainder will bypass this system and get mixed with th treated effluent from the STS membrane system. Leach stockpile seepage (column 10) and runoff from the uncovered portions of the leach stockpiles (column 6) will be treated through the long-term evaporative treatment system for the entire post-cosure water treatment period.

(4) Sources of water in-flow to the system related to the Santa Rita Pit groundwater and the estimated flow rates based on North Area groundwater flow model simulations conducted as part of the North Mine Area Groundwater Flow Model Re-Calibration (Golder, 2016). The re-calibrated estimate of groundwater discharge to the open pit under end of year 2018 operational conditions was 377 gallons per minute (gpm). Currently this groundwater is removed via operational pit sumps and via evaporation. In the closure scenario, recharge to groundwater beneath the stockpiles was simulated at 0.14 cm/yr from UNSAT-H Model Run 187 (3-foot covered stockpile) from Chino DP-1340 Condition 93 Feasibility Study (Golder 2007b). The model estimated groundwater discharge to the open pit after closure was 352 gpm for the re-calibrated model. The stockpiles are assumed to be regraded, covered and revegetated by the end of year 12, and the transition from uncovered to covered recharge rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32.

Chino Closure/Closeout Plan
Post Mining Process Water Management and Water Treatment Flow Rates - Combination Spray and Drip System on Leach Stockpile Top Surfaces
100-Year Water Handling Plan with Nanofiltration and HDS Water Treatment Plan

EOY	Evaporation System Water Flow Rates			System Inflows - Impacted Water Process Water Inflows Into the Evaporative Treatment System and WTP										In-Flow to Water Treatment Systems			Storage	Treated Waters		Year Following Closure	WT Year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)		
	Evaporation System Flow Rate (gpm)	Evaporation System Water Loss (gallons per year)	Impacted Water Included In NMA Evaporation System Flow Rate (gpm)	Santa Rita Pit Groundwater Inflow (gpm)	Pit Storm Water Run-on Inflow (gpm)	Storm Water Run-Off Leached SP's Outside Pit Perimeter (gpm)	Storm Water Run-Off Waste Rock SP's Outside Pit Perimeter (gpm)	Pumping Rate of NMA Interceptor Wells (gpm)	Inflow from Cobre Sources (gpm)	Seepage from Leached SP's (gpm)	Seepage from Waste Rock SP's (gpm)	Tailing Pond 7 Interceptor Well System Flows (gpm)	Combined Impacted Water In-flow Rate (gpm)	Total Active SMA In-Flows to Membrane Water Treatment System (gpm)	Total Active NMA In-Flows to Lime HDS Water Treatment System (gpm)	Total Active In-Flows to Lime HDS Water Treatment Plant (gpm)	Water in Storage at the End of the Year (gallons)	Treated Water Flow Rate (gpm)	Total Water Flow Rate to Beneficial Use (gpm)		

(5) Sources of water in-flow to the system related to the Santa Rita Pit storm water run-on and the estimated average flow rates from Condition 93 Feasibility Study (Golder, 2007b). Based on a catchment area of 1,610 acres (= pit rim area) and a CN of 75. EOY 2018 pit perimeter = 1,626 acres which represents a 1% increase in area. FS flow estimates were increased by 1% (32 gpm to 32.3 gpm) to account for increased catchment area.

(6) Sources of water in-flow to the system related to storm water run-off from leached stockpile outslopes outside pit watershed area (= pit perimeter) and the estimated average flow rates from Condition 93 Feasibility Study (Golder, 2007b). FS used CN of 85 for uncovered SPs. EOY 2018 leach SP areas = 1,842.2 acres w/Lee Hill and 1,814.6 acres w/o Lee Hill which represents a 17% increase in area previously used. Uncovered outslopes after year 12 = 195.7 acres w/o Lee Hill which represents 12.6% of area previously used. FS flow estimates were increased by 17% for EOY 2018 and decreased by 87% after year 12. Proportion of leached to unleached stockpiles were accounted for to scale current runoff estimates.

(7) Sources of water in-flow to the system related to storm water run-off from unleached stockpile outslopes outside pit watershed area (= pit perimeter) and the estimated average flow rates from Condition 93 Feasibility Study (Golder, 2007b). FS used CN of 85 for uncovered SPs. EOY 2018 SP areas = 1,842.2 acres w/Lee Hill and 1,814.6 acres w/o Lee Hill which represents a 17% increase in area previously used. Uncovered outslopes after year 12 = 195.7 acres w/o Lee Hill which represents 12.6% of area previously used. FS flow estimates were increased by 17% for EOY 2018 and decreased by 87% after year 12. Proportion of leached to unleached stockpiles were accounted for to scale current runoff estimates.

(8) Water inflow to the system from the North Mine Area interceptor wells and the estimated average flow rate from this source. Estimated at 8.65 gpm combined from water extracted from the West Stockpile and the Lampbright areas (Krueger, April 1, 2016 email). Pumping from the Lampbright Cut (25.25 gpm) and Lampbright East (8.1 gpm) is for mine production and would be discontinued at closure (Mark Birch email communication dated March 15, 2016).

(9) Sources of water in-flow to the system related to impacted waters from the Cobre Mine. Based on estimated flows presented in Table C.3 of Appendix C of the Freeport-McMoRan Cobre Mining Company's 2014 Continental Mine Closure/Closeout Plan Update (Telesto, 2014). No pumping projected from the Continental Pit.

(10) Sources of water in-flow to the system related to leach stockpile seepage and the estimated average flow rates from Condition 93 Feasibility Study June 2007 UNSAT-H Model Runs (Golder, 2007b). The stockpiles are assumed to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered seepage rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32. Long term average drainage rates of 2.67 cm/yr (1.05 in/yr) for uncovered SPs and 0.14 cm/yr (0.055 in/yr) for 3' cover stockpile surfaces. Total plan area (tops and outslopes) of leach stockpiles is 1,464 acres at the EOY 2018, and 1,635 acres at year 12 following regrading and cover placement (Based on March 10, 2016 reclamation design drawing set; Golder, 2016).

(11) Sources of water in-flow to the system related to waste rock stockpile seepage and the estimated average flow rates from Condition 93 Feasibility Study June 2007 UNSAT-H Model Runs (Golder, 2007b). The stockpiles are assumed to be regraded, covered and revegetated in year 12, and the transition from uncovered to covered seepage rates is assumed to occur over a 20 year period with a linear rate decrease between year 12 and 32. Long term average drainage rates of 2.67 cm/yr (1.05 in/yr) for uncovered SPs and 0.14 cm/yr (0.055 in/yr) for 3' cover stockpile surfaces. Total plan area (tops and outslopes) of waste rock stockpiles is 1,102 acres at the EOY 2018, and 1,106 acres at year 12 following regrading and cover placement (Based on March 10, 2016 reclamation design drawing set; Golder, 2016).

(12) Sources of water in-flow to the system related to Tailing Pond 7 Interceptor Well System. Initial flow of 1,480 gpm based on JSAI Recommendations for 2016 Pond 7 Interceptor Well Pumping (February 2016). Tailing ponds 6E, 6W, and 7 are assumed to be regraded, covered and revegetated in year 12, and annual reduction in pumping of 5% each year after reclamation until you get to steady-state post closure flow. Revised SMA Groundwater Flow Model has estimated post-closure flow of 533 gpm (Golder, 2015).

(13) "Combined Impacted Water In-Flow Rate" (CIW) is total of in-flows columns, column-4 through column-12.

(14) "Total Active SMA In-Flows to the STS Membrane Water Treatment System (gpm)" is the SMA in-flows to the STS Membrane System. Remaining portion of Tailing Pond 7 Interceptor Well System Inflow gets bypassed and mixed with the membrane system treated effluent.

(15) "Total Active NMA In-Flows to the STS Lime HDS Water Treatment System (gpm)" is the flow rate from low sulfate sources (Columns 4,5,7,8,9, and 11).

(16) "Total Active In-Flows to Lime HDS Water Treatment System (gpm)" is the in-flows to the Lime/HDS water treatment system from the NMA and membrane system reject (years 6 through 100).

(17) Water in Storage to be removed through evaporation at the end of a year in the schedule. Initial 'Water in Storage' (WIS) = water in reservoirs, impoundments and pits plus 'Average Circulated Inventory' (ACI).

Initial WIS = **2,575,110,200 gal.**

"Average Circulated Inventory" (ACI) is calculated based on experience with leach operations at Chino: (1) when raffinate application is stopped, PLS flow rate from stockpiles diminishes to 10% of the full flow rate in 45 days; and (2) make-up water requirement = 4% of raffinate flow rate during leaching (based on average flows between May 2011 and December 2013, therefore 96% of the raffinate flow rate reports to PLS).

For an initial raffinate flow rate of 21,000 gallons per minute (average measured flow rates between May 2011 and December 2013), the ACI is calculated as follows:

ACI = ((21,000 gpm x 96%) x 60 min/hr x 24 hr/day x 45 day drain-down cycle) x 0.90

ACI = **1,175,731,200** gal.

The volume of WIS decreases as a result of calculating the difference between the initial WIS plus the water in-flows minus water out-flows (through evaporation or water treatment). For example: WIS Year 2 = (WIS Year-1) + (NMA water inflow to STS WTP/ETS (column 3) Year-2 x 60 min/hr x 24 hr/day x 365 days/yr) - (EWL (column 2) Year-2) - (Active NMA In-flows to STS WTP (15) Year-2 x 60 min/hr x 24 hr/day x 365 days/yr).

(18) "Treated Water Flow Rate" (TWFR) is treated effluent from the Water Treatment Plant that goes to beneficial use.

(19) Total Water Flow Rate to Beneficial Use (gpm)= TWFR + portion of Tailing Interceptor Water that bypasses STS membrane treatment system.

ATTACHMENT B

Chino Closure/Closeout Plan Water Management and Treatment Cost Estimate (electronic version of cost estimate provided in CD included with this report)

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Capital and O&M Cost Summary Table
Project Short Title: Chino Mine Closure Closeout Plan

SUMMARY BY SYSTEM

Indirect		**Inputs**
Capital Cost		30.0%
O&M Cost (commodities, labor routine maint, replacement)		17.5%
Capital Cost Elements		**2018 Chino CCP Update**
Short-Term Evaporative Treatment System (ETS)	$	1,908,800
Long-Term ETS	$	429,833
South Mine Area Water Treatment System (STS)	$	7,585,047
Water Collection/Conveyance for STS	$	1,564,227
Sludge Disposal Facility for STS	$	138,682
Salt Disposal Facility for ETS	$	534,816
Subtotal, Capital	$	12,161,405
Indirect Costs, Capital	*$*	*3,648,421*
Total, Capital	**$**	**15,809,826**
O&M Costs - Commodities (Reagents, Analytical, Power)		
Short-Term ETS	$	12,236,266
Long-Term ETS	$	840,074
South Mine Area Water Treatment System (STS)	$	68,520,568
Water Collection/Conveyance for STS	$	11,028,494
Sludge Disposal Facility for STS	$	-
Salt Disposal Facility for ETS	$	-
Subtotal, O&M Commodities	$	92,625,402
Indirect Costs, O&M Commodities	*$*	*16,209,445*
Total, O&M Commodities	**$**	**108,834,847**
O&M Costs - Replacement O&M, Routine Maintenance, Labor		
Short-Term ETS	$	940,654
Long-Term ETS	$	4,966,038
South Mine Area Water Treatment System (STS)	$	65,095,852
Water Collection/Conveyance for STS	$	14,119,680
Sludge Disposal Facility for STS	$	7,549,128
Salt Disposal Facility for ETS	$	6,090,454
Subtotal, O&M Labor, Routine Maintenance	$	98,761,805
Indirect Costs, O&M Labor, Routine Maintenance	*$*	*17,283,316*
Total, O&M Labor, Routine Maintenance	**$**	**116,045,121**
Total, O&M	**$**	**224,879,969**
Total, Capital and O&M in Current Costs	**$**	**240,689,794**

GOLDER

Date: 12-Mar-19
Project No.: 113-01153

Subject: Summary Cash Flow in Current Costs
Project Short Title: Chino Mine Closure Closeout Plan

Indirect	Inputs
Capital Cost	30.0%
O&M Cost (power, reagents, analytical)	17.5%
O&M Cost (replacement O&M, labor, routine maintenance)	17.5%

Year	Short-Term ETS			Long-Term ETS			STS			Water Conveyance			Sludge Disposal Facility		Salt Disposal Facility		Total						
	Capital	Power	Replacement O&M, Routine Maintenance, Labor	Capital	Power	Replacement O&M, Routine Maintenance, Labor	Capital	Reagents, Analytical, Power	Replacement O&M, Routine Maintenance, Labor	Capital	Power	Replacement O&M, Routine Maintenance, Labor	Capital	Replacement O&M, Routine Maintenance, Labor	Capital	Replacement O&M, Routine Maintenance, Labor	Capital Cost Subtotal	Capital Cost Indirects	O&M Cost Subtotal (Reagents, Analytical, Power)	O&M Subtotal (Reagents, Analytical, Power) Indirects	O&M Subtotal (Replacement O&M, Routine Maintenance, Labor)	O&M Subtotal (Replacement O&M, Routine Maintenance, Labor) Indirects	Total Cost
0	$ 1,908,800	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,908,800	$ 572,640	$ -	$ -	$ -	$ -	**$ 2,481,440**
1	$ -	$ 2,721,415	$ 156,776	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,734,311	$ 478,504	$ 156,776	$ 27,436	**$ 3,397,026**
2	$ -	$ 2,862,639	$ 156,776	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,875,535	$ 503,219	$ 156,776	$ 27,436	**$ 3,562,966**
3	$ -	$ 2,380,133	$ 156,776	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,393,029	$ 418,780	$ 156,776	$ 27,436	**$ 2,996,020**
4	$ -	$ 1,900,349	$ 156,776	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,913,245	$ 334,818	$ 156,776	$ 27,436	**$ 2,432,274**
5	$ -	$ 1,423,161	$ 156,776	$ -	$ -	$ -	$ 7,585,047	$ 12,896	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,585,047	$ 2,275,514	$ 1,436,057	$ 251,310	$ 156,776	$ 27,436	**$ 11,732,139**
6	$ -	$ 948,570	$ 156,776	$ -	$ -	$ -	$ -	$ 1,765,017	$ 1,112,926	$ 1,564,227	$ 156,051	$ 148,628	$ 138,682	$ 213,757	$ -	$ -	$ 1,702,909	$ 510,873	$ 2,869,637	$ 502,187	$ 1,632,086	$ 285,615	**$ 7,503,307**
7	$ -	$ -	$ -	$ 429,833	$ 46,134	$ 54,997	$ -	$ 1,606,306	$ 1,112,926	$ -	$ 157,284	$ 148,628	$ -	$ 195,617	$ 534,816	$ 222,004	$ 964,649	$ 289,395	$ 1,809,724	$ 316,702	$ 1,734,172	$ 303,480	**$ 5,418,121**
8	$ -	$ -	$ -	$ -	$ 46,134	$ 54,997	$ -	$ 1,614,124	$ 1,112,926	$ -	$ 157,284	$ 148,628	$ -	$ 195,993	$ -	$ 222,004	$ -	$ -	$ 1,817,542	$ 318,070	$ 1,734,548	$ 303,546	**$ 4,173,706**
9	$ -	$ -	$ -	$ -	$ 46,134	$ 54,997	$ -	$ 1,620,590	$ 1,112,926	$ -	$ 157,284	$ 148,628	$ -	$ 196,267	$ -	$ 222,004	$ -	$ -	$ 1,824,008	$ 319,201	$ 1,734,822	$ 303,594	**$ 4,181,626**
10	$ -	$ -	$ -	$ -	$ 46,134	$ 54,997	$ -	$ 1,627,078	$ 1,112,926	$ -	$ 157,284	$ 148,628	$ -	$ 196,432	$ -	$ 222,004	$ -	$ -	$ 1,830,496	$ 320,337	$ 1,734,987	$ 303,623	**$ 4,189,443**
11	$ -	$ -	$ -	$ -	$ 46,134	$ 54,997	$ -	$ 1,506,110	$ 1,112,926	$ -	$ 157,284	$ 148,628	$ -	$ 180,595	$ -	$ 222,004	$ -	$ -	$ 1,709,528	$ 299,167	$ 1,719,150	$ 300,851	**$ 4,028,696**
12	$ -	$ -	$ -	$ -	$ 46,134	$ 54,997	$ -	$ 1,402,101	$ 1,112,926	$ -	$ 157,284	$ 148,628	$ -	$ 166,308	$ -	$ 222,004	$ -	$ -	$ 1,605,519	$ 280,966	$ 1,704,863	$ 298,351	**$ 3,889,699**
13	$ -	$ -	$ -	$ -	$ 26,321	$ 54,997	$ -	$ 1,189,732	$ 1,112,926	$ -	$ 132,525	$ 148,628	$ -	$ 142,017	$ -	$ 211,886	$ -	$ -	$ 1,348,578	$ 236,001	$ 1,670,454	$ 292,329	**$ 3,547,363**
14	$ -	$ -	$ -	$ -	$ 26,088	$ 54,997	$ -	$ 1,088,373	$ 1,112,926	$ -	$ 132,525	$ 148,628	$ -	$ 128,125	$ -	$ 202,516	$ -	$ -	$ 1,246,987	$ 218,223	$ 1,647,192	$ 288,259	**$ 3,400,661**
15	$ -	$ -	$ -	$ -	$ 25,855	$ 54,997	$ -	$ 967,998	$ 1,112,926	$ -	$ 132,525	$ 148,628	$ -	$ 110,719	$ -	$ 193,145	$ -	$ -	$ 1,126,379	$ 197,116	$ 1,620,415	$ 283,573	**$ 3,227,482**
16	$ -	$ -	$ -	$ -	$ 25,623	$ 54,997	$ -	$ 944,829	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 107,564	$ -	$ 183,774	$ -	$ -	$ 1,102,978	$ 193,021	$ 1,129,865	$ 197,726	**$ 2,623,590**
17	$ -	$ -	$ -	$ -	$ 25,390	$ 54,997	$ -	$ 922,037	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 104,484	$ -	$ 174,403	$ -	$ -	$ 1,079,952	$ 188,992	$ 1,117,413	$ 195,547	**$ 2,581,904**
18	$ -	$ -	$ -	$ -	$ 24,587	$ 54,997	$ -	$ 899,614	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 101,475	$ -	$ 165,032	$ -	$ -	$ 1,056,727	$ 184,927	$ 1,105,034	$ 193,381	**$ 2,540,069**
19	$ -	$ -	$ -	$ -	$ 23,215	$ 54,997	$ -	$ 877,555	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 98,536	$ -	$ 155,661	$ -	$ -	$ 1,033,296	$ 180,827	$ 1,092,724	$ 191,227	**$ 2,498,073**
20	$ -	$ -	$ -	$ -	$ 21,748	$ 54,997	$ -	$ 855,855	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 95,664	$ -	$ 146,291	$ -	$ -	$ 1,010,128	$ 176,772	$ 1,080,481	$ 189,084	**$ 2,456,466**
21	$ -	$ -	$ -	$ -	$ 20,281	$ 54,997	$ -	$ 834,508	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 92,856	$ -	$ 136,920	$ -	$ -	$ 987,314	$ 172,780	$ 1,068,303	$ 186,953	**$ 2,415,349**
22	$ -	$ -	$ -	$ -	$ 18,908	$ 54,997	$ -	$ 813,715	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 90,168	$ -	$ 127,549	$ -	$ -	$ 965,149	$ 168,901	$ 1,056,243	$ 184,843	**$ 2,375,136**
23	$ -	$ -	$ -	$ -	$ 17,441	$ 54,997	$ -	$ 797,798	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 88,216	$ -	$ 118,178	$ -	$ -	$ 947,764	$ 165,859	$ 1,044,921	$ 182,861	**$ 2,341,405**
24	$ -	$ -	$ -	$ -	$ 15,974	$ 54,997	$ -	$ 781,894	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 86,277	$ -	$ 108,807	$ -	$ -	$ 930,393	$ 162,819	$ 1,033,611	$ 180,882	**$ 2,307,704**
25	$ -	$ -	$ -	$ -	$ 14,601	$ 54,997	$ -	$ 757,752	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 83,041	$ -	$ 99,436	$ -	$ -	$ 904,879	$ 158,354	$ 1,021,004	$ 178,676	**$ 2,262,913**
26	$ -	$ -	$ -	$ -	$ 13,134	$ 54,997	$ -	$ 740,928	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 80,979	$ -	$ 90,066	$ -	$ -	$ 886,587	$ 155,153	$ 1,009,571	$ 176,675	**$ 2,227,986**
27	$ -	$ -	$ -	$ -	$ 11,762	$ 52,245	$ -	$ 724,353	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 78,942	$ -	$ 80,695	$ -	$ -	$ 868,640	$ 152,012	$ 995,410	$ 174,197	**$ 2,190,259**
28	$ -	$ -	$ -	$ -	$ 10,294	$ 52,245	$ -	$ 708,024	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 76,930	$ -	$ 71,324	$ -	$ -	$ 850,844	$ 148,898	$ 984,028	$ 172,205	**$ 2,155,974**
29	$ -	$ -	$ -	$ -	$ 8,922	$ 52,245	$ -	$ 691,942	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 74,944	$ -	$ 61,953	$ -	$ -	$ 833,390	$ 145,843	$ 972,671	$ 170,217	**$ 2,122,122**
30	$ -	$ -	$ -	$ -	$ 7,455	$ 52,245	$ -	$ 676,106	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 72,984	$ -	$ 52,582	$ -	$ -	$ 816,086	$ 142,815	$ 961,340	$ 168,235	**$ 2,088,476**
31	$ -	$ -	$ -	$ -	$ 6,082	$ 52,245	$ -	$ 660,514	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 71,049	$ -	$ 43,211	$ -	$ -	$ 799,122	$ 139,846	$ 950,035	$ 166,256	**$ 2,055,259**
32	$ -	$ -	$ -	$ -	$ 4,615	$ 52,245	$ -	$ 645,167	$ 634,901	$ -	$ 132,525	$ 148,628	$ -	$ 69,140	$ -	$ 33,841	$ -	$ -	$ 782,308	$ 136,904	$ 938,754	$ 164,282	**$ 2,022,248**
33	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 631,635	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 68,449	$ -	$ 33,841	$ -	$ -	$ 741,829	$ 129,820	$ 938,064	$ 164,161	**$ 1,973,875**
34	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 626,796	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 67,778	$ -	$ 33,841	$ -	$ -	$ 736,990	$ 128,973	$ 937,392	$ 164,044	**$ 1,967,399**
35	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 621,816	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 67,097	$ -	$ 33,841	$ -	$ -	$ 732,010	$ 128,102	$ 936,711	$ 163,924	**$ 1,960,747**
36	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 616,843	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 66,415	$ -	$ 33,841	$ -	$ -	$ 727,037	$ 127,231	$ 936,030	$ 163,805	**$ 1,954,104**
37	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 611,877	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 65,734	$ -	$ 33,841	$ -	$ -	$ 722,071	$ 126,362	$ 935,349	$ 163,686	**$ 1,947,468**
38	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 606,917	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 65,053	$ -	$ 33,841	$ -	$ -	$ 717,111	$ 125,494	$ 934,668	$ 163,567	**$ 1,940,840**
39	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 601,965	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 64,372	$ -	$ 33,841	$ -	$ -	$ 712,159	$ 124,628	$ 933,987	$ 163,448	**$ 1,934,221**
40	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
41	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
42	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
43	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
44	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
45	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
46	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
47	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
48	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
49	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
50	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
51	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
52	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
53	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
54	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
55	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
56	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
57	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
58	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
59	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
60	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
61	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
62	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
63	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
64	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
65	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
66	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
67	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
68	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
69	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
70	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**

GOLDER

Date: 12-Mar-19
Project No.: 113-01153

Subject: Summary Cash Flow in Current Costs
Project Short Title: Chino Mine Closure Closeout Plan

Indirect	Inputs
Capital Cost	30.0%
O&M Cost (power, reagents, analytical)	17.5%
O&M Cost (replacement O&M, labor, routine maintenance)	17.5%

	Short-Term ETS			Long-Term ETS			STS			Water Conveyance			Sludge Disposal Facility		Salt Disposal Facility		Total						
Year	Capital	Power	Replacement O&M, Routine Maintenance, Labor	Capital	Power	Replacement O&M, Routine Maintenance, Labor	Capital	Reagents, Analytical, Power	Replacement O&M, Routine Maintenance, Labor	Capital	Power	Replacement O&M, Routine Maintenance, Labor	Capital	Replacement O&M, Routine Maintenance, Labor	Capital	Replacement O&M, Routine Maintenance, Labor	Capital Cost Subtotal	Capital Cost Indirects	O&M Cost Subtotal (Reagents, Analytical, Power)	O&M Subtotal (Reagents, Analytical, Power) Indirects	O&M Subtotal (Replacement O&M, Routine Maintenance, Labor)	O&M Subtotal (Replacement O&M, Routine Maintenance, Labor) Indirects	Total Cost
71	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
72	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
73	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
74	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
75	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
76	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
77	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
78	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
79	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
80	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
81	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
82	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
83	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
84	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
85	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
86	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
87	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
88	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
89	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
90	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
91	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
92	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
93	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
94	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
95	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
96	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
97	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
98	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
99	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
100	$ -	$ -	$ -	$ -	$ 3,161	$ 52,245	$ -	$ 597,020	$ 634,901	$ -	$ 107,033	$ 148,628	$ -	$ 63,691	$ -	$ 33,841	$ -	$ -	$ 707,214	$ 123,762	$ 933,305	$ 163,328	**$ 1,927,610**
Total	**$ 1,908,800**	**$ 12,236,266**	**$ 940,654**	**$ 429,833**	**$ 840,074**	**$ 4,966,038**	**$ 7,585,047**	**$ 68,520,568**	**$ 65,095,852**	**$ 1,564,227**	**$ 11,028,494**	**$ 14,119,680**	**$ 138,682**	**$ 7,549,128**	**$ 534,816**	**$ 6,090,454**	**$ 12,161,405**	**$ 3,648,421**	**$ 92,625,402**	**$ 16,209,445**	**$ 98,761,805**	**$ 17,283,316**	**$ 240,689,794**

GOLDER

Date:	12-Mar-19	**Inputs**	
Project No.:	113-01153	New Cost	$ 1,908,800
Subject:	Short Term ETS Direct Cost Cash Flow by Year in Current Cost Dollars	Replacement O&M Percentage	0.0%
Project Short Title:	Chino Mine Closure Closeout Plan	Routine Maintenance Percentage	1.5%
		Avg ($/kWh) Year 1 through 6	$ 0.044
		Avg ($/kWh) Year 7 through 100	$ 0.045

Year Following Closure	Year	Capital	Replacement O&M[1]	Routine Maintenance[1]	O&M Labor	Annual Power Usage (kWh)	Electricity Annual Cost	Total Annual Cost
0	2018	$ 1,908,800	$ -	$ -	$ -	0	$ -	$ 1,908,800
1	2019	$ -	$ -	$ 28,632	$ 128,144	61,320,000	$ 2,721,415	$ 2,878,190
2	2020	$ -	$ -	$ 28,632	$ 128,144	64,502,135	$ 2,862,639	$ 3,019,415
3	2021	$ -	$ -	$ 28,632	$ 128,144	53,630,103	$ 2,380,133	$ 2,536,908
4	2022	$ -	$ -	$ 28,632	$ 128,144	42,819,413	$ 1,900,349	$ 2,057,124
5	2023	$ -	$ -	$ 28,632	$ 128,144	32,067,230	$ 1,423,161	$ 1,579,937
6	2024	$ -	$ -	$ 28,632	$ 128,144	21,373,553	$ 948,570	$ 1,105,345
7	2025	$ -	$ -	$ -	$ -	0	$ -	$ -
8	2026	$ -	$ -	$ -	$ -	0	$ -	$ -
9	2027	$ -	$ -	$ -	$ -	0	$ -	$ -
10	2028	$ -	$ -	$ -	$ -	0	$ -	$ -
11	2029	$ -	$ -	$ -	$ -	0	$ -	$ -
12	2030	$ -	$ -	$ -	$ -	0	$ -	$ -
13	2031	$ -	$ -	$ -	$ -	0	$ -	$ -
14	2032	$ -	$ -	$ -	$ -	0	$ -	$ -
15	2033	$ -	$ -	$ -	$ -	0	$ -	$ -
16	2034	$ -	$ -	$ -	$ -	0	$ -	$ -
17	2035	$ -	$ -	$ -	$ -	0	$ -	$ -
18	2036	$ -	$ -	$ -	$ -	0	$ -	$ -
19	2037	$ -	$ -	$ -	$ -	0	$ -	$ -
20	2038	$ -	$ -	$ -	$ -	0	$ -	$ -
21	2039	$ -	$ -	$ -	$ -	0	$ -	$ -
22	2040	$ -	$ -	$ -	$ -	0	$ -	$ -
23	2041	$ -	$ -	$ -	$ -	0	$ -	$ -
24	2042	$ -	$ -	$ -	$ -	0	$ -	$ -
25	2043	$ -	$ -	$ -	$ -	0	$ -	$ -
26	2044	$ -	$ -	$ -	$ -	0	$ -	$ -
27	2045	$ -	$ -	$ -	$ -	0	$ -	$ -
28	2046	$ -	$ -	$ -	$ -	0	$ -	$ -
29	2047	$ -	$ -	$ -	$ -	0	$ -	$ -
30	2048	$ -	$ -	$ -	$ -	0	$ -	$ -
31	2049	$ -	$ -	$ -	$ -	0	$ -	$ -
32	2050	$ -	$ -	$ -	$ -	0	$ -	$ -
33	2051	$ -	$ -	$ -	$ -	0	$ -	$ -
34	2052	$ -	$ -	$ -	$ -	0	$ -	$ -
35	2053	$ -	$ -	$ -	$ -	0	$ -	$ -
36	2054	$ -	$ -	$ -	$ -	0	$ -	$ -
37	2055	$ -	$ -	$ -	$ -	0	$ -	$ -
38	2056	$ -	$ -	$ -	$ -	0	$ -	$ -
39	2057	$ -	$ -	$ -	$ -	0	$ -	$ -
40	2058	$ -	$ -	$ -	$ -	0	$ -	$ -
41	2059	$ -	$ -	$ -	$ -	0	$ -	$ -
42	2060	$ -	$ -	$ -	$ -	0	$ -	$ -
43	2061	$ -	$ -	$ -	$ -	0	$ -	$ -
44	2062	$ -	$ -	$ -	$ -	0	$ -	$ -
45	2063	$ -	$ -	$ -	$ -	0	$ -	$ -
46	2064	$ -	$ -	$ -	$ -	0	$ -	$ -
47	2065	$ -	$ -	$ -	$ -	0	$ -	$ -
48	2066	$ -	$ -	$ -	$ -	0	$ -	$ -
49	2067	$ -	$ -	$ -	$ -	0	$ -	$ -
50	2068	$ -	$ -	$ -	$ -	0	$ -	$ -
51	2069	$ -	$ -	$ -	$ -	0	$ -	$ -
52	2070	$ -	$ -	$ -	$ -	0	$ -	$ -
53	2071	$ -	$ -	$ -	$ -	0	$ -	$ -
54	2072	$ -	$ -	$ -	$ -	0	$ -	$ -
55	2073	$ -	$ -	$ -	$ -	0	$ -	$ -
56	2074	$ -	$ -	$ -	$ -	0	$ -	$ -
57	2075	$ -	$ -	$ -	$ -	0	$ -	$ -
58	2076	$ -	$ -	$ -	$ -	0	$ -	$ -
59	2077	$ -	$ -	$ -	$ -	0	$ -	$ -
60	2078	$ -	$ -	$ -	$ -	0	$ -	$ -
61	2079	$ -	$ -	$ -	$ -	0	$ -	$ -

Inputs

New Cost	$	1,908,800
Replacement O&M Percentage		0.0%
Routine Maintenance Percentage		1.5%
Avg ($/kWh) Year 1 through 6	$	0.044
Avg ($/kWh) Year 7 through 100	$	0.045

Date: 12-Mar-19
Project No.: 113-01153
Subject: Short Term ETS Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Year Following Closure	Year	Capital	Replacement O&M[1]	Routine Maintenance[1]	O&M Labor	Annual Power Usage (kWh)	Electricity Annual Cost	Total Annual Cost
62	2080	$ -	$ -	$ -	$ -	0	$ -	$ -
63	2081	$ -	$ -	$ -	$ -	0	$ -	$ -
64	2082	$ -	$ -	$ -	$ -	0	$ -	$ -
65	2083	$ -	$ -	$ -	$ -	0	$ -	$ -
66	2084	$ -	$ -	$ -	$ -	0	$ -	$ -
67	2085	$ -	$ -	$ -	$ -	0	$ -	$ -
68	2086	$ -	$ -	$ -	$ -	0	$ -	$ -
69	2087	$ -	$ -	$ -	$ -	0	$ -	$ -
70	2088	$ -	$ -	$ -	$ -	0	$ -	$ -
71	2089	$ -	$ -	$ -	$ -	0	$ -	$ -
72	2090	$ -	$ -	$ -	$ -	0	$ -	$ -
73	2091	$ -	$ -	$ -	$ -	0	$ -	$ -
74	2092	$ -	$ -	$ -	$ -	0	$ -	$ -
75	2093	$ -	$ -	$ -	$ -	0	$ -	$ -
76	2094	$ -	$ -	$ -	$ -	0	$ -	$ -
77	2095	$ -	$ -	$ -	$ -	0	$ -	$ -
78	2096	$ -	$ -	$ -	$ -	0	$ -	$ -
79	2097	$ -	$ -	$ -	$ -	0	$ -	$ -
80	2098	$ -	$ -	$ -	$ -	0	$ -	$ -
81	2099	$ -	$ -	$ -	$ -	0	$ -	$ -
82	2100	$ -	$ -	$ -	$ -	0	$ -	$ -
83	2101	$ -	$ -	$ -	$ -	0	$ -	$ -
84	2102	$ -	$ -	$ -	$ -	0	$ -	$ -
85	2103	$ -	$ -	$ -	$ -	0	$ -	$ -
86	2104	$ -	$ -	$ -	$ -	0	$ -	$ -
87	2105	$ -	$ -	$ -	$ -	0	$ -	$ -
88	2106	$ -	$ -	$ -	$ -	0	$ -	$ -
89	2107	$ -	$ -	$ -	$ -	0	$ -	$ -
90	2108	$ -	$ -	$ -	$ -	0	$ -	$ -
91	2109	$ -	$ -	$ -	$ -	0	$ -	$ -
92	2110	$ -	$ -	$ -	$ -	0	$ -	$ -
93	2111	$ -	$ -	$ -	$ -	0	$ -	$ -
94	2112	$ -	$ -	$ -	$ -	0	$ -	$ -
95	2113	$ -	$ -	$ -	$ -	0	$ -	$ -
96	2114	$ -	$ -	$ -	$ -	0	$ -	$ -
97	2115	$ -	$ -	$ -	$ -	0	$ -	$ -
98	2116	$ -	$ -	$ -	$ -	0	$ -	$ -
99	2117	$ -	$ -	$ -	$ -	0	$ -	$ -
100	2118	$ -	$ -	$ -	$ -	0	$ -	$ -
Total		**$ 1,908,800**	**$ -**	**$ 171,792**	**$ 768,862**	**275,712,433**	**$ 12,236,266**	**$ 15,085,720**

Notes:
[1] Replacement O&M allowance for the Short-Term ETS is estimated at zero given this is a short-term system and capital replacement is not expected. Routine maintenance is estimated at a percentage of the initial direct capital cost.
Cost estimate backup details are included in Attachment B to the Chino Water Treatment Cost Basis Document.
Costs do not include indirect costs

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Labor Cost Estimate - ETS and Salt Disposal Facility Operations
Project Short Title: Chino Mine Closure Closeout Plan

Short-Term ETS			
Day shift - 1.5 operator (7 day/wk shift coverage)[1]			
Operators		1.5	
Operator Rate[2]	$	18.60	/hr
Operator Hours (1.5 FTE)		2080	hr/op
Operator Total Cost	$	58,032	
Sub-Total Operator Cost	**$**	**58,032**	
Overtime for operators		15%	
Overtime hours for operators		468	
Operator Overtime Total Cost	$	13,057	
Overtime Cost	**$**	**13,057**	
Supervisors		0.5	
Supervisor Rate[3]	$	31.10	/hr
Supervisor Hours		1,040	hr/sup
Supervisor Total Cost	$	32,344	
Benefits fringe rate per hour[2]	$	5.94	/hr
Hours per year		4,160	hrs/yr
Benefits Cost	$	24,710	
Benefits Cost	**$**	**24,710**	
Total Operator Labor Cost	**$**	**128,144**	

Notes:

[1] Operator numbers are estimated from Golder's experience with operating similar plants.

[2] Wages from 2019 New Mexico Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group I.
https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf

[3] Wages from 2019 New Mexico Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group X.
https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf

Costs do not include indirect costs

GOLDER

Date:	12-Mar-19
Project No.:	113-01153
Subject:	Long Term ETS Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title:	Chino Mine Closure Closeout Plan

Inputs

Total Pumps and Pipeline Costs if New	$ 638,400
Total Sprayer Costs if New	$186,874
Total Tank and Reservoir Cost if New	$ 841,307
Replacement O&M	1.8%
Routine Maintenance Percentage	1.5%
Avg ($/kWh) Year 7 through 100	$ 0.045

Year Following Closure	Year	Capital	Pumps and Pipeline Replacement O&M[1]	Sprayers Replacement O&M[1]	Tank and Reservoirs Replacement O&M[1]	Pumps and Pipeline Routine Maintenance[2]	Sprayers Routine Maintenance[2]	Tank and Reservoirs Routine Maintenance[2]	O&M Labor[3]	Pumping System Annual Power Usage (kWh)	Mechanical Spray System Annual Power Usage (kWh)	Electricity Annual Cost	Total Annual Cost
1	2019	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	0	$ -	$ -
2	2020	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	0	$ -	$ -
3	2021	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	0	$ -	$ -
4	2022	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	0	$ -	$ -
5	2023	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	0	$ -	$ -
6	2024	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0	0	$ -	$ -
7	2025	$ 429,833	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	207,458	823,890	$ 46,134	$ 530,964
8	2026	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	207,458	823,890	$ 46,134	$ 101,131
9	2027	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	207,458	823,890	$ 46,134	$ 101,131
10	2028	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	207,458	823,890	$ 46,134	$ 101,131
11	2029	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	207,458	823,890	$ 46,134	$ 101,131
12	2030	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	207,458	823,890	$ 46,134	$ 101,131
13	2031	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	122,601	465,821	$ 26,321	$ 81,318
14	2032	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	117,398	465,821	$ 26,088	$ 81,085
15	2033	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	112,195	465,821	$ 25,855	$ 80,853
16	2034	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	106,992	465,821	$ 25,623	$ 80,620
17	2035	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	101,789	465,821	$ 25,390	$ 80,387
18	2036	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	96,585	453,083	$ 24,587	$ 79,585
19	2037	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	91,382	427,606	$ 23,215	$ 78,212
20	2038	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	86,179	400,007	$ 21,748	$ 76,745
21	2039	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	80,976	372,408	$ 20,281	$ 75,278
22	2040	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	75,772	346,932	$ 18,908	$ 73,905
23	2041	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	70,569	319,333	$ 17,441	$ 72,438
24	2042	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	65,366	291,734	$ 15,974	$ 70,971
25	2043	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	60,163	266,258	$ 14,601	$ 69,598
26	2044	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 2,803	$ 12,620	Included in Total Operating Cost	54,960	238,659	$ 13,134	$ 68,131
27	2045	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	49,756	213,183	$ 11,762	$ 64,006
28	2046	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	44,553	185,584	$ 10,294	$ 62,539
29	2047	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	39,350	160,107	$ 8,922	$ 61,167
30	2048	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	34,147	132,508	$ 7,455	$ 59,699
31	2049	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	28,944	107,032	$ 6,082	$ 58,327
32	2050	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	79,433	$ 4,615	$ 56,860
33	2051	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
34	2052	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
35	2053	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
36	2054	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
37	2055	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
38	2056	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
39	2057	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
40	2058	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
41	2059	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
42	2060	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
43	2061	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Long Term ETS Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Inputs

Total Pumps and Pipeline Costs if New	$	638,400
Total Sprayer Costs if New		$186,874
Total Tank and Reservoir Cost if New	$	841,307
Replacement O&M		1.8%
Routine Maintenance Percentage		1.5%
Avg ($/kWh) Year 7 through 100	$	0.045

Year Following Closure	Year	Capital	Pumps and Pipeline Replacement O&M[1]	Sprayers Replacement O&M[1]	Tank and Reservoirs Replacement O&M[1]	Pumps and Pipeline Routine Maintenance[2]	Sprayers Routine Maintenance[2]	Tank and Reservoirs Routine Maintenance[2]	O&M Labor[3]	Pumping System Annual Power Usage (kWh)	Mechanical Spray System Annual Power Usage (kWh)	Electricity Annual Cost	Total Annual Cost
44	2062	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
45	2063	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
46	2064	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
47	2065	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
48	2066	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
49	2067	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
50	2068	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
51	2069	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
52	2070	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
53	2071	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
54	2072	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
55	2073	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
56	2074	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
57	2075	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
58	2076	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
59	2077	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
60	2078	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
61	2079	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
62	2080	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
63	2081	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
64	2082	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
65	2083	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
66	2084	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
67	2085	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
68	2086	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
69	2087	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
70	2088	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
71	2089	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
72	2090	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
73	2091	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
74	2092	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
75	2093	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
76	2094	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
77	2095	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
78	2096	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
79	2097	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
80	2098	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
81	2099	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
82	2100	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
83	2101	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
84	2102	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
85	2103	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
86	2104	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Long Term ETS Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Inputs

Total Pumps and Pipeline Costs if New	$ 638,400
Total Sprayer Costs if New	$186,874
Total Tank and Reservoir Cost if New	$ 841,307
Replacement O&M	1.8%
Routine Maintenance Percentage	1.5%
Avg ($/kWh) Year 7 through 100	$ 0.045

Year Following Closure	Year	Capital	Pumps and Pipeline Replacement O&M[1]	Sprayers Replacement O&M[1]	Tank and Reservoirs Replacement O&M[1]	Pumps and Pipeline Routine Maintenance[2]	Sprayers Routine Maintenance[2]	Tank and Reservoirs Routine Maintenance[2]	O&M Labor[3]	Pumping System Annual Power Usage (kWh)	Mechanical Spray System Annual Power Usage (kWh)	Electricity Annual Cost	Total Annual Cost
87	2105	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
88	2106	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
89	2107	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
90	2108	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
91	2109	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
92	2110	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
93	2111	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
94	2112	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
95	2113	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
96	2114	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
97	2115	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
98	2116	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
99	2117	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
100	2118	$ -	$ 11,491	$ 3,364	$ 15,144	$ 9,576	$ 50	$ 12,620	Included in Total Operating Cost	23,740	46,935	$ 3,161	$ 55,406
Total		**$ 429,833**	**$ 1,080,173**	**$ 316,191**	**$ 1,423,491**	**$ 900,144**	**$ 59,796**	**$ 1,186,243**	**$ -**	**4,322,504**	**14,457,880**	**$ 840,074**	**$ 6,235,945**

Notes:

[1] Replacement O&M costs are estimated at 1.8% of the total capital cost for the complete long-term ETS (pumps, pipelines, tanks, reservoirs, and sprayers). A higher percentage of capital cost is estimated given that existing pumps, pipelines, tanks and reservoirs will be utilized initially up until their associated life expectancies are met and will require replacement sooner than if new equipment was utilized initially. All spray systems will be new at the start of the ETS, but a higher percentage capital cost is estimated to ensure conservatism and to align with existing existing pumps, pipelines, tanks and reservoirs O&M Replacement estimates.

[2] Routine maintenance is estimated at 1.5% of the total capital cost for the complete long-term ETS (pumps, pipelines, tanks, reservoirs, and sprayers). Routine maintenance includes materials needed for preventative maintenance such as mechanical seals, lubricant, valve sleeves, fuses, etc.

[3] O&M Labor is included in the Total Operating Cost calculation.

Cost estimate backup details are included in Attachment B to the Chino Water Treatment Cost Basis Document.

Costs do not include indirect costs

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Salt Disposal Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Inputs

New Cost	$	534,816
Replacement O&M		0.25%
Salt Removal (cy/yr)	$	8.055

Year Following Closure	Year	Capital	Replacement O&M[1]	Routine Maintenance[2]	O&M Labor[2]	Annual Salt Production/ Removal (cy/yr)	Total Operating Cost[3]
1	2019	$ -	$ -	$ -	$ -	0	$ -
2	2020	$ -	$ -	$ -	$ -	0	$ -
3	2021	$ -	$ -	$ -	$ -	0	$ -
4	2022	$ -	$ -	$ -	$ -	0	$ -
5	2023	$ -	$ -	$ -	$ -	0	$ -
6	2024	$ -	$ -	$ -	$ -	0	$ -
7	2025	$ 534,816	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	27,395	$ 756,820
8	2026	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	27,395	$ 222,004
9	2027	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	27,395	$ 222,004
10	2028	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	27,395	$ 222,004
11	2029	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	27,395	$ 222,004
12	2030	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	27,395	$ 222,004
13	2031	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	26,139	$ 211,886
14	2032	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	24,976	$ 202,516
15	2033	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	23,812	$ 193,145
16	2034	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	22,649	$ 183,774
17	2035	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	21,486	$ 174,403
18	2036	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	20,322	$ 165,032
19	2037	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	19,159	$ 155,661
20	2038	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	17,995	$ 146,291
21	2039	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	16,832	$ 136,920
22	2040	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	15,669	$ 127,549
23	2041	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	14,505	$ 118,178
24	2042	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	13,342	$ 108,807
25	2043	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	12,179	$ 99,436
26	2044	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	11,015	$ 90,066
27	2045	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	9,852	$ 80,695
28	2046	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	8,689	$ 71,324
29	2047	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	7,525	$ 61,953
30	2048	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	6,362	$ 52,582
31	2049	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	5,199	$ 43,211
32	2050	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
33	2051	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
34	2052	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
35	2053	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
36	2054	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
37	2055	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
38	2056	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
39	2057	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
40	2058	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
41	2059	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
42	2060	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
43	2061	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
44	2062	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
45	2063	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
46	2064	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
47	2065	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
48	2066	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
49	2067	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
50	2068	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
51	2069	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
52	2070	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
53	2071	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
54	2072	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
55	2073	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
56	2074	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
57	2075	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
58	2076	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
59	2077	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
60	2078	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
61	2079	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
62	2080	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
63	2081	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
64	2082	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
65	2083	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
66	2084	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841

GOLDER

Inputs

New Cost	$	534,816
Replacement O&M		0.25%
Salt Removal (cy/yr)	$	8.055

Date: 12-Mar-19
Project No.: 113-01153
Subject: Salt Disposal Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Year Following Closure	Year	Capital	Replacement O&M[1]	Routine Maintenance[2]	O&M Labor[2]	Annual Salt Production/ Removal (cy/yr)	Total Operating Cost[3]
67	2085	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
68	2086	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
69	2087	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
70	2088	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
71	2089	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
72	2090	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
73	2091	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
74	2092	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
75	2093	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
76	2094	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
77	2095	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
78	2096	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
79	2097	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
80	2098	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
81	2099	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
82	2100	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
83	2101	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
84	2102	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
85	2103	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
86	2104	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
87	2105	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
88	2106	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
89	2107	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
90	2108	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
91	2109	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
92	2110	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
93	2111	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
94	2112	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
95	2113	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
96	2114	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
97	2115	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
98	2116	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
99	2117	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
100	2118	$ -	$ 1,337	Included in Total Operating Cost	Included in Total Operating Cost	4,035	$ 33,841
Total		**$ 534,816**	**$ 125,682**	**$ -**	**$ -**	**740,506**	**$ 6,625,270**

Notes:

[1] Replacement O&M is estimated only at 0.25% of the total capital cost since the capital cost of the facility is high since it is a lined facility. Costs associated with closure of each of the four individual cells comprising the salt disposal facility (approximately 106,800 cubic yards per cell). Closure includes grading, three foot of earthen cover, and revegetation. Initial capital cost for construction of salt disposal facility (by RS Means) shown in Year 7.

[2] Routine Maintenance and O&M Labor is included in the Total Operating Cost calculation.

[3] Costs based on RS Means estimate of $8.055 per/cy for excavation, loading, hauling, and placing of salts at the Resevoir 6 HDPE-lined salt disposal facility.

Cost estimate backup details are included in Attachment B to the Chino Water Treatment Cost Basis Document.

Costs do not include indirect costs

GOLDER

Inputs

Total Pump and Pipeline Costs if New	$	4,195,576
Total Tank and Reservoir Cost if New	$	308,309
Replacement O&M Percentage		1.8%
Routine Maintenance Percentage		1.5%
Avg ($/kWh) Year 1 through 6	$	0.044
Avg ($/kWh) Year 7 through 100	$	0.045

Date: 12-Mar-19
Project No.: 113-01153
Subject: Water Conveyance Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Year Following Closure	Year	Capital[1]	Pumps and Pipeline Replacement O&M[2]	Tanks and Reservoir Replacement O&M[2]	Pumps and Pipeline Routine Maintenance[3]	Tanks and Reservoir Routine Maintenance[3]	O&M Labor[4]	Pumping System Annual Power Usage (kWh)	O&M Electrical Annual Cost	Total Annual Cost
1	2019	$ -	$ -	$ -	$ -	$ -	N/A	0	$ -	$ -
2	2020	$ -	$ -	$ -	$ -	$ -	N/A	0	$ -	$ -
3	2021	$ -	$ -	$ -	$ -	$ -	N/A	0	$ -	$ -
4	2022	$ -	$ -	$ -	$ -	$ -	N/A	0	$ -	$ -
5	2023	$ -	$ -	$ -	$ -	$ -	N/A	0	$ -	$ -
6	2024	$ 1,564,227	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	3,516,193	$ 156,051	$ 1,868,906
7	2025	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	3,516,193	$ 157,284	$ 305,913
8	2026	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	3,516,193	$ 157,284	$ 305,913
9	2027	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	3,516,193	$ 157,284	$ 305,913
10	2028	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	3,516,193	$ 157,284	$ 305,913
11	2029	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	3,516,193	$ 157,284	$ 305,913
12	2030	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	3,516,193	$ 157,284	$ 305,913
13	2031	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
14	2032	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
15	2033	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
16	2034	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
17	2035	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
18	2036	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
19	2037	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
20	2038	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
21	2039	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
22	2040	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
23	2041	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
24	2042	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
25	2043	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
26	2044	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
27	2045	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
28	2046	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
29	2047	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
30	2048	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
31	2049	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
32	2050	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,962,690	$ 132,525	$ 281,154
33	2051	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
34	2052	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
35	2053	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
36	2054	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
37	2055	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
38	2056	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
39	2057	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
40	2058	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
41	2059	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
42	2060	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
43	2061	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
44	2062	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
45	2063	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
46	2064	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
47	2065	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
48	2066	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
49	2067	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
50	2068	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
51	2069	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
52	2070	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
53	2071	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
54	2072	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
55	2073	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
56	2074	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
57	2075	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
58	2076	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
59	2077	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
60	2078	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
61	2079	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
62	2080	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
63	2081	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
64	2082	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
65	2083	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
66	2084	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
67	2085	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
68	2086	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
69	2087	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
70	2088	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
71	2089	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
72	2090	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
73	2091	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
74	2092	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
75	2093	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
76	2094	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
77	2095	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
78	2096	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661

GOLDER

Inputs

Total Pump and Pipeline Costs if New	$	4,195,576
Total Tank and Reservoir Cost if New	$	308,309
Replacement O&M Percentage		1.8%
Routine Maintenance Percentage		1.5%
Avg ($/kWh) Year 1 through 6	$	0.044
Avg ($/kWh) Year 7 through 100	$	0.045

Date: 12-Mar-19
Project No.: 113-01153
Subject: Water Conveyance Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Year Following Closure	Year	Capital[1]	Pumps and Pipeline Replacement O&M[2]	Tanks and Reservoir Replacement O&M[2]	Pumps and Pipeline Routine Maintenance[3]	Tanks and Reservoir Routine Maintenance[3]	O&M Labor[4]	Pumping System Annual Power Usage (kWh)	O&M Electrical Annual Cost	Total Annual Cost
79	2097	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
80	2098	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
81	2099	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
82	2100	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
83	2101	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
84	2102	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
85	2103	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
86	2104	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
87	2105	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
88	2106	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
89	2107	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
90	2108	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
91	2109	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
92	2110	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
93	2111	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
94	2112	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
95	2113	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
96	2114	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
97	2115	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
98	2116	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
99	2117	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
100	2118	$ -	$ 75,520	$ 5,550	$ 62,934	$ 4,625	Inc. in STS Labor	2,392,785	$ 107,033	$ 255,661
Total		**$ 1,564,227**	**$ 7,174,436**	**$ 527,208**	**$ 5,978,696**	**$ 439,340**	**$ -**	**246,576,521**	**$ 11,028,494**	**$ 26,712,401**

Notes:

[1] Capital pipeline costs include discharge pipeline from STS to James Canyon Reservoir, energy dissipation structure, and a tank.

[2] Replacement O&M costs are estimated at 1.8% of the total capital cost for the complete water conveyance system. A higher percentage of capital cost is estimated given that existing pumps, pipelines, tanks and reservoirs will be utilized initially up until their associated life expectancies are met and will require replacement sooner than if new equipment was utilized initially.

[3] Routine maintenance is estimated at 1.5% of the total capital cost for the complete water conveyance system. Routine maintenance includes materials needed for preventative maintenance such as mechanical seals, lubricant, valve sleeves, fuses, etc.

[4] Labor for water conveyance is included in labor for the STS. STS Labor is provided on the STS Cash Flow sheet.

Cost estimate backup details are included in Attachment B to the Chino Water Treatment Cost Basis Document.

Costs do not include indirect costs

Date:	12-Mar-19		
Project No.:	113-01153		
Subject:	Sludge Disposal Direct Cost Cash Flow by Year in Current Cost Dollars		
Project Short Title:	Chino Mine Closure Closeout Plan		

Inputs

New Cost	$	138,682
Replacement O&M		1.0%
Sludge disposal ($/cy)	$	5.34

Year Following Closure	Year	Capital	Replacement O&M[1]	Routine Maintenance[2]	O&M Labor[2]	Annual Sludge Production/ Removal (cy/yr)	Total Operating Cost
1	2019	$ -	$ -	$ -	$ -	0	$ -
2	2020	$ -	$ -	$ -	$ -	0	$ -
3	2021	$ -	$ -	$ -	$ -	0	$ -
4	2022	$ -	$ -	$ -	$ -	0	$ -
5	2023	$ -	$ -	$ -	$ -	0	$ -
6	2024	$ 138,682	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	39,770	$ 352,439
7	2025	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	36,373	$ 195,617
8	2026	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	36,443	$ 195,993
9	2027	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	36,494	$ 196,267
10	2028	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	36,525	$ 196,432
11	2029	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	33,560	$ 180,595
12	2030	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	30,884	$ 166,308
13	2031	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	26,335	$ 142,017
14	2032	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	23,734	$ 128,125
15	2033	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	20,474	$ 110,719
16	2034	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	19,883	$ 107,564
17	2035	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	19,307	$ 104,484
18	2036	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	18,743	$ 101,475
19	2037	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	18,193	$ 98,536
20	2038	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	17,655	$ 95,664
21	2039	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	17,129	$ 92,856
22	2040	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	16,626	$ 90,168
23	2041	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	16,260	$ 88,216
24	2042	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	15,897	$ 86,277
25	2043	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	15,291	$ 83,041
26	2044	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	14,905	$ 80,979
27	2045	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	14,523	$ 78,942
28	2046	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	14,147	$ 76,930
29	2047	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	13,775	$ 74,944
30	2048	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	13,408	$ 72,984
31	2049	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	13,045	$ 71,049
32	2050	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	12,688	$ 69,140
33	2051	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	12,559	$ 68,449
34	2052	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	12,433	$ 67,778
35	2053	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	12,305	$ 67,097
36	2054	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	12,178	$ 66,415
37	2055	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	12,050	$ 65,734
38	2056	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,923	$ 65,053
39	2057	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,795	$ 64,372
40	2058	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
41	2059	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
42	2060	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
43	2061	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
44	2062	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
45	2063	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
46	2064	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
47	2065	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
48	2066	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
49	2067	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
50	2068	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
51	2069	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
52	2070	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
53	2071	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
54	2072	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
55	2073	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
56	2074	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
57	2075	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
58	2076	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
59	2077	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
60	2078	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
61	2079	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
62	2080	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
63	2081	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
64	2082	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
65	2083	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691

GOLDER

Date:	12-Mar-19		
Project No.:	113-01153		
Subject:	Sludge Disposal Direct Cost Cash Flow by Year in Current Cost Dollars		
Project Short Title:	Chino Mine Closure Closeout Plan		

Inputs

New Cost	$	138,682
Replacement O&M		1.0%
Sludge disposal ($/cy)	$	5.34

Year Following Closure	Year	Capital	Replacement O&M[1]	Routine Maintenance[2]	O&M Labor[2]	Annual Sludge Production/ Removal (cy/yr)	Total Operating Cost
66	2084	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
67	2085	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
68	2086	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
69	2087	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
70	2088	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
71	2089	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
72	2090	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
73	2091	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
74	2092	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
75	2093	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
76	2094	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
77	2095	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
78	2096	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
79	2097	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
80	2098	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
81	2099	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
82	2100	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
83	2101	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
84	2102	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
85	2103	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
86	2104	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
87	2105	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
88	2106	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
89	2107	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
90	2108	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
91	2109	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
92	2110	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
93	2111	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
94	2112	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
95	2113	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
96	2114	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
97	2115	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
98	2116	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
99	2117	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
100	2118	$ -	$ 1,387	Included in Total Operating Cost	Included in Total Operating Cost	11,667	$ 63,691
Total		**$ 138,682**	**$ 131,748**	**$ -**	**$ -**	**1,389,023**	**$ 7,687,810**

Notes:

[1] Capital replacement is estimated at 1% of the total capital cost and includes estimated costs associated with closure of each of the four individual cells comprising the sludge disposal facility (approximately 347,256 cubic yards per cell). Closure includes grading, three foot of earthen cover, and revegetation costs. Initial capital cost for construction of sludge disposal facility (by RS Means) shown in Year 6.

[2] Routine Maintenance and Operation and Maintanance Labor is included in the Total Operating Cost calculation. Costs based on RS Means estimate of $5.34 per/cy for loading, hauling, and placing of sludge at the sludge disposal facility.

Cost estimate backup details are included in Attachment B to the Chino Water Treatment Cost Basis Document.
Costs do not include indirect costs

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: STS Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Inputs		
New Cost	$	7,585,047
Replacement O&M Percentage		1.0%
Routine Maintenance Percentage		1.5%
Avg ($/kWh) Year 1 through 6	$	0.044
Avg ($/kWh) Year 7 through 100	$	0.045

Year	Capital	Labor	Replacement O&M	Routine Maintenance	Reagents: Lime (CaO)	Reagents: Flocculent	Reagents: Acid (35% HCl)	Reagents: Membrane Chemicals	Analytical	Power	Total Annual Cost
1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ 12,896
2	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ 12,896
3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ 12,896
4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ 12,896
5	$ 7,585,047	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,896	$ -	$ 7,597,943
6	$ -	$ 923,300	$ 75,850	$ 113,776	$ 1,373,365	$ 92,947	$ 8,577	$ 154,231	$ 46,748	$ 89,148	$ 2,877,943
7	$ -	$ 923,300	$ 75,850	$ 113,776	$ 1,242,759	$ 82,606	$ 7,896	$ 143,249	$ 46,748	$ 83,048	$ 2,719,231
8	$ -	$ 923,300	$ 75,850	$ 113,776	$ 1,259,625	$ 81,841	$ 7,629	$ 138,019	$ 46,748	$ 80,262	$ 2,727,050
9	$ -	$ 923,300	$ 75,850	$ 113,776	$ 1,274,945	$ 80,985	$ 7,371	$ 132,978	$ 46,748	$ 77,564	$ 2,733,516
10	$ -	$ 923,300	$ 75,850	$ 113,776	$ 1,289,928	$ 80,132	$ 7,122	$ 128,165	$ 46,748	$ 74,983	$ 2,740,004
11	$ -	$ 923,300	$ 75,850	$ 113,776	$ 1,182,095	$ 78,386	$ 6,898	$ 123,055	$ 43,524	$ 72,152	$ 2,619,035
12	$ -	$ 923,300	$ 75,850	$ 113,776	$ 1,086,256	$ 77,342	$ 6,712	$ 118,555	$ 43,524	$ 69,712	$ 2,515,027
13	$ -	$ 923,300	$ 75,850	$ 113,776	$ 910,906	$ 70,255	$ 6,277	$ 110,777	$ 26,598	$ 64,919	$ 2,302,657
14	$ -	$ 923,300	$ 75,850	$ 113,776	$ 818,044	$ 68,758	$ 6,086	$ 106,396	$ 26,598	$ 62,492	$ 2,201,299
15	$ -	$ 923,300	$ 75,850	$ 113,776	$ 721,701	$ 67,000	$ 5,438	$ 92,265	$ 26,598	$ 54,997	$ 2,080,924
16	$ -	$ 445,275	$ 75,850	$ 113,776	$ 704,173	$ 66,287	$ 5,286	$ 89,167	$ 26,598	$ 53,318	$ 1,579,731
17	$ -	$ 445,275	$ 75,850	$ 113,776	$ 686,801	$ 65,580	$ 5,141	$ 86,206	$ 26,598	$ 51,711	$ 1,556,938
18	$ -	$ 445,275	$ 75,850	$ 113,776	$ 669,588	$ 64,878	$ 5,002	$ 83,376	$ 26,598	$ 50,172	$ 1,534,515
19	$ -	$ 445,275	$ 75,850	$ 113,776	$ 652,539	$ 64,181	$ 4,869	$ 80,671	$ 26,598	$ 48,697	$ 1,512,456
20	$ -	$ 445,275	$ 75,850	$ 113,776	$ 635,658	$ 63,489	$ 4,741	$ 78,084	$ 26,598	$ 47,285	$ 1,490,756
21	$ -	$ 445,275	$ 75,850	$ 113,776	$ 618,951	$ 62,802	$ 4,619	$ 75,608	$ 26,598	$ 45,930	$ 1,469,409
22	$ -	$ 445,275	$ 75,850	$ 113,776	$ 602,372	$ 62,111	$ 4,509	$ 73,408	$ 26,598	$ 44,718	$ 1,448,617
23	$ -	$ 445,275	$ 75,850	$ 113,776	$ 587,692	$ 61,498	$ 4,486	$ 73,056	$ 26,598	$ 44,469	$ 1,432,699
24	$ -	$ 445,275	$ 75,850	$ 113,776	$ 573,047	$ 60,874	$ 4,462	$ 72,697	$ 26,598	$ 44,215	$ 1,416,795
25	$ -	$ 445,275	$ 75,850	$ 113,776	$ 555,717	$ 60,156	$ 4,275	$ 68,855	$ 26,598	$ 42,151	$ 1,392,654
26	$ -	$ 445,275	$ 75,850	$ 113,776	$ 540,171	$ 59,523	$ 4,251	$ 68,491	$ 26,598	$ 41,894	$ 1,375,829
27	$ -	$ 445,275	$ 75,850	$ 113,776	$ 524,869	$ 58,891	$ 4,228	$ 68,129	$ 26,598	$ 41,638	$ 1,359,254
28	$ -	$ 445,275	$ 75,850	$ 113,776	$ 509,811	$ 58,262	$ 4,204	$ 67,767	$ 26,598	$ 41,382	$ 1,342,925
29	$ -	$ 445,275	$ 75,850	$ 113,776	$ 494,995	$ 57,634	$ 4,180	$ 67,406	$ 26,598	$ 41,127	$ 1,326,843
30	$ -	$ 445,275	$ 75,850	$ 113,776	$ 480,422	$ 57,009	$ 4,157	$ 67,047	$ 26,598	$ 40,873	$ 1,311,007
31	$ -	$ 445,275	$ 75,850	$ 113,776	$ 466,090	$ 56,385	$ 4,133	$ 66,689	$ 26,598	$ 40,620	$ 1,295,416
32	$ -	$ 445,275	$ 75,850	$ 113,776	$ 451,998	$ 55,763	$ 4,110	$ 66,331	$ 26,598	$ 40,368	$ 1,280,068
33	$ -	$ 445,275	$ 75,850	$ 113,776	$ 447,029	$ 55,712	$ 4,110	$ 66,302	$ 18,135	$ 40,347	$ 1,266,536
34	$ -	$ 445,275	$ 75,850	$ 113,776	$ 442,269	$ 55,672	$ 4,110	$ 66,279	$ 18,135	$ 40,331	$ 1,261,697
35	$ -	$ 445,275	$ 75,850	$ 113,776	$ 437,387	$ 55,622	$ 4,110	$ 66,250	$ 18,135	$ 40,310	$ 1,256,717
36	$ -	$ 445,275	$ 75,850	$ 113,776	$ 432,513	$ 55,573	$ 4,110	$ 66,222	$ 18,135	$ 40,290	$ 1,251,744
37	$ -	$ 445,275	$ 75,850	$ 113,776	$ 427,646	$ 55,523	$ 4,110	$ 66,193	$ 18,135	$ 40,270	$ 1,246,778
38	$ -	$ 445,275	$ 75,850	$ 113,776	$ 422,785	$ 55,473	$ 4,110	$ 66,165	$ 18,135	$ 40,250	$ 1,241,818
39	$ -	$ 445,275	$ 75,850	$ 113,776	$ 417,931	$ 55,423	$ 4,110	$ 66,136	$ 18,135	$ 40,230	$ 1,236,866
40	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
41	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
42	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921

Date: 12-Mar-19
Project No.: 113-01153
Subject: STS Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Inputs	
New Cost	$ 7,585,047
Replacement O&M Percentage	1.0%
Routine Maintenance Percentage	1.5%
Avg ($/kWh) Year 1 through 6	$ 0.044
Avg ($/kWh) Year 7 through 100	$ 0.045

					Reagents						
Year	Capital	Labor	Replacement O&M	Routine Maintenance	Lime (CaO)	Flocculent	Acid (35% HCl)	Membrane Chemicals	Analytical	Power	Total Annual Cost
43	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
44	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
45	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
46	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
47	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
48	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
49	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
50	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
51	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
52	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
53	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
54	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
55	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
56	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
57	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
58	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
59	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
60	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
61	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
62	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
63	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
64	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
65	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
66	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
67	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
68	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
69	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
70	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
71	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
72	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
73	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
74	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
75	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
76	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
77	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
78	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
79	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
80	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
81	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
82	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
83	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
84	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: STS Direct Cost Cash Flow by Year in Current Cost Dollars
Project Short Title: Chino Mine Closure Closeout Plan

Inputs

New Cost	$	7,585,047
Replacement O&M Percentage		1.0%
Routine Maintenance Percentage		1.5%
Avg ($/kWh) Year 1 through 6	$	0.044
Avg ($/kWh) Year 7 through 100	$	0.045

Year	Capital	Labor	Replacement O&M	Routine Maintenance	Reagents: Lime (CaO)	Reagents: Flocculent	Reagents: Acid (35% HCl)	Reagents: Membrane Chemicals	Analytical	Power	Total Annual Cost
85	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
86	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
87	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
88	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
89	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
90	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
91	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
92	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
93	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
94	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
95	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
96	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
97	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
98	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
99	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
100	$ -	$ 445,275	$ 75,850	$ 113,776	$ 413,085	$ 55,373	$ 4,110	$ 66,107	$ 18,135	$ 40,209	$ 1,231,921
Total	**$ 7,585,047**	**$47,081,367**	**$ 7,205,794**	**$ 10,808,691**	**$49,140,252**	**$ 5,582,351**	**$ 426,137**	**$6,996,777**	**$ 2,150,408**	**$4,224,642**	**$ 141,201,466**

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: STS Capital Cost Estimate Details
Project Short Title: Chino Mine Closure Closeout Plan

Item		Description			Qty	UOM	Unit $	Extended
Equipment Cost								
Membrane System, UF and RO systems	a	1,700 gpm, UF is 2 50% units and RO is 3 33% units for flexibility			1	each	$ 1,876,145	$ 1,876,145
Reaction Tank	a	Four 30,000 gallon tanks for flexibility, appx 120 min reaction time, baffles, ladder, platform, mixer mount and mixer			4	each	$ 188,490	$ 753,960
Floc Tank	a	5,000 gallon tank and mixer			1	each	$ 20,334	$ 20,334
Sludge Densification Tank	a	2 tanks at 600 gal, with internal baffles, mixer mount and mixer, legs for gravity overflow to reaction tank			2	each	$ 108,076	$ 216,151
Thickener/Clarifier	a	70' diameter, with feedwell, bridge, ladder, platform			1	each	$ 331,660	$ 331,660
Sludge Pump	a	42 gpm			2	each	$ 5,470	$ 10,941
Underflow Pump	a	3 Recycles 249 gpm			2	each	$ 19,014	$ 38,029
Polymer system	a	10 mg/L - 0.67 gph			1	each	$ 15,998	$ 15,998
Lime Silo and Slaker System	a	36,780 lb/day - 39 gpm, 10% slurry			1	each	$ 1,014,550	$ 1,014,550
pH control system (acid addition)	a	6.65 mg/L - 1.46 gph, 0.35 concentration			2	each	$ 16,267	$ 32,534
Effluent Neutralization Tank	a	28,000 gallon tank with mixer			1	each	$ 188,490	$ 188,490
Sludge Holding Tank	a	13,000 gal			1	each	$ 38,093	$ 38,093
Filter Press System	a	2 - 100 ft3 including platform and conveyor			2	each	$ 275,208	$ 550,417
Filtrate Tank	a	4,000 gal			1	each	$ 11,406	$ 11,406
Filtrate Pump	a	13 gpm			2	each	$ 5,731	$ 11,463
Process Water Tank	a	3,000 gal			1	each	$ 9,326	$ 9,326
Process Water Return Pump	a	39.67 gpm			2	each	$ 12,515	$ 25,029
Air Compressor	b	For diaphragm pumps, includes air receiver			2	each	$ 15,000	$ 30,000
Electrical Equipment	b				1	ls	$ 100,000	$ 100,000
Valves and Piping	b				1	ls	$ 156,000	$ 156,000
Instrumentation	b				1	ls	$ 50,000	$ 50,000
Control System	b				1	ls	$ 50,000	$ 50,000
Freight	b				1	ls	$ 100,000	$ 100,000
Total Direct Equipment								**$ 5,630,525**
Installation Cost								
Equipment Placement		Materials/equipment			1	ls	$ 50,000	$ 50,000
	c	Crew size	6	men				
	c	Duration	35	days				
		Labor subtotal (Group II Laborers)			1,680	hrs	$23.84	$ 40,051
Tank Erection (Clarifier Tank)		Materials/equipment			1	ls	$ 75,000	$ 75,000
	c	Crew size	8	men				
	c	Duration	28	days				
		Ironworker			1,792	hrs	$48.66	$ 87,199
Process Mechanical		Materials/equipment			1	ls	$ 30,000	$ 30,000
	c	Crew size	6	men				
	c	Duration	32	days				
		Labor subtotal (Plumber/Pipefitter)			1,536	hrs	$45.45	$ 69,811
Process Electrical		Materials/equipment			1	ls	$ 200,000	$ 200,000
	c	Crew size	4	men				
	c	Duration	45	days				
		Labor subtotal [Electrician (Lineman/Tech)]			1,440	hrs	$54.05	$ 77,838
Process Controls		Materials/equipment			1	ls	$ 5,000	$ 5,000
	c	Crew size	4	men				
	c	Duration	20	days				
		Labor subtotal [Electrician (Lineman/Tech)]			640	hrs	$54.05	$ 34,595
Per Diem (Facility Electrical, Plumber)	c	Per Day			284	days	$50.00	$ 14,200
Structural Steel	b				1	ls	$50,000	$ 50,000

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: STS Capital Cost Estimate Details
Project Short Title: Chino Mine Closure Closeout Plan

Item		**Description**			**Qty**	**UOM**	**Unit $**	**Extended**
Total Installation Cost								**$ 733,693**
		Facility Cost						
Site Work	b	2 x pad area	20,800	ft^2	0.5	acre	$100,000	$ 47,750
Foundations	b	Pad area	10,400	ft^2				
		Total concrete			486	cy	$600	$ 291,615
Building Envelope	b	Building area	5,000	ft^2	5,000	ft^2	$100	$ 500,000
Building Electrical	b	Materials/equipment			1	ls	$40,000	$ 40,000
	c	Crew size	4	men				
	c	Duration	15	days				
Electrical Lineman (outside)		Labor subtotal			480	hrs	$55.13	$ 26,462
Building Plumbing	b				1	ls	$75,000	$ 75,000
Building HVAC	b				1	ls	$115,000	$ 115,000
Freight (building)	d				1	ls	$25,000	$ 25,000
Commissioning	b				1	ls	$100,000	$ 100,000
Total Facility Cost								**$ 1,220,828**
		Total Capital Cost						
Total Direct Cost								**$ 7,585,047**

Notes:
a = Cost based on quote from vendor.
b = Cost based on experience with detailed design and construction of similar treatment systems.
c = Hours based on experience with detailed design and construction of similar treatment systems, labor rates based on 2019 New Mexico rates. Per diem based on 2019 New Mexico Subsisistence, Zone and Incentive Pay Rates (per diem applies Plumber/Pipefitter and Electrical Lineman (outside)
d = Lump sum costs for freight have been included for the major process equipment and the building. Freight on materials is not included.
Costs do not include indirect costs

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: STS Equipment List
Project Short Title: Chino Mine Closure Closeout Plan

3/1/2019 2019
Inflation 2.43%

Equipment Name	Description	Power, hp	Footprint	Quantity	Cost	Manufacturer/Vendor/ *Quote Tab Number*	Base Year	Size Costed	Base Cost	Size Needed	Unit	New Cost / Base Year	# Years	New Cost / New Year	Notes
Membrane System, UF and RO systems	1,700 gpm, UF is 2 50% units and RO is 3 33% units for flexibility	250	784	1	$ 1,876,145	**WesTech Quote (*Tab 1)***	2018	1,700	$ 1,821,500	1,700	gpm	$ 1,821,500	1	$ 1,876,145	UF $826,5000, RO $995,000
Reaction Tank	Four 30,000 gallon tanks for flexibility, appx 120 min reaction time, baffles, ladder, platform, mixer mount and mixer	0	616	4	$ 753,960	**WesTech Quote (*Tab 1)***	2018	32,000	$ 183,000	32,000	gal	$ 183,000	1	$ 188,490	Quote is for 2 - 32,000 gallon tanks, need 4 for a total reaction time of 120 min
Floc Tank	5,000 gallon tank and mixer	0	95	1	$ 20,334	**Tank Equipment 2017 *(Tab 2)* by adding $7k (based on previous engineering experience) to Floc Tank quote**	2017	5,000	$ 12,569	5,000	gal	$ 12,569	2	$ 13,334	
Sludge Densification Tank	2 tanks at 600 gal, with internal baffles, mixer mount and mixer, legs for gravity overflow to reaction tank	0	77	2	$ 216,151	**WesTech Quote (*Tab 1)***	2018	500	$ 79,000	750	gal	$ 104,928	1	$ 108,076	
Thickener/Clarifier	70' diameter, with feedwell, bridge, ladder, platform	2	3739	1	$ 331,660	**WesTech Quote (*Tab 1*)**	2018	70	$ 322,000	70	ft	$ 322,000	1	$ 331,660	
Sludge Pump	42 gpm	0	16	2	$ 10,941	**Denver Industrial Pumps *(Tab 3)***	2016	300	$ 19,825	42	gpm	$ 5,006	3	$ 5,470	
Underflow Pump	3 Recycles 249 gpm	0	16	2	$ 38,029	**Denver Industrial Pumps *(Tab 3)***	2016	300	$ 19,825	249	gpm	$ 17,401	3	$ 19,014	
Polymer system	10 mg/L - 0.67 gph	0.3	16	1	$ 15,998	**Fluid Dynamics 2014 Quote *(Tab 4)***	2014	1	$ 13,800	1	gpm	$ 13,800	5	$ 15,998	
Lime Silo and Slaker System	36,780 lb/day - 39 gpm, 10% slurry	10	113	1	$ 1,014,550	**Louisville Dryer Company Quote *(Tab 5)***	2018	1,000	$ 985,000	1,000	lb/hr	$ 985,000	1	$ 1,014,550	
pH control system (acid addition)	6.65 mg/L - 1.46 gph, 0.35 concentration	0.3	12	2	$ 32,534	**Prominent Quote 2017 *(Tab 6)***	2017	1	$ 15,333	1		$ 15,333	2	$ 16,267	
Effluent Neutralization Tank	28,000 gallon tank with mixer	0	201	1	$ 188,490	**WesTech Quote (*Tab 1)***	2018	32,000	$ 183,000	32,000	gal	$ 183,000	1	$ 188,490	Quote is for 2 - 32,000 gallon tanks, need 1
Sludge Holding Tank	13,000 gal	0	113	1	$ 38,093	**Tank Equipment 2018 *(Tab 7*)**	2018	20,000	$ 50,000	13,000	gal	$ 36,984	1	$ 38,093	
Filter Press System	2 - 100 ft3 including platform and conveyor	15	476	2	$ 550,417	**WesTech Quote (*Tab 1)***	2018	200	$ 350,000	136	ft3	$ 267,193	1	$ 275,208	Need 2 for max, 1 for avg conditions
Filtrate Tank	4,000 gal	0	64	1	$ 11,406	**Tank Equipment 2017 *(Tab 2)***	2017	5,000	$ 12,569	4,000	gal	$ 10,751	2	$ 11,406	
Filtrate Pump	13 gpm	0.5	16	2	$ 11,463	**Denver Industrial Pumps *(Tab 3)***	2016	20	$ 7,091	13	gpm	$ 5,245	3	$ 5,731	
Process Water Tank	3,000 gal	0	28	1	$ 9,326	**Tank Equipment 2017 *(Tab 2*)**	2017	5,000	$ 12,569	3,000	gal	$ 8,790	2	$ 9,326	
Process Water Return Pump	39.67 gpm	1	16	2	$ 25,029	**Denver Industrial Pumps *(Tab 3)***	2016	20	$ 7,091	40	gpm	$ 11,453	3	$ 12,515	
Air Compressor	For diaphragm pumps, includes air receiver	15	16	2	$ 30,000	Estimation based on previous experience	NA	NA	NA	NA	NA	NA	NA	$ 15,000	
Electrical Equipment		0	NA	1	$ 100,000	Estimation based on previous experience	NA	NA	NA	NA	NA	NA	NA	$ 100,000	
Valves and Piping		0	NA	1	$ 156,000	Estimation based on previous experience	NA	NA	NA	NA	NA	NA	NA	$ 156,000	
Instrumentation		0	NA	1	$ 50,000	Estimation based on previous experience	NA	NA	NA	NA	NA	NA	NA	$ 50,000	
Control System		5	NA	1	$ 50,000	Estimation based on previous experience	NA	NA	NA	NA	NA	NA	NA	$ 50,000	
Freight		0	NA	1	$ 100,000	Estimation based on previous experience	NA	NA	NA	NA	NA	NA	NA	$ 100,000	
Total Process Equip		**300**	2,675	1	$ 5,630,525										
STS Total		224	Thickner outside												

Assume building load allowance is covered under safety factor of max hp listed for equipment
NOTE - Quotes are available in referenced lettered tabs (Column F) in a separate PDF.

Date: 12-Mar-19
Project No.: 113-01153
Subject: Yearly Summary for STS
Project Short Title: Chino Mine Closure Closeout Plan

	STS Flow Balance			STS Sulfate Concentration Balance							STS Sludge																STS Power Calculations		
Year	NMA Flow to HDS, gpm	SMA Flow to RO, gpm	HDS Feed (Brine Recycle, NMA, Sludge Recycle), gpm	NMA Sulfate, mg/L	SMA Sulfate, mg/L	HDS Feed Sulfate, mg/L	HDS Effluent Sulfate, mg/L	Membrane Feed Sulfate, mg/L	Brine Sulfate, mg/L	Effluent Sulfate, mg/L	Sludge Dry Solids, lb/day	Sludge Dry Solids (for calculation), lb/day	Final Sludge @ 50% Moisture, lb/day	Final Sludge @ 50% Moisture, cy/year	Lime (CaO) Consumption, lb/day	Lime (CaO) Consumption, ton/year	Flocculent (Anionic Polymer) Consumption, lb/day	Flocculent (Anionic Polymer) Consumption, ton/year	Acid (35% HCl) Consumption, lb/day	Acid (35%HCl) Consumption, ton/year	Antiscalant, lb/year	Biocide, lb/year	MF High pH Cleaning Chem, lb/year	MF Low pH Cleaning Chem, lb/year	RO High pH Cleaning Chem, lb/year	RO Low pH Cleaning Chem, lb/year	Membrane Power (kwh/yr)	HDS Power (kwh/yr)	Total Power (kwh/year)
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	618	784	1057	6,590	1,100	6,295	1,600	1,315	5,718	376	147,726	147,093	295,453	39,941	29,396	5,365	89	16.25	111.9	20.4	18,101	6,034	5837	5837	973	973	1,684,986	323,738	2,008,723
7	546	744	952	6,797	1,100	6,410	1,600	1,309	5,690	376	135,181	134,531	270,362	36,549	26,600	4,855	79	14.44	103.0	18.8	16,812	5,604	5421	5421	904	904	1,564,999	291,599	1,856,598
8	540	707	936	7,003	1,100	6,557	1,600	1,313	5,708	376	135,460	134,790	270,920	36,624	26,961	4,920	78	14.31	99.5	18.2	16,198	5,399	5223	5223	871	871	1,507,870	286,447	1,794,317
9	533	672	918	7,210	1,100	6,707	1,600	1,317	5,725	376	135,669	134,980	271,338	36,681	27,289	4,980	78	14.16	96.2	17.5	15,606	5,202	5033	5033	839	839	1,452,790	281,192	1,733,982
10	526	638	902	7,416	1,100	6,858	1,600	1,321	5,743	376	135,802	135,094	271,603	36,717	27,610	5,039	77	14.01	92.9	17.0	15,042	5,014	4850	4850	808	808	1,400,211	276,086	1,676,297
11	521	606	877	6,749	1,100	6,425	1,600	1,324	5,756	376	124,772	124,125	249,544	33,735	25,302	4,618	75	13.70	90.0	16.4	14,442	4,814	4657	4657	776	776	1,344,388	268,615	1,613,003
12	521	576	860	6,082	1,100	5,984	1,600	1,328	5,772	376	114,815	114,229	229,631	31,043	23,250	4,243	74	13.52	87.6	16.0	13,914	4,638	4487	4487	748	748	1,295,220	263,241	1,558,461
13	479	547	787	5,416	1,100	5,524	1,600	1,323	5,753	376	97,904	97,405	195,808	26,470	19,497	3,558	67	12.28	81.9	14.9	13,001	4,334	4192	4192	699	699	1,210,247	241,057	1,451,304
14	475	520	766	4,749	1,100	5,069	1,600	1,326	5,766	376	88,201	87,783	176,403	23,847	17,510	3,195	66	12.02	79.4	14.5	12,487	4,162	4027	4027	671	671	1,162,386	234,652	1,397,038
15	471	418	723	4,082	1,100	4,589	1,600	1,346	5,853	376	76,069	75,726	152,138	20,567	15,447	2,819	64	11.71	70.9	12.9	10,828	3,609	3492	3492	582	582	1,007,997	221,484	1,229,482
16	467	397	711	4,000	1,100	4,526	1,600	1,350	5,871	376	73,858	73,541	147,715	19,969	15,072	2,751	63	11.59	69.0	12.6	10,465	3,488	3375	3375	562	562	974,152	217,799	1,191,951
17	463	377	700	3,917	1,100	4,462	1,600	1,355	5,890	376	71,699	71,408	143,397	19,385	14,700	2,683	63	11.47	67.1	12.2	10,117	3,372	3263	3263	544	544	941,808	214,214	1,156,022
18	459	358	688	3,835	1,100	4,397	1,600	1,359	5,909	376	69,590	69,324	139,180	18,815	14,332	2,616	62	11.34	65.3	11.9	9,785	3,262	3155	3155	526	526	910,893	210,723	1,121,616
19	455	340	677	3,752	1,100	4,332	1,600	1,364	5,928	376	67,530	67,288	135,060	18,258	13,967	2,549	61	11.22	63.5	11.6	9,468	3,156	3053	3053	509	509	881,335	207,323	1,088,658
20	451	323	666	3,670	1,100	4,266	1,600	1,368	5,947	376	65,517	65,299	131,035	17,714	13,606	2,483	61	11.10	61.9	11.3	9,164	3,055	2955	2955	493	493	853,067	204,009	1,057,076
21	448	307	656	3,587	1,100	4,199	1,600	1,372	5,966	376	63,550	63,354	127,101	17,182	13,248	2,418	60	10.98	60.3	11.0	8,873	2,958	2861	2861	477	477	826,025	200,776	1,026,801
22	444	293	646	3,505	1,100	4,132	1,600	1,376	5,983	376	61,666	61,492	123,333	16,673	12,893	2,353	59	10.86	58.8	10.7	8,615	2,872	2778	2778	463	463	801,984	197,708	999,693
23	440	293	640	3,422	1,100	4,071	1,600	1,375	5,979	376	60,294	60,140	120,588	16,302	12,579	2,296	59	10.75	58.5	10.7	8,574	2,858	2765	2765	461	461	798,138	195,991	994,129
24	436	293	634	3,340	1,100	4,011	1,600	1,374	5,974	376	58,931	58,797	117,861	15,933	12,266	2,238	58	10.64	58.2	10.6	8,532	2,844	2751	2751	459	459	794,220	194,243	988,463
25	432	267	621	3,257	1,100	3,936	1,600	1,383	6,013	376	56,670	56,556	113,340	15,322	11,895	2,171	58	10.52	55.8	10.2	8,081	2,694	2606	2606	434	434	752,244	190,076	942,320
26	428	267	615	3,164	1,100	3,866	1,600	1,382	6,008	376	55,223	55,127	110,445	14,931	11,562	2,110	57	10.41	55.5	10.1	8,038	2,679	2592	2592	432	432	748,270	188,302	936,572
27	424	267	609	3,071	1,100	3,797	1,600	1,381	6,003	376	53,794	53,717	107,587	14,544	11,234	2,050	56	10.30	55.2	10.1	7,996	2,665	2578	2578	430	430	744,309	186,534	930,842
28	421	267	604	2,978	1,100	3,728	1,600	1,380	5,998	376	52,383	52,323	104,767	14,163	10,912	1,991	56	10.19	54.8	10.0	7,953	2,651	2565	2565	427	427	740,358	184,770	925,128
29	417	267	598	2,884	1,100	3,659	1,600	1,378	5,993	376	50,992	50,948	101,983	13,787	10,595	1,934	55	10.08	54.5	10.0	7,911	2,637	2551	2551	425	425	736,419	183,012	919,431
30	413	267	592	2,791	1,100	3,590	1,600	1,377	5,988	376	49,618	49,590	99,237	13,415	10,283	1,877	55	9.97	54.2	9.9	7,869	2,623	2537	2537	423	423	732,492	181,259	913,751
31	409	267	586	2,698	1,100	3,522	1,600	1,376	5,983	376	48,264	48,250	96,528	13,049	9,976	1,821	54	9.86	53.9	9.8	7,827	2,609	2524	2524	421	421	728,576	179,511	908,088
32	405	267	581	2,605	1,100	3,453	1,600	1,375	5,977	376	46,928	46,928	93,855	12,688	9,675	1,766	53	9.75	53.6	9.8	7,785	2,595	2510	2510	418	418	724,673	177,769	902,442
33	405	267	580	2,560	1,100	3,419	1,600	1,375	5,977	376	46,456	46,449	92,911	12,560	9,568	1,746	53	9.74	53.6	9.8	7,781	2,594	2509	2509	418	418	724,355	177,627	901,982
34	405	267	580	2,514	1,100	3,385	1,600	1,375	5,977	376	45,990	45,984	91,981	12,434	9,466	1,728	53	9.73	53.6	9.8	7,779	2,593	2508	2508	418	418	724,102	177,514	901,616
35	405	267	579	2,469	1,100	3,350	1,600	1,375	5,976	376	45,518	45,512	91,037	12,307	9,362	1,709	53	9.72	53.6	9.8	7,775	2,592	2507	2507	418	418	723,790	177,375	901,164
36	405	267	579	2,424	1,100	3,316	1,600	1,374	5,976	376	45,047	45,041	90,093	12,179	9,258	1,690	53	9.72	53.6	9.8	7,772	2,591	2506	2506	418	418	723,478	177,235	900,713
37	405	267	578	2,378	1,100	3,282	1,600	1,374	5,975	376	44,575	44,569	89,149	12,052	9,153	1,670	53	9.71	53.6	9.8	7,769	2,590	2505	2505	418	418	723,165	177,096	900,261
38	405	267	578	2,333	1,100	3,247	1,600	1,374	5,975	376	44,103	44,097	88,206	11,924	9,049	1,652	53	9.70	53.6	9.8	7,765	2,588	2504	2504	417	417	722,852	176,956	899,809
39	405	267	578	2,287	1,100	3,213	1,600	1,374	5,974	376	43,631	43,625	87,262	11,797	8,945	1,633	53	9.69	53.6	9.8	7,762	2,587	2503	2503	417	417	722,540	176,817	899,357
40	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
41	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
42	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
43	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
44	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
45	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
46	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
47	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
48	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
49	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
50	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
51	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
52	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
53	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
54	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
55	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
56	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
57	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
58	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
59	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
60	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
61	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
62	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
63	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
64	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
65	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
66	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
67	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
68	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
69	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
70	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
71	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
72	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
73	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
74	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
75	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Yearly Summary for STS
Project Short Title: Chino Mine Closure Closeout Plan

	STS Flow Balance			STS Sulfate Concentration Balance							STS Sludge																STS Power Calculations		
Year	NMA Flow to HDS, gpm	SMA Flow to RO, gpm	HDS Feed (Brine Recycle, NMA, Sludge Recycle), gpm	NMA Sulfate, mg/L	SMA Sulfate, mg/L	HDS Feed Sulfate, mg/L	HDS Effluent Sulfate, mg/L	Membrane Feed Sulfate, mg/L	Brine Sulfate, mg/L	Effluent Sulfate, mg/L	Sludge Dry Solids, lb/day	Sludge Dry Solids (for calculation), lb/day	Final Sludge @ 50% Moisture, lb/day	Final Sludge @ 50% Moisture, cy/year	Lime (CaO) Consumption, lb/day	Lime (CaO) Consumption, ton/year	Flocculent (Anionic Polymer) Consumption, lb/day	Flocculent (Anionic Polymer) Consumption, ton/year	Acid (35% HCl) Consumption, lb/day	Acid (35%HCl) Consumption, ton/year	Antiscalant, lb/year	Biocide, lb/year	MF High pH Cleaning Chem, lb/year	MF Low pH Cleaning Chem, lb/year	RO High pH Cleaning Chem, lb/year	RO Low pH Cleaning Chem, lb/year	Membrane Power (kwh/yr)	HDS Power (kwh/yr)	Total Power (kwh/year)
76	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
77	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
78	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
79	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
80	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
81	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
82	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
83	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
84	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
85	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
86	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
87	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
88	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
89	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
90	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
91	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
92	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
93	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
94	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
95	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
96	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
97	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
98	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
99	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
100	405	267	577	2,242	1,100	3,178	1,600	1,374	5,974	376	43,159	43,154	86,318	11,669	8,842	1,614	53	9.68	53.6	9.8	7,758	2,586	2502	2502	417	417	722,228	176,677	898,905
Average	**423**	**310**	**620**	**2,866**	**1,100**	**3,636**	**1,600**	**1,368**	**5,949**	**376**	**54,170**	**54,079**	**108,340**	**14,646**	**11,072**	**2,021**	**56**	**10**	**59**	**11**	**8,644**	**2,881**	**2,787**	**2,787**	**465**	**465**	**804,634**	**189,685**	**994,319**
Max	**618**	**784**	**1,057**	**7,416**	**1,100**	**6,858**	**1,600**	**1,383**	**6,013**	**376**	**147,726**	**147,093**	**295,453**	**39,941**	**29,396**	**5,365**	**89**	**16**	**112**	**20**	**18,101**	**6,034**	**5,837**	**5,837**	**973**	**973**	**1,684,986**	**323,738**	**2,008,723**

Notes:
Max flow used for sizing capital equipment; annual flows used for OPEX
Flow values directly from Table 5a - Alt 1 (Chino), 4-Table 6_App D_Att A PSE 07142016_VR System.xlsx
Values for HDS sludge, lime, etc. directly from Updated Chino Mixing v3 1 0leach_TS_REV07192016 (003).xlsx
Others values were extrapolated and/or calculated

44% Membrane Bypass *Assuming 1600 mg/L SO4 in HDS Effluent, 1100 mg/L SO4 in STS Bypass, 10 mg/L SO4 in Perm*
77% RO Recovery
4.35 Brine Concentration Factor

Date: 12-Mar-19
Project No.: 113-01153
Subject: Analytical Costs
Project Short Title: Chino Mine Closure Closeout Plan

Year	Tailings Location			Stockpile Location			Pit Location			Plant Performance	Number of total Samples	Cost per sample	Total Cost Estimation
	Quarterly	*Semiannual*	*Annual*	*Quarterly*	*Semiannual*	*Annual*	*Quarterly*	*Semiannual*	*Annual*	*Monthly*			
1	7	0	0	1	0	0	0	0	0	0	32	$ 403	$ 12,896
2	7	0	0	1	0	0	0	0	0	0	32	$ 403	$ 12,896
3	7	0	0	1	0	0	0	0	0	0	32	$ 403	$ 12,896
4	7	0	0	1	0	0	0	0	0	0	32	$ 403	$ 12,896
5	7	0	0	1	0	0	0	0	0	0	32	$ 403	$ 12,896
6	8	0	0	12	0	0	3	0	0	2	116	$ 403	$ 46,748
7	8	0	0	12	0	0	3	0	0	2	116	$ 403	$ 46,748
8	8	0	0	12	0	0	3	0	0	2	116	$ 403	$ 46,748
9	8	0	0	12	0	0	3	0	0	2	116	$ 403	$ 46,748
10	8	0	0	12	0	0	3	0	0	2	116	$ 403	$ 46,748
11	8	0	0	10	0	0	3	0	0	2	108	$ 403	$ 43,524
12	8	0	0	10	0	0	3	0	0	2	108	$ 403	$ 43,524
13	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
14	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
15	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
16	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
17	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
18	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
19	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
20	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
21	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
22	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
23	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
24	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
25	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
26	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
27	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
28	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
29	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
30	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
31	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
32	0	8	0	0	10	0	0	3	0	2	66	$ 403	$ 26,598
33	0	0	8	0	0	10	0	0	3	2	45	$ 403	$ 18,135
34	0	0	8	0	0	10	0	0	3	2	45	$ 403	$ 18,135
35	0	0	8	0	0	10	0	0	3	2	45	$ 403	$ 18,135
36	0	0	8	0	0	10	0	0	3	2	45	$ 403	$ 18,135

Date: 12-Mar-19
Project No.: 113-01153
Subject: Analytical Costs
Project Short Title: Chino Mine Closure Closeout Plan

Year	Tailings Location			Stockpile Location			Pit Location			Plant Performance	Number of total Samples	Cost per sample	Total Cost Estimation
	Quarterly	*Semiannual*	*Annual*	*Quarterly*	*Semiannual*	*Annual*	*Quarterly*	*Semiannual*	*Annual*	*Monthly*			
37	0	0	8	0	0	10	0	0	3	2	45	$ 403	$ 18,135
38	0	0	8	0	0	10	0	0	3	2	45	$ 403	$ 18,135
39	0	0	8	0	0	10	0	0	3	2	45	$ 403	$ 18,135
40	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
41	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
42	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
43	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
44	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
45	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
46	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
47	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
48	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
49	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
50	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
51	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
52	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
53	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
54	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
55	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
56	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
57	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
58	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
59	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
60	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
61	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
62	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
63	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
64	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
65	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
66	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
67	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
68	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
69	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
70	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
71	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
72	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Analytical Costs
Project Short Title: Chino Mine Closure Closeout Plan

Year	Tailings Location			Stockpile Location			Pit Location			Plant Performance	Number of total Samples	Cost per sample	Total Cost Estimation
	Quarterly	*Semiannual*	*Annual*	*Quarterly*	*Semiannual*	*Annual*	*Quarterly*	*Semiannual*	*Annual*	*Monthly*			
73	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
74	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
75	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
76	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
77	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
78	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
79	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
80	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
81	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
82	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
83	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
84	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
85	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
86	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
87	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
88	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
89	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
90	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
91	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
92	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
93	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
94	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
95	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
96	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
97	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
98	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
99	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
100	0	0	8			10	0	0	3	2	45	$ 403	$ 18,135
												TOTAL	**$ 2,150,408**

Notes:
Costs do not include indirect costs
No sampling required for O&M of the short-term ETS or the high TDS and sulfate sources during O&M of the long-term ETS.
Revised sampling strategy - quarterly through year 12 and then semi-annual over the 20 year period where we apply a linear decrease in flows (uncovered to covered drainage rates). Annual thereafter.
West Stockpile reclaimed by April 2029 so we don't have to collect samples from the two collections that are just collecting stormwater runoff after this point.
NPDES surface water sampling locations will be sampled beginning in Year 1 for complaince purposes (1 in NMA and 7 in SMA).

GOLDER

Date:	12-Mar-19			
Project No.:	113-01153			
Subject:	STS O&M Cost Inputs			
Project Short Title:	Chino Mine Closure Closeout Plan			

Reagent Inputs

Lime (CaO) ($/ton)	=	$	256.00	2018 Lhoist Street Price
Flocculent ($/lb)	=	$	2.86	2018 NALCO Water
Hydrochloric Acid - 35% ($/lb)	=	$	0.21	2018 Univar Mining - HCl (35%) from bulk delivery (tote price $0.335/lb)
MF High pH Cleaning Chemicals ($/lb)	=	$	3.38	2018 Avista quote - pail price (assume bimonthly cleaning during high flows)
MF Low pH Cleaning Chemicals ($/lb)	=	$	3.38	2018 Avista quote - pail price (assume bimonthly cleaning during high flows)
RO High pH Cleaning Chemicals ($/lb)	=	$	7.37	2018 Avista quote - pail price (assume quarterly cleaning during high flows)
RO Low pH Cleaning Chemicals ($/lb)	=	$	6.29	2018 Avista quote - pail price (assume quarterly cleaning during high flows)
Biocide ($/lb)	=	$	8.00	2018 Avista quote - tote price
Antiscalant ($/lb)	=	$	2.94	2018 Avista quote - tote price

Electricity Input

Electricity ($/kwh)	=	$	0.044	PNM Method of Calculation (Avg ($/kWh) Years 1 through 6)
	=	$	0.045	PNM Method of Calculation (Avg ($/kWh) Years 7 through 100)

Analytical Input

Analytical Cost ($/sample)	=	$	403.00	2018 Hall Environmental Analysis Laboratory

Labor Inputs

Operator Base Rate	=	$	18.60	2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group I.
Supervisor Rate	=	$	31.10	2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group X. https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf
Maintenance Technician Rate	=	$	19.83	2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group V. https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf
Operator Fringe Rate	=	$	5.94	2019 NM Type
Laborer (Group II)	=	$	23.84	2019 NM
Plumber/Pipefitter	=	$	45.45	2019 NM Department of Labor Type H (Heavy Engineering) 2019 labor rates. Rates include base hourly wage, fringe benefit, and apprenticeship contribution rates. https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_H_2019_final.pdf
Electrician (Lineman/Tech Outside)	=	$	55.13	2019 NM Department of Labor Type H (Heavy Engineering) 2019 labor rates. Rates include base hourly wage, fringe benefit, and apprenticeship contribution rates. https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_H_2019_final.pdf
Electrician (Wireman/Tech Inside)		$	54.05	2019 NM Department of Labor Type H (Heavy Engineering) 2019 labor rates. Rates include base hourly wage, fringe benefit, and apprenticeship contribution rates. Includes 26% increase for work outside Zone 1 https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_H_2019_final.pdf
Ironworker		$	48.66	2019 NM Department of Labor Type H (Heavy Engineering) 2019 labor rates. Rates include base hourly wage, fringe benefit, apprenticeship contribution rates, and subsistence rate. https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_H_2019_final.pdf

Maintenance

Replacement O&M	=		1.0%	of Direct Capital Cost
Routine Maintenance	=		1.5%	of Direct Capital Cost
Per Diem Subsistence, Zone and Incentive	=	$	50.00	per day for Plumber/Pipefitter, Electrical Lineman/Tech (outside). 2019 NM Department of Labor Type H (Heavy Engineering), 2019 Subsistence, Zone, and

GOLDER

Date: 1-Feb-19
Project No.: 11301153
Subject: Example Calculations
Project Short Title: Chino Mine

Flow and Sulfate Inputs

Max Year	=	6	
Membrane Max Flow rate	**=**	**1,400**	**gpm**
Membrane Avg Flow rate	=	*700*	*gpm*
HDS Equipment Max Flow rate	**=**	**1,100**	**gpm**
HDS Equipment Avg Flow rate	=	*620*	*gpm*
HDS Sulfate Max	**=**	**6,858**	**mg/L**
HDS Sulfate Avg	=	*3,636*	*mg/L*
Sludge Recycle Avg Flow rate	**=**	**124**	**gpm**
Sludge Max (50% Solids)	**=**	**295,453**	**lb/day**
Sludge Avg (50% Solids)	=	*108,340*	*lb/day*
Effluent Neutralization Max (if necessary)	**=**	**1,500**	**gpm**
Effluent Neutralization Avg Flow rate(if necessary)	=	*800*	*gpm*

Equipment sizing based on maximum flows, operating costs based on average flows.

Van Riper Study (2002) Inputs

Lime Consumption Factor	=	0.5249	mg/L CaO/mg/L SO4	5,270 mg/L CaO needed to treat high metals AMD water with sulfate concentration of 10,040 mg/L
Sulfuric Acid Consumption Factor	=	0.000028	lb/gal	0.028 pounds per 1,000 gallons (50 mg acid per liter of water treated)
Sludge Factor	=	2.0916	mg/L Sludge/mg/L SO4	21,000 mg/L Sludge for 10,040 mg/L SO4

Van Riper treatability study results used to detemine lime usage and sludge production according to the factors listed above and the sulfate concentration.

HDS Chemical Precipitation

Reaction Tank

Tank size

Need 4 reaction tanks - to provide minimum of 90 min retention time at max flow and minimum of 120 min retention time at avg flow

$$= \frac{1{,}100 \text{ gal}}{1 \text{ min}} \times 24 \text{ min}$$

$$= \mathbf{26{,}400 \text{ gal}}$$

$$= \frac{26400 \text{ gal}}{1 \text{ min}} \times 1.1 \text{ Freeboard}$$

$$= \mathbf{30{,}000 \text{ gal}}$$

each tank, total of 4 tanks for approximately 90 min reaction time

$$= 30{,}000 \text{ gal} \times \frac{1 \text{ ft}^3}{7.48 \text{ gal}}$$

$$= \mathbf{4{,}010 \text{ ft}^3}$$

Tank Height = 28 ft

Diameter

$$= \left| \frac{4{,}010 \text{ ft}^3}{28 \text{ ft}} \times \frac{4}{\pi} \right|^{1/2}$$

$$= \mathbf{14 \text{ ft}}$$

Mixing Requirement

$$= \frac{0.001139 \text{ N-s}}{\text{m}^2} \times 4{,}010 \text{ ft}^3 \times \frac{1 \text{ m}^3}{35 \text{ ft}^3} \times \frac{\text{W}}{1{,}000 \text{ kW}} \times \left(\frac{300}{1 \text{ sec}}\right)^2$$

$$= \mathbf{12 \text{ kW}}$$

GOLDER

Date: 1-Feb-19
Project No.: 11301153
Subject: Example Calculations
Project Short Title: Chino Mine

Floc Tank

Tank size

$$= \frac{1{,}100 \text{ gal}}{1 \text{ min}} \times 3.5 \text{ min}$$

$$= \mathbf{3{,}850 \text{ gal}}$$

$$= \frac{3{,}850 \text{ gal}}{1 \text{ min}} \times 1.1 \text{ Freeboard}$$

$$= \mathbf{5{,}000 \text{ gal}}$$

$$= 5{,}000 \text{ gal} \times \frac{1 \text{ ft}^3}{7.48 \text{ gal}}$$

$$= \mathbf{668 \text{ ft}^3}$$

Tank Height

$$= 8 \text{ ft}$$

Diameter

$$= \left(\frac{668 \text{ ft}^3}{8 \text{ ft}} \times \frac{4}{\pi} \right)^{1/2}$$

$$= \mathbf{11 \text{ ft}}$$

Mixing Requirement

$$= \frac{0.001139 \text{ N-s}}{\text{m}^2} \times 668 \text{ ft}^3 \times \frac{1 \text{ m}^3}{35 \text{ ft}^3} \times \frac{\text{W}}{1{,}000 \text{ kW}} \times \left(\frac{300}{1 \text{ sec}} \right)^2$$

$$= \mathbf{2 \text{ kW}}$$

Clarifier

Tank size (based on Clarification)
Use conservative loading rate of 0.3 gpm/ft^2 considering sludge is primarily calcium sulfate and iron hydroxide and densified.

$$= \frac{1{,}100 \text{ gal}}{1 \text{ min}} \times \frac{1 \text{ ft}^2}{0.3 \text{ gpm}}$$

$$= \mathbf{3{,}729 \text{ ft}^2}$$

Diameter (based on Clarification)

$$= \left(3{,}729 \text{ ft}^2 \times \frac{4}{\pi} \right)^{1/2}$$

$$= \mathbf{69 \text{ ft}}$$

Depth (based on Clarification)

$$= \mathbf{15 \text{ ft}}$$

Overflow

Solids underflow

$$= \frac{586{,}233 \text{ lb}}{\text{day}} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} \times \frac{1 \text{ day}}{1{,}440 \text{ min}} \times \frac{1 \text{ m}^3}{1{,}190 \text{ kg}} \times \frac{264 \text{ gal}}{1 \text{ m}^3}$$

$$= \mathbf{42 \text{ gpm}}$$

Solids recycle (max)
(assumption)

$$= 3 \text{ Recycles} \times \frac{295{,}453 \text{ lb}}{\text{d}} \times \frac{1}{25\% \text{ solids}} \times \frac{1 \text{ gal}}{8.34 \text{ lb}} \times \frac{1}{1.19 \text{ SG}} \times \frac{1 \text{ day}}{1{,}440 \text{ min}}$$

$$= \mathbf{249 \text{ gal/min}}$$

Date: 1-Feb-19
Project No.: 11301153
Subject: Example Calculations
Project Short Title: Chino Mine

Effluent Neutralization System

Effluent Neutralization Tank

Tank size $= \dfrac{1{,}500 \text{ gal}}{1 \text{ min}} \times 18 \text{ min}$

$= \mathbf{27{,}000 \text{ gal}}$

$= \dfrac{27{,}000 \text{ gal}}{1 \text{ min}} \times 1.1 \text{ Freeboard}$

$= \mathbf{30{,}000 \text{ gal}}$

$= 30{,}000 \text{ gal} \times \dfrac{1 \text{ ft}^3}{7.48 \text{ gal}}$

$= \mathbf{4{,}010 \text{ ft}^3}$

Tank Height = 22 ft

Diameter $= \left(\dfrac{4{,}010 \text{ ft}^3}{22 \text{ ft}} \times \dfrac{4}{\pi} \right)^{1/2}$

$= \mathbf{16 \text{ ft}}$

Mixing Requirement $= \dfrac{0.001139 \text{ N-s}}{\text{m}^2} \times 4{,}010 \text{ ft}^3 \times \dfrac{1 \text{ m}^3}{35 \text{ ft}^3} \times \dfrac{\text{W}}{1{,}000 \text{ kW}} \times \left(\dfrac{300}{1 \text{ sec}}\right)^2$

$= \mathbf{12 \text{ kW}}$

Discharge System

Discharge Tank

Tank size $= \dfrac{1{,}500 \text{ gal}}{1 \text{ min}} \times 30 \text{ min}$

$= \mathbf{45{,}000 \text{ gal}}$

$= \dfrac{45000 \text{ gal}}{1 \text{ min}} \times 1.1 \text{ Freeboard}$

$= \mathbf{50{,}000 \text{ gal}}$

$= 50{,}000 \text{ gal} \times \dfrac{1 \text{ ft}^3}{7.48 \text{ gal}}$

$= \mathbf{6{,}684 \text{ ft}^3}$

Tank Height = 20 ft

Diameter $= \left(\dfrac{6{,}684 \text{ ft}^3}{20 \text{ ft}} \times \dfrac{4}{\pi} \right)^{1/2}$

$= \mathbf{21 \text{ ft}}$

GOLDER

Date: 1-Feb-19
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Subject: Example Calculations
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Solids Management

Sludge Storage Tank

Sludge Production
per Hazen Research, Inc., May 3, 2002
Van Riper Factor (Sulfate x Factor = sludge)

$$= \frac{21{,}000 \text{ mg Sludge}}{1 \text{ L}} \times \frac{1 \text{ L}}{10{,}040 \text{ mg } SO_4}$$

$$= \mathbf{2.0916 \text{ mg/L}}$$

Influent Concentration

$$= \frac{6{,}858 \text{ mg } SO_4}{1 \text{ L}} \times \frac{2.0916 \text{ mg/L Sludge}}{1 \text{ mg/L } SO_4}$$

$$= \mathbf{14{,}345 \text{ mg/L}}$$

Influent Dry Solids

$$= \frac{14{,}345 \text{ mg}}{1 \text{ L}} \times \frac{851 \text{ gal}}{1 \text{ min}} \times \frac{3.785 \text{ L}}{1 \text{ gal}} \times \frac{1{,}440 \text{ min}}{1 \text{ d}} \times \frac{1 \text{ lb}}{454{,}000 \text{ mg}}$$

$$= \mathbf{146{,}558 \text{ lb/day}}$$

Influent Wet Cake

$$= \frac{146{,}558 \text{ lb}}{1 \text{ day}} \times \frac{1 \text{ Wet Cake}}{50\% \text{ Dry Solids}}$$

$$\mathbf{293{,}116 \text{ lb/day}}$$

Influent Wet Solids
(Clarifier Underflow)

$$= \frac{146{,}558 \text{ lb/day}}{1 \text{ day}} \times \frac{1 \text{ Wet Solids}}{25\% \text{ Wet Cake}}$$

$$\mathbf{586{,}233 \text{ lb/day}}$$

Water Content
(filtrate from dewatering)

$$= \frac{586{,}233 \text{ lb}}{1 \text{ day}} - \frac{293{,}116 \text{ lb}}{1 \text{ day}}$$

$$\mathbf{293{,}116 \text{ lb/day}}$$

$$= \frac{293{,}116 \text{ lb}}{1 \text{ day}} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} \times \frac{1 \text{ m}^3}{1{,}000 \text{ kg}} \times \frac{1 \text{ day}}{1{,}440 \text{ min}} \times \frac{264 \text{ gal}}{1 \text{ m}^3}$$

$$\mathbf{24 \text{ gpm}}$$

Volume of Cake - Max

$$= \frac{293{,}116 \text{ lb}}{1 \text{ day}} \times \frac{1 \text{ ft}^3}{100 \text{ lb}} \times \frac{365 \text{ days}}{1 \text{ yr}}$$

$$\mathbf{1{,}069{,}875 \text{ ft}^3\text{/yr}}$$

Filter Press Size - Max

$$= \frac{1{,}069{,}875 \text{ ft}^3}{1 \text{ yr}} \times \frac{1 \text{ yr}}{365 \text{ days}} \times \frac{1 \text{ days}}{8 \text{ cycle}} \times \frac{1 \text{ cycle}}{2 \text{ filter presses online}}$$

3 shifts, 2 presses 6 op

$$\mathbf{100 \text{ ft}^3\text{/cycle/filter press}}$$

Volume of Cake - Average

$$= \frac{108{,}340 \text{ lb}}{1 \text{ day}} \times \frac{1 \text{ ft}^3}{100 \text{ lb}} \times \frac{365 \text{ days}}{1 \text{ yr}}$$

$$\mathbf{395{,}440 \text{ ft}^3\text{/yr}}$$

Filter Press Size - Avg

$$= \frac{395{,}440 \text{ ft}^3}{1 \text{ yr}} \times \frac{1 \text{ yr}}{365 \text{ days}} \times \frac{1 \text{ days}}{8 \text{ cycle}} \times \frac{1 \text{ cycle}}{1 \text{ filter presses online}}$$

1 shift 2 presses

$$\mathbf{136 \text{ ft}^3\text{/cycle/filter press}}$$

GOLDER

Date: 1-Feb-19
Project No.: 11301153
Subject: Example Calculations
Project Short Title: Chino Mine

Sludge storage tank

$$= \frac{42\ \text{gal}}{1\ \text{min}} \times 270\ \text{min} \times 1.1\ \text{Freeboard}$$

$$= \mathbf{13{,}000\ gal}$$

$$= 13{,}000\ \text{gal} \times \frac{1\ \text{ft}^3}{7.48\ \text{gal}}$$

$$= \mathbf{1{,}738\ ft^3}$$

Tank Height $= 16$ ft

Diameter

$$= \left| \frac{1{,}738\ \text{ft}^3}{16\ \text{ft}} \times \frac{4}{\pi} \right|^{1/2}$$

$$= \mathbf{12\ ft}$$

Filtrate Tank

Filtrate $= 13$ gpm

Tank size

$$= \frac{13\ \text{gal}}{1\ \text{min}} \times 240\ \text{min}$$

$$= \mathbf{4{,}000\ gal}$$

$$= 4{,}000\ \text{gal} \times \frac{1\ \text{ft}^3}{7.48\ \text{gal}}$$

$$= \mathbf{535\ ft^3}$$

Tank Height $= 10$ ft

Diameter

$$= \left| \frac{535\ \text{ft}^3}{10\ \text{ft}} \times \frac{4}{\pi} \right|^{1/2}$$

$$= \mathbf{9\ ft}$$

Chemical Addition Systems

Lime Chemical Addition System

Lime Consumption
per Hazen Research, Inc., May 3, 2002

$$= \frac{5{,}270\ \text{mg CaO}}{1\ \text{L}} \times \frac{1\ \text{L}}{10{,}040\ \text{mg } SO_4}$$

$$= \mathbf{0.5249\ mg/L\ CaO\ /\ mg/L\ SO_4}$$

Lime, CaO

$$= \frac{6{,}858\ \text{mg } SO_4}{1\ \text{L}} \times \frac{0.5249\ \text{mg/L CaO}}{1\ \text{mg/L } SO_4}$$

$$= \mathbf{3{,}600\ mg/L\ CaO}$$

Lime Consumption

$$= \frac{3{,}600\ \text{mg CaO}}{1\ \text{L}} \times \frac{3.785\ \text{L}}{1\ \text{gal}} \times \frac{1\ \text{lb}}{454{,}000\ \text{mg}} \times \frac{851\ \text{gal}}{1\ \text{min}} \times \frac{1{,}440\ \text{min}}{1\ \text{day}}$$

$$= \mathbf{36{,}779\ \ lb\ CaO/day}$$

Volume, 10% $Ca(OH)_2$ slurry
From FMI's Calcs

$$= \frac{36{,}779\ \text{lb}}{1\ \text{day}} \times \frac{1\ \text{kg}}{2.2\ \text{lb}} \times \frac{1\ \text{L}}{1\ \text{kg}} \times \frac{1\ \text{day}}{1440\ \text{min}} \times \frac{1\ \text{Concentration}}{10\%\ \text{Factor}} \times \frac{1}{1.07\ \text{SG}} \times \frac{1\ \text{gal}}{3.785\ \text{L}} \times \frac{75\ \text{mg } CaOH_2}{56\ \text{mg CaO}}$$

$$= \mathbf{39\ \ gpm}$$

GOLDER

Date: 1-Feb-19
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Subject: Example Calculations
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Lime Consumption, as CaO	=	36,780	lb CaO	x	1	day	x	1	min		
		1	day		1,440	min		1,100	gal		
	=	**0.02**	**lb CaO/gal**								
Chemical Usage, as CaO	=	36,780	lbs CaO	x	365	day	x	1	ton		
		1	day		1	yr		2,000	lbs		
	=	**6,713**	**ton CaO/yr**								
Densification Tank (lime slurry + recycled sludge)	=	288 gpm									
Tank size	=	288 gal		x	5 min						
		1 min									
	=	**1,500 gal**									
	=	1,500 gal		x	1 ft^3						
					7.48 gal						
	=	**201 ft^3**									
Tank Height	=	6 ft									
Diameter	=	201 ft^3		x	4	$^{1/2}$					
		6 ft			π						
	=	**7 ft**									

$$\text{Diameter} = \left(\frac{201\ ft^3}{6\ ft} \times \frac{4}{\pi} \right)^{1/2} = 7\ ft$$

Flocculent Chemical Addition System

Mass	=	10	mg	x	3.785	L	x	1,100	gal	x	1	lb										
Estimated from experience		1	L		1	gal			min		453,600	mg										
(typically moderately anionic polymer)	=	**0.09**	**lb/min**																			
Usage	=	0.09	lb	x			x	1440	min	x	365	d										
		1	min		1,100	gpm		1	d		1	yr										
	=	**44**	**lb/yr-gpm**																			
Volume	=	0.09	lb	x	1	kg	x	1	L	x	60	min	x	1	Concentration	x	1		x	1	gal	
		1	min		2.2	lb		1	kg		1	hr		100%	Factor		1	SG		3.785	L	
	=	**0.67**	**gph**																			

HCl Acid Chemical Addition

NOTE: 2018 UPDATE INCLUDES USING HCL INSTEAD OF SULFURIC - THE FOLLOWING CONVERSION FACTOR IS INCORPORATED INTO THE SUMMARY SHEET TO CONVERT 93% SULFURIC USAGE TO 35% HCL USAGE

	=	1	lb 93% H2SO4	x	93	lb H2SO4	x	1	nol H2SO4	x	2	mols H+	x	1	mol HCl	x	36.5	lb HCl	x	100	lb 35%
		1	gal		100	lb 93%		98	lb H2SO4		1	mol H2SO4		1	mol H+		1	mol HCl		35	lb HCl
factor lb SO4(93%)/gal to lb HCl (35%)/gal		1.98	lb 35%HCL/gal																		
HCl (35%) Acid Consumption	=	0.028	lbs H2SO4 (93%)	x	1.98	lbs HCl (35%)															
Used Van Riper Consulting, 2002 for H2SO4		1,000	gal		1	lbs H2SO4 (93%)															
then converted to 35% HCl	=	**0.0001**	**lbs/gal**																		
Mass	=	0.0001	lbs	x	453,600	mg	x	1	gal												
		1	gal		1	lb		3.785	L												
	=	**6.65**	**mg/L**																		

GOLDER

Date: 1-Feb-19
Project No.: 11301153
Subject: Example Calculations
Project Short Title: Chino Mine

Usage	=	6.65	mg	x	1,500	gal	x	3.785	L	x	1	lb
		1	L		1	min		1	gal		453,600	mg
	=	**0.0832**	**lb/min**									

Volume	=	0.08	lb	x	1	kg	x	1	L	x	60	min	x	1	Concentration	x	1		x	1	gal
		1	min		2.2	lb		1	kg		1	hr		35%	Factor		1.18	SG		3.785	L
	=	**1.46**	**gph**																		

Chemical Usage	=	0.0001	lbs	x	1,500	gal	x	1,440	min	x	365	day
		1	gal		1	min		1	day		1	yr
	=	**43,709**	**lbs/yr**									

MF Cleaning Chemicals

High pH Cleaner Mass	=	2	cleanings	x	12	month	x	6	pail	x	45	lb
Estimated from experience		1	month		1	yr			cleaning			pail
and advice from Avista	=	**5,940**	**lb/yr**									
High pH Cleaner Usage Rate	=	5,940	lb MF Cleaning Chem	x								
		1	year		1,400	gpm						
	=	**4.24**	**lb/yr-gpm**									
Low pH Cleaner Mass	=	2	cleanings	x	12	month	x	6	pail	x	45	lb
Estimated from experience		1	month		1	yr			cleaning			pail
and advice from Avista	=	**5,940**	**lb/yr**									
Low pH Cleaner Usage Rate	=	5,940	lb MF Cleaning Chem	x								
		1	year		1,400	gpm						
	=	**4.24**	**lb/yr-gpm**									

RO Cleaning Chemicals

High pH Cleaner Mass	=	1	cleanings	x	12	month	x	6	pail	x	45	lb
Estimated from experience		3	month		1	yr			cleaning			pail
and avista advice	=	**990**	**lb/yr**									
High pH Cleaner Usage Rate	=	990	lb MF Cleaning Chem	x								
		1	year		1,400	gpm						
	=	**0.707**	**lb/yr-gpm**									
Low pH Cleaner Mass	=	1	cleanings	x	12	month	x	6	pail	x	45	lb
Estimated from experience		3	month		1	yr			cleaning			pail
	=	**990**	**lb/yr**									
Low pH Cleaner Usage Rate	=	990	lb MF Cleaning Chem	x								
		1	year		1,400	gpm						
	=	**0.707**	**lb/yr-gpm**									

Antiscalant

Mass	=	3	mg	x	3.785	L	x	1,400	gal	x	1	lb	x	1,440	min	x	365	d
Estimated from experience		1	L		1	gal			min		453,600	mg			d		1	yr
	=	**18,420**	**lb/yr**															

Date: 1-Feb-19
Project No.: 11301153
Subject: Example Calculations
Project Short Title: Chino Mine

Usage

$$= \frac{18{,}420 \text{ lb MF Cleaning Chem}}{1 \text{ year}} \times \frac{}{1{,}400 \text{ gpm}}$$

$$= \mathbf{13.16 \ lb/yr\text{-}gpm}$$

Biocide

Mass

Estimated from experience

$$= \frac{1 \text{ mg}}{1 \text{ L}} \times \frac{3.785 \text{ L}}{1 \text{ gal}} \times \frac{1{,}400 \text{ gal}}{\text{min}} \times \frac{1 \text{ lb}}{453{,}600 \text{ mg}} \times \frac{1{,}440 \text{ min}}{\text{d}} \times \frac{365 \text{ d}}{1 \text{ yr}}$$

$$= \mathbf{6{,}140 \ lb/yr}$$

Usage

$$= \frac{6{,}140 \text{ lb}}{1 \text{ yr}} \times \frac{}{1{,}400 \text{ gpm}}$$

$$= \mathbf{4.39 \ lb/yr\text{-}gpm}$$

Process Water (Does not include slaking water)

Water required = Polymer make-down + Lime make-down

$$= \frac{0.67 \text{ gal}}{\text{min}} + \frac{39 \text{ gal}}{\text{min}}$$

Water required = **39.7 gpm**

Tank size

$$= \frac{39.7 \text{ gal}}{1 \text{ min}} \times \frac{75 \text{ min}}{}$$

$$= \mathbf{3{,}000 \ gal}$$

$$= \frac{3{,}000 \text{ gal}}{} \times \frac{1 \text{ ft}^3}{7.48 \text{ gal}}$$

$$= \mathbf{401 \ ft^3}$$

Tank Height = 15 ft

Diameter

$$= \left| \frac{401 \text{ ft}^3}{15 \text{ ft}} \times \frac{4}{\pi} \right|^{1/2}$$

$$= \mathbf{6 \ ft}$$

Power Consumption

Membrane System

Plus 5% for building load

$$= \frac{263 \text{ hp}}{} \times \frac{0.746 \text{ kw}}{1 \text{ hp}} \times \frac{24 \text{ hr}}{1 \text{ day}} \times \frac{365 \text{ day}}{1 \text{ year}}$$

= 1,714,737 kw-hr/year

$$= \frac{1{,}714{,}737 \text{ kw-hr}}{\text{year}} \times \frac{}{1{,}400 \text{ gpm}}$$

$$= \mathbf{1{,}225 \ kw\text{-}hr/gpm\text{-}yr}$$

HDS System

Plus 5% for building load

$$= \frac{52 \text{ hp}}{} \times \frac{0.746 \text{ kw}}{1 \text{ hp}} \times \frac{24 \text{ hr}}{1 \text{ day}} \times \frac{365 \text{ day}}{1 \text{ year}}$$

= 336,774 kw-hr/year

$$= \frac{336{,}774 \text{ kw-hr}}{\text{year}} \times \frac{}{1{,}100 \text{ gpm}}$$

$$= \mathbf{306 \ kw\text{-}hr/gpm\text{-}yr}$$

GOLDER

Date: 12-Mar-19
Project No.: 113-01153
Subject: Labor Cost Estimate - STS and SDF Operations
Project Short Title: Chino Mine Closure Closeout Plan

Max Solids		**Avg Solids**	
Day shift - 1 supervisor, 2 maintenance - 40 hrs a week (also used for ETS, SDF, Salt Disposal Facility) Per shift - 2 filter press, 1 lime silo, 1 membrane, 1 HDS, 1 pumps/pipelines (conveyance and discharge) and ETS 2 shifts each 12 hr days, 7 days week, Covered by 4 crews so that each crew works 40 hr/wk plus average of 4 hrs scheduled overtime		Day shift - 1 supervisor, 1 maintenance - 40 hrs a week (also used for ETS, SDF, Salt Disposal Facility) One shift - 2 filter press, 1/2 HDS, 1/2 Membrane, 1 lime silo, 1 pumps/pipelines (conveyance and discharge) and ETS 1 shift 12 hr days, 7 days week	
Operators	12	Operators	5
Operator Rate[2]	$ 18.60 /hr	Operator Rate	$ 18.60 /hr
Operator Hours (7 day/wk)	2,080 hr/op	Operator Hours	2,080 hr/op
Operator Total Cost	$ 464,256	Operator Total Cost	$ 193,440
Supervisors	1	Supervisors	1
Supervisor Rate[3]	$ 31.10 /hr	Supervisor Rate	$ 31.10 /hr
Supervisor Hours (5 day/wk)	2,080 hr/op	Supervisor Hours	2,080 hr/op
Supervisor Total Cost	$ 64,688	Operator Total Cost	$ 64,688
Maintenance Techs	2	Maintenance Techs	1
Maintenance Tech Rates[4]	$ 19.83 /hr	Maintenance Tech Rates	$ 19.83 /hr
Maintenance Tech Hours (5 day/wk)	2,080 hr/op	Maintenance Tech Hours	2,080 hr/op
Maintenance Tech Total Cost	$ 82,493	Maintenance Tech Total Cost	$ 41,246
Sub-Total Labor Cost	**$ 611,437**	**Sub-Total Labor Cost**	**$ 299,374**
Overtime for supervisor[5]	10%	Overtime for supervisor[5]	10%
Overtime hours for supervisor	208	Overtime hours for supervisor	208
Supervisor Overtime Total Cost	$ 9,703	Supervisor Overtime Total Cost	$ 9,703
Overtime for maintenance[5]	10%	Overtime for maintenance[5]	10%
Overtime hours for maintenance	416	Overtime hours for maintenance	208
Maintenance Overtime Total Cost	$ 12,374	Maintenance Overtime Total Cost	$ 6,187
Overtime for operators[5]	15%	Overtime for operators[5]	15%
Overtime hours for operators[5]	3,744	Overtime hours for operators[5]	1,560
Operator Overtime Total Cost	$ 104,458	Operator Overtime Total Cost	$ 43,524
Overtime Cost	**$ 126,535**	**Overtime Cost**	**$ 59,414**
Benefits fringe rate per hour[6]	$ 5.94 /hr	Benefits fringe rate per hour[6]	$ 5.94 /hr
Number of employees	15 ops	Number of employees	7 ops
Hours per year	2,080 hrs/op	Hours per year	2,080 hrs/op
Benefits Cost	$ 185,328	Benefits Cost	$ 86,486
Benefits Cost	**$ 185,328**	**Benefits Cost**	**$ 86,486**
Total Labor Cost	**$ 923,300**	**Total Labor Cost**	**$ 445,275**
Sludge (lb/day) [7]	*295,453*	*Sludge (lb/day)* [7]	*108,340*
Labor Cost/lb sludge ($/d)	*$ 3*	*Labor Cost/lb sludge ($/d)*	*$ 4*

Notes:

[1] Operator numbers are estimated from Golder's experience with operating similar plants.

[2] 2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group I.
https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf

[3] 2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group X.
https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf

[4] 2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. Operator Group V.
https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf

[5] Overtime for supervisor/maintenance is for call-outs when off-shift (nights and weekends). Overtime for operators includes average of 4 hours per week scheduled overtime (10%) plus an additional 5% for unexpected projects, covering sick time, holiday work, etc) for max solids. Scheduled overtime for average solids operating periods is 2 hours scheduled per week, however, with the plant operating unattended there may be more call-outs so overtime is left at 15%.

[6] 2019 NM Type "A" Street, Highway, Utility & Light Engineering Prevailing Wages. All Operator groups.
https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_A_2019_final.pdf

[7] If sludge is max solids then need full crew, otherwise assume crew size is less and listed as Average Solids
Costs do not include indirect costs

ATTACHMENT C

Equipment and Material Quotes and Cost Backup Details

ATTACHMENT C1

ETS Equipment Backup

Tab 1: Water Management Variables Evaporative Treatment and Water Conveyance Systems

Description	Variable
RSMeans NM Discount Rate	0.847
Steel Tank Life Expectancy (yr)	50
Lined Pond Life Expectancy (yr)	30
Pump Life Expectancy (yr)	20
HDPE Pipeline Life Expectancy (yr)	100
Reclamation Start Year (End of Year 2018)	0
Reclamation Finished	12
Vegetation Established Assume stormwater released	12
Short-Term Evaporative Treatment System Start Year (Beginning of Year 2019)	1
Short-Term Evaporative Treatment System Finish Year (End of Year 2024)	6
Long-Term Evaporative Treatment System Start Year (Beginning of Year 2025)	7
Long-Term Evaporative Treatment System Finish Year (End of Year 2118)	100

Tab 2: LONG-TERM EVAPORITION TREATMENT SYSTEM - CAPEX
Rev. A

Created by: Antonio Herilalaina
Checked by: Wade Wang
Approved by: JP Wu
Revised by: **Todd Stein (11/1/2018)**

Pipelines CAPEX and Replacement Schedule

From	To	Length (ft)	Material	Nom. Pipe Size (in)	Pipe Schedule	Material and Installation Cost	Total Installed Direct Cost	Comments	Assumed Age at Start of LT ETS (Yr 7)	1st Relacement Year	2nd Relacement Year	3rd Relacement Year	4th Relacement Year	5th Relacement Year
MAIN LAMPBRIGHT LEACH STOCKPILE	EAST HEADWALL IMPOUNDMENT	1180	HDPE PE4710	4	DR17	$6.96	$8,217	RS Means bare costs for materials and installation (Line No. 331413350100)	7	99	NA	NA	NA	NA
MAIN LAMPBRIGHT LEACH STOCKPILE	EAST LAMPBRIGHT SUMP	2851	HDPE PE4710	3	DR17	$6.06	$17,288	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	26	80	NA	NA	NA	NA
EAST HEADWALL IMPOUNDMENT	EAST LAMPBRIGHT SUMP	5121	HDPE PE4710	3	DR17	$6.06	$31,052	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	7	99	NA	NA	NA	NA
EAST LAMPBRIGHT SUMP	STAINLESS STEEL PLS TANK 1	5491	HDPE PE4710	2	DR17	$5.42	$29,771	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	26	80	NA	NA	NA	NA
SOUTH LAMPBRIGHT LEACH STOCKPILE	STAINLESS STEEL PLS TANK 1	1000	HDPE PE4710	2	DR17	$5.42	$5,422	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	26	80	NA	NA	NA	NA
STAINLESS STEEL PLS TANK 1	RESERVOIR 8	150	HDPE PE4710	3	DR17	$6.06	$910	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	26	80	NA	NA	NA	NA
RESERVOIR 8	RESERVOIR 7	11352	HDPE PE4710	4	DR11	$6.96	$79,055	RS Means bare costs for materials and installation (Line No. 331413350100)	26	80	NA	NA	NA	NA
SOUTH LEACH STOCKPILE SEEPAGE AND RUNOFF	STAINLESS STEEL PLS TANK 2	9820	HDPE PE4710	4	DR17	$6.96	$68,386	RS Means bare costs for materials and installation (Line No. 331413350100)	26	80	NA	NA	NA	NA
WEST LEACH STOCKPILE STOCKPILE SEEPAGE AND RUNOFF	STAINLESS STEEL PLS TANK 2	9345	HDPE PE4710	2	DR17	$5.42	$50,666	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	26	80	NA	NA	NA	NA
STAINLESS STEEL PLS TANK 2	RESERVOIR 4A	290	HDPE PE4710	3	DR17	$6.06	$1,758	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	26	80	NA	NA	NA	NA
RESERVOIR 4A	RESERVOIR 7	22440	HDPE PE4710	6	DR9	$10.39	$233,152	RS Means bare costs for materials and installation (Line No. 331413350200)	26	80	NA	NA	NA	NA
LEE HILL LEACH STOCKPILE SEEPAGE AND RUNOFF	LEE HILL #1 BOOSTER	2059	HDPE PE4710	2	DR11	$5.42	$11,163	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	26	80	NA	NA	NA	NA
							$536,840							

Tab 2: LONG-TERM EVAPORITION TREATMENT SYSTEM - CAPEX
Rev. A

Created by: Antonio Herilalaina
Checked by: Wade Wang
Approved by: JP Wu
Revised by: **Todd Stein (11/1/2018)**

Pumps CAPEX and Replacement Schedule

From	To	Quantity	Design Flow Rate (gpm)	Total Head (ft)	Assumed Motor Rating, hp	Material Cost	Installation Cost	Total Installed Direct Cost	Comments	Assumed Age at Start of LETS (Yr 7)	1st Relacement Year	2nd Relacement Year	3rd Relacement Year	4th Relacement Year	5th Relacement Year
EAST LAMPBRIGHT SUMP	STAINLESS STEEL PLS TANK 1	1	50	223	5	$10,000	$6,269	$16,269	Sump pump estimate based on historical database of actual pump costs on various Golder projects. Unit hours required to install each pump were taken from Estimator Piping Man-Hour Manual Book, based on pump horse power. $85/hr was used for labor rate.	11	15	35	55	75	95
RESERVOIR 8	RESERVOIR 7	1	70	422	15	$13,000	$6,269	$19,269		11	15	35	55	75	95
RESERVOIR 4A	RESERVOIR 7	1	80	500	15	$13,000	$6,269	$19,269		11	15	35	55	75	95
LEE HILL LEACH STOCKPILE SEEPAGE AND RUNOFF	LEE HILL #1 BOOSTER	1	10	443	2	$10,000	$6,269	$16,269		11	15	35	55	75	95
								$71,078							

ALLOWANCE FOR MINOR MECHANICAL, ELECTRICAL, INSTRUMENTATION, AND UNDEFINED SCOPE (5%):	$30,395.86	5% Allowance for both
TOTAL CONSTRUCTION COST:	**$638,400**	

Notes:
Pump Life Expectancy – 20 years
HDPE Pipeline Life Expectancy – 100 years
NA - Not applicable

Tab 3: LONG-TERM EVAPORITION TREATMENT SYSTEM - CAPEX
Rev. A

Created by: Todd Stein
Date: 2/5/2019

Reservoirs and Tanks CAPEX and Replacement Schedule

Reservoir/Tank ID	Current Size (ac)	New/Replacement Size (ac)	New/Replacement Size (sf)	New/Replacement Cost	Assumed Age at Start of LT-ETS (Yr 7)	CAPEX	1st Relacement Year	2nd Relacement Year	3rd Relacement Year
East Headwall Impoundment	0.46	0.46	20,038	$ 22,352	7		29	59	89
East Lampbright Sump	0.51	0.51	22,216	$ 24,782	26		10	40	70
Stainless Steel PLS Tank next to Reservoir 8	371,846 gal	100,000 gal	100,000 gal	$ 223,614	26		30	80	NA
Lined portion of Reservoir 8	0.09	0.5	21,780	$ 24,296	26		10	40	70
5 acres of Reservoir 7 (5 acres will be lined with HDPE and the remaining portion will be reclaimed)	NA	5	217,800	$ 242,959	0	$ 242,959	36	66	96
Stainless Steel PLS Tank next to Reservoir 4A	500,000 gal	100,000 gal	100,000 gal	$ 223,614	26		30	80	NA
Reservoir 4A	1.5	1.5	65,340	$ 72,888	26		10	40	70
Lee Hill #1 Booster Pond	0.14	0.14	6,098	$ 6,803	26		10	40	70
Total for Complete System:				**$ 841,307**					

Notes:

Steel Tank Life Expectancy (yr)	50		
Lined Pond Life Expectancy (yr)	30		
80 mil Geomembrane Liner	$ 1.12	$/SF	RSMeans 2018 (1500 sf daily output), Pond and reservoir liners, membrane lining systems HDPE, 100,000 S.F. or more, 80 mil thick, per S.F.

NA - Not applicable

Steel water storage tanks, ground level, ht./diam. less than 1, 100,000 gallons, excl. foundation (RS Means #331623130910) = $223,614

Tab 4: EVAPORATION TREATMENT SYSTEM - CAPEX
Rev. A

Created by: Todd Stein
Date: 2/5/2019

Mechanical Spray Systems CAPEX and Replacement Schedule

Description	Quantity	Design Flow Rate (gpm)	Assumed Motor and Fan Rating, hp	Material Cost	Installation Cost	Total Installed Direct Cost	Comments	Assumed Age at Start of ST-ETS (Yr 1)	Assumed Age at Start of LETS (Yr 7)	1st Relacement Year	2nd Relacement Year	3rd Relacement Year	4th Relacement Year
Short-Term ETS Spray Systems (SMI Mega Polecat)	36	123	60	$52,500	$18,800	$1,908,800	a	0	7	NA	NA	NA	NA
Long-Term ETS Spray Systems at Reservoir 7 (SMI Super Polecat)	4	66	32.5	$33,484	$11,600	$145,536	b	NA	0	27	47	67	87
Long-Term ETS Spray Systems at the Lee Hill #1 Sump Impoundment (SMI 420F floating unit)	1	25	27	$35,438	$4,400	$39,838	c	NA	0	27	47	67	87
TOTAL CONSTRUCTION COST:						**$2,094,174**							

Notes:
[a]SMI Quote Dated 10/4/18, includes $52,500 per Mega Polecat unit, $18,800 for supplier system setup (9 days total). Submersible pump not required, will use existing Raff distribution system.
[b]SMI Quote Dated 10/4/18, includes $26,984 per Super Polecat unit plus $6,500 for each submersible pump, $11,600 for supplier system setup (5 days total), $1500 for plastic float cords. The number of required spray units gets reduced to 2 by Year 13 and to 1 by Year 25.
[c]SMI Quote Dated 10/4/18, includes $33,200 per 420F floating unit, $4,400 for supplier system setup (automation technician 1 day setup and programming), $1,500 weather control panels at each location, $738 for plastic float cords.
Mechanical spray systems assumed to be replaced every 20 years, setup reduced to one day for each location (Reservoir 7 and Lee Hill Sump) for a total of $6200.
NA - Not applicable

Tab 5: ELECTRICITY RATE CALCULATIONS
Rev. A

Created by: Antonio Herilalaina
Checked by: Wade Wang
Approved by: Todd Stein
Date: 2/5/2019

Table 1. STS, ETS, and Water Conveyance System Operational Electricity Rate Calculations (Years 1 through 6)

Assume a load of ### kW 1609.2
Assume a demand of 100% of the kW 1609.2

On-Peak kWh	427587.4	386208	427587.4	413794.3	427587.4	413794.3	427587.4	427587.4	413794.3	427587.4	413794.2857	427587.43
Off-Peak kWh	769657.4	695174.4	769657.4	744829.7	769657.4	744829.7	769657.4	769657.4	744829.7	769657.4	744829.7143	769657.37
Total kWh for the month	1197245	1081382	1197245	1158624	1197245	1158624	1197245	1197245	1158624	1197245	1158624	1197244.8
On-Peak cost	10075.33	9100.296	10075.33	9750.318	10075.33	12416.77	12830.66	12830.66	9750.318	10075.33	9750.317513	10075.328
Off peak cost	11994.42	10833.67	11994.42	11607.5	11994.42	11607.5	11994.42	11994.42	11607.5	11994.42	11607.50075	11994.417
demand charge	26342.6	26342.6	26342.6	26342.6	26342.6	37864.48	37864.48	37864.48	26342.6	26342.6	26342.604	26342.604
Customer charge	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17
Total bill (not including fuel adjustment & taxes)	48993.52	46857.74	48993.52	48281.59	48993.52	62469.91	63270.72	63270.72	48281.59	48993.52	48281.59226	48993.52
Average cost (not including fuel adjustment & taxes) $/kWh	0.041	0.043	0.041	0.042	0.041	0.054	0.053	0.053	0.042	0.041	0.042	0.041

Avg ($/kWh) 0.044

Table 2. STS, ETS, and Water Conveyance System Operational Electricity Rate Calculations (Years 7 through 12)

Assume a load of ### kW 941.8
Assume a demand of 100% of the kW 941.8

On-Peak kWh	250238.7	226022.1	250238.7	242166.5	250238.7	242166.5	250238.7	250238.7	242166.5	250238.7	242166.5229	250238.74
Off-Peak kWh	450429.7	406839.8	450429.7	435899.7	450429.7	435899.7	450429.7	450429.7	435899.7	450429.7	435899.7411	450429.73
Total kWh for the month	700668.5	632861.8	700668.5	678066.3	700668.5	678066.3	700668.5	700668.5	678066.3	700668.5	678066.264	700668.47
On-Peak cost	5896.425	5325.804	5896.425	5706.218	5896.425	7266.715	7508.939	7508.939	5706.218	5896.425	5706.218211	5896.4255
Off peak cost	7019.542	6340.231	7019.542	6793.105	7019.542	6793.105	7019.542	7019.542	6793.105	7019.542	6793.105156	7019.542
demand charge	15416.59	15416.59	15416.59	15416.59	15416.59	22159.58	22159.58	22159.58	15416.59	15416.59	15416.58992	15416.59
Customer charge	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17
Total bill (not including fuel adjustment & taxes)	28913.73	27663.8	28913.73	28497.08	28913.73	36800.57	37269.23	37269.23	28497.08	28913.73	28497.08329	28913.727
Average cost (not including fuel adjustment & taxes) $/kWh	0.041	0.044	0.041	0.042	0.041	0.054	0.053	0.053	0.042	0.041	0.042	0.041

Avg ($/kWh) 0.045

Tab 5: ELECTRICITY RATE CALCULATIONS
Rev. A

Created by: Antonio Herilalaina
Checked by: Wade Wang
Approved by: Todd Stein
Date: 2/5/2019

Table 3. STS, ETS, and Water Conveyance System Operational Electricity Rate Calculations (Years 13 through 32)

Assume a load of ### kW 893.3
Assume a demand of 100% of the kW 893.3

On-Peak kWh	237356.9	214386.9	237356.9	229700.2	237356.9	229700.2	237356.9	237356.9	229700.2	237356.9	229700.2371	237356.91
Off-Peak kWh	427242.4	385896.4	427242.4	413460.4	427242.4	413460.4	427242.4	427242.4	413460.4	427242.4	413460.4269	427242.44
Total kWh for the month	664599.4	600283.3	664599.4	643160.7	664599.4	643160.7	664599.4	664599.4	643160.7	664599.4	643160.664	664599.35
On-Peak cost	5592.888	5051.641	5592.888	5412.473	5592.888	6892.638	7122.393	7122.393	5412.473	5592.888	5412.472628	5592.8884
Off peak cost	6658.189	6013.848	6658.189	6443.409	6658.189	6443.409	6658.189	6658.189	6443.409	6658.189	6443.408638	6658.1889
demand charge	14622.97	14622.97	14622.97	14622.97	14622.97	21018.85	21018.85	21018.85	14622.97	14622.97	14622.97232	14622.972
Customer charge	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17
Total bill (not including fuel adjustment & taxes)	27455.22	26269.63	27455.22	27060.02	27455.22	34936.06	35380.6	35380.6	27060.02	27455.22	27060.02359	27455.22
Average cost (not including fuel adjustment & taxes) $/kWh	0.041	0.044	0.041	0.042	0.041	0.054	0.053	0.053	0.042	0.041	0.042	0.041

Avg ($/kWh) 0.045

Table 4. STS, ETS, and Water Conveyance System Operational Electricity Rate Calculations (Years 33 through 100)

Assume a load of ### kW 864.9
Assume a demand of 100% of the kW 864.9

On-Peak kWh	229823.9	207582.9	229823.9	222410.2	229823.9	222410.2	229823.9	229823.9	222410.2	229823.9	222410.2371	229823.91
Off-Peak kWh	413683	373649.2	413683	400338.4	413683	400338.4	413683	413683	400338.4	413683	400338.4269	413683.04
Total kWh for the month	643507	581232.1	643507	622748.7	643507	622748.7	643507	643507	622748.7	643507	622748.664	643506.95
On-Peak cost	5415.387	4891.317	5415.387	5240.697	5415.387	6673.886	6896.349	6896.349	5240.697	5415.387	5240.6969	5415.3868
Off peak cost	6446.878	5822.986	6446.878	6238.914	6446.878	6238.914	6446.878	6446.878	6238.914	6446.878	6238.914078	6446.8779
demand charge	14158.88	14158.88	14158.88	14158.88	14158.88	20351.77	20351.77	20351.77	14158.88	14158.88	14158.88282	14158.883
Customer charge	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17	581.17
Total bill (not including fuel adjustment & taxes)	26602.32	25454.36	26602.32	26219.66	26602.32	33845.74	34276.17	34276.17	26219.66	26602.32	26219.6638	26602.317
Average cost (not including fuel adjustment & taxes) $/kWh	0.041	0.044	0.041	0.042	0.041	0.054	0.053	0.053	0.042	0.041	0.042	0.041

Avg ($/kWh) 0.045

Notes:
Based on Public Service Company of New Mexico Electrical Services 20th Revised Rate No. 4B Large Power Service - Time of Use Rate (Effective Date Febrary 1, 2018)

Todd Stein
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F: +1 (505) 821-5273
E: Todd_Stein@golder.com
www.golder.com

Todd,

Thank you for your time and discussions about the Chino Mine in New Mexico. As discussed, please find the below offers for a variety of equipment we can provide for the project:

A. Equipment and Pricing Kid PoleCat Evaporator with Standalone Controls

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	SMI Kid Polecat Evaporator with 480V/60Hz 7.5 HP (5.6 kW) fan motor, painted steel fan housing with stainless steel inlet screen, stainless steel spray manifold with 1-1/2 inch male stainless steel cam and groove fitting and 16 Teflon spiral tip nozzles (rated 35 gpm at 100 psi or 133 lpm at 6.9 bar), mounted on 3-wheel galvanized steel chassis with tow bar, manual hand crank jack for adjusting fan inclination from 0-45°, 40° oscillation, control panel with manual controls, 150ft* of 10/4 SEOOW power cord and no plug.	1	Each	22,908.00	$22,908.00

A. Equipment and Pricing Kid PoleCat Evaporator with Standalone Controls (continued)

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	Continued: Package includes upgrades from manual controls to standalone automated operation, weather control panel, weather device with temperature, relative humidity, wind speed and wind direction, and control panel upgrades for automatic control. System will automatically shut down for high winds or unfavorable wind direction. Low temperature set point to keep the system idle during freezing temperatures and user settable humidity so the system does not operate when raining or for high humidity. *Automation pricing subject to change if SMI pump is not chosen.				
	2 HP (1.5 kW) 480V/60Hz 304 stainless steel self-priming submersible pump in PVC sleeve to cool pump, plastic pontoon float system with stainless steel framework, junction box for terminating pump leads with Kellems grip for strain relief, 1.5 in. x 100ft water feed hose from pump to Evaporator, 100 ft of 10/4 SEOOW pump power cord with Hubbell HBL2431SW twist lock plug with water tight safety shroud to connect to Hubbell receptacle 2430SW mounted on the bottom of the Evaporator control panel.	1	Each	3,950.00	$3,950.00
	Plastic power cord floats (1 per 3.3m of cable)	10	Each	14.75	$147.50
	SMI Automation technician on-site 1 day for automation, machine and system training, supervision and startup including expenses. The machines will be	1	Each	4,400.00	$4,400.00

A. Equipment and Pricing Kid PoleCat Evaporator with Standalone Controls (continued)

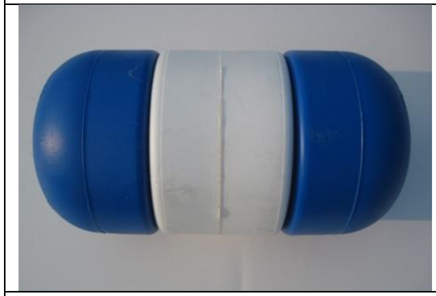
	Description	Qty.	Unit	USD($)/unit	Total USD($)
	Continued: commissioned to verify fan, pump, and controls operate correctly and that each machine can be controlled and interfaced from the weather control panel. Wind set points will be input to the software for shutting down the equipment when conditions are not favorable for evaporation and to minimize drift. SMI Automation technician will also inspect for proper machine installation and spacing, wiring of machines to machine control panels on panel shelters. Equipment must be installed and have power to the system before the Automation technician arrives. Additional consecutive days $1,800.00/per day. Recommended 1 day per 4 evaporators.				
Total F.O.B. Midland, MI for Kid PoleCat with Standalone Controls					**$31,405.50**

* Additional power cord above the 150 ft/machine is $2.35/ft

B. Equipment and Pricing Super PoleCat Evaporator with Standalone Controls

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	SMI Super Polecat Evaporator with 480V/60Hz 25 HP (18.7 kW) fan motor, painted steel fan housing with stainless steel inlet screen, stainless steel spray manifold with 2-way stainless steel ball valve for flow regulation , 1-1/2 inch male stainless steel cam and groove fitting on water inlet and 30 Teflon spiral tip nozzles (rated 66 gpm at 100 psi or 250 lpm at 6.9 bar), mounted on 3-wheel galvanized steel A-frame chassis with anchor jacks and tow bar, manual hand crank jack for adjusting fan inclination from 0-45°, no oscillation, control panel with manual controls, 150ft* of 8/4 type W power cord and no plug.	1	Each	26,984.00	$26,984.00

B. Equipment and Pricing Super PoleCat Evaporator with Standalone Controls (continued)

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	Continued: Package includes upgrades from manual controls to standalone automated operation, weather control panel, weather device with temperature, relative humidity, wind speed and wind direction, and control panel upgrades for automatic control. System will automatically shut down for high winds or unfavorable wind direction. Low temperature set point to keep the system idle during freezing temperatures and user settable humidity so the system does not operate when raining or for high humidity.				
	7.5HP (5.6 kW) 480V/60Hz 304 stainless steel self-priming submersible pump in PVC sleeve to cool pump, plastic pontoon float system with stainless steel framework, junction box for terminating pump leads with Kellems grip for strain relief, 1.5 in. x 100ft water feed hose from pump to Evaporator, 100 ft of 10/4 SEOOW pump power cord with Hubbell HBL2431SW twist lock plug with water tight safety shroud to connect to Hubbell receptacle 2430SW mounted on the bottom of the Evaporator control panel.	1	Each	6,500.00	$6,500.00
	Plastic power cord floats (1 per 3.3m of cable)	10	Each	14.75	$147.50
	SMI Automation technician on-site 1 day for automation, machine and system training, supervision and startup including expenses. The machines will be commissioned to verify fan, pump, and controls operate correctly and that each machine can be controlled and interfaced from the weather control panel.	1	Each	4,400.00	$4,400.00

B. Equipment and Pricing Super PoleCat Evaporator with Standalone Controls (continued)

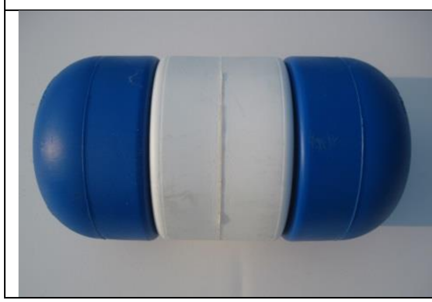
	Description	Qty.	Unit	USD($)/unit	Total USD($)
	Continued: Wind set points will be input to the software for shutting down the equipment when conditions are not favorable for evaporation and to minimize drift. SMI Automation technician will also inspect for proper machine installation and spacing, wiring of machines to machine control panels on panel shelters. Equipment must be installed and have power to the system before the Automation technician arrives. Additional consecutive days $1,800.00/per day. Recommended 1 day per 4 evaporators.				
Total F.O.B. Midland, MI for SPC with Manual Controls					**$38,031.50**

* Additional power cord above the 150 ft/machine is $4.85/ft

C. Equipment and Pricing Mega PoleCat Evaporator with Standalone Controls

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	SMI Mega Polecat with 480V/60Hz 60HP (45 kW) fan motor, painted steel fan housing with stainless steel inlet screen, 2-1/2 inch large diameter stainless steel spray manifold with 1-1/2 inch 2-way stainless steel ball valve for flow regulation, 1-1/2 inch male stainless steel cam and groove fitting on water inlet and 30 Teflon spiral tip nozzles (rated 123 gpm at 100 psi or 466 lpm at 6.9 bar), mounted on galvanized enclosure and skid mount with integrated fork pockets for easy transport on-site, electric head jack for adjusting fan inclination from 0-45°, 359 degree oscillation with center water feed, control panel with PLC, Wye-Delta start and HMI touch screen interface for machine control, 150ft* of 4/4 type W power cord and no plug and no on-board pump.	1	Each	52,490.50	$52,490.50

C. Equipment and Pricing Mega PoleCat Evaporator with Standalone Controls

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	Continued: Package includes upgrades from manual controls to standalone automated operation, weather control panel, weather device with temperature, relative humidity, wind speed and wind direction, and control panel upgrades for automatic control. System will automatically shut down for high winds or unfavorable wind direction. Low temperature set point to keep the system idle during freezing temperatures and user settable humidity so the system does not operate when raining or for high humidity.				
	30HP (22.4 kW) 480V/60Hz 304 stainless steel self-priming submersible pump in PVC sleeve to cool pump, plastic pontoon float system with stainless steel framework, junction box for terminating pump leads with Kellems grip for strain relief, 2.5 in. x 100ft water feed hose from pump to Evaporator and 10 hose floats, 100 ft of 8/4 tray pump power cord with Hubbell HBL460P5W pin and sleeve plug to connect to Hubbell HBL460R5W receptacle mounted on the bottom of the Evaporator control panel.	1	Each	23,023.50	$23,023.50
	Plastic power cord floats (1 per 3.3m of cable)	10	Each	14.75	$147.50

C. Equipment and Pricing Mega PoleCat Evaporator with Standalone Controls

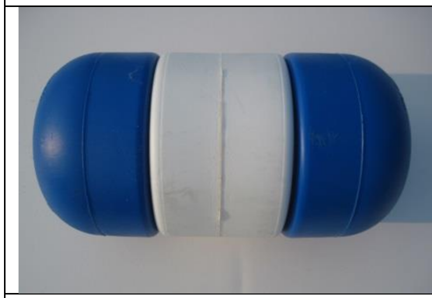
	Description	Qty.	Unit	USD($)/unit	Total USD($)
	SMI Automation technician on-site 1 day for automation, machine and system training, supervision and startup including expenses. The machines will be commissioned to verify fan, pump, and controls operate correctly and that each machine can be controlled and interfaced from the weather control panel. Wind set points will be input to the software for shutting down the equipment when conditions are not favorable for evaporation and to minimize drift. SMI Automation technician will also inspect for proper machine installation and spacing, wiring of machines to machine control panels on panel shelters. Equipment must be installed and have power to the system before the Automation technician arrives. Additional consecutive days $1,800.00/per day. Recommended 1 day per 4 evaporators.	1	Each	4,400.00	$4,400.00
Total F.O.B. Midland, MI for Mega PoleCat with Standalone Controls					**$80,061.50**

* Additional power cord above the 150 ft/machine is $9.27/ft for 4/4 type W and $10.78/ft for 2/4 type W

D. Equipment and Pricing 420F Evaporator with Standalone Controls

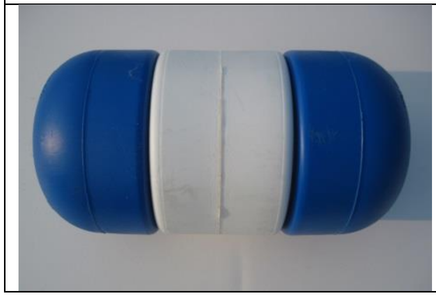
	Description	Qty.	Unit	USD($)/unit	Total USD($)
	SMI 420F standalone automated Evaporator with 480V/60Hz 25 HP (18.7 kW) fan motor, vibration switch, stainless steel motor enclosure, water manifold and propeller, mounted on galvanized steel support and plastic pontoon float system with 480V/60Hz 2 HP (1.5 kW) stainless steel submersible pump, automatic control panel with PLC, and VFD controls, and 300ft* of 18/7 & 10/7 custom and 10/4 SEOOW pump cord.	1	Each	33,200.00	$33,200.00

D. Equipment and Pricing 420F Evaporator with Standalone Controls (continued)

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	Weather control panel, weather devices (includes wind speed, wind direction, humidity and temperature)	1	Each	1,500.00	$1,500.00
	Plastic power cord floats (1 per 3.3m of cable)	50	Each	14.75	$737.50
	SMI Automation technician on-site 1 day for automation, machine and system training, supervision and startup including expenses. The machines will be commissioned to verify fan, pump, and controls	1	Each	4,400.00	$4,400.00
Total F.O.B. Midland, MI for 420F with Standalone Controls					**$39,837.50**

*Additional cord above 300 ft/420F Evaporator at $8/ft

E. Equipment and Pricing 420B Evaporator with Standalone Controls

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	SMI 420B standalone fully automatic Evaporator with 480V/60Hz 25 HP (18.7 kW) fan motor, vibration switch, stainless steel motor enclosure, water manifold and propeller, mounted on galvanized steel boom, upright and platform assembly and concrete counterweight. Automatic control panel with PLC, custom urethane coated jack for raising/lowering the boom, non-metallic junction box mounted to the boom for connecting 200ft* 18/7 & 10/7 custom power cord to the machine control panel. 1.5kW (2HP) 480V/60Hz stainless steel submersible pump in PVC sleeve to cool pump, plastic pontoon float system with stainless steel framework, junction box for terminating pump leads with Kellems grip for strain relief, 1.5 in. x 100ft water feed hose from pump to Evaporator, 300ft** of 10/4 SEOOW pump power cord from pump back to the machine control panel.	1	Each	39,265.00	$39,265.00
	Weather control panel, weather devices (includes wind speed, wind direction, humidity and temperature)	1	Each	1,500.00	$1,500.00
	Plastic power cord floats (1 per 3.3m of cable)	10	Each	14.75	$147.50

E. Equipment and Pricing 420B Evaporator with Standalone Controls (continued)

	Description	Qty.	Unit	USD($)/unit	Total USD($)
	SMI Automation technician on-site 1 day for automation, machine and system training, supervision and startup including expenses. The machines will be commissioned to verify fan, pump, and controls operate correctly and that each machine can be controlled and interfaced from the weather control panel. Wind set points will be input to the software for shutting down the equipment when conditions are not favorable for evaporation and to minimize drift. SMI Automation technician will also inspect for proper machine installation and spacing, wiring of machines to machine control panels on panel shelters. Equipment must be installed and have power to the system before the Automation technician arrives. Additional consecutive days $1,800.00/per day. Recommended 1 day per 4 evaporators.	1	Each	4,400.00	$4,400.00
Total F.O.B. Midland, MI for 420F with Standalone Controls					**$45,312.50**

*Additional 10/7 & 18/7 custom cord above 150 ft/420B Evaporator at $5.65/ft

1. Delivery and Conditions

Pricing is F.O.B. Midland, Michigan. SMI equipment to carry a 6-month warranty on any defective parts and workmanship. Customer is responsible for applicable taxes.

Visit www.evapor.com for Terms and Conditions.

2. Payment Terms

50% due with signed contract
50% + Freight due Net on invoice after delivery

Terms are based upon receiving satisfactory credit references.

3. Customer Responsibilities

1. 480V 3-phase equipment power source
2. All wiring of equipment.
3. All permits.
4. All installation, construction, site engineering and preparation.
5. All fencing, signage and equipment protection
6. All lifting equipment for Evaporators.
7. All Civil Engineering work for the site.
8. Regulatory compliance and permits.
9. Evaporator/Pump shore anchoring including foundation blocks and positioning cables and cable clamps and thimbles.
10. Mounting control panels.
11. Mounting weather devices.

SMI also offers annual evaporation system service agreements per requirements. Please call me at 775-772-6983 if you have any questions. We look forward to hearing from you soon and working with you on this project.

Best Regards,

Nic Horgan
SMI – West
Ph 775 772 6983
nic@evapor.com
www.evapor.com

ATTACHMENT C2

STS Equipment Quotes

Golder Mine Water Treatment

Represented by
The Fairchild Company
Tempe, Arizona
Contact: Voni Rice
(480) 345-4570 / (602) 363-8448
Voni.rice@fairchildcompany.com

Engineer

GOLDER

Lakewood, Colorado
Contact: Paige Pruisner
(303) 980-0540
Paige_Pruisner@golder.com

Furnished by
Chelsea Stewardson
cstewardson@westech-inc.com
Kib Huefner
khuefner@westech-inc.com
George Laird
glaird@westech-inc.com

Proposal No.: 1810581
Friday, September 21, 2018

WESTECH

September 21, 2018

Ms. Paige Pruisner
Water Treatment Engineer
44 Union Boulevard, Suite 300
Lakewood, Colorado 80228
303-980-0540
paige_pruisner@golder.com

Dear Paige,

It was a pleasure for Kib Huefner and me to meet with you and your colleagues yesterday. We really appreciate your taking the time to listen to our presentation.

You, Karen, and Bridgette are working on a water treatment system for a mine site in New Mexico which has the following requirements:

HDS Clarifier

- 1000 gpm influent, 70 ft diameter, about 40,000 mg/L influent TSS

Filter Press

- 200 ft^3, 10-15% expected solids in influent

UF/RO System

- This system will initially treat the 1000 gpm effluent from the clarifier plus a separate 600 gpm stream for a total feed flow of 1600 gpm. Eventually the total feed flow will be reduced to 1000 gpm.

For this application we recommend the system described in the proposal below.

Please call me with any questions. We look forward to working with you on this project.

Best regards,

George Laird

George Laird
Pure Water Specialist| T: 801.290.1447 | C: 801.628.8921
glaird@westech-inc.com; westech-inc.com
3665 S. West Temple, Salt Lake City, Utah 84115

WesTech

Process Equipment Scope of Services

Item A – 70’ WesTech Clarifier Mechanism, Model Number CLS25

General Scope of Supply

Description	Dimension/Capacity	Unit
Number of Clarifiers	1	Each
Application	HDS	-
Clarifier Diameter	70	ft.
Tank Side Wall Depth	14	ft.

Equipment Description

Detailed Scope of Supply

Item	Description	Unit/Size	Material
Bridge Structures	Truss Design	-	Mild Steel
Bridge Walkway Type	Half Span	-	
Grating	1 1/4	in	HDG Steel
Handrail	1-1/2, 2-Rail, Pipe	-	Steel
Rake Arm Type	Truss	-	Mild Steel
Rake Arms Quantity	2 Long Arms	Each	
Tank Bottom Slope	1.75 : 12	-	-
Center Shaft Diameter	12	in	Mild Steel
Discharge Cone Diameter	8	ft.	Mild Steel
Feedwell Type	Standard	-	Mild Steel
Feedwell Dimensions	7’ Dia X 7’ Height	-	
Bolts & Fasteners		-	304 SS/A325

WesTech Drive Unit

Drive Unit		
Description	**Dimension/Capacity**	**Unit**
Drive Type	Shaft	-
Duty-rated Torque	100,000	ft·lbs
Rake Speed	0.104	RPM
Rake Power	3	hp
Motor RPM/Voltage/Hz/Phase	1800 / 460 / 60 / 3	RPM / V / Hz / Phase
Alarm Cutouts	30% 90% 100%	Alarm Motor Cutout Full Scale
Main Gear & Pinions Lubrication	Oil bath	-
Main Bearing & Reducers Lubrication	Grease	-

Controls and Instrumentation

Controls and Instrumentation			
Description	**Type**	**Output Signal**	**Notes**
Control Panel Type	NEMA 4X	Alarm	Stainless Steel
Remote Torque Transmitter	Electromechanical	4-20 mA	Indication/Recording
Bed Level Sensor	Ultrasonic	4-20 mA	Walkway Mounted

Coatings

Paint						
Coating Area	**Sandblast SSPC**	**Paint Type**	**Brand**	**Product #**	**Total DFT**	**Coats**
Submerged Coating	SP10	Epoxy	Tnemec	N69	3-7	2
Non-Submerged	SP6	Epoxy	Tnemec	N69	3-7	2
Non-Submerged Second Coat	N/A	Urethane	Tnemec	1074U	2-5	1
Drive First Coat	SP6	Epoxy	Tnemec	N140-1255	3-9	1
Drive Second Coat	N/A	Urethane	Tnemec	1074U	2-5	1

Clarifications and Exceptions

The information provided above is for budgetary purposes only. No exceptions have been taken at this time.

Items Not Included in WesTech's Base Scope of Supply

- Electrical controls and wiring not described above
- Piping, valves, or fittings
- Lubricants
- Unloading or storage
- Erection or assembly
- Concrete

Bolted On-Grade Anchor Ring Clarifier Tank, Model TKC11B

General Design Criteria

Description	Description
Quantity	1
Size	70 ft x 14 ft
Material of construction	Carbon Steel Bolted Flat Panel
Floor	Concrete (concrete design not by WesTech)
Design Flow	1400 gpm
Launder	Peripheral launder with drop out box
Weir	Included
Access	Ladder Included, Fall Arrest System Provided by Others
Nozzles	(1) Feed, (1) Overflow
Manway	(1) 30" Manway
Grounding Lugs	2
Design Style	Bolted
Sealant	Manus Bond 75-AM and EPDM for panel construction
Shop Coatings	Fusion Bonded Epoxy Coated
Field Erection	By Others
Governing Codes	API650, ASTM, ASME, AISC, AWWA D-101 etc. as the basis in establishing its own design, fabrication, quality criteria, standards, practices, methods and tolerances for tanks. Corrosion allowance not required nor included on tank.
Nozzle Loads	External pipes must be fully supported; nozzles not designed for load bearing.

Benefit – estimated 2-week field erection per tank (by Others)

Item B – One 200 ft^3 Automatic Filter Press, Model Number PFA63C

General Process Information and Scope of Supply		
Description	**Dimension / Capacity / Units**	**Material / Comments**
Application	Mining	Waste Water Treatment
Slurry Feed*	250-400 gpm	Average 24-hour Rate
Solids Concentration*	10-15 wt%	-
Cycles and Cycle Time*	24 cycles/day	1 hr/cycle
Filter Press	One (1) 200 ft^3	Recessed Plates
Size of Filter Plates	1500mm x 1500mm	Polypropylene
Max. Operating Pressure	100 psig	-
Frame Construction	Side Bar	Steel

** Slurry testing is required to verify equipment selection and performance.*

Additional Information and Details on the Scope of Supply

Detailed Unit Scope of Supply – Unit Basis		
Description	Dimension / Capacity / Units	Material / Comments
Filtration Surface Area	4123 ft^2	-
Number of Filter Plates	103 Plates	1500mm x 1500mm
Plate Construction	Polypropylene	Recessed – Non-Gasketed
Cake Thickness	32 mm	-
Filter Cloths	103 cloths (one set each unit)	Polypropylene, Multifilament
Type of Closure	Automatic	Electric / Hydraulic
Plate Shifter	Automatic	Electric, Servomotors
Drip Trays	Automatic	Hydraulic, Steel Frame/304L Covers
Filtrate Manifold & Valves	Automatic Valves	304L SS Pipe & Valves
Feed Style	Center Feed	Dual Feed Flange Option Included
Filtrate Porting	4-Ports	-
Paint	Manufacturer's Standards	-
Control Panels	AB CompactLogix PLC	6" Operating Interface, NEMA 4X
Safety Package	Safety Curtains, both sides	Includes E-stop Lanyards, full length
Cloth Wash System	Not Included	-
Membrane Squeeze System	Not Included	-
Feed Pumps	Not Included	-
Elevated Platform	Not Included	-

Approximate Dimensions and Weights – Unit Basis		
Description	**Units**	**Capacity**
Press Dimensions (L x W x H)	inches	408 x 84 x 86
Press weight (Empty Weight)	lbs	52,500

Clarification and Exceptions

- Slurry testing is required to verify equipment selection and performance.
- Any item not listed above to be furnished by others.
- All information provided in this proposal is preliminary in nature and will be finalized during the detail engineering phase of this project.
- USA Tariffs and Current Trade Laws: All prices are based on current USA and North America tariffs and trade laws/agreements at time of bid. Any changes in costs due to USA Tariffs and trade laws/ agreements will be passed through to the purchaser at cost.

Item C – Ultrafiltration System, Model Number UFT82A

Design Overview		
Description	**Unit**	**Dimension/Capacity**
Application	-	Mine Water Treatment
WesTech System Model	-	UFT82A, Membrane Filtration System
Redundancy and Unit Quantity	-	2 x 50%; (2) total units
Module Model & Quantity	-	Toray HFU-2020N, 42 installed, 42 capacity
Feed / Net Product Flow Rates	gpm	1,600 / 1,527
Recovery	%	95.5
Approximate Dimensions	Per Unit	20'-11" L x 5'-4" W x 11'-10" H

Scope of Supply Information

Scope of Supply – Ultrafiltration System			
Item	**Quantity**	**Description**	**Brand (or equal)**
Membrane Modules	42/unit 84/system	Hollow-fiber, outside-in UF, PVDF/TIPS, 0.01 µm	Toray
Skid Frames	2	Welded carbon steel, baked powder-coat	-
Manifold and Supply Piping	-	Schedule 80 PVC, HDPE 8” feed/filtrate connections	-
Feed Pump	2 x 50%	-	Goulds
Backwash Pump	1 x 100%	-	Goulds
Pre-strainer	2 x 50%	200 micron, automatic backwashing	Forsta
Compressed Air System	1 x 100%	Compressor, receiver, oil filter, and dryer	Quincy
Blowers	1 x 100%	Regenerative	FPZ
Turbidimeter	1 common feed 1/unit filtrate 3 total	TU5300 sc TU5300 sc	Hach Hach
Flow Meters	1/unit 2 total	Bi-directional magnetic flow meter with transmitter	Siemens
Pressure Instrumentation	-	Transmitters, switches, gauges	Wika, Ashcroft
Valves / Actuators	-	Manual and actuated valves	Bray
Electrical Controls	1 Master Panel 1 Local Panels	NEMA 4, 480 V 3 ph, PLC, HMI	-
Tanks	By Others	Feed, backwash HDPE with level measurement	-

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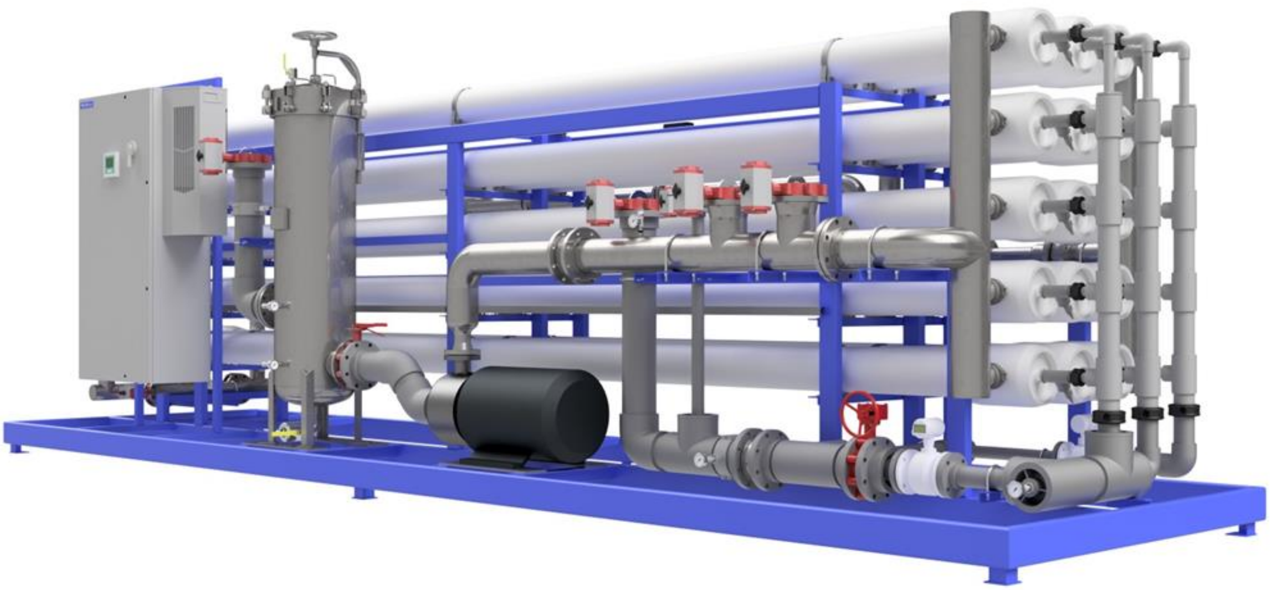
Scope of Supply – Clean-in-Place System			
Item	**Quantity**	**Description**	**Brand (or equal)**
Skid Frames	1	Welded carbon steel, baked powder-coat	-
Manifold and Supply Piping	-	Schedule 80 PVC, HDPE 6” CIP supply/return connections	-
Recirculation Pump	1 x 100%	Frame mounted, close-coupled end suction centrifugal	Goulds
Heater	2 x 50%	18 kW	Chromalox
Chemical Metering Pumps			
Sodium Hypochlorite	1 x 100%	CIP/MC process	ProMinent
Citric Acid	1 x 100%	CIP/MC process	ProMinent
Instrumentation			
pH Sensor/Transmitter	1	-	GF Signet
Temperature Transmitter	1	-	Dwyer
Flow Switch	1	-	IFM Efector
Pressure Instrumentation	-	Transmitters, switches, gauges	Wika, Ashcroft
Valves / Actuators	-	Manual and actuated valves	Bray
Electrical Controls	1 CIP Panel	NEMA 4, 480 V 3 ph	-
Tank	By WesTech	Off-skid HDPE with level measurement	Norwesco

Item D – Reverse Osmosis System, Model Number ROT83B

Design Overview		
Description	**Unit**	**Dimension/Capacity**
Application	-	Wastewater Treatment
WesTech System Model	-	ROT83B, Reverse Osmosis System
Redundancy, Unit Quantity, Array	-	3 x 33%; (3) total units, 10:5 7 M
Membrane Manufacturer, Array	-	Toray, 10:5 7M
Influent / Product Flow Rate	gpm	1,527 / 1,145
Anticipated Recovery	%	75
Approximate Dimensions	Per Skid	24’-6” L x 6’-3” W x 7’-6” H



Design Information

Water Quality

Projected Water Quality				
Description	**Unit**	**Feed**	**Concentrate**	**Permeate**
Calcium	mg/L	530	2,118	0.71
Magnesium	mg/L	25	99.9	0.03
Sodium	mg/L	119.5	476.6	0.43
Potassium	mg/L	70	279	0.33
Barium	mg/L	0.3	1.2	ND
Strontium	mg/L	1.5	5.99	0.002
Ammonia - N	mg/L	0.8	3.19	0.004
Iron	mg/L	0.04	0.16	ND
Bicarbonate	mg/L	0.1	0.38	0.01
Chloride	mg/L	150	598.5	0.5
Sulfate	mg/L	1,500	5,992	2.41
Nitrate	mg/L	5	19.8	0.06
Fluoride	mg/L	0.6	2.38	0.007
Boron	mg/L	0.02	0.043	0.012
Silica	mg/L	0.5	1.98	0.006
TDS	mg/L	2,403	9,599	4.52

**Values are assumed and should be verified. Permeate water quality values are projected estimates, not guaranteed values. Water quality may be improved or hampered by changes in the water quality and fluctuations in dissolved constituent concentrations. It should be noted that the use of upstream charged polymeric flocculant aids increases risk of irreversible membrane fouling and should be discussed with WesTech, and this risk is applicable to all polymeric membranes. The presence of oil and grease in the source water should also be avoided.*

Scope of Supply Information

Scope of Supply – Reverse Osmosis System			
Item	**Quantity**	**Description**	**Brand (or equal)**
Membrane Elements	15/unit 45/system	Spiral wound, thin-film composite, polyamide	Toray
Skid Frames	3 x 33%	Welded carbon steel, baked powder-coat	-
Manifold and Supply Piping	-	Low Pressure: Sch 80 PVC High Pressure: 316 SS	-
Element Housings	15/unit	FRP	Codeline
High Pressure Pump	1/unit	Multi-stage; *note that pressure to the high pressure pump must be 30 psi or greater*	Goulds
Cartridge Filters and Vessels	1/unit	Stainless steel	Fil-Trek
Compressed Air System	Shared with UF	-	-
Instrumentation			
Conductivity Sensor	2/unit	Feed/permeate	GF Signet
ORP Sensor/Trans.	1	Combined feed	GF Signet
pH Sensor/Trans.	1	Combined feed	GF Signet
Temperature Trans.	1	Combined feed	Dwyer
Flow Meters	2/unit 6 total	Magnetic flow meter Feed / concentrate	Siemens
Pressure Instrumentation	-	Transmitters, switches, gauges	Wika
Valves / Actuators	-	Manual and actuated valves	Bray
Electrical Controls	1 Master Panel 3 Local Panels	NEMA 4, Allen-Bradley PLC NEMA 4, Allen-Bradley Flex I/O	-
Tanks	By Others	Feed, Permeate HDPE with level measurement	-
Feed Chemical Addition		Antiscalant, Sodium Bisulfite	
Antiscalant Pump	By WesTech	-	-
Sodium Bisulfite Pump	By WesTech	-	-
Static Mixer	By WesTech	-	Komax

Scope of Supply – Clean-in-Place System			
Item	**Quantity**	**Description**	**Brand (or equal)**
Skid Frames	1	Welded carbon steel, baked powder-coat	-
Manifold and Supply Piping	-	Schedule 80 PVC, HDPE	-
Recirculation Pump	1 x 100%	End-suction centrifugal	Goulds
Cartridge Filters	1 x 100%	5 micron pore size	Fil-Trek
Heater	2	18 kW	Chromalox
Chemical Metering Pumps			
Acid	1 x 100%	CIP process	ProMinent
Alkaline	1 x 100%	CIP process	ProMinent
Instrumentation			
pH Sensor/Transmitter	1	-	GF Signet
Temperature Transmitter	1	-	Dwyer
Flow Switch	1	-	Dwyer
Pressure Instrumentation	-	Transmitters, switches, gauges	Wika, Ashcroft
Valves / Actuators	-	Manual and actuated valves	Bray
Electrical Controls	1 CIP Panel	NEMA 4, 480 V 3 ph	-
Tank	By WesTech	Off-skid; HDPE with level meas.	Norwesco

Clarifications and Exceptions

- WesTech would like to receive feed water quality information for the feed stream to the UF in order to provide a more accurate scope of supply and budget. Please send water quality information if possible.
- Attached reference drawings are not specific to this project, but are very similar in size and layout to the proposed equipment.
- The UF and RO systems include all required pumps, chemical pumps (chemicals by others), controls, instrumentation, and clean-in-place systems in order to provide complete and operational systems. Interconnecting piping, SCADA controls, and interconnecting conduit will be by others.
- Feed and filtrate/permeate tanks are by others in this proposal. WesTech can supply these tanks and revise the scope of supply and pricing upon request.

Item E - HDS Mix Tanks with Mechanical Mixer for One Train, Model Number TKF40

Tank List

Name	Tank Qty	Volume (working)	Volume (total)	Dia. x Height	Retention Time
HDS Mix Tank	2 One Train	30,000 gal per tank*	32,000 gal / tank	14'x28'	30 minutes per tank @ 1000 gpm

**Mixer design is for a constant water level in tank.*

Tank General Scope of Supply

Tank Type	Circular, Flat Bottom, On-Grade
Resin	Standard Polyester a CoNAP/MEKP cure
Corrosion Allowance	Nominal corrosion barrier thickness of 100 mils
SG of contents	1.05
Tank Material of Construction	FRP, based on RTP-1 standards. Non-Stamped
Top	Open
Anchors	Not Included
Access to mixer bridge	Ladder Included, OSHA Approved Fall Arrest System by Others
Mixer Bridge	Painted Steel Bridge w/ HDG Grating, HDG Handrail
Mixer	1.5 Hp Top Mounted Mechanical Mixer Wetted Carbon Steel Ends are Rubber Coated
Mixer Controls	Local Start/Stop Pushbutton Station Included VFD provided by Others
Down-comer Pipe	Included
Baffles	Vertical Mix Baffles on Tank Wall
Nozzles, per tank	(1) 10" inlet nozzle (1) 10" outlet nozzle (1) 4" drain (1) 24" manway
Nozzle Loads	External pipes must be fully supported; nozzles not designed for load bearing.

Items Excluded	Insulation rings, insulation, field assembly / fitting / welding / bolting, anchor bolts.

Shipment: Tank, bridge and mixer ship separately.

Coatings						
Coating Area	**Sandblast SSPC**	**Paint Type**	**Brand**	**Product #**	**Total DFT**	**Coats**
Access and Supports	SP6	Epoxy	Tnemec	N140	6-9	2
FRP	N/A	N/A	N/A	N/A	N/A	N/A

Benefit – One-day field erection per tank (by Others)

Item F - FRP Densification Tank with Mechanical Mixer on Legs, Model Number TKE40

Tank List

Name	Tank Qty	Volume (working)	Volume (total)	Dia. x Height	Retention Time
Densification Tank	1	500 gal*	870 gal / tank	5’x6’	5 minutes @ 100 gpm

**Mixer design is for a constant water level in tank.*

Tank General Scope of Supply

Tank Type	Circular, Flat Bottom tank on 23.5’ Elevated Legs to gravity feed into the 14’ x 28’ HDS Mix Tank
Resin	Standard Polyester a CoNAP/MEKP cure
Corrosion Allowance	Nominal corrosion barrier thickness of 100 mils
SG of contents	1.05
Anchors	Not Included
Tank Material of Construction	FRP, based on RTP-1 standards. Non-Stamped
Top	Open
Access to Top of Tank	Ladder Included, OSHA Approved Fall Arrest System by Others
Mixer Support	Included
Mixer	½ Hp Top Mounted Mechanical Mixer Wetted Carbon Steel Ends are Rubber Coated
Mixer Controls	Local Start/Stop Pushbutton Station Included VFD provided by Others
Baffles	(2) Vertical baffles
Downcomer Pipe	Included
Nozzles, per tank	(1) 8” inlet nozzle (1) 8” outlet nozzle (1) 4” drain

Shipment: Tank and mixer ship separately.

Coatings

Coating Area	Sandblast SSPC	Paint Type	Brand	Product #	Total DFT	Coats
Access and Supports	SP6	Epoxy	Tnemec	N140	6-9	2
FRP	N/A	N/A	N/A	N/A	N/A	N/A

Commercial Budget Proposal

Proposal Name: Golder Mine Water Treatment   Proposal Number: 1810581

Date: September 19, 2018

1. Bidder's Contact Information

Company Name	WesTech Engineering, Inc.
Contact Name	Kib Huefner
Phone	801.265.1000
Email	khuefner@westech-inc.com
Address: Number/Street	3665 S West Temple
Address: City, State, Zip	Salt Lake City, UT 84115

2. Pricing

Currency	US Dollars
Scope of Supply	
Item A – One 70'x14' Flocculating Clarifier (CLS25) & Bolted AC Tank (TKC11B)	$322,000
Item B – One 200 ft^3 Automatic Filter Press, PFA63C	$350,000
Item C – Ultrafiltration System, UFT82A	$826,500
Item D – Reverse Osmosis System, ROT83B	$995,000
Item E – Two 14'x28' HDS Mix Tanks with Mechanical Mixer for One Train, TKF40	$366,100
Item F – One 5'x6' FRP Densification Tank with Mechanical Mixer on Legs, TKE40	$79,000
Total Approximate Equipment Price:	**$2,938,600**
Taxes (sales, use, VAT, IVA, IGV, duties, import fees, etc.)	**NOT INCLUDED**

Prices are for a period not to exceed 30 days from date of proposal.

Field Service

Included Field Service	None
Daily Rate	$1,200

Prices do not include field service unless noted, but it is available at the daily rate plus expenses. The customer will be charged for a minimum of three days for time at the jobsite. Travel will be billed at the daily rate. Any canceled charges due to the customer's request will be added to the invoice. The greater of visa procurement time or a two week notice is required prior to trip departure date.

3. Payment Terms

PO Acceptance	10%
Submittals Approved	15%
Major Materials in Shop	35%
Notification of Ready to Ship	40%

All payments are net 30 days. Partial shipments are allowed. Other terms per WesTech proforma invoice.

WesTech

4. Schedule

Submittals, after PO receipt	6 to 8 weeks
Ready to Ship, after Submittal approval (Clarifier, Tank, UF, RO)	16 to 2 weeks
Ready to Ship, after Submittal approval (Filter Press)	18 to 22 weeks
Start-up & Commissioning	2 to 4 weeks

5. Freight

Not included – Approximate number of trucks	3 for UF Equipment 3 for RO Equipment

Terms & Conditions: This proposal, including all terms and conditions contained herein, shall become part of any resulting contract or purchase order. Changes to any terms and conditions, including but not limited to submittal and shipment days, payment terms, and escalation clause shall be negotiated at order placement, otherwise the proposal terms and conditions contained herein shall apply.

Paint: If your equipment has paint included in the price, please take note to the following. Primer paints are designed to provide only a minimal protection from the time of application (usually for a period not to exceed 30 days). Therefore, it is imperative that the finish coat be applied within 30 days of shipment on all shop primed surfaces. Without the protection of the final coatings, primer degradation may occur after this period, which in turn may require renewed surface preparation and coating. If it is impractical or impossible to coat primed surfaces within the suggested time frame, WesTech strongly recommends the supply of bare metal, with surface preparation and coating performed in the field. All field surface preparation, field paint, touch-up, and repair to shop painted surfaces is not by WesTech.

One-Year Warranty

WesTech equipment is backed by WesTech's reputation as a quality manufacturer, and by many years of experience in the design of reliable equipment.

Equipment manufactured or sold by WesTech Engineering, Inc., once paid for in full, is backed by the following warranty:

For the benefit of the original user, WesTech warrants all new equipment manufactured by WesTech Engineering, Inc. to be free from defects in material and workmanship, and will replace or repair, F.O.B. its factories or other location designated by it, any part or parts returned to it which WesTech's examination shall show to have failed under normal use and service by the original user within one (1) year following initial start-up, or eighteen (18) months from shipment to the purchaser, whichever occurs first.

Such repair or replacement shall be free of charge for all items except for those items such as resin, filter media and the like that are consumable and normally replaced during maintenance, with respect to which, repair or replacement shall be subject to a pro-rata charge based upon WesTech's estimate of the percentage of normal service life realized from the part. WesTech's obligation under this warranty is conditioned upon its receiving prompt notice of claimed defects, which shall in no event be later than thirty (30) days following expiration of the warranty period, and is limited to repair or replacement as aforesaid.

This warranty is expressly made by WesTech and accepted by purchaser in lieu of all other warranties, including warranties of merchantability and fitness for particular purpose, whether written, oral, express, implied, or statutory. WesTech neither assumes nor authorizes any other person to assume for it any other liability with respect to its equipment. WesTech shall not be liable for normal wear and tear, corrosion, or any contingent, incidental, or consequential damage or expense due to partial or complete inoperability of its equipment for any reason whatsoever.

This warranty shall not apply to equipment or parts thereof which have been altered or repaired outside of a WesTech factory, or damaged by improper installation, application, or maintenance, or subjected to misuse, abuse, neglect, accident, or incomplete adherence to all manufacturer’s requirements, including, but not limited to, Operations & Maintenance Manual guidelines & procedures.

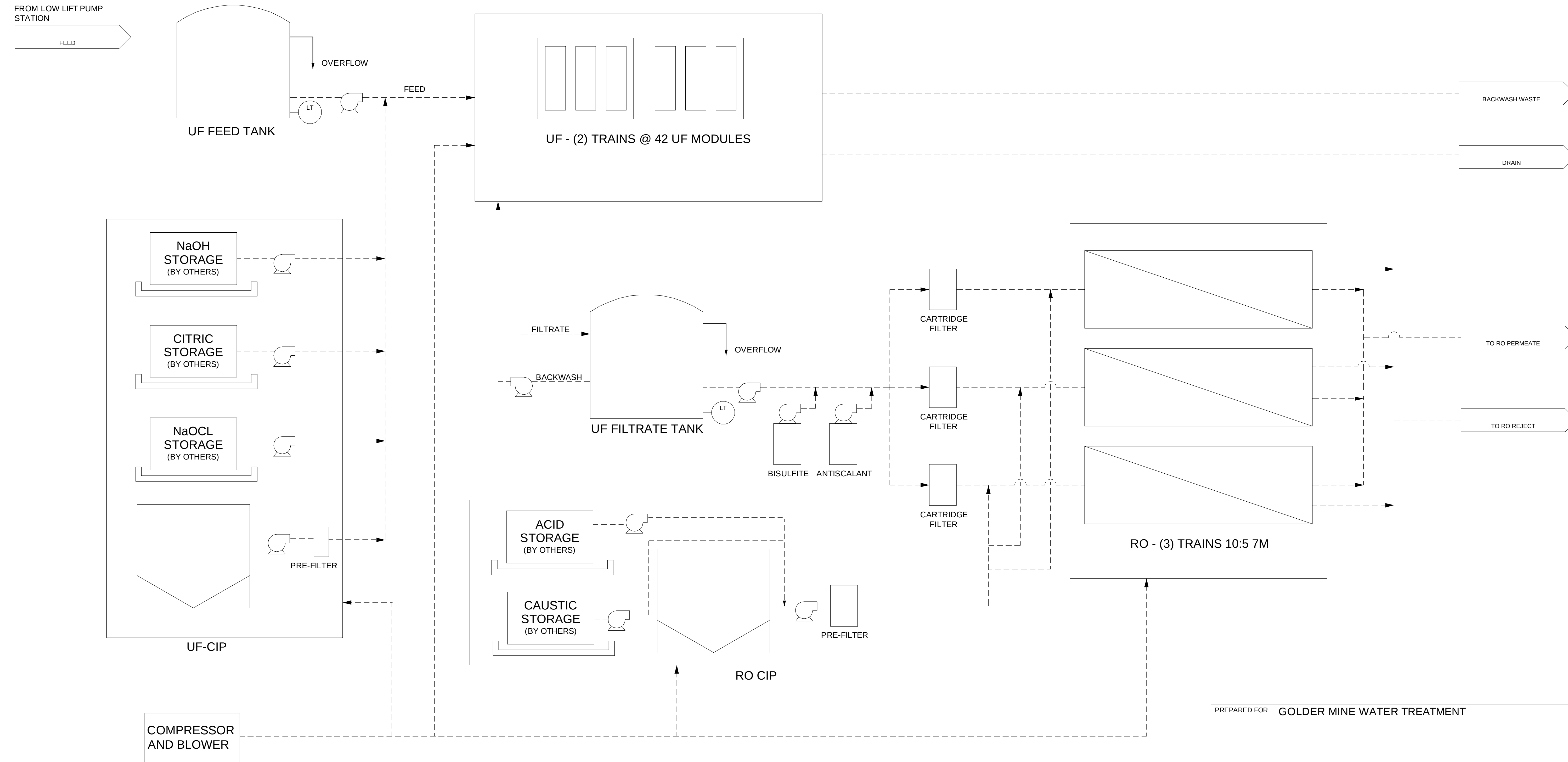
This warranty applies only to equipment made or sold by WesTech Engineering, Inc.

WesTech Engineering, Inc. makes no warranty with respect to parts, accessories, or components purchased by the customer from others. The warranties which apply to such items are those offered by their respective manufacturers.

WESTECH

Additional Information

Process Flow Diagram
General Arrangement Drawings



NOTES:

1. All INTERCONNECTING PIPING BY OTHERS.
2. ALL VALVING AND INSTRUMENTATION IN FIELD PIPING BY OTHERS.
3. ALL CONTAINMENT BY OTHERS.

PREPARED FOR GOLDER MINE WATER TREATMENT

ENGINEER

CONTRACTOR

PO/CONTRACT NUMBER

WESTECH

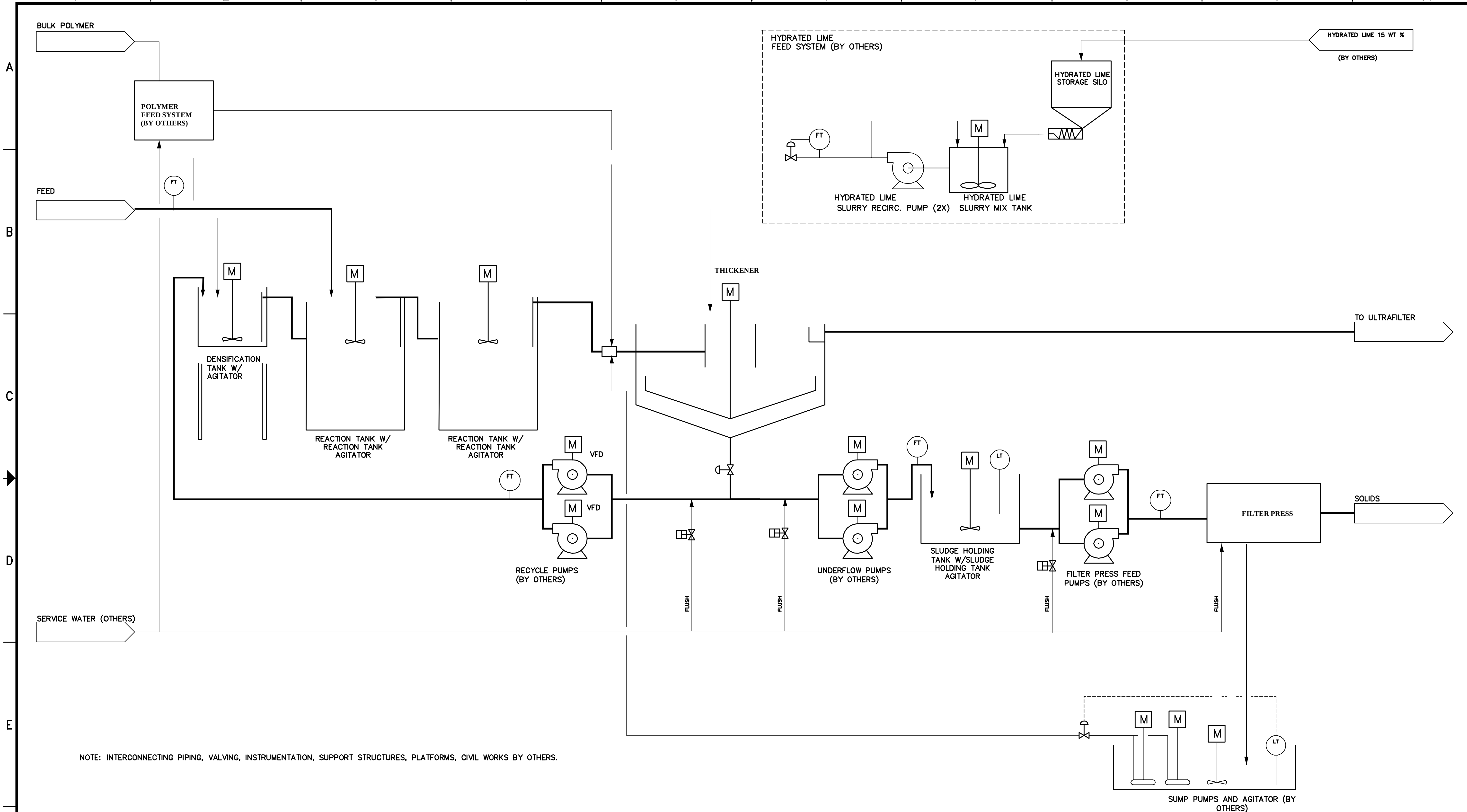
TITLE **PROCESS FLOW DIAGRAM**
UF/RO SYSTEM

DESIGNER	CHECKER	APPROVER	DATE
GR87			2018-09-14

DOCUMENT NUMBER	SHEET	REV
1810581-1010	1 OF 1	-

REV	REVISION DESCRIPTION	ECN	DESIGNER	APPROVER	DATE	REFERENCE DOCUMENTS

G:\ACTVPROP\181 PROPS\1810581 Golder Mine Water Treatment NM\7-WESTECH DRAWINGS\1810581-1010 - PFD.DWG



NOTE: INTERCONNECTING PIPING, VALVING, INSTRUMENTATION, SUPPORT STRUCTURES, PLATFORMS, CIVIL WORKS BY OTHERS.

REV	DESIGN	P&ID	DOC.	DATE	DESIGN	P&ID	DOC.	DATE	BY	DATE	DESCRIPTION
											PRELIMINARY PFD
DETAIL REVIEW					DESIGN VERIFICATION				APPROVAL		DESCRIPTION

PROJECT:

PREPARED FOR: GOLDER

ENGINEER:

PREPARED BY: WESTECH ENGINEERING, INC.
SALT LAKE CITY, UTAH

PROCESS FLOW DIAGRAM

DESCRIPTION
HDS PROCESS

MODEL
SIZE

WESTECH

DRAWING NUMBER	PROJECT NUMBER	REV.
PFD01	1810581	

Reverse Osmosis Systems

High Quality Potable and Process Water Solutions

ISO 9001 WesTech CERTIFIED QUALITY SYSTEM

WesTech®

Quality Systems, Dependable Service

A 2,000 gpm RO system achieved 99.4% rejection of selenium from a mine-influenced water with WesTech UF pretreatment.

Why Choose WesTech?

WesTech provides NF/RO membrane filtration equipment designed to meet your unique project requirements. Whether your treatment objective is for softening or to reduce dissolved solids, organics, or other target contaminants, WesTech has a solution. Customers have found reliable solutions with WesTech for over 40 years. By partnering with WesTech to achieve a state-of-the-art nanofiltration or reverse osmosis system, you can count on a strong commitment to service, complete process knowledge, and expert experience.

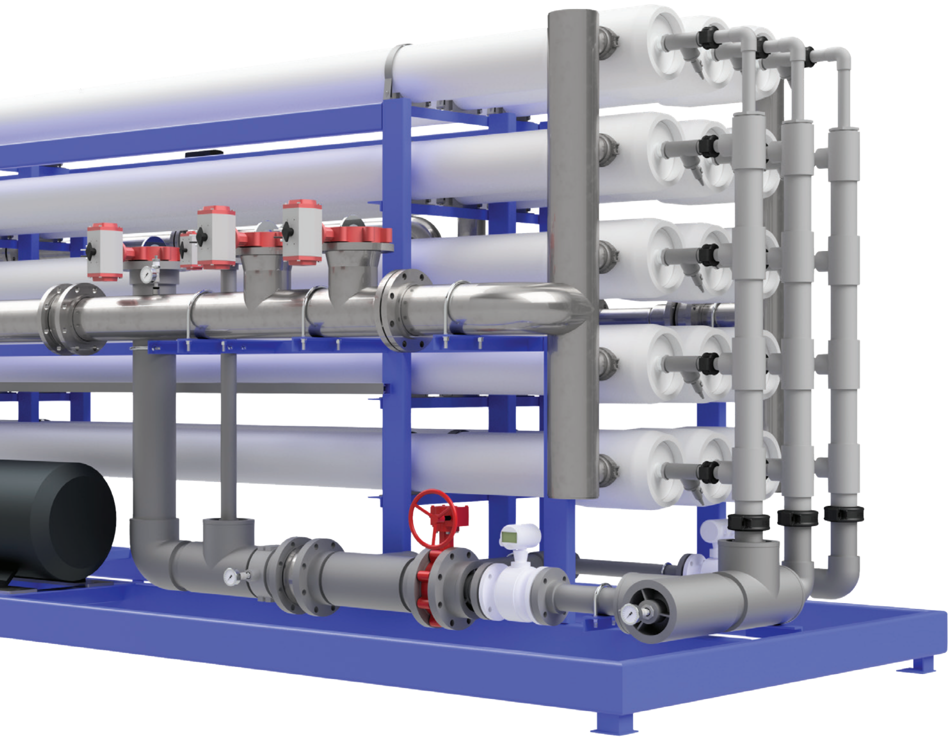
Standard Features
Reverse Osmosis or Nanofiltration Elements
5-micron Cartridge Pre-filters
Booster Pumps
Welded and Painted Steel Skid Frame
Sch 80 PVC Low-Pressure Piping
316 SS High-Pressure Piping
FRP Element Housings
Pneumatically Actuated Valves
Clean-in-Place System
Chemical Metering Pumps
Permeate and Concentrate Flowmeters
Conductivity Sensors
Pressure Gauges and Transmitters
Allen Bradley® PLC Controls
Process Tanks

Low Operating Costs

Compact Footprint

Experienced System Supplier

High Quality Treated Water



Applications

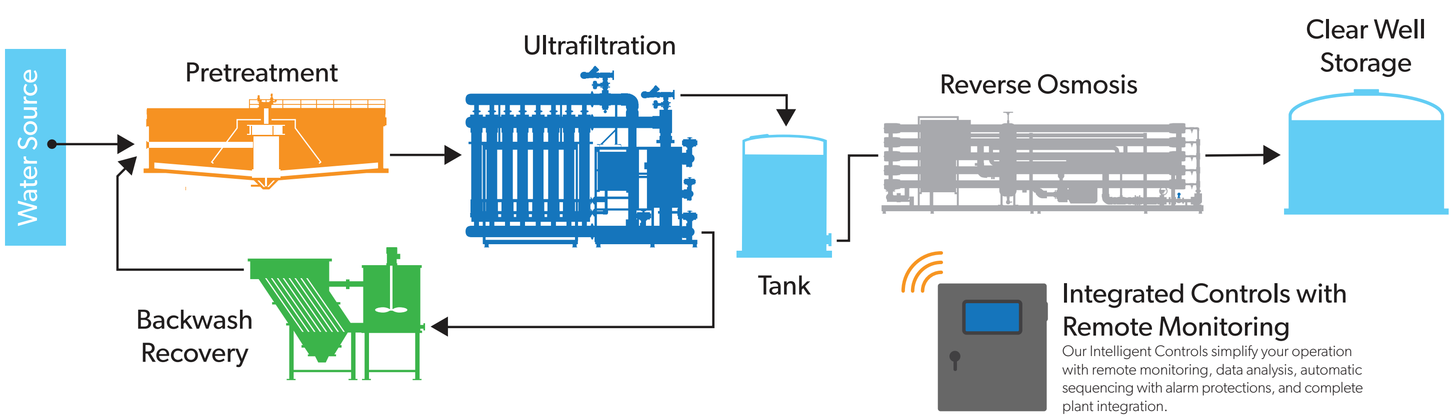
- Municipal Drinking Water
- Industrial Process Water
- Mine Water Remediation
- Wastewater Reuse
- Deionization Pretreatment
- Targeted Contaminant Removal
- Desalination

What We Offer

- Standard or Custom System Designs
- Skid-Mounted and Site-Built Equipment Options
- Piloting and Testing Services
- Start-up and Operator Training
- Turnkey Solutions
- Installation and Site Supervision
- Operation and Maintenance Contracts
- Long-Term Customer Support

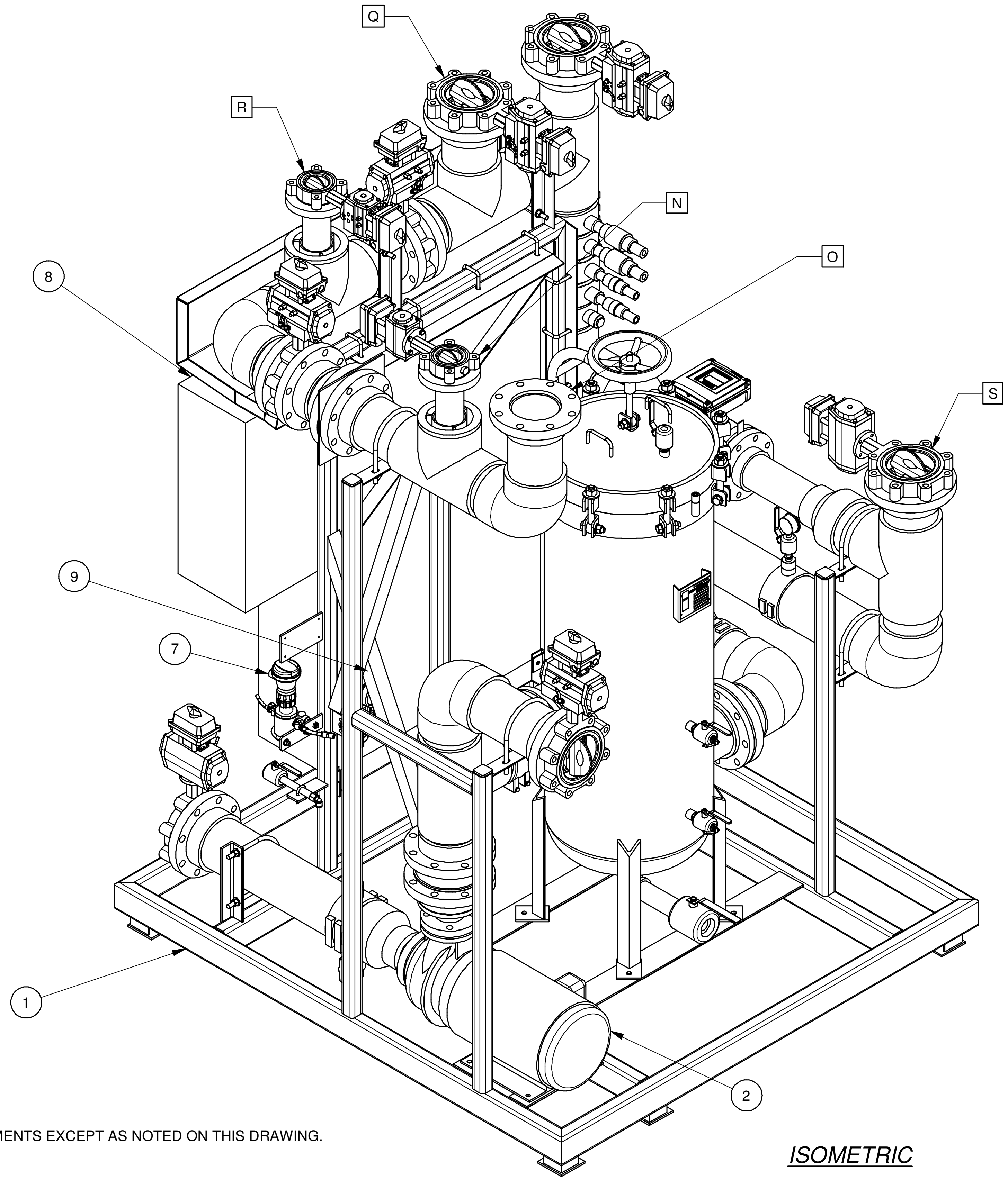
WesTech Complete Process Treatment System

Customers benefit from consolidated process solutions as WesTech integrates our RO systems with other pre- or post-treatment equipment. With WesTech's treatment knowledge, you receive process support and equipment from the source water through the final treatment step. Our advanced control systems allow seamless operation of multiple trains and spare I/O simplifies integration with existing facilities.



Tel: 801.265.1000
westech-inc.com
info@westech-inc.com
Salt Lake City, Utah, USA

ITEM	EQUIPMENT DESCRIPTION	MAT'L
1	CIP SKID	STL
2	CIP RECIRCULATION PUMP	-
3	CARTRIDGE FILTER	SST
4	CIP HEATER	INCOLOY
5	TEMPERATURE TRANSMITTER	-
6	FLOW METER	-
7	pH ANALYZER	-
8	CONTROL PANEL	STL
9	DIFFERENTIAL PRESSURE GAUGE	-



ISOMETRIC

CONNECTION SUMMARY				
NOZZLE	SIZE	TYPE	MAT'L	DESCRIPTION
M	6"	FLG	CI	RO FEED FLUSH / CIP SUPPLY STAGE 1
N	3"	FLG	CI	CIP RETURN STAGE 2
O	6"	FLG	PVC	CIP RETURN
P	6"	FLG	CI	TANK ISOLATION
Q	6"	FLG	CI	NEUTRALIZATION WASTE
R	3"	FLG	CI	CIP RETURN STAGE 1 / SUPPLY STAGE 2
S	6"	FLG	CI	CIP WASTE
T	1/2"	FNPT	SS	AIR SUPPLY
U	1"	MNPT	PP	CHEMICAL INJECTION CHECK VALVE - ALKALINE
V	1"	MNPT	PVC	CHEMICAL INJECTION CHECK VALVE - ACID
W	3/4"	MNPT	PVC	CHEMICAL INJECTION CHECK VALVE - HYDROCHLORIC ACID
X	3/4"	MNPT	PP	CHEMICAL INJECTION CHECK VALVE - SODIUM HYDROXIDE
Y	6"	FLG	PVC	RO EMERGENCY FLUSH

NOTES:

1. FOLLOW THE LISTED WESTECH REFERENCE DOCUMENTS EXCEPT AS NOTED ON THIS DRAWING.
2. ALL FLANGED CONNECTIONS TO BE 150#.
3. SKID CONNECTIONS NOT DESIGNED TO BEAR PLANT PIPING LOADS. PLANT PIPING MUST BE PROPERLY SUPPORTED.
4. EQUIPMENT MUST BE LEVEL AFTER INSTALLATION.
5. AIR SUPPLY TO BE 304SS, ALL OTHER SKID PIPING TO BE SCH 80 PVC.
6. ALL VALVE ACTUATOR AIR SUPPLY/SAMPLE TUBING TO BE POLYURETHANE.

REV	REVISION DESCRIPTION	ECN	DESIGNER	APPROVER	DATE

REFERENCE DOCUMENTS

PROJECT

CUSTOMER

ENGINEER

CONTRACTOR

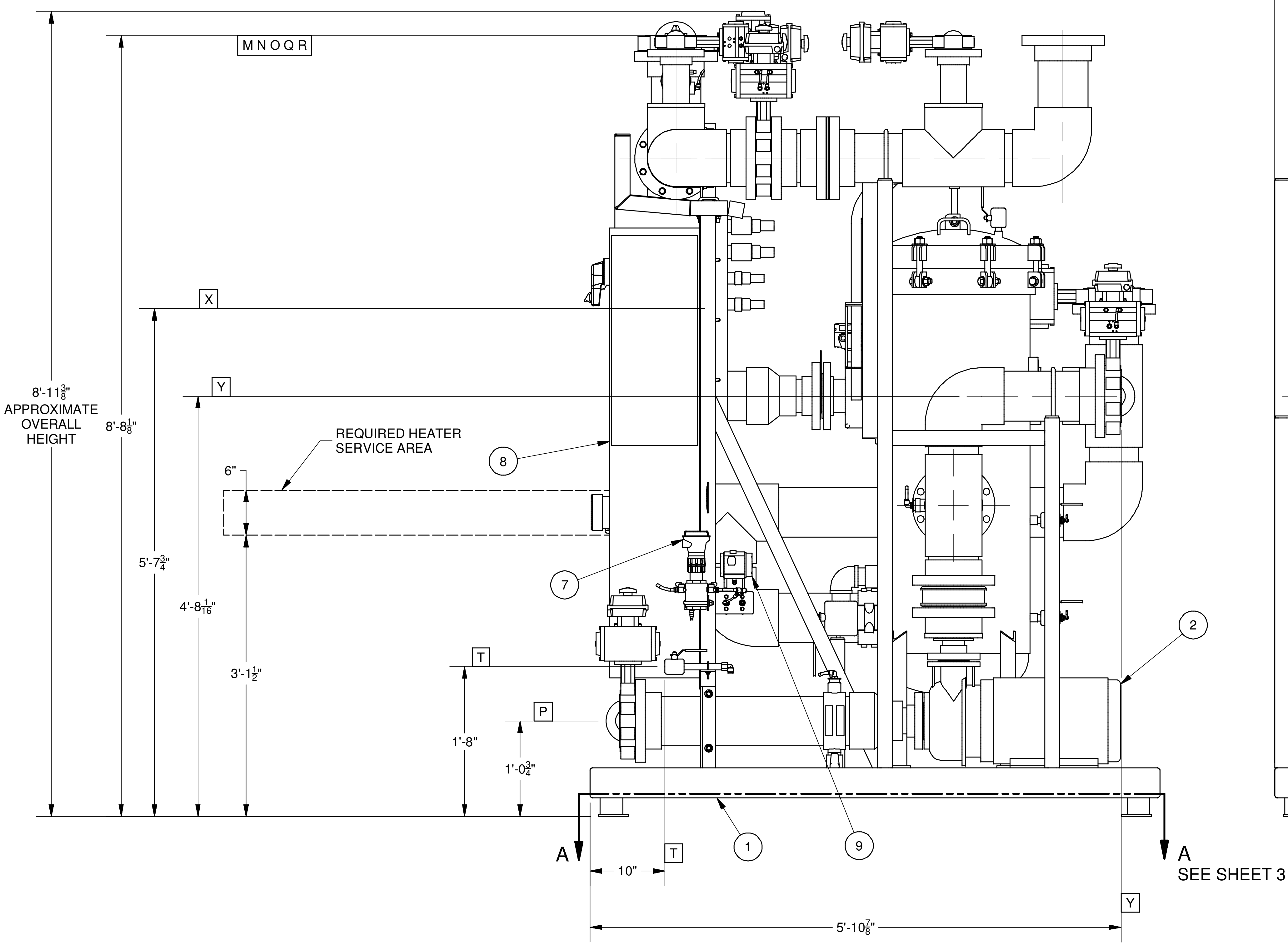
PO/CONTRACT NUMBER

WESTECH

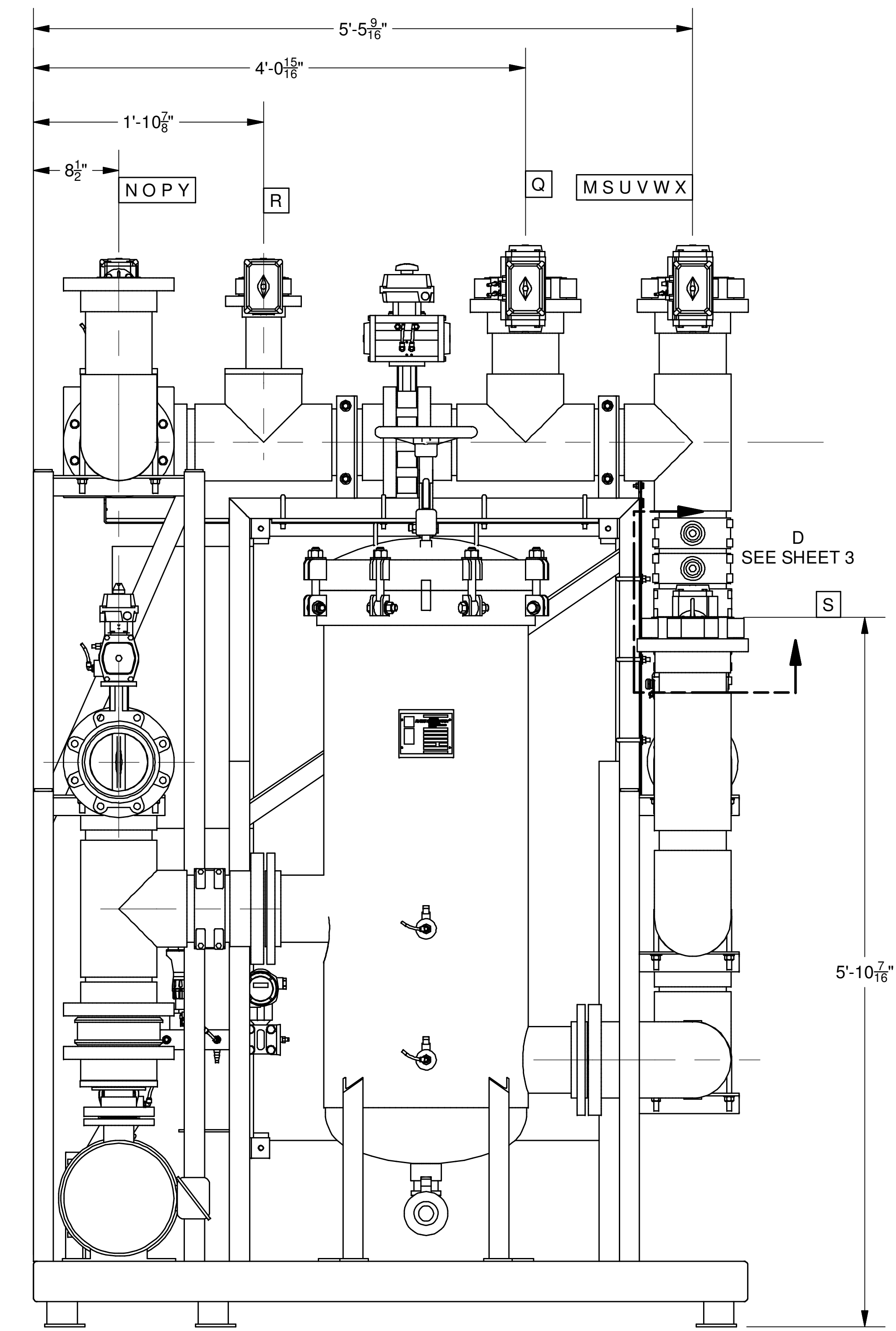
TITLE **GENERAL ARRANGEMENT, RO CIP SKID**
RO SYSTEM

DESIGNER	CHECKER	APPROVER	DATE
VO00	ST00	DY03	04/22/2016

DOCUMENT NUMBER	SHEET	REV
-2003	1 OF 4	-



ELEVATION



BACK

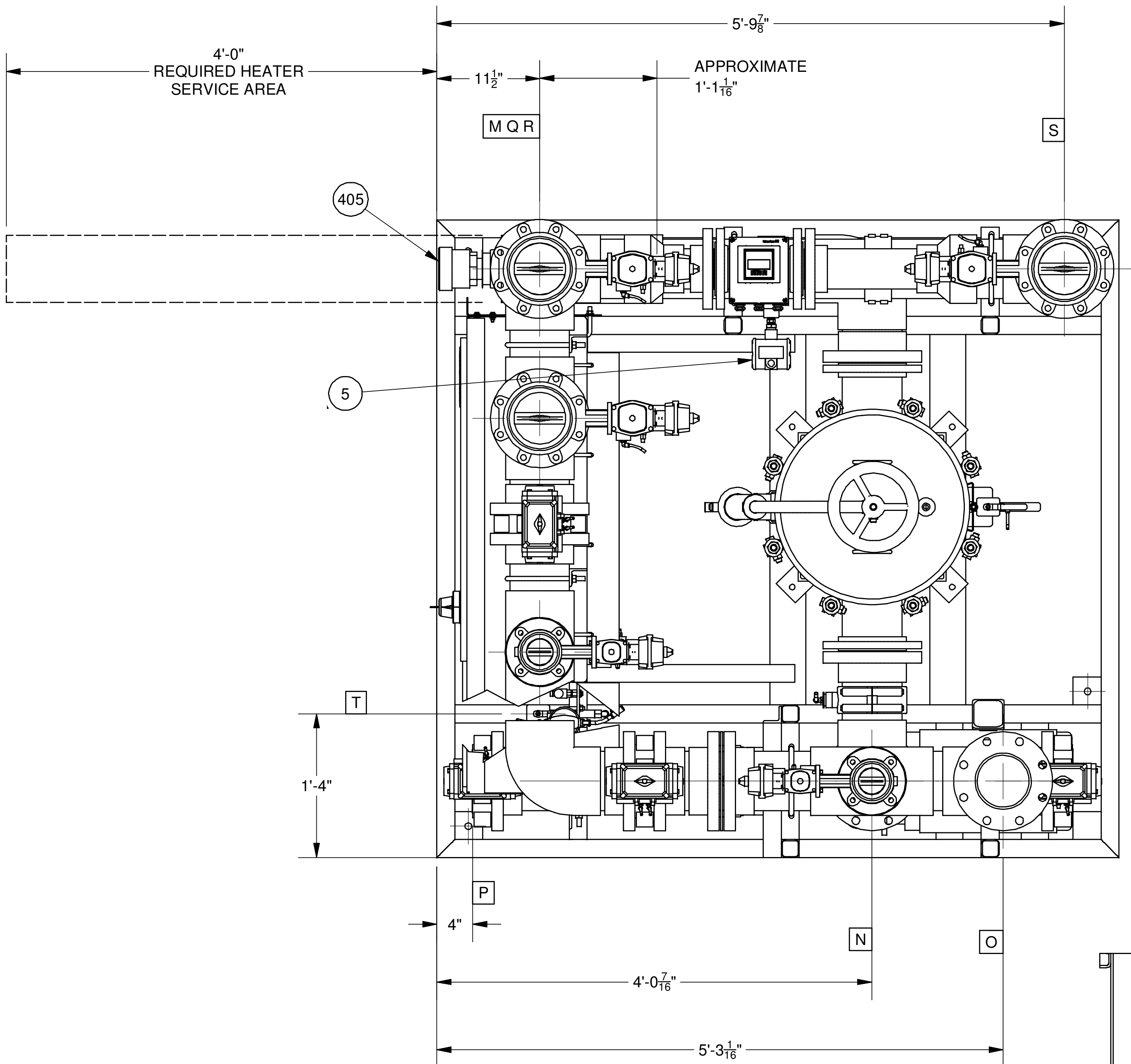
WESTECH

THIS DRAWING IS PROPERTY OF WESTECH ENGINEERING, INC. AND IS TRANSMITTED IN CONFIDENCE. NEITHER RECEIPT NOR POSSESSION CONFERS OR TRANSFERS ANY RIGHTS TO REPRODUCE, USE, OR DISCLOSE, IN WHOLE OR IN PART, DATA CONTAINED HEREIN FOR ANY PURPOSE, WITHOUT THE WRITTEN PERMISSION OF WESTECH ENGINEERING, INC.

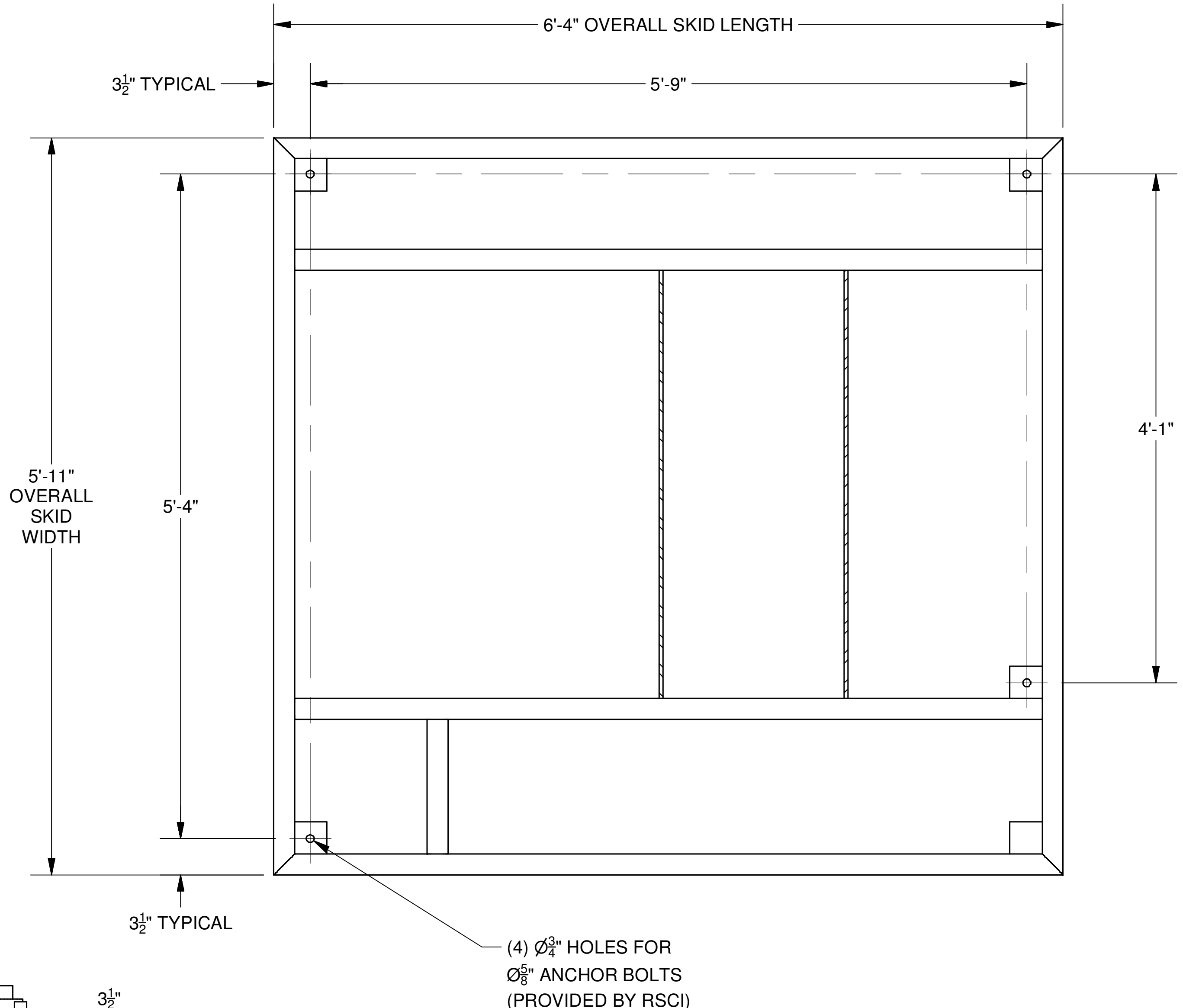
TITLE **GENERAL ARRANGEMENT, RO CIP SKID**
RO SYSTEM

DESIGNER	CHECKER	APPROVER	DATE
VO00	ST00	DY03	04/22/2016

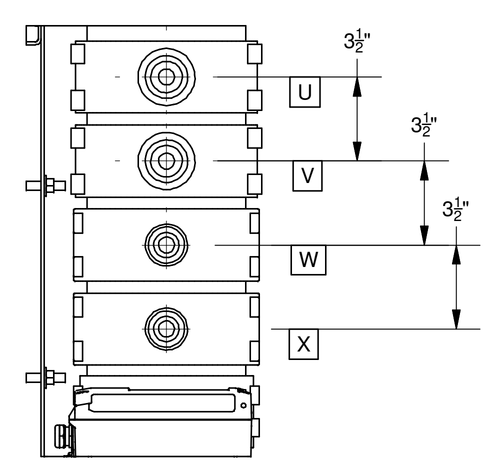
DOCUMENT NUMBER	SHEET	REV
-2003	2 OF 4	-



PLAN



SECTION A-A - ANCHOR BOLT LAYOUT
FROM SHEET 2



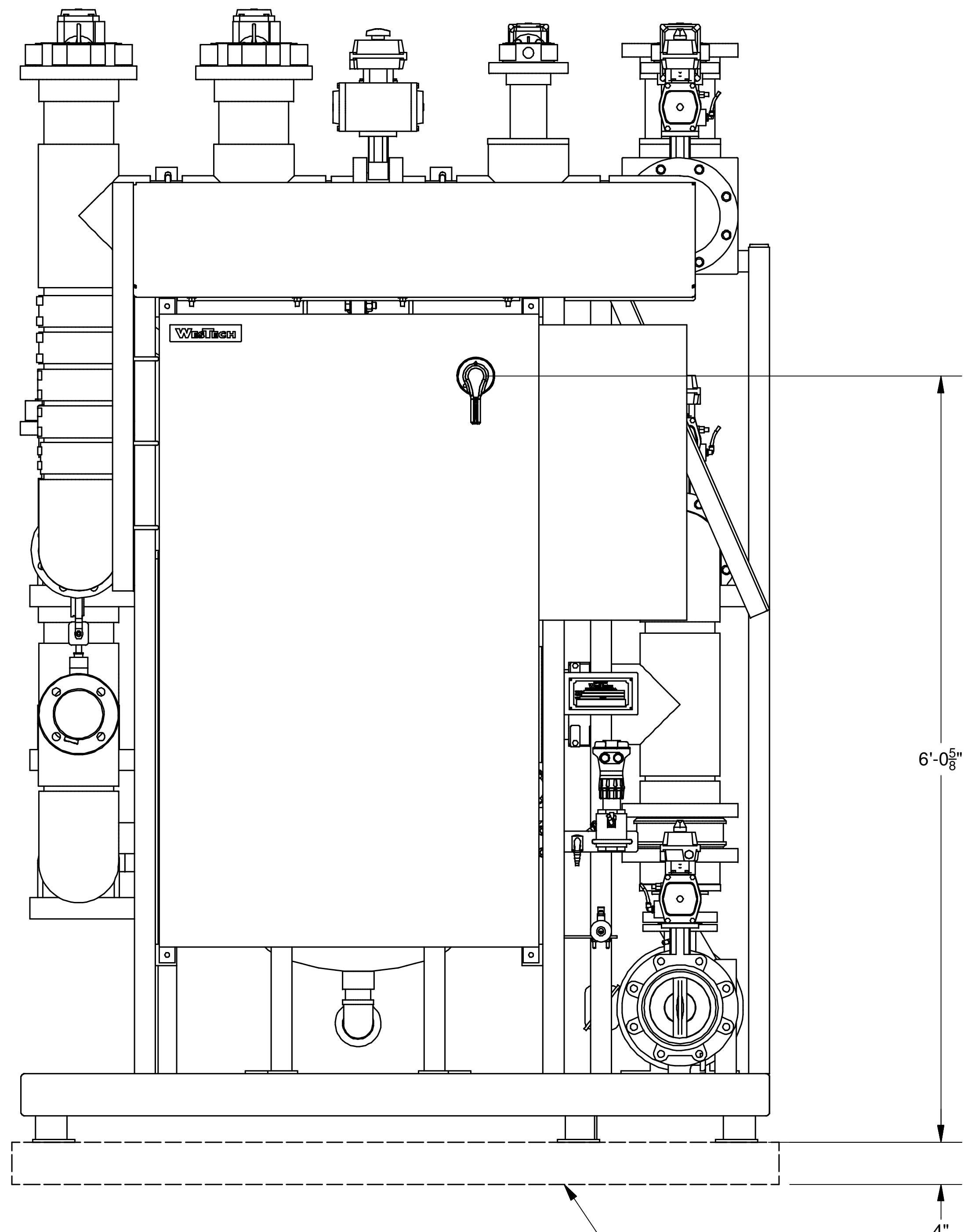
DETAIL D
FROM SHEET 2
(SOME ITEMS HIDDEN FOR CLARITY)

WESTECH

TITLE **GENERAL ARRANGEMENT, RO CIP SKID**
RO SYSTEM

DESIGNER	CHECKER	APPROVER	DATE
VO00	ST00	DY03	04/22/2016

DOCUMENT NUMBER	SHEET	REV
-2003	3 OF 4	-



FRONT

EQUIPMENT PAD (BY RSCI)
SHOWN FOR REFERENCE ONLY

WESTECH

TITLE **GENERAL ARRANGEMENT, RO CIP SKID**
RO SYSTEM

DESIGNER	CHECKER	APPROVER	DATE	
VO00	ST00	DY03	04/22/2016	
DOCUMENT NUMBER			SHEET	REV
-2003			4 OF 4	-

Ultrafiltration Systems

Versatile membrane solutions for
potable and process water treatment

ISO 9001 WesTech CERTIFIED Quality System

WesTech®

Systems Designed With You in Mind

WesTech leads the way in membrane system innovation with versatile open-platform designs, packaged systems for small communities, and solutions for challenging retrofit applications. WesTech in-house electrical and programming experts provide integrated and intuitive controls for seamless operation and performance monitoring. Our technical expertise, complete process knowledge, and strong commitment to service make WesTech the best partner to achieve a state-of-the-art treatment system. Big or small, challenging or straight-forward. WesTech can help.

Ultrafiltration/microfiltration is advanced membrane filtration technology used for reliable production of high-quality potable and process water. Membranes act as an absolute barrier with a small nominal pore size (0.01-0.1 μm) to remove microbial and viral pathogens, suspended solids, turbidity, particulate metals, and coagulated organic matter.

Applications:

- Municipal Drinking Water
- Wastewater Reuse
- NF/RO Pretreatment
- Industrial Process Water
- Mine Water Remediation
- Retrofit Systems

The WesTech Difference:

- Customizable or Packaged Systems
- Innovative, Space-Saving Designs
- Strong, Fouling-Resistant Membranes
- Low Chemical & Energy Consumption
- Piloting and Testing Services
- Long-Term Customer Support

CDPH and NSF/ANSI 419, Title 22, and NSF/ANSI 61 Certified

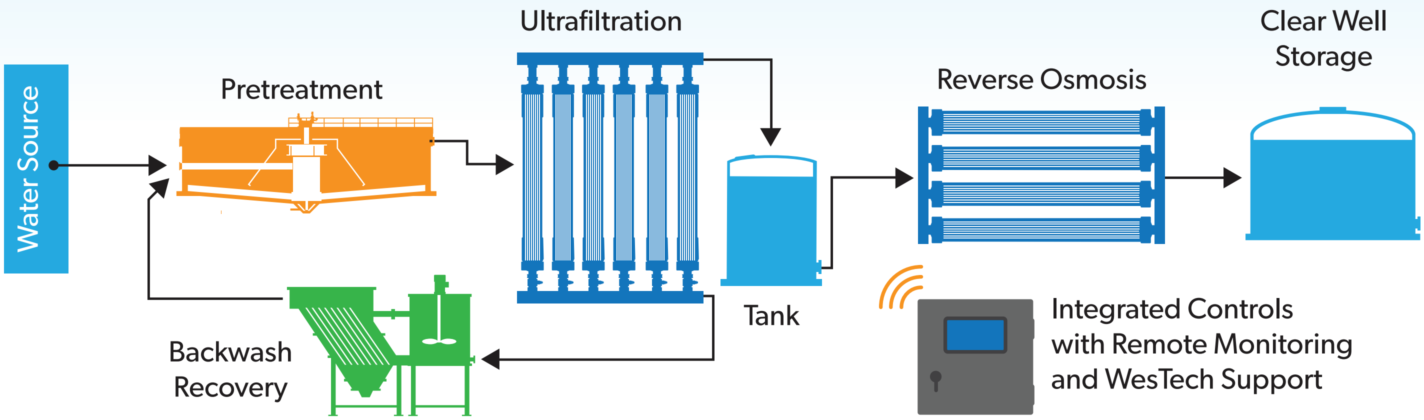
VersaFilter™ Open-Platform Systems will accommodate all leading commercially-available modules to adapt to innovation and protect your ultrafiltration system investment.

AltaPac™ Packaged UF Systems are economic, complete treatment solutions optimally configured for small communities and remote locations.

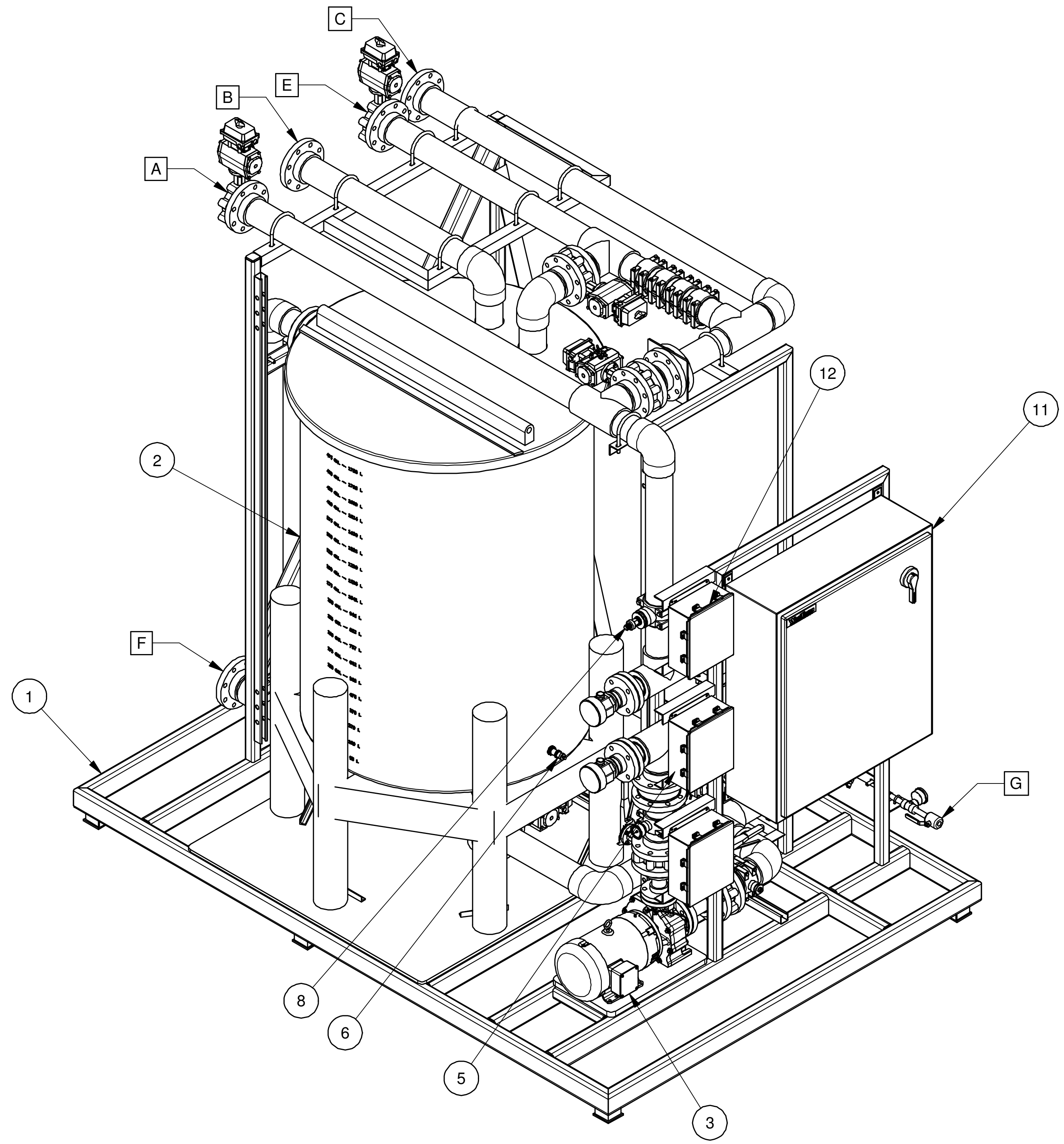
With **Retrofit Engineering** experience, WesTech offers you creative and cost-conscious solutions to upgrade existing membrane or conventional systems.

Our **Intelligent Controls** simplify your operation with remote monitoring, data analysis, automatic sequencing with alarm protections, and complete plant integration.

WesTech Complete Process Treatment Systems



Tel: 801.265.1000
westech-inc.com
membranes@westech-inc.com
Salt Lake City, Utah, USA



ISOMETRIC

ITEM	EQUIPMENT DESCRIPTION	MAT'L
1	CIP SKID	STL
2	CIP TANK 500 GALLON WITH STAND	HDPE
3	(1) CIP RECIRCULATION PUMP	-
4	(2) CIP HEATERS	INCOLOY
5	PRESSURE GAUGE	-
6	LEVEL TRANSMITTER	-
7	TEMPERATURE TRANSMITTER	-
8	FLOW SWITCH	-
9	pH TRANSMITER	-
10	ORP TRANSMITTER	-
11	CONTROL PANEL	-
12	DISCONNECT SWITCH	

CONNECTION SUMMARY

NOZZLE	SIZE	TYPE	DESCRIPTION
A	4"	FLG	CIP SUPPLY
B	4"	FLG	CIP RETURN (UF FILTRATE)
C	4"	FLG	CIP RETURN (BW WASTE)
D	4"	FLG	NEUTRALIZATION SUPPLY
E	4"	FLG	NEUTRALIZATION RETURN
F	4"	FLG	TANK OVERFLOW/DRAIN
G	1/2"	FNPT	AIR SUPPLY
H	1"	MNPT	CHEMICAL ADDITION - HCl SUPPLY
I	1"	MNPT	CHEMICAL ADDITION - NaOCl SUPPLY
J	1"	MNPT	CHEMICAL ADDITION - SBS SUPPLY
K	1"	MNPT	CHEMICAL ADDITION - NaOH SUPPLY

NOTES:

1. FOLLOW THE LISTED WESTECH REFERENCE DOCUMENTS EXCEPT AS NOTED ON THIS DRAWING.

2. ALL FLANGED CONNECTIONS TO BE 150# RAISED FACE.

3. **SKID CONNECTIONS NOT DESIGNED TO BEAR PLANT PIPING LOADS. PLANT PIPING MUST BE PROPERLY SUPPORTED.**

4. EQUIPMENT MUST BE LEVEL AFTER INSTALLATION.

5. AIR SUPPLY TO BE 304SS, ALL OTHER SKID PIPING TO BE SCH 80 PVC.

6. ALL VALVE AIR SUPPLY / SAMPLE / INSTRUMENT TUBING TO BE POLYURETHANE.

7. SHIPPING WEIGHT: 4,500 LBS OPERATING WEIGHT: 9,500 LBS

PRELIMINARY ONLY -
NOT FOR CONSTRUCTION

PREPARED FOR

CUSTOMER

ENGINEER

CONTRACTOR

PO/CONTRACT NUMBER

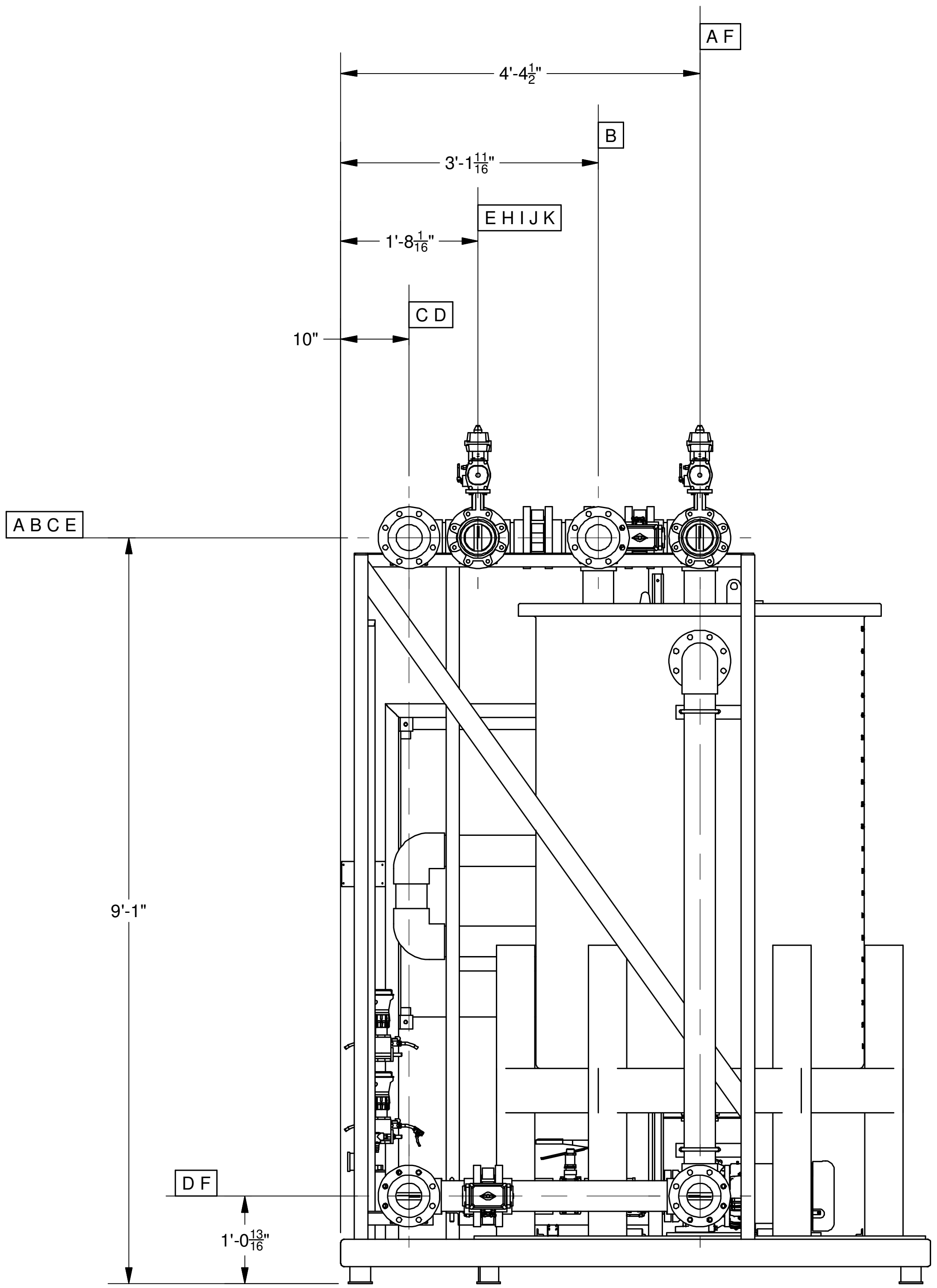
WESTECH

TITLE **GENERAL ARRANGEMENT**
CIP SKID

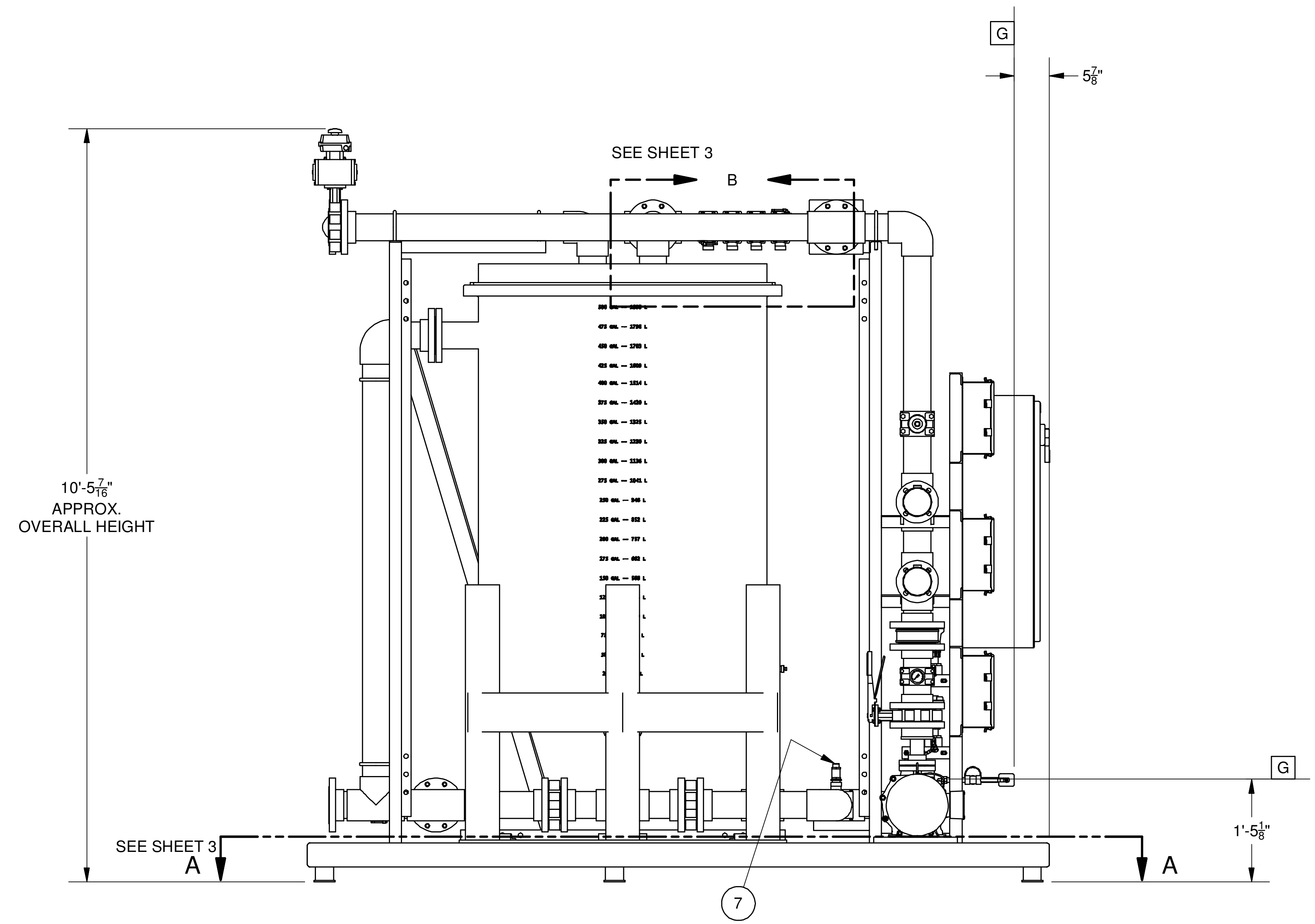
DESIGNER	CHECKER	APPROVER	DATE
VO00	ST00	DY03	01/13/2016

DOCUMENT NUMBER	SHEET	REV
	1 OF 3	-

REV	REVISION DESCRIPTION	ECN	DESIGNER	APPROVER	DATE	REFERENCE DOCUMENTS



SIDE



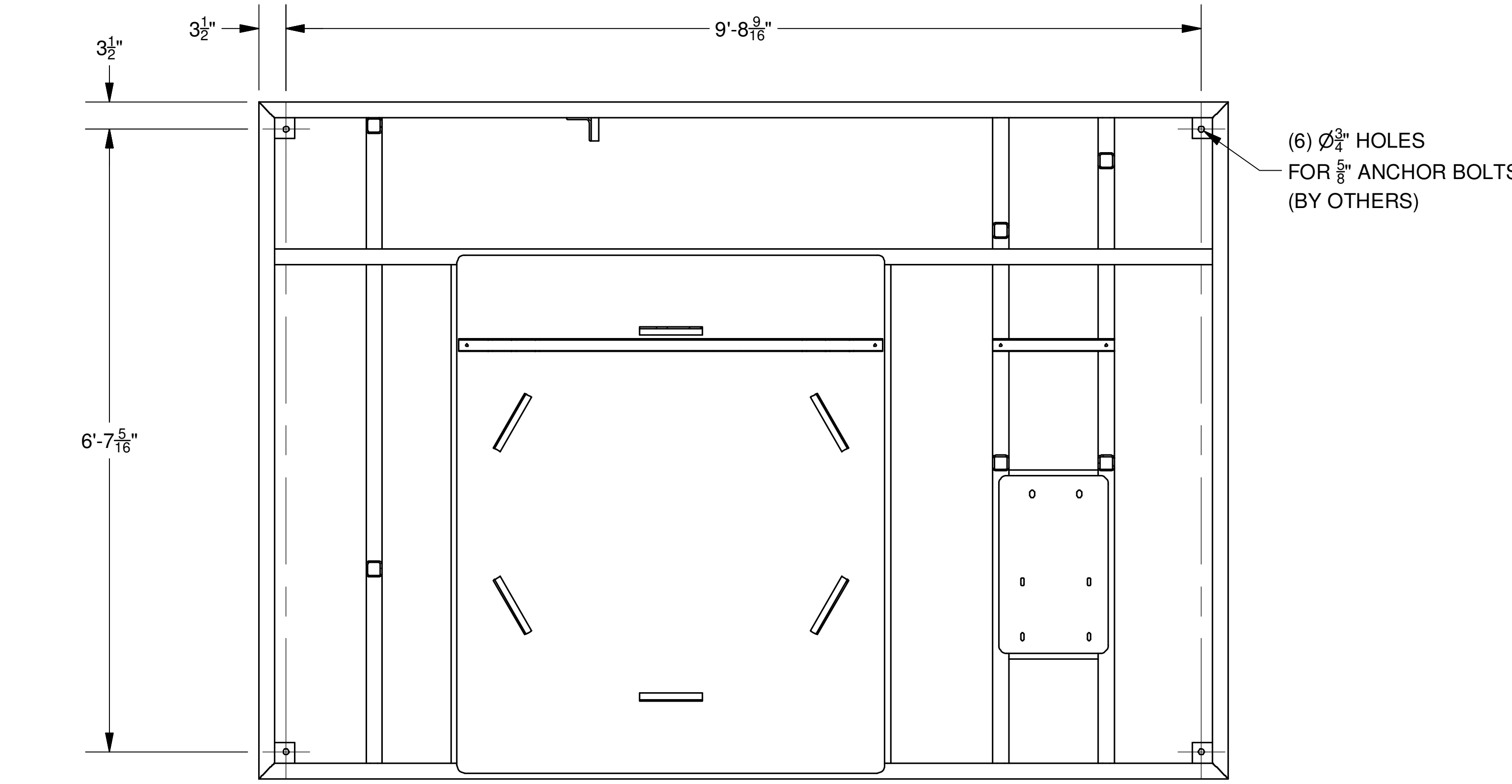
ELEVATION

WESTECH

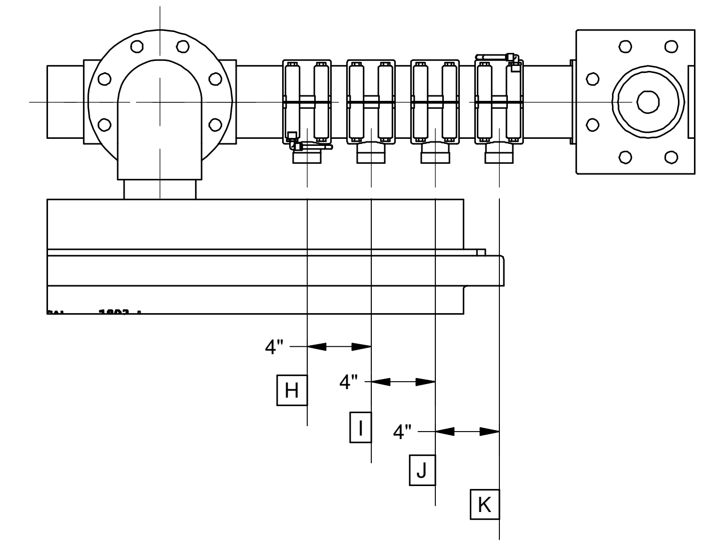
TITLE **GENERAL ARRANGEMENT**
CIP SKID

DESIGNER	CHECKER	APPROVER	DATE
VO00	ST00	DY03	01/13/2016

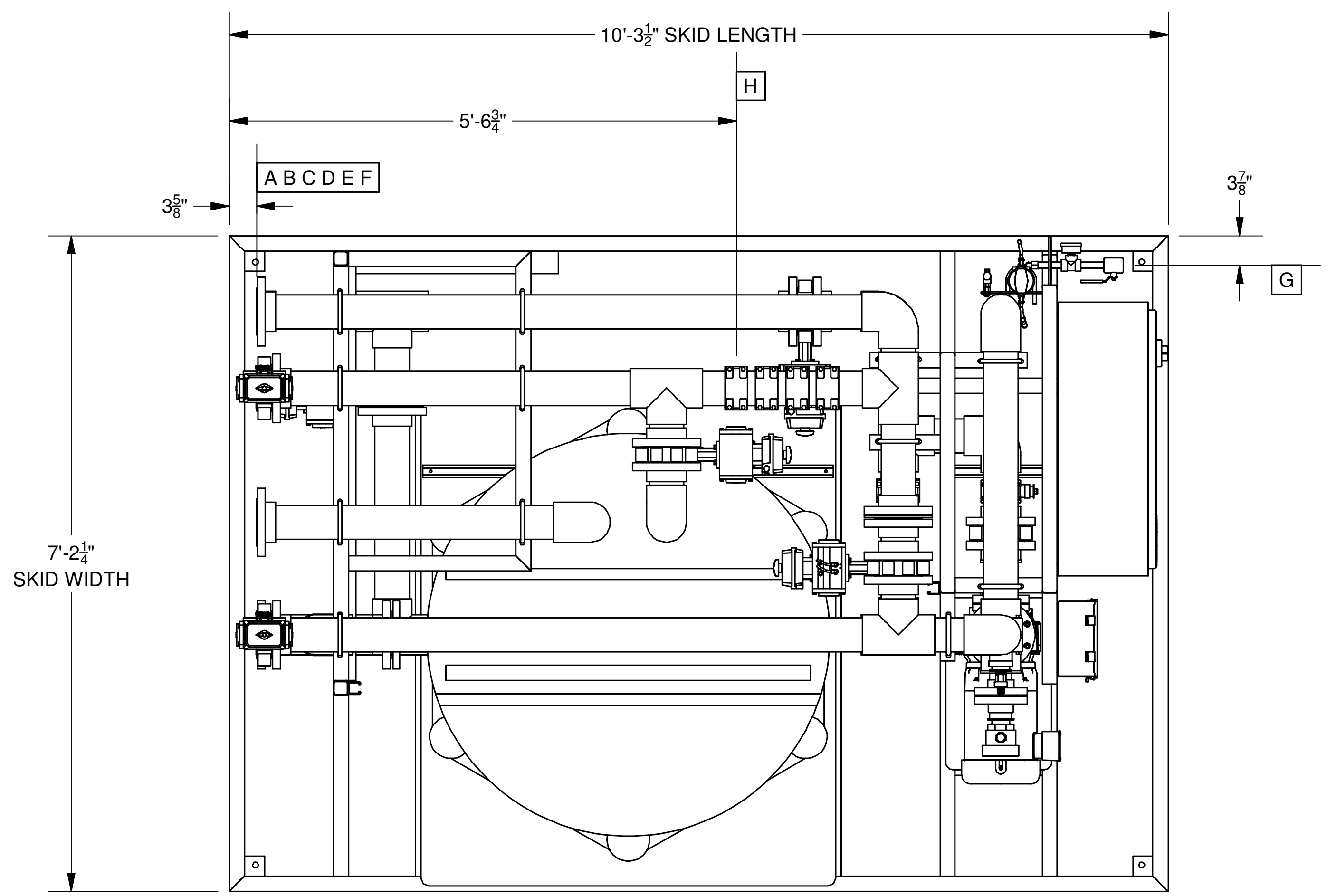
DOCUMENT NUMBER	SHEET	REV
	2 OF 3	-



SECTION A-A ANCHOR BOLT LAYOUT
(FROM SHEET 2)



DETAIL B CHEMICAL ADDITION
(SOME ITEMS NOT SHOWN FOR CLARITY)
(FROM SHEET 2)



PLAN

WESTECH

TITLE **GENERAL ARRANGEMENT**
CIP SKID

DESIGNER	CHECKER	APPROVER	DATE
VO00	ST00	DY03	01/13/2016

DOCUMENT NUMBER	SHEET	REV
	3 OF 3	-

September 7, 2017

Choolwe Mandona
Golder Associates Inc.
44 Union Blvd. Suite 300
Lakewood, CO 80228

Dear Choolwe:

Thank you for your interest in our line of Belding Tanks. Budgetary Pricing for your Indonesia Project is as follows.

Please note, Beldings FRP tanks are made with molds and Iquoted the closest sizes we have to your request, while keeping the capacity based on the sizes you requested.

Carbon Makedown Tank

1- 1,564 gallon flat bottom open top vertical tank, 72"ID x 91" tall with 2" fill fitting, 2" outlet fitting, 2" level fitting, 3" overflow fitting, painted carbon steel mixer bridge and four (4) mixing baffles.

$9,101.00 plus freight

Reaction Tank

1- 4,493 gallon flat bottom open top vertical tank, 96"ID x 144" tall with 2" fill fitting, 2" outlet fitting, 2" level fitting, 3" overflow fitting, painted carbon steel mixer bridge and four (4) mixing baffles.

$12,569.00 plus freight

pH Adjust Tank

1- 3,852 gallon flat bottom open top vertical tank, 96"ID x 124" tall with 2" fill fitting, 2" outlet fitting, 2" level fitting, 3" overflow fitting, painted carbon steel mixer bridge and four (4) mixing baffles.

$11,384.00 plus freight

Sludge Thickener Tank

1- 8,990 gallon flat bottom open top vertical tank, 96”ID x 288” tall with 2” fill fitting, 2” outlet fitting, 2” level fitting, 3” overflow fitting, painted carbon steel mixer bridge and four (4) mixing baffles.

$21,631.00 plus freight

Lime Tank

1- 1,564 gallon flat bottom open top vertical tank, 72”ID x 91” tall with 2” fill fitting, 2” outlet fitting, 2” level fitting, 3” overflow fitting, painted carbon steel mixer bridge and four (4) mixing baffles.

$9,101.00 plus freight

Notes:

- Prices quoted are firm for 30 days.
- Lead-time is 10-12 weeks after receipt of signed approved drawings. Please allow 2-3 weeks for approval drawings.
- Tanks are FOB Belding, MI. We do not handle overseas shipping.
- All sales are subject to Tank Equipment Terms & Conditions W.A.C. which can be viewed on our website at www.tankequipment.com. Some orders may be subject to a down payment and/or progress payments

Please let me know if I can answer any questions or be of further assistance.

Sincerely,

Matt Licknosky
Tank Equipment, Inc.
Office: 303-833-9200
Direct: 303-962-7814
Email: matt@tankequipment.com

DENVER INDUSTRIAL PUMPS, INC.

16-25985

April 15, 2016

Entered by: Mark Hibl

15165 W. 44th Avenue Golden, CO 80403 **303-233-9255** FAX 303-233-9031

PUMP QUOTATION

To: GOLDER ASSOCIATES INCORPORAT
44 UNION BLVD
SUITE 300
LAKEWOOD, CO 80228

Fax: 303.985.2080
Phone: 303.980.0540
Email:

We are pleased to offer the following quote for your consideration.

BARRICK GOLDSTRIKE MINES, INC.
c/o GOLDER ASSOCIATES, INC.

MEIKLE SURFACE FILTRATION PLANT
REQUEST FOR PROPOSAL 1523314A - PROCESS PUMPS

REVISION #1, 04/19/2016: Include spares for Cornell; Include vertical cantilever pumps

NOTES:
1. Freight, installation assistance, training, field testing and startup assistance are not included, unless expressly listed below as an inclusion below the pump description
2. Progress payments will be required for orders over $50,000. Milestones / percentages to be determined at time of order
3. Spare Parts:
   a. Metal Hydroxide Slurry Pumps, add $596.00 total, one mech. seal and two gaskets
   b. Backwash/Filter Waste Pumps, add $512.00 total, one mech. seal and two gaskets
   c. Polishing Filter Feed Pumps, To Be Provided at a Later Time

EXCEPTIONS/COMMENTS/CLARIFICATIONS:

Section 01 33 00 - Submittals (Rev.C)

General - Emailed documentation and submittals only; no hard copies, USBs drives or CDs

Section 01 60 00 - Product Requirements

Clause 1.4 - Freight, transportation and offloading are not included in our bid

1.5 - Manufacturer's standard storage protection is provided

Section 25 31 00 - Integrated Automation Instrumentation...

COMPLETE EXCEPTION; NOT APPLICABLE

15165 W. 44th Avenue Golden, CO 80403 **303-233-9255** FAX 303-233-9031

Section 40 20 00 - Liquid Process Piping

COMPLETE EXCEPTION; NOT APPLICABLE

Barrick PO Terms and Conditions (Rev. 05/09/2014)

Exceptions and comments to this document will follow

Barrick Goldstrike - Confidentiality Agreement

Signed copy, along with any exceptions/comments, will follow. Until that time, we will maintain strict confidentiality standards

15165 W. 44th Avenue Golden, CO 80403 **303-233-9255** FAX 303-233-9031

TAG NOs. P-100/110
METAL HYDROXIDE SLURRY PUMPS

Conditions of Service:
Pumping Metal Hydroxide Slurry (pH = 8 - 10)
300 GPM at 61 ft. TDH

CORNELL SEMI-OPEN-IMPELLER CENTRIFUGAL END SUCTION PUMP
Model No. 4NNDH-F16K
- All iron construction
- 4", 125# flanged connections
- Cornell's patented CycloSeal, single mechanical seal
  - Tungsten Carbide vs. Silicon Carbide
- Includes clean-out hole and cover
- Oil lubricated bearings

15HP, 1800 RPM, 3/60/460V electric motor
- TEFC enclosure, Premium Efficient, Inverter Duty

Motor mounted on vertical v-base (piggy-back design)
All equipment mounted on sandblasted, primed and expoxied baseplate
Includes coupling and guard

LEAD TIME: 12 -14 weeks ANTP (After Notice To Proceed)

EXCEPTIONS/COMMENTS/CLARIFICATIONS:

Section 44 42 56 - Centrifugal Pumps

1. Pumps do not meet ANSI B73.1 dimensional standards.
2. Cornell does not have an offering to meet the conditions for the Backwash Pumps.
3. Standard warranty is two years (24 months) beginning the date of shipment.
4. Volute drains shall be 3/8” per the specification.
5. The 316SS impeller shall be balanced to ISO G6.3 standards.
6. Pump shaft shall be LaSalle 1144 “Stressproof” steel.
7. Bearings shall be oil lubricated.
8. Pump is provided with Cycloseal back plate and Type 2 single mechanical seal.
9. No flush water is required for mechanical seal.
10. Pumps shall be shipped with lubricating oil drained from the bearing frame.
11. Any onsite testing or services shall be provided by others.
12. Any requirements listed in sections of the specification not provided shall be by others

Price - $19,825.00 each / $39,650.00 total

15165 W. 44th Avenue Golden, CO 80403 **303-233-9255** FAX 303-233-9031

TAG NOs. P-370/380
BACKWASH / FILTER WASTE PUMPS

Conditions of Service:
Pumping Backwash Filter Waste (pH = 8 - 10)
20 GPM at 14 ft. TDH

CORNELL SEMI-OPEN-IMPELLER CENTRIFUGAL END SUCTION PUMP
Model No. 1.25YML
- All iron construction
- 1.25", 125# flanged connections
- Cornell's patented CycloSeal, single mechanical seal
  - Tungsten Carbide vs. Silicon Carbide
- Oil lubricated bearings

1HP, 1200 RPM, 3/60/230-460V electric motor
- TEFC enclosure, Premium Efficient, Inverter Duty

All equipment mounted on sandblasted, primed and expoxied baseplate
Includes coupling and guard

LEAD TIME: 7 -9 weeks ANTP (After Notice To Proceed)

EXCEPTIONS/COMMENTS/CLARIFICATIONS:

Section 44 42 56 - Centrifugal Pumps

1. Pumps do not meet ANSI B73.1 dimensional standards.
2. Cornell does not have an offering to meet the conditions for the Backwash Pumps.
3. Standard warranty is two years (24 months) beginning the date of shipment.
4. Bearings shall be oil lubricated.
5. Pump is provided with Cycloseal back plate and Type 2 single mechanical seal.
6. No flush water is required for mechanical seal.
7. Any onsite testing or services shall be provided by others.
8. Any requirements listed in sections of the specification not provided shall be by others

Price - $7,091.00 each / $14,182.00 total

DENVER
INDUSTRIAL
PUMPS, INC.

15165 W. 44th Avenue Golden, CO 80403 **303-233-9255** FAX 303-233-9031

TAG NOs. P-300/310
POLISHING FILTER FEED PUMPS

Conditions of Service:
Pumping FIlter Feed (minimal solids, pH = 8-10)
350 GPM at 83 ft. TDH
6-ft. sump depth

VERTIFLO VERTICAL CANTILEVER SUMP PUMP
Model 1203, size 3x4x10, approx. 9.625" impeller diameter
Cast iron materials of construction
1045 steel 5"-diam. pump shaft
6"-diam. Sch-40 steel column
Steel support plate (1" thickness, 34" diameter)
Includes 316SS strainer
Pump to be painted with 2-part light grey epoxy paint
20HP, 1750 RPM, 3/60/230-460V electric motor
TEFC, Premium Efficient, with lifting lugs
NOTE: motor is to be installed AFTER pump is installed
Includes one (1) NEMA 4 float switch

LEAD TIME: 6 weeks ANTP (After Notice To Proceed)

EXCEPTIONS/COMMENTS/CLARIFICATIONS:

Section 43 21 39 - Vertical Cantilever Pumps

Clause 1.3.A.3 - Discharge pipiing by others
2.2.B.2 - Impeller diameter is 96.25% of maximum (10.00")
2.2.C - Shaft sleeve is not included
2.2.G.1 - Exception; pump inlet is not a flanged connection
2.2.G.2 - Flange is 125#
2.2.I.3 - Spare parts pricing to be provided at a later time
3.2.B - No field services provided; site location has not been revealed

Price - $19,189.00 each / $38,378.00 total

QuoteTotal: **$92,210.00**

Sincerely, David Wellington / Mark Hibl

Denver Industrial Pumps, Inc. has a complete service shop for pump repair, rebuild, modifications, and custom packaged units. Our field service technicians offer on-site pump removal, installation, repair, alignment services, and maintenance contracts. If we can be of further assistance please contact us. Please be advised, pricing good for 30 days of quotation and standard Terms and Conditions of sales are incorporated by reference posted at www.denverpumps.com All equipment quoted FOB factory unless otherwise stated.

FOB factory means freight from the origin will be added to invoice and purchaser takes title to equipment at shipping point. Availability subject to prior sale.

Taxes will be added to your invoice unless a current tax exempt certificate is supplied.

For all orders totaling $50,000.00 or more progress payments may be required.

Equipment left over 90 days are subject to scrap/disposal.

If not sending a hard copy Purchase Order, we require that you sign and return a copy of this quote when placing your order. Please verify item quantities, shipping address and shipping method.

APPROVED:

Signature ______________________________ Date ______________

Purchase Order No. ______________________________ Attached: Yes ___ No ___

Shipping/Special Instructions:

____

295 DeKalb Pike • North Wales, PA 19454
Tel: 215-699-8700 • Fax: 215-699-0370
Toll-Free Tel: 1-888-363-7886
Toll-Free Fax: 1-800-255-4017
Web Site: http://www.dynablend.com

Budgetary Proposal Number:	**19560**
Proposal Revision:	00
Proposal Date:	September 18, 2014
Project Reference:	Golder Associates – Michigan Coal Power Plant
Prepared By:	Ray Kyle
Representative:	Goble Sampson Associates – Josh Queen (303) 815-8257

Golder Associates
Attention: Katherine Tenny
PH: (303) 980-0540

Fluid Dynamics is pleased to offer the following dynaBLEND® polymer blending system:

One (1) L4S-600-0.5.0PS-I3-3(NO) dynaBLEND® system as described herein

Capacities:

Dilution Water:	60 - 600 GPH
Neat Polymer:	0.025 – 0.5 GPH

1. Polymer Activation

This offering includes the patented, hydrodynamic multistage dynaBLEND® mixing chamber. The chamber is paired with Fluid Dynamics' proprietary water flow control valve and polymer check valve to create a proven blending package specifically designed to invert, mix and activate emulsion, solution and dispersion polymers.

2. Water Inlet and Solution Outlet Assemblies

The inlet water assembly consists of a solenoid valve, rotameter and pressure gauge prior to the chamber-mounted water flow control valve. This system is also equipped with a differential pressure switch to monitor the presence of adequate water flow.

The chamber outlet assembly includes a pressure gauge and a section of clear acrylic discharge piping to monitor solution consistency.

3. Polymer Feed Pump

The neat polymer metering pump is a peristaltic tubing pump with an adjustable speed microprocessor controlled motor. System includes a calibration column sized for the pump supplied with required isolation valves.

4. Controls Package

Control Level 3

System "ON/OFF/REMOTE" selector switch
Local or remote (4-20mA) pump speed control
Low water pressure alarm with 15 second time delay
NEMA 4X enclosure
Heavy duty cord and plug
120 VAC power required
UL 508 Labeling

295 DeKalb Pike • North Wales, PA 19454
Tel: 215-699-8700 • Fax: 215-699-0370
Toll-Free Tel: 1-888-363-7886
Toll-Free Fax: 1-800-255-4017
Web Site: http://www.dynablend.com

5. Materials of Construction

	Body	Internals
Chamber:	304 Stainless steel	
Flow control valve:	PVC	304 Stainless steel
Solenoid valve:	Brass	NBR
Rotameter:	Acrylic	316 stainless steel
Piping:	PVC	
Peristaltic pump	Thermoplastic	Tygothane and PVDF
Control enclosure:	FRP	
Conduit:	PVC coated flexible metallic sealtight (UA) and liquidtight galvanized iron alloy fittings	
Frame:	304 Stainless steel	

6. Additional Accessories

One (1) 55 gallon drum/Suction wand assembly, consisting of 5/8" hose fitting, 2" polymer source isolation ball valve, one (1) friction lock fitting, 2" NPT bung fitting, clear PVC suction wand (1/2" pipe) and ½" foot valve, FDI Part Number 2700101.

7. Field Service/Start-Up

Start-up assistance is not included, but can be added for additional cost.

Fluid Dynamics™
Part of Pump Solutions Group
A DOVER COMPANY

295 DeKalb Pike • North Wales, PA 19454
Tel: 215-699-8700 • Fax: 215-699-0370
Toll-Free Tel: 1-888-363-7886
Toll-Free Fax: 1-800-255-4017
Web Site: http://www.dynablend.com

Budgetary Proposal Number:	**19560**
Proposal Revision:	00
Proposal Date:	September 18, 2014
Project Reference:	Golder Associates – Michigan Coal Power Plant
Prepared By:	Ray Kyle
Representative:	Goble Sampson Associates – Josh Queen (303) 815-8257

Budgetary Pricing: L4S-600-0.5PS-I3-3(NO)

Equipment:	**$13,300.00**
Accessories:	**Included with Equipment**
Freight:	**$500.00**
Services:	
Total:	**$13,800.00**

Commercial Terms and Conditions:

Submittals:	4-6 weeks after receipt of an order.
Delivery:	6-8 weeks after receipt of an order or after engineering approval.
F.O.B.:	Factory North Wales, PA; freight prepay and add
Terms:	Net 30 days. This firm price quotation is valid for acceptance within 90 days.

Local Representative:

Goble Sampson Associates

6905 N. Broadway

Denver, CO 80221

Ph: (303) 770-6418

Fax: (303) 640-7549

Attention: Josh Queen

E-mail: JQueen@goblesampson.com

295 DeKalb Pike • North Wales, PA 19454
Tel: 215-699-8700 • Fax: 215-699-0370
Toll-Free Tel: 1-888-363-7886
Toll-Free Fax: 1-800-255-4017
Web Site: http://www.dynablend.com

Budgetary Proposal Number:	**19560**
Proposal Revision:	00
Proposal Date:	September 18, 2014
Project Reference:	Golder Associates – Michigan Coal Power Plant
Prepared By:	Ray Kyle
Representative:	Goble Sampson Associates – Josh Queen (303) 815-8257

Fluid Dynamics

Terms and Conditions of Sale

This offer and all of the goods and sales of Fluid Dynamics are subject only to the following terms and conditions. The acceptance of any order is based upon the express condition that the Buyer agrees to all the terms and conditions contained herein. Any terms and conditions in any order which are in addition to or inconsistent with the following, shall not be binding upon Fluid Dynamics. The terms and conditions set forth herein shall be construed under and in accordance with the laws of the Commonwealth of Pennsylvania and the Court of Common Pleas of Montgomery County, Pennsylvania, and the Federal District Court.

PAYMENT

Unless specifically stated otherwise, quoted terms are Net 30 Days from date of shipment. Past-due charges are 1.5% per month and will apply only on any past-due balance. Fluid Dynamics (FDI) does not allow Retainage of any invoice amount, unless authorized in writing by an authorized representative of FDI and at no time shall any retainage exceed 180 days from the date of the invoice.

DURATION OF QUOTATION

Quoted prices are valid for 90 days from the date of the proposal, unless specifically stated otherwise, and are subject to change at any time prior to acceptance.

SHIPMENT

Shipping dates are not a guarantee of a particular day of shipment and are approximate, being based upon present production information, and are subject to change per the production schedules existing at time of receipt of purchase order. FDI shall not be responsible for any delay in shipment for causes beyond its control including, but not limited to, war, riots, strikes, labor trouble causing interruption of work, fires, other casualties, transportation delays, modification of order, any act of government or acts of God. Quoted shipment dates in this proposal are approximate dates goods will be shipped and, unless agreed to in writing by FDI, Buyer may not postpone or delay the dates of shipment of goods from our plant or from our supplier's plants beyond the dates set forth in this proposal. Shipments beyond one year from date of proposal are subject to escalation of 1% per month.

TITLE AND RISK OF LOSS

All prices and all shipments of goods are F.O.B. FDI's place of manufacture unless specifically stated otherwise. Delivery of goods sold hereunder to the carrier shall be deemed delivery to the buyer, and upon delivery, title to such goods and risk of loss or damage shall be borne by the Buyer.

TAXES

Prices quoted do not include any taxes, customs duties, or import fees. Buyer shall pay any and all use, sales, privilege or other tax or customs duties or import fees levied by any governmental authority with respect to the sale or transportation of any goods covered hereby. If FDI is required by any taxing authority to collect or to pay any such tax, duty or fee, the Buyer shall be separately billed at such time for the amounts FDI is required to pay.

295 DeKalb Pike • North Wales, PA 19454
Tel: 215-699-8700 • Fax: 215-699-0370
Toll-Free Tel: 1-888-363-7886
Toll-Free Fax: 1-800-255-4017
Web Site: http://www.dynablend.com

INSURANCE
Unless the goods are sold on a CIF basis, the Buyer shall provide marine insurance for all risks, including war and general coverage.

SECURITY
If at any time the financial responsibility of the Buyer becomes unsatisfactory to FDI or FDI otherwise deems itself insecure as to receipt of full payment of the purchase price from the Buyer hereunder, FDI reserves the right to require payment in advance or security or guarantee satisfactory to FDI of payment in full of the purchase price.

LIMITATION OF ACTION
No action shall be brought against FDI for any breach of its contract of sale more than two years after the accrual of the cause of action thereof, and, in no event unless the Buyer shall first have given written notice to FDI of any claim of breach of contract within 30 days after the discovery thereof.

CANCELLATION
No acceptance of this proposal, by purchase order or otherwise, may be modified except by written consent of FDI, nor may it be cancelled except by prior payment to FDI the following sums: 1) If cancellation is prior to commencement of production and prior to the assumption of any obligations by FDI for any materials or component parts, a sum equal to 15% of the total purchase order price; 2) If cancellation is after the commencement of production or after the assumption of any obligations by FDI for any materials or component parts, a sum equal to the total of the direct, out of pocket expenses incurred to the date of cancellation for labor, materials, machine time, materials and any charges made to us by suppliers for cancellation, plus 30% of the total purchase price.

PROPRIETARY INFORMATION
This proposal, including all descriptive data, drawings, material, information and know-how disclosed by FDI to buyer in relation hereto is confidential information intended solely for the confidential use of Buyer, shall remain the property of FDI and shall not be disclosed or otherwise used to the disadvantage or detriment of FDI in any manner.

QUALIFIED ACCEPTANCE AND LIABILTY
In the event the acceptance of this proposal by Buyer either is contingent upon or subject to the approval by any third party such as, but not limited to, a consulting engineer, with respect to goods, parts, materials, descriptive data, drawings, calculations, or any other matter, then upon such approval by any third party, FDI shall have no liability to Buyer or to any third party so long as the goods sold and delivered by FDI conform to this proposal. In the event any such third party requires modifications in the proposal prior to the approval thereof, FDI reserves the right to request payment for the modifications or may at its sole option and without liability to any party elect to cancel this proposal or return the purchase order to Buyer. In the event FDI elects to modify this proposal to conform to the requirements for approval by any third party, FDI in such event shall have no liability to Buyer or to any third party so long as the goods sold and delivered by FDI conform to this proposal as modified. Buyer agrees to indemnify and hold harmless FDI from and against all costs and expenses and liability of any kind whatsoever arising

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out of or in connection with claims by third parties so long as the goods sold hereunder conform to the requirements of this proposal as approved by any third party.

WARRANTY; LIMITATION OF LIABILITY; AND DISCLAIMER

In return for purchase and full payment for FDI goods, we warrant new goods provided by us to be free from defects in materials and workmanship under normal conditions and use for a period of one year from the date of startup or eighteen months from date of shipment (whichever occurs sooner). If the goods include an "dynaBLEND®" Liquid Polymer blending unit the dynaBLEND® unit shall be warranted by FDI to be free from defects in materials and workmanship under normal conditions and use for two years from the date of startup or 30 months from the date of shipment (whichever occurs sooner). OUR OBLIGATION UNDER THIS WARRANTY IS EXPRESSLY AND EXCLUSIVELY LIMITED to replacing or repairing (at our factory in Lansdale, PA) any part or parts returned to our factory with transportation charges prepaid, and which our examination shall show to have been defective. Prior to return of any goods or its parts to our factory, Buyer shall notify FDI of claimed defect and obtain an RMA prior to returning any goods or parts thereof. This warranty does not apply to any goods or part which has been repaired or altered outside our factory, or applied, operated or installed contrary to our instruction, or subjected to misuse, chemical attack/degradation, negligence or accident. Our warranty on accessories and component parts not manufactured by FDI is expressly limited to that of the original manufacture thereof.

The foregoing warranty is made in lieu of all other warranties, express or implied, and of all other liabilities and obligations on our part, including any liability for negligence, strict liability, or otherwise; and any implied warranty of merchantability or fitness for a particular purpose is expressly disclaimed; and we expressly deny the right of any other person to incur or assume for us any other liability in connection with the sale of any goods provided by us. There are no warranties or guarantees of performance unless specifically stated otherwise. Under no circumstances, including any claim of negligence, strict liability, or otherwise, shall FDI be liable for any incidental or consequential damages, costs of connecting, disconnecting, or any loss or damage resulting from a defect in the goods. Limit of liability: FDI's total liability under the above warranty is limited to the repair or replacement of any defective part. The remedies set forth herein are exclusive, and our liability with respect to any contract or sale, or anything done in conjunction therewith, whether in contract, in tort, under any warranty, or otherwise, shall not, in any case, exceed the price of the goods upon which such liability is based.

Fluid Dynamics
Part of Pump Solutions Group
A DOVER COMPANY

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Web Site: http://www.dynablend.com

Budgetary Proposal Number:	**19560**
Proposal Revision:	00
Proposal Date:	September 18, 2014
Project Reference:	Golder Associates – Michigan Coal Power Plant
Prepared By:	Ray Kyle
Representative:	Goble Sampson Associates – Josh Queen (303) 815-8257

STATEMENT OF WARRANTY
dynaBLEND® LIQUID POLYMER BLENDING SYSTEMS

The dynaBLEND® liquid polymer preparation and feed equipment, manufactured and sold by Fluid Dynamics is warranted to be free from defects in workmanship and materials for a period of two (2) years from date of delivery or significant startup, whichever is later. This warranty is not applicable to equipment that has not been stored in a reasonable and appropriate manner and/or equipment that is used in a service not recommended by Fluid Dynamics and/or conditions other than made known to Fluid Dynamics. at the time of purchase. All Fluid Dynamics warranties are contingent upon proper use of the equipment, and will not apply if the equipment is subjected to unusual physical stress, neglect or misuse.

Fluid Dynamics assumes no liability for consequential and/or contingent damages of any kind. The Customer, by acceptance of the equipment, assumes all liability for consequences of its use or misuse by the Customer, the Customer's employees, and/or all others. Any part of Fluid Dynamics equipment considered defective in either workmanship or material may be returned to the Fluid Dynamics. point of manufacture within the warranty period and such part will be repaired/replaced free of charge. Fluid Dynamics will assume transportation charges if Fluid Dynamics inspection at the point of manufacture substantiates the warranty claim of defect. If Fluid Dynamics can establish no defect, transportation charges will be billed to the Customer. Customer's purchase orders and any other documents submitted by the Customer shall not alter or waive any of the foregoing warranty terms or conditions unless such documents are accepted and signed by an authorized representative of Fluid Dynamics.

In no event shall Fluid Dynamics be liable to Purchaser for any special, indirect, incidental or consequential damages arising out of, or as a result of, the sale, delivery, servicing or loss of use of the products or any part thereof, or for any charges or expenses of any nature incurred without the written consent of Fluid Dynamics. Even if Fluid Dynamics has been negligent, in no event shall Fluid Dynamics liability under any claim made by Customer exceed the purchase price of the products in respect of which damages are claimed.

This warranty is in lieu of all other warranties except as noted below (including without limiting the generality of the foregoing warranties of merchantability and fitness for a particular purpose) expressed or implied, and Customer's sole and exclusive remedy for breach of this warranty shall be as hereinabove stated.

NOTE: All pumps, optional and customized equipment carry the warranty of the original manufacturer. Fluid Dynamics makes no warranty with regard to any products not manufactured by Fluid Dynamics.

September 27, 2018

Ms. Paige Pruisner
Golder
44 Union Blvd. – Suite 300
Lakewood, CO 80228
Phone: 303-980-0540

RE: INQ #2100 NM LIME SLAKING SYSTEM

Dear Ms. Pruisner,

Thank you for contacting us about this project and providing your process data to allow us to size this system and provide budget pricing for your feasibility study.

Proposed equipment descriptions and scope limits are as follows:

LIME SLAKING SYSTEM OVERVIEW:
1. Lime system shall be comprised of 1 field erected bolted, skirted, silo that would be located outdoors, and be complete with dust filter, fill pipe, interior lighting, heat, and ventilation, internal access to the feeder level platform, and a local control panel.

2. System shall utilize a vibrating bin activator mounted on the silo cone discharging to a metering screw to the slaker pre-mixer inlet. Lime slurry flows out of the slaker through a vibrating grit screen and through an equipment support floor to the 2,500 gallon slurry holding tank located at the grade level of the skirted silo.

3. Internal silo components shall be provided loose for field installation on and inside the skirted silo. Interconnecting piping and wiring shall be provided by others on site.

4. Scope limits would be the inlet connection on the 4” lime fill pipe. On the slurry discharge side, Vulcan scope ends at the 2 pump outlet flanges on the exterior of the skirted silo.

A. EQUIPMENT PRICING: (USD$)

BUDGET PRICING:
Lime Slaking System: Field Erected by Others
-DV-50 Horizontal Detention Slaking System – w/10,000 CF MT SILO $985,000

Estimated Freight Costs:

1. Estimated Lump Sum Freight costs, FCA Origin	**EST**	**$45,000**

B. Commercial Rates of Payment: (Daily Rates $USD)	STD
1. Field erection advisor	$1800
2. Electrical engineer for verification of proper wiring	$2000
3. Commissioning of equipment ADDL DAYS	$2000
4. Operator training	$2000

C. Terms of Payment

-**20% with order**
-20% on transmittal of approval drawings
-20% on release for purchase for major material purchases
-20% on start of shop fabrication for silo and slaker
-20% on notification of readiness to ship major components

D. Proposed warranty is 12 months from startup or 18 months from shipment (as requested), whichever occurs first.

E. Budget pricing valid for 10 days from submission date.

NOTES:
1. Shipping costs to site location have not been included and have been listed as an additional item.
2. Equipment startup services for a total of 10 days on site have not been included.
3. Spare parts lists with costs shall be provided as part of the equipment submittal for approval prior to fabrication.

Thank you for your interest in our products and systems, and we look forward to working with you on this project.

Do not hesitate to contact me if you have questions or need additional information.

Sincerely,
Michael D. Mohle
Louisville Dryer Company
Ph: 712-461-1332
www.vulcanironworksonline.com
Your solution provider for kilns, dryers, ball mills and other processing equipment!

VULCAN IRON WORKS EQUIPMENT DIVISION

DATE: 9-27-19

TO: GOLDER ASSOCIATES – Quote #2100
RE: LIME SLAKING SYSTEM, Rev. 0

DESIGN CRITERIA: Code NBC 2005
A. Seismic – 2A; Importance Factor:
B. Wind – 100 MPH; Exposure:
C. Silo Pressure/Vacuum Design:
 1. Pressure: 4 oz.
 2. Vacuum: .4 oz.

LEAD TIME:
SUBMITTAL DRAWINGS AND DOCUMENTATION: 8-10 weeks ARO
FOR SHIPMENT AFTER RELEASE TO PROCEED WITH FABRICATION: 24-28 weeks ARAD

NOTE: Equipment described below is for supply of 1 field assembled lime slaking system.

EQUIPMENT DESCRIPTION:
A1. Storage Silo: 1
 1. 10,000 CF field bolted and gasketed storage silo; 55 PCF material volume calculations, 80 PCF for structural calculations
 2. 20' diameter, 60 Deg cone, skirted
 3. 32’ storage cylinder height, 70’ approx. eave height
 4. 7' flanged opening for bin activator
 5. 24" manway with pressure/vacuum relief valve
 6. 4” flange for lime inlet fill pipe with elbow and target box
 7. HI and LO bin level silo penetrations with paddle guards for horizontal mounted units, 1-1/4” couplings
  a. Roof mounted flange for Radar level indicator transducer
 8. Dust Filter Flange on silo roof
 9. Storage silo shall be constructed of A-36 carbon steel.
 10. Silo provided as factory coated carbon steel silo, bolted and gasketed construction, materials on site, for field assembly and interior equipment installation by others.
 11. Interior and exterior silo and skirt panels provided with factory applied epoxy powder coating.
A2. Silo Support Structure:
 1. Skirted with interior platform at the feeder level, internal spiral stair access, HDG coated carbon steel.
  a. Double door opening at grade level.
 2. Height of discharge above floor approximately 12 feet (subject to change), to allow access to lime screw to slaker inlet chute and bin activator.
B. Silo Access:
 1. HDG steel ladder cage from grade to silo roof with rest platforms.

2. 2 rail roof and platform handrail provided as galvanized steel pipe, 1.5" diameter Schedule 40, with bolted pipe connections.
3. Roof toeplate provided as painted carbon steel.
4. Access components field mounted during field erection of silo

C. Bin Activator: 1
1. 7' diameter with carbon steel mounting ring
2. 10" diameter flanged outlet
3. 3 HP, 460/3/60 vibrator motor
4. Field mounted and wired

D. Silo Knife Gate: 1
1. 10" diameter, manual chainwheel operated, open and closed limit switches
2. Cast Iron body with SS blade
3. Packing: PTFE
4. Field mounted
5. Flexible connection provided between knife gates and feeder inlets

E1. Silo Point Level Indicators: 2 (High and Low level)
1. Rotating paddle type with SS paddles
2. NEMA 4X exterior housing, SPDT switch
3. 120/1/60 powered
4. Field mounted and wired by installation contractor

E2. Silo Continuous Level Indicator: 1
1. Roof mounted radar level indicator (Siemens/Milltronics)
2. Transducer field installed, with 30 meter range
   a. 24VDC - 2 wire loop powered
3. E-Z Aimer kit provided
4. Indicator/controller shipped loose for field mounting and wiring

F. Silo Fill System:
1. 4", Sch. 40 carbon steel pipe coated to match silo finish color
2. Pipe sections connected with compression couplings with connecting straps
3. Fill elbow provided as 90 degree cast iron Vortice Ell or wide-sweep
4. Truck coupling, limit switch, and end cap provided on pipe end
5. Fill pipe assembly field installed

G. Dust Filter: 1
1. Roof mounted on silo flange
2. Welded CS housing painted to match silo
3. 1200 CFM pulse-jet bag filter, with 250 Sq. Ft. minimum cloth area
4. 3 HP – 460/3/60 fan motor – 3450 RPM
5. Ships loose for field attachment and wiring

H. Fill Station Panel: 1
1. NEMA 4X enclosure
2. Panel complete with indicating lights, alarm horn, and H-O-A switch, interlocked to silo dust collector and fan
3. Panel ships loose for field mounting and wiring by others

I. Lime Feed Screw: 1
1. Volumetric screw conveyor, SS contact parts, 6" diameter tube with 4" screw
2. 1.5 HP AC motor 460/3/60, inverter duty
3. Sized for transfer rate of up to 5,000 PPH (3/4" minus @ 55 pcf)
4. Fabricated SS feed chute provided on feeder outlet to slaker
5. Feeder shipped loose for field assembly and installation on site

J. Detention Lime Slaker: 1

1. Vulcan DV-50 detention type lime slaker, carbon steel construction
    a. Slaker max output 50 GPM of 20-25% solids hydrated lime slurry
2. Sized for feed rate of 500-5,000 PPH
3. Slaker provided with 5 HP 460/3/60 motor, belt driven
4. Slaker provided with draft inducer with fan, factory mounted
5. Makeup water piping (galvanized) with the following plumbing components and valves factory mounted:
    a. 1 Makeup water ON-OFF solenoid valve
    b. 1 Pneumatic water control segmented ball valve
    c. 1 Magnetic flow meter/transmitter with local display
    d. 1 Aspirator spray ON-OFF valve
    e. 1 Manual ball valve for water inlet shutoff
    f. 1 Direct reading temperature gauge with 2 switch control
        1. 1 Temperature transmitter with 4-20mA out to PLC
    g. 1 Solenoid for emergency/high-temp water feed
6. Slaker shall be factory welded and coated (exterior only), with valves and piping factory mounted and wired. Field installed in silo skirt area on 2nd equipment level platform of skirted silo
7. Slaker shall be provided with premixer for warming of incoming water prior to injection into the slaker reactor. Slaker body shall be insulated and provided with an exterior 16 gauge shell, to protect the insulation material.

K. Grit Removal Equipment: 1

1. 30” diameter vibrating screen unit, SS cloth, 16 mesh
2. Screen unit provided with carbon steel housing, base, and cover
3. Unit provided with 0.5 HP, 460/3/60 motor
4. Flexible chutes provided on the screen inlet and outlet
5. Field mounted and wired in silo skirted area on second level

L. Grit Screw: 1

1. 6” diameter carbon steel helicoid full-pitch, carbon steel
2. Length 10’ nominal, with inlet and outlet flanges
3. Motor: ½ HP, 460/3/60
4. Field installed

M. Slurry Storage Tank: 1

1. 2,500 gallon capacity, ¼” thick A-36 carbon steel, 8’ diameter, 6’ tall with flat bottom and flat top
    a. Tank design factory welded, exterior coated with epoxy
2. All tank penetrations, mounting brackets, flanges, and couplings factory completed based on system design requirements
    a. Tank overflow and drain piping shall be provided as Sch. 40 threaded carbon steel, with manual gate valve at tank bottom for draining, factory installed
3. Tank provided with hinged 20” roof mounted access/inspection manway
4. Tank provided with 2 outlet flanges

N. Slurry Tank Level Indication: 1

1. Ultrasonic type, top tank mount, 8m transducer
2. 4-20 mA output to PLC
3. 2 Wire loop powered
4. Factory mounted and wired on tank top

O. Slurry Tank Mixer: 1
   1. 1.5 HP, TEFC, 460/3/60 motor
   2. 316 SS shaft and single impeller, 350 RPM
   3. Factory mounted and wired, with shaft/impeller removed for shipment, requiring reinstallation on site by installation contractor

P. Slurry Tank Dilution Water Plumbing Piping and Components: SEE P&ID FOR DETAILS
   1. Water inlet piping:
      a. Galvanized threaded water piping, Sch. 40
      b. 1 Bronze pressure reducing valve with strainer
      c. 1 Pressure indicating valve
      d. 1 Pressure switch
      e. 1 Local reading flow meter/transmitter
      f. 1 Solenoid water feed valve
      g. 1 globe water valve for water inlet control
   2. Slurry Piping: SEE P&ID FOR REQUIREMENTS
      a. Schedule 40 steel
      b. Manual ball valves for water flush
      c. Manual rubber lined pinch valves for on/off control

Q. Slurry Pumps: 2
   1. Horizontal Centrifugal, Cast-iron, rubber lined construction, constant speed
      a. Overhead belt-drive with guard
   2. Warman 1.5/1 BAH, or equal
   3. Capacity: 60 GPM @ 80' TDH
      a. 10HP, 1750 RPM, TEFC motors
   4. Seals: Packed gland seals, water flushed
   5. Factory skid mounted, for field mounting in grade level of skirted silo

R. Wiring:
   1. Conduit and wiring field installed and mounted on silo for integral components (provided an installed by others)
      a. Lime Slaker shall be factory wired to local junction box
   2. Internal and External Lighting: By others

S. System Local Controls: (Feed/Slaking area)
   1. NEMA 4X-SS enclosure
   2. Terminal strips provided for connection to MCC and DCS
      a. VFD by others in MCC
   3. External mounted 3 phase to single phase transformer not included
   4. PLC not included
   5. Plain language operating description provided to allow PLC programming (programming by others)
   6. Control panel shipped loose for mounting on slaker work level platform
   7. Interconnecting wiring between panel and devices/JBs by others

T. Paint and Coatings:
   1. SP-10 prep for silo shell exterior and equipment area interior
   2. Silo:
      a. Interior of silo storage area: Epoxy power coating, 4 mils
      b. Skirt area and Silo Exterior: 2 coat powder coat system epoxy/polyester
         1. 6 mils minimum DFT
   3. Paint colors to be determined by customer/engineer
   4. Touch up paint provided

5. Purchased products shall be provided with manufacturer's standard paint
6. Field erected silo provided with factory applied coating

U. Environmental Components:
Silo interior provided with the following components loose for field mounting and wiring by others:
1. 4 x 10 kW 575/3/60 heaters
2. 8 x 75 W 120/1/60 HPS vapor tight light fixtures
3. 1 x 24" square ventilation fan, 300 CFM, 120/1/60
4. Double man door shall be provided for installation at grade level of silo, included as part of the silo assembly
5. Interior skirt insulation has not been included

V. Preparation for Shipment:
1. Controls shall be factory tested prior to shipment, panels ship loose

W. Startup Service:
1. 1 man, 2 trips, 5 days per trip on site for startup and commissioning recommended
2. Field erection/assembly advisor: 1 man 10 days, 2 trips **ADDITIONAL COST**

X. Spares:
1. None Included
2. Spare parts list provided in submittal and O&M electronic manual

Y. Special Freight Information: FCA Shipping point (various), No Freight Allowed
FCA Locations:
1. Parsons, KS
2. Louisville, KY

Z. O&M Documentation:
1. 3 CD electronic copies shall be provided in PDF format, English language

ITEMS AND SERVICES NOT INCLUDED IN THIS PROPOSAL:
1. Freight costs, unloading at site, erection, or installation
2. Hook up/supply of utilities (water, power, air)
3. Foundation design or supply, or anchor bolts
4. Chemicals
5. Slaker water heater or water pressure supply system
6. Skirt insulation
7. Silo aeration system air supply system

Equipment Proposal - All equipment is sold subject to the terms and conditions stated on Attachment #1 (below) which by this reference is incorporated as part of this proposal.

Attachment #1

LOUISVILLE DRYER COMPANY

DBA: VULCAN IRONWORKS

PROJECTS and PARTS ORDERS

GENERAL LIMITATION OF LIABILITY

Except to the extent that Vulcan Ironworks is entitled to be indemnified under a policy of insurance effected pursuant to the requirements of the contract, the liability of Vulcan for any defect in the goods supplied or work performed is limited to the repair or replacement, at Vulcan's option, of any nonconforming goods or work resulting from defects in material or workmanship under normal use and service which are reported within 12 months after the date of the contract covering such goods or work.

THE REMEDY OF REPAIR OR REPLACEMENT OF THE NONCONFORMING GOODS OR WORK SHALL BE THE SOLE AND EXCLUSIVE REMEDY AVAILABLE TO THE BUYER OR ANY OTHER PERSON. IN THE EVENT THAT REPAIR OR REPLACEMENT IS NOT ACHIEVED OR OTHERWISE IS AN INEFFECTIVE REMEDY, THE BUYER'S SOLE AND EXCLUSIVE ADDITIONAL REMEDY IS THE RIGHT TO RECOVER AN AMOUNT NOT TO EXCEED THE AMOUNT PAID TO FOR THE NONCONFORMING GOODS OR WORK. EXCEPT FOR SUCH REPAIR, REPLACEMENT, OR REFUND, VULCAN SHALL NOT BE LIABLE FOR ANY LOSS, INJURY, EXPENSE, OR DAMAGE, WHETHER DIRECT, INDIRECT, SPECIAL, CONSEQUENTIAL, INCIDENTAL, PUNITIVE OR OTHERWISE, RESULTING FROM THE GOODS OR WORK OR IKD'S ACTION UNDER THIS AGREEMENT, WHETHER A CLAIM FOR SUCH DAMAGES IS BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, OR ANY OTHER LEGAL OR EQUITABLE THEORY.

All completion or start-up dates specified in the contract are estimates only and are not guaranteed. VULCAN SHALL NOT BE LIABLE FOR ANY LOSSES OR DAMAGES (WHETHER DIRECT, INDIRECT, SPECIAL, CONSEQUENTIAL, INCIDENTAL, PUNITIVE OR OTHERWISE) RESULTING FROM ANY DELAYS IN COMPLETION OF THE FIELD SERVICE PROJECT OR START-UP OF THE EQUIPMENT.

These limitations of liability apply to all liability whatsoever arising under, or out of, or in the course of this contract or the performance thereof and continue to apply notwithstanding rescission, repudiation or termination of the contract for any reason, whether deliberate, unintentional or by operation of law.

Customer Address:

Golder Assoc.

44 Union Blvd.
Suite 300
Lakewood, CO 80228
Phone: (303) 980-0540
Fax: (303) 985-2080

Attention: Paige Pruisner
EMAIL:
ppruisner@golder.com

Quoted By: Andrew Forquer
Customer No: 10000607

Application: Indonesia Project

I am pleased to provide the following proposal for your consideration.

GENERAL NOTES, CLARIFICATIONS & EXCEPTIONS:

- Prominent has in good faith reviewed all of the plans and specifications that in our opinion, apply to this equipment. This proposal is based on the following sections and drawings only, except as indicated by the exceptions and clarifications. Meeting additional specifications or plans may require a quote revision.
- Specifications: N/A
- Drawings: N/A

- Field startup and training are not included in this quotation unless otherwise stated herein. Please consult the factory for startup charges applicable to this scope of equipment.

- Drawing Submittals:
- One set of drawings available in electronic format.
- One set of component manuals is included and will ship with the equipment.
- Submittals are not included unless quoted as a line item. Charges for submittals will vary for electronic versus paper copies, as well as, content required and binding.
- Material procurement and production will not begin until submittal drawings are returned and marked approved.

- All proposals are subject to ProMinent Fluid Controls, Inc. Terms and Conditions

Should you have any additional questions, please do not hesitate to contact us immediately.

TERMS & CONDITIONS

Payment: Net 30 days
Price: US Dollars, ExWorks, Pittsburgh, PA
Offer Validity: 90 days
Lead Times: Engineering: 2 Weeks ARO
Equipment: 8 Weeks ARAD
(Note: All lead times subject to change based on current Engineering and Shop load. Please consult factory when placing your order)

Andy Forquer
Application Engineering Manager

Office Phone: 815.304.4540
Cell Phone: 815.954.1946

SECTION 001: Duplex PAC Skid Package

TWO PUMP PAC FEED SYSTEM:

APPLICATION DATA:
Chemical: PAC Slurry
Pump Type: Solenoid driven diaphragm
Pump Quantity: 2
Capacity: 0.61gph @ 200spm vs 232psi each
Piping Material: SCH 80 PVC/Viton
Piping Configuration: Primary/backup

MECHANICAL DETAILS:
Skid Type: Black fusion welded polypropylene skid base
Chemical Inlet: (1) 0.5" Solution
Outlets: (1) 0.5" Isolation ball
valves as required One wye
strainer
100ml PVC calibration cylinder
Two pressure relief valves
Two 164ml PVC/Viton pulsation dampener
One discharge pressure gauge with isolator
One back pressure valve

ELECTRICAL DETAILS:
Electrical terminal box for all pump electrical connections
120vac power
Pump power receptacles
All wiring is completed at the factory

Material:	Qty
DO000041	1

gamma/X

The ProMinent gamma/X is a microprocessor-based solenoid-driven diaphragm programmable pump. Continuous electronic stroke length adjustment from 0 - 100% (recommended 30 - 100%). Stroke rate adjustment in 1 stroke/hour increments from 0 to 12,000 strokes/h.

Standard features include:
- Remote on/off and external contact input 1:1 with pulse control.
- Backlit dot matrix display with 3-LED indicators
- Fiberglass-reinforced, PPE plastic housing rated to IP65.

** (ProMinent Control Cable is required for external control)

Flow: 0.61gph / 2.3l/h
Pressure: 232psi / 16bar

Options Included:

- Liquid end materials	PV	PVDF/PVDF
- Diaphragm/seals	T	PTFE/PFTE coated
- Liquid end version	2	Bleed valve w/o valve springs
- Hydraulic connections	6	standard (SS/TT)
- Diaphragm rupture indicator	0	Not included
- Version	0	Standard
- Logo	0	Standard, with logo
- Electrical connection	U	Universal, 100-230 V 50/60 Hz
- Cable and plug	D	N.American plug, 115V
- Relay, pre-set	C	Fault relay + 4-20ma output
- Accessories	0	Not included (SS/TT/HV)
- Control variant	3	Option 0 + analog control
- Metering monitor	0	Pulse signal input
- Bluetooth remote stop	0	Not included
- Language	EN	Standard (English)
- Approvals	07	MET (USA)
- Documentation	EN	Standard Documentation

Material:	Qty
GMXA1602PVT26000UDC0300EN	2

Universal control cable, 5-pin round plug; 5-wire 15 ft. (5 m)

Material:	Qty
1001301	2

TERMINAL BOX KIT, 2 PUMP, NON-GFI RECEPT

Material:	Qty
7745880	1

SECTION 001 Sub Total: ***Total Net: 7,712.00***

SECTION 002: Duplex Polymer Aid Skid Package

TWO PUMP POLYMER FEED SYSTEM:

APPLICATION DATA:
Chemical: Polymer Aid
Pump Type: Solenoid driven diaphragm
Pump Quantity: 2
Capacity: 7.7gph @ 200spm vs 102psi each
Piping Material: SCH 80 PVC/Viton
Piping Configuration: Primary/backup

MECHANICAL DETAILS:
Skid Type: Black fusion welded polypropylene skid base
Chemical Inlet: (1) 0.5" Solution
Outlets: (1) 0.5" Isolation ball
valves as required One wye
strainer
500ml PVC calibration cylinder
Two pressure relief valves
Two 164ml PVC/Viton pulsation dampener
One discharge pressure gauge with isolator
One back pressure valve

ELECTRICAL DETAILS:
Electrical terminal box for all pump electrical connections
120vac power
Pump power receptacles
All wiring is completed at the factory

Material:	**Qty**
DO000041	1

delta® with optoDrive®

The ProMinent® delta® is a microprocessor based, solenoid driven diaphragm programmable pump designed for delivery rates, ranging from 2.0 gallons per hour at 363 psi (7.5 l/h at 25 bar) up to 19.8 gallons per hour at 29 psi (75 l/h at 2 bar). Independent suction and discharge stroke duration allows for continuous metering with a 36,000:1 turndown ratio. A ProMinent® control cable is required for external control.

Flow: 7.71GPH / 29.2L/H
Pressure: 102PSI / 07BAR

Options Included:

- Liquid End Material	PV	PVDF
- Seal Material	T	PTFE seal w/ PTFE Diaphragm
- Liquid End Version	4	HV w/o b.valve, w/ v.springs
- Connection	0	Standard (per specifications)
- Diaphragm Failure	0	W/o diaph rupture indicator
- Labeling	0	Standard w/PM-Logo , w/o. lock
- Electrical Connection	U	115-230 V, 50/60 Hz
- Cable and Plug	D	2m USA / 115V
- Relay	C	Option 1 + 4-20 mA output
- Accessories	0	Not Included
- Control Version	3	Manual + pulse ctrl + analog
- Access Code	1	with Access code
- Pause/Float	0	Standard

Material:	**Qty**
DLTA0730PVT4000UDC031EN0	2

Universal control cable, 5-pin round plug; 5-wire 15 ft. (5 m)

Material:	**Qty**
1001301	2

TERMINAL BOX KIT, 2 PUMP, NON-GFI RECEPT

Material:	**Qty**
7745880	1

SECTION 002 Sub Total: ***Total Net: 8,392.00***

SECTION 003: Duplex Lime Slurry Skid Package

TWO PUMP LIME SLURRY FEED SYSTEM:

APPLICATION DATA:
Chemical: Lime Slurry
Pump Type: Solenoid driven diaphragm
Pump Quantity: 2
Capacity: 12.9gph @ 200spm vs 58psi each
Piping Material: SCH 80 PVC/Viton
Piping Configuration: Primary/backup

MECHANICAL DETAILS:
Skid Type: Black fusion welded polypropylene skid base
Chemical Inlet: (1) 0.5" Solution
Outlets: (1) 0.5" Isolation ball
valves as required One wye
strainer
500ml PVC calibration cylinder
Two pressure relief valves
Two 164ml PVC/Viton pulsation dampener
One discharge pressure gauge with isolator
One back pressure valve

ELECTRICAL DETAILS:
Electrical terminal box for all pump electrical connections
120vac power
Pump power receptacles
All wiring is completed at the factory

Material:	**Qty**
DO000041	1

delta® with optoDrive®

The ProMinent® delta® is a microprocessor based, solenoid driven diaphragm programmable pump designed for delivery rates, ranging from 2.0 gallons per hour at 363 psi (7.5 l/h at 25 bar) up to 19.8 gallons per hour at 29 psi

(75 l/h at 2 bar). Independent suction and discharge stroke duration allows for continuous metering with a 36,000:1 turndown ratio. A ProMinent® control cable is required for external control.

Flow: 12.95GPH / 49.0L/H
Pressure: 58PSI / 04BAR

Options Included:

- Liquid End Material	PV	PVDF
- Seal Material	T	PTFE seal w/ PTFE Diaphragm
- Liquid End Version	2	w/ b.valve, w/o valve springs
- Connection	6	1” MNPT Conn (0450/0280/2508)
- Diaphragm Failure	0	W/o diaph rupture indicator
- Labeling	0	Standard w/PM-Logo , w/o. lock
- Electrical Connection	U	115-230 V, 50/60 Hz
- Cable and Plug	D	2m USA / 115V
- Relay	C	Option 1 + 4-20 mA output
- Accessories	0	Not Included
- Control Version	3	Manual + pulse ctrl + analog
- Access Code	1	with Access code
- Pause/Float	0	Standard

Material:	**Qty**
DLTA0450PVT2600UDC031EN0	2

Universal control cable, 5-pin round plug; 5-wire 15 ft. (5 m)

Material:	**Qty**
1001301	2

TERMINAL BOX KIT, 2 PUMP, NON-GFI RECEPT

Material:	**Qty**
7745880	1

SECTION 003 Sub Total: ***Total Net: 8,336.00***

SECTION 004: Duplex Phosphorus Skid Package

TWO PUMP PHOSPHORUS NUTRIENT FEED SYSTEM:

APPLICATION DATA:
Chemical: Phosphorus Nutrient
Pump Type: Solenoid driven diaphragm
Pump Quantity: 2
Capacity: 0.61gph @ 200spm vs 232psi each
Piping Material: 316SS/PTFE - Compression fittings and tubing
Piping Configuration: Primary/backup

MECHANICAL DETAILS:
Skid Type: Black fusion welded polypropylene skid base
Chemical Inlet: (1) 0.5" Solution
Outlets: (1) 0.5" Isolation ball
valves as required One wye
strainer
100ml 316SS/Glass calibration cylinder
Two pressure relief valves
Two 131ml 316SS/PTFE pulsation dampener
One discharge pressure gauge with isolator
One back pressure valve

ELECTRICAL DETAILS:
Electrical terminal box for all pump electrical connections
120vac power
Pump power receptacles
All wiring is completed at the factory

Material:	Qty
DO000041	1

gamma/X

The ProMinent gamma/X is a microprocessor-based solenoid-driven diaphragm programmable pump. Continuous electronic stroke length adjustment from 0 - 100% (recommended 30 - 100%). Stroke rate adjustment in 1 stroke/hour increments from 0 to 12,000 strokes/h.

Standard features include:
- Remote on/off and external contact input 1:1 with pulse control.
- Backlit dot matrix display with 3-LED indicators
- Fiberglass-reinforced, PPE plastic housing rated to IP65.

** (ProMinent Control Cable is required for external control)

Flow: 0.61gph / 2.3l/h
Pressure: 232psi / 16bar

Options Included:

- Liquid end materials	SS	stainless steel
- Diaphragm/seals	T	PTFE/PFTE coated
- Liquid end version	0	Non-bleed w/o valve springs
- Hydraulic connections	6	standard (SS/TT)
- Diaphragm rupture indicator	0	Not included
- Version	0	Standard
- Logo	0	Standard, with logo
- Electrical connection	U	Universal, 100-230 V 50/60 Hz
- Cable and plug	D	N.American plug, 115V
- Relay, pre-set	C	Fault relay + 4-20ma output

- Accessories	0	Not included (SS/TT/HV)
- Control variant	3	Option 0 + analog control
- Metering monitor	0	Pulse signal input
- Bluetooth remote stop	0	Not included
- Language	EN	Standard (English)
- Approvals	07	MET (USA)
- Documentation	EN	Standard Documentation

Material:	Qty
GMXA1602SST06000UDC0300EN	2

Universal control cable, 5-pin round plug; 5-wire 15 ft. (5 m)

Material:	Qty
1001301	2

TERMINAL BOX KIT, 2 PUMP, NON-GFI RECEPT

Material:	Qty
7745880	1

SECTION 004 Sub Total: ***Total Net: 15,333.00***

SECTION 005: Duplex Hydrogen Peroxide Skid Package

TWO PUMP PHOSPHORUS NUTRIENT FEED SYSTEM:

APPLICATION DATA:
Chemical: Phosphorus Nutrient
Pump Type: Solenoid driven diaphragm
Pump Quantity: 2
Capacity: 0.61gph @ 200spm vs 232psi each
Piping Material: 316SS/PTFE - Compression fittings and tubing
Piping Configuration: Primary/backup

MECHANICAL DETAILS:
Skid Type: Black fusion welded polypropylene skid base
Chemical Inlet: (1) 0.5"
Solution Outlets: (1) 0.5"
Isolation ball valves as required (Vented)
One wye strainer
100ml 316SS/Glass calibration cylinder
Four pressure relief valves
Two 131ml 316SS/PTFE pulsation dampener
One discharge pressure gauge with isolator
One back pressure valve

ELECTRICAL DETAILS:
Electrical terminal box for all pump electrical connections

120vac power
Pump power receptacles
All wiring is completed at the factory

Material:	**Qty**
DO000041	1

gamma/X

The ProMinent gamma/X is a microprocessor-based solenoid-driven diaphragm programmable pump. Continuous electronic stroke length adjustment from 0 - 100% (recommended 30 - 100%). Stroke rate adjustment in 1 stroke/hour increments from 0 to 12,000 strokes/h.

Standard features include:
- Remote on/off and external contact input 1:1 with pulse control.
- Backlit dot matrix display with 3-LED indicators
- Fiberglass-reinforced, PPE plastic housing rated to IP65.

** (ProMinent Control Cable is required for external control)

Flow: 0.61gph / 2.3l/h
Pressure: 232psi / 16bar

Options Included:

- Liquid end materials	SS	stainless steel
- Diaphragm/seals	T	PTFE/PFTE coated
- Liquid end version	0	Non-bleed w/o valve springs
- Hydraulic connections	6	standard (SS/TT)
- Diaphragm rupture indicator	0	Not included
- Version	0	Standard
- Logo	0	Standard, with logo
- Electrical connection	U	Universal, 100-230 V 50/60 Hz
- Cable and plug	D	N.American plug, 115V
- Relay, pre-set	C	Fault relay + 4-20ma output
- Accessories	0	Not included (SS/TT/HV)
- Control variant	3	Option 0 + analog control
- Metering monitor	0	Pulse signal input
- Bluetooth remote stop	0	Not included
- Language	EN	Standard (English)
- Approvals	07	MET (USA)
- Documentation	EN	Standard Documentation

Material:	**Qty**
GMXA1602SST06000UDC0300EN	2

Universal control cable, 5-pin round plug; 5-wire 15 ft. (5 m)

Material:	**Qty**
1001301	2

TERMINAL BOX KIT, 2 PUMP, NON-GFI RECEPT

Material:	**Qty**
7745880	1

SECTION 005 Sub Total: ***Total Net: 15,688.00***

SECTION 006: Four Ferric Chloride Feed Skid

TWO PUMP FERRIS CHLORIDE FEED SYSTEM:

APPLICATION DATA:
Chemical: Ferric Chloride
Pump Type: Solenoid driven diaphragm
Pump Quantity: 4
Capacity: 0.61gph @ 200spm vs 232psi each
Piping Material: PVC/Viton
Piping Configuration: Common Suction / Dual Discharge
System will be configured with two inline standby pumps

MECHANICAL DETAILS:
Skid Type: Black fusion welded polypropylene skid base
Chemical Inlet: (1) 0.5" Solution
Outlets: (1) 0.5" Isolation ball
valves as required One wye
strainer
Two 100ml PVC calibration cylinder
Four pressure relief valves
Four 164ml PVC/Viton dampener
Two discharge pressure gauge with isolator
Two back pressure valve

ELECTRICAL DETAILS:
Electrical terminal box for all pump electrical connections
120vac power
Pump power receptacles
All wiring is completed at the factory

Material:	**Qty**
DO000041	1

gamma/X

The ProMinent gamma/X is a microprocessor-based solenoid-driven diaphragm programmable pump. Continuous electronic stroke length adjustment from 0 - 100% (recommended 30 - 100%). Stroke rate adjustment in 1 stroke/hour increments from 0 to 12,000 strokes/h.

Standard features include:
- Remote on/off and external contact input 1:1 with pulse control.
- Backlit dot matrix display with 3-LED indicators
- Fiberglass-reinforced, PPE plastic housing rated to IP65.

** (ProMinent Control Cable is required for external control)

Flow: 0.61gph / 2.3l/h
Pressure: 232psi / 16bar

Options Included:

- Liquid end materials	PV	PVDF/PVDF
- Diaphragm/seals	T	PTFE/PFTE coated
- Liquid end version	2	Bleed valve w/o valve springs
- Hydraulic connections	6	standard (SS/TT)
- Diaphragm rupture indicator	0	Not included
- Version	0	Standard
- Logo	0	Standard, with logo
- Electrical connection	U	Universal, 100-230 V 50/60 Hz
- Cable and plug	D	N.American plug, 115V
- Relay, pre-set	C	Fault relay + 4-20ma output
- Accessories	0	Not included (SS/TT/HV)
- Control variant	3	Option 0 + analog control
- Metering monitor	0	Pulse signal input
- Bluetooth remote stop	0	Not included
- Language	EN	Standard (English)
- Approvals	07	MET (USA)
- Documentation	EN	Standard Documentation

Material:	**Qty**
GMXA1602PVT26000UDC0300EN	4

Universal control cable, 5-pin round plug; 5-wire 15 ft. (5 m)

Material:	**Qty**
1001301	4

TERMINAL BOX KIT, 4 PUMP, NON-GFI RECEPT

Material:	**Qty**
7746099	1

SECTION 006 Sub Total: ***Total Net: 14,878.00***

Grand Total NET: 70,339.00
(Total amount in USD)

September 20, 2018

Paige Pruisner
Golder Associates Inc.
44 Union Blvd. Suite 300
Lakewood, CO 80228

Dear Paige:

Thank you for your interest in our line of Belding Tank Technologies FRP tanks. Bedgetary pricing for your ID Industrial WWTP Project.

2- 20,968 gallon cone bottom closed flat top single wall fiberglass tank, 14'D x 16'8" straight side x 25' overall height, 1.2SG standard resin, single glass veil with 24" top manway, five (5) 2" flanged fittings, three (3) 3" flanged fittings and twelve (12) 6"D pipe legs with supports.

$50,000 ea. **$100,000** plus freight

Note- since this is a budgetary quote, we made some guesses on seismic, snow load, wind, etc.- but those items can change the pricing dramatically. We originally had (12) 3" diameter pipe legs, but the different loads caused us to need to increas them to 6", which increased the price per tank by $9,000. When this project gets further along, we can get all of the pertinent information and run it through engineering to get you a firm quote.

Notes:

- Prices quoted are firm for 30 days.
- Lead-time is 13 -15 weeks plus transit time.
- All sales are subject to Tank Equipment Terms & Conditions W.A.C. which can be viewed on our website at www.tankequipment.com. Some orders may be subject to a down payment and/or progress payments

Please let me know if I can answer any questions or be of further assistance.

Sincerely,

Matt Licknosky
Tank Equipment, Inc.
Office: 303-833-9200
Direct: 303-962-7814
Email: matt@tankequipment.com

ATTACHMENT C3

STS O&M Quotes

To:	Golder Associates	**West Business Unit** 2900 W Horizon Ridge Pkwy #120 Henderson, NV 89052 Main office: 702 818 1575
Attn:	Bridgette Hendricks	
email:		**Date: September 28, 2018**
From:	**Jacob Skow**	**Ref:**
Quicklime		

Lhoist is pleased to provide the following price for Quicklime to be delivered and unloaded to the location(s) listed below. Lime is manufactured at Lhoist's Nelson, AZ plant in Peach Springs, AZ. Lime to be used for water treatment. Pricing below is only for Budgetary Pricing. Please contact Lhoist for set delivered price if the opportunity moves forward.

Product	Terminal	Destination	Delivered Lime Price
Minus 1/8" Quicklime	Belen, NM	Silver City, NM FMI Chino Mine	$256.00

Lime is manufactured at Nelson, AZ Plant

Ordering: Please call Nelson Customer Service @ 1-800-423-1956

Lhoist NA requires that all orders be placed during office hours (8 AM – 5 PM) at least 48 hours in advance prior to delivery. The price quoted above is subject to all applicable taxes subsequent to this quotation. Payment Terms are NET 30 Days. Lhoist NA's Terms and Conditions will apply.

Please call me if you have any questions

Regards,

Jacob Skow
Sales Manager

Lhoist North America
Mobile: +1 720-340-9998
Jacob.Skow@lhoist.com
http://www.lhoist.com

From:	Arndt, Rolf
To:	Mandona, Choolwe
Subject:	Budgetary Prices
Date:	Wednesday, September 26, 2018 6:43:25 AM

Choolwe,

Sorry for the delays in getting this information.

Budgetary pricing for the products you inquired about;

Flocculant 8182 aka 8872 is $3.29/lb in 55 gallon drums
Coagulant 8131 is $ 0.85/lb in 55 gallon drums

Regards,

Rolf Arndt
DIRECTOR MARKETING, GLOBAL MINING

NALCO Water | An Ecolab Company 1601 W. DIEHL ROAD, NAPERVILLE, IL 60563
T 303 791 0637 **M** 303 809 9144 **E** rarndt@ecolab.com

From:	Tom Carroll
To:	Hendricks, Bridgette
Cc:	Amanda Billingsley; Candy Fitzgerald
Subject:	RE: HCL price
Date:	Monday, October 01, 2018 1:57:41 PM
Attachments:	image002.jpg image003.png image004.jpg image006.jpg

---

Hi Bridgette

HCL Totes
HYDROCHLORIC ACID 31% 20B 2600.0000 LB TK .3350/# FOB delivered

HCL Bulk
HCL 35% 22BE TECH LIQ 1 LB LB BULK .21/# 45,000# Truck Loads FOB Delivered

Thank you for the opportunity to quote on your chemical requirements

Tom Carroll
Account Manager
Univar Mining
19450 Hwy. 249, 3rd Floor, Houston, TX 77070
O 602 272 3272
M 602-684-7019
Tom.Carroll@univarusa.com

From: Candy Fitzgerald
Sent: Friday, September 28, 2018 11:25 AM
To: Tom Carroll
Cc: bridgette_hendricks@golder.com; Amanda Billingsley
Subject: FW: HCL price

Good Morning Tom,

Please quote Bridgette for a load of HCL delivering to Silver City New Mexico. She would like pricing on both bulk and totes.

Thanks and have a great day!

Candy Fitzgerald
Customer Service Lead
Univar
Phoenix, AZ.
T (602) 455-4032

cid:C4BE6FFF-97A5-40A3-8D10-B434C9CFD520@moveo.com

From: Hendricks, Bridgette [mailto:Bridgette_Hendricks@golder.com]
Sent: Friday, September 28, 2018 7:12 AM
To: Candy Fitzgerald
Subject: HCL price

Hi Candy,
I got your name from Alex Nowak at our office. I need a price for HCl delivered to Silver City New Mexico (zip code 88041). We're undecided yet whether we would use totes or bulk HCl at a usage of about 2 totes per week. Can you give me pricing for both totes and bulk delivery for concentrated HCl and also let me know what concentration.

Thanks for your help and let me know if you need additional information.
Bridgette

Bridgette Hendricks, MsChE
Senior Engineer

44 Union Boulevard, Suite 300, Lakewood, Colorado, USA 80228
T: +1 303 980-0540 | **D:** +1 303 980-0540 x20636 | golder.com
LinkedIn | Facebook | Twitter

Work Safe, Home Safe

From:	Stuart Leak
To:	Nowak, Alex; Rob Goodlett
Cc:	Cheddy Tobias
Subject:	RE: Cost Estimation Southwest NM Water Treatment
Date:	Tuesday, October 09, 2018 6:09:13 AM
Attachments:	image002.png image004.png image005.jpg image003.jpg

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Hello Alex,

Thank you for checking with Avista for budgetary estimates for the upcoming business, please keep in mind that these are estimates and we will need additional information to properly asses the site cost. Another note, Avista's antiscalant is typically injected between 2-3 ppm which can equate to ½ the chemical usage of other manufactures and our cleaners typically mix at a 2% Solution. This will all depend on the feed water and the severity of foulant on the membranes.
Freight estimates to ship product from our CA warehouse 92069 to NM 88036 is as follows via SAIA with a 3 day transit:

1. To ship all of below in one shipment = $1,077.53
2. To ship one tote of Vitec 7000 = $522.64
   2500 lb tote @ $2.94 suggested retail.
3. To ship one pallet of 24 pails of cleaner = $276.20
   45lb pails MF high/low cleaner $3.38 lb. suggested retail
   45lb pail RO low cleaner $6.29 lb. suggested retail
   45lb pail RO high cleaner $7.37 lb. suggested retail
4. To ship one tote of biocide = $463.48
   2500 lb tote@ $8.00 lb. suggested retail

Please let me know if you need any additional information or if there is any other application we are able to offer our support with.

Thank you and have a great day.

Best Regards,

Stuart Leak
Applications and Sales

Avista Technologies, Inc.
140 Bosstick Boulevard
San Marcos, California 92069

Tel. | +1.760.744.0536
Cell | +1.936.245.2482
Fax. | +1.760.744.0619
sleak@avistatech.com

www.avistatech.com

Avista-IMPACT-Stories-Email-Sig-2 (002)

A trusted expert in membrane system chemistry and global process support.

• REVERSE OSMOSIS • MICRO/ULTRA FILTRATION • MULTIMEDIA FILTRATION

From: Nowak, Alex <Alex_Nowak@golder.com>
Sent: Thursday, October 4, 2018 5:05 PM
To: Stuart Leak <sleak@avistatech.com>; Rob Goodlett <rgoodlett@avistatech.com>
Subject: Cost Estimation Southwest NM Water Treatment

Hello!
Thanks again for giving the seminar at Golder last week. I did come across a few items I was hoping you could assist me with or at least point me in the right direction. We are assembling quotes for a water treatment plant (focused on sulfate removal) that will be located near Silver City, NM and were hoping you had an idea of cost per pound+freight estimations for:
1. RO Antiscalant
2. MF/RO cleaning agents
3. Biocide
I don't need time consuming quotes for this, more of a high level budgetary estimate of commonly sold products, but let me know if you do need further detail to provide the information.

Best,

Alex Nowak
Water Treatment Operations Engineer

44 Union Boulevard, Suite 300, Lakewood, Colorado, USA 80228
T: +1 303 980-0540 | **golder.com**
LinkedIn | Facebook | Twitter

Work Safe, Home Safe

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

QUOTATION

Quote#: **1480**
Date: **10/5/2018**

Company:	Golder Associates	Project:	Water Quality Testing
Contact:	Alex Nowak	TAT:	5 working days
Address:	44 Union Blvd STE 300	QC Level:	LEVEL II
		Project Manager:	Andy Freeman
	Lakewood, CO 80228	Sales Rep:	
Phone:		Quote Expires:	10/31/2019
Fax:			

Item Description	Test	Matrix	Remarks	Qty	Unit Price	Total
EPA Method 300.0: Anions	E300	Aqueous	Cl, NO3, F, SO4	1	70.00	70.00
SM2320B: Alkalinity	SM2320B	Aqueous		1	25.00	25.00
SM2540C MOD: Total Dissolved S	M2540C	Aqueous		1	25.00	25.00
EPA Method 200.7: Metals	E200.7	Aqueous	Ca, Mg, Na, K, Al, Cd, Cr, Co, Fe, Mn, Mo, Ni, Ag, V, Zn	1	203.00	203.00
EPA 200.8: Metals	E200.8	Aqueous	As, Cu, Pb, Se	1	80.00	80.00

Sub Total:	$403.00
Misc:	$0.00
Surcharge:	0%
TOTAL:	**$403.00**

Sincerely,

Jackie Bolte

Jackie Bolte
Administration
Phone: 505-345-3975
Email: jnb@hallenvironmental.com

Terms and Conditions:

Hall Environmental Analysis Laboratory (HEAL) will provide all sampling containers, coolers, chains of custody and labels. A standard data deliverables package and QC package will be provided with this report, including lab spikes and lab spike duplicates. NM State tax has not been included in this quotation. Thank you, for the opportunity to bid on this project. Please feel free to call with any questions (505) 345-3975.. Invoices can be paid via Visa, Master Card, American Express, Company Check or Cash.

ATTACHMENT C4

Water Conveyance Materials and Cost Backup Details

Tab 1: Water Management Variables Evaporative Treatment and Water Conveyance Systems

Description	Variable
RSMeans NM Discount Rate	0.847
Steel Tank Life Expectancy (yr)	50
Lined Pond Life Expectancy (yr)	30
Pump Life Expectancy (yr)	20
HDPE Pipeline Life Expectancy (yr)	100
Reclamation Start Year (End of Year 2018)	0
Reclamation Finished	12
Vegetation Established Assume stormwater released	12
Short-Term Evaporative Treatment System Start Year (Beginning of Year 2019)	1
Short-Term Evaporative Treatment System Finish Year (End of Year 2024)	6
Long-Term Evaporative Treatment System Start Year (Beginning of Year 2025)	7
Long-Term Evaporative Treatment System Finish Year (End of Year 2118)	100

Tab 2: WATER TREATMENT CONVEYANCE SYSTEM - CAPEX at Start of STS (Beginning of Year 6 Following Closure
Rev. B

Created by: Arielle Dobrowolski
Checked by: Wade Wang
Approved by: JP Wu
Revised by: Todd Stein (11/4/2018)

Reservoirs and Tanks CAPEX and Replacement Schedule

From	To	Length (ft)	Material	Nom. Pipe Size (in)	Pipe Schedule DR	Material and Installation Unit Cost	Total Installed Direct Cost	Comments	Assumed Age at Start of STS (Yr 6)	1st Relacement Year	2nd Relacement Year	3rd Relacement Year	4th Relacement Year	5th Relacement Year
East Pit Sump	Estrella Pit	2585	HDPE PE4710	2	9	$5.42	$14,015	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	25	80	NA	NA	NA	NA
Lee Hill Pit Sump	Estrella Pit	3758	HDPE PE4710	4	9	$6.59	$24,765	RS Means bare costs for materials and installation (Line No. 331413350100)	25	80	NA	NA	NA	NA
Estrella Pit Sump	Booster #1	1102	HDPE PE4710	6	17	$10.39	$11,450	RS Means bare costs for materials and installation (Line No. 331413350200)	25	80	NA	NA	NA	NA
Booster #1	Booster #2	1704	HDPE PE4710	8	11	$14.79	$25,202	RS Means bare costs for materials and installation (Line No. 331413350300)	25	80	NA	NA	NA	NA
Booster #2	Booster #3	2227	HDPE PE4710	8	11	$14.79	$32,937	RS Means bare costs for materials and installation (Line No. 331413350300)	25	80	NA	NA	NA	NA
Booster #3	Booster #4	1579	HDPE PE4710	8	11	$14.79	$23,353	RS Means bare costs for materials and installation (Line No. 331413350300)	25	80	NA	NA	NA	NA
Booster #4	Tailing Thickeners	8764	HDPE PE4710	6	17	$10.39	$91,058	RS Means bare costs for materials and installation (Line No. 331413350200)	0	NA	NA	NA	NA	NA
Dam 10	Tailing Thickeners	6763	HDPE PE4710	2	17	$5.42	$36,667	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	25	80	NA	NA	NA	NA
Dam 11	Tailing Thickeners	2397	HDPE PE4710	2	17	$5.42	$12,996		25	80	NA	NA	NA	NA
Dam 13	Dam 14	536	HDPE PE4710	2	17	$5.42	$2,906		25	80	NA	NA	NA	NA
Dam 14	Tailing Thickeners	3853	HDPE PE4710	2	17	$5.42	$20,890		25	80	NA	NA	NA	NA
Dam 15	Tailing Thickeners	1219	HDPE PE4710	2	17	$5.42	$6,609		25	80	NA	NA	NA	NA
Dam 16 Seep	Tailing Thickeners	3631	HDPE PE4710	2	17	$5.42	$19,686		25	80	NA	NA	NA	NA
Dam 18 Seep	Dam 11	108	HDPE PE4710	2	17	$5.42	$586		25	80	NA	NA	NA	NA
Dam 19 Seep	Dam 13	136	HDPE PE4710	2	17	$5.42	$737		25	80	NA	NA	NA	NA
Dam 20 (runoff)	Tailing Thickeners	1600	HDPE PE4710	2	17	$5.42	$8,675		25	80	NA	NA	NA	NA
North Stockpile	NE Stockpile Conveyance Pipe	1481	Carbon Steel	2	SCH 40	$20.93	$30,997	RS Means bare costs for materials and installation (Line No. 221113440610)	0	NA	NA	NA	NA	NA
Northwest Stockpile	NE Stockpile Conveyance Pipe	1112	HDPE PE4710	2	17	$5.42	$6,029	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	0	NA	NA	NA	NA	NA
Northeast Stockpile	Tailing Thickeners	22083	HDPE PE4710	2	17	$5.42	$119,729		0	NA	NA	NA	NA	NA
Upper South Stockpile	Tailing Thickeners	18821	HDPE PE4710	2	9	$5.42	$102,043		0	NA	NA	NA	NA	NA
STS2 Stockpile	Upper South Conveyance Pipe	1621	HDPE PE4710	2	17	$5.42	$8,789		0	NA	NA	NA	NA	NA
3A Stockpile	Upper South Conveyance pipe	4634	HDPE PE4710	2	17	$5.42	$25,124		0	NA	NA	NA	NA	NA
SW Lampbright Stockpile	Tailing Thickeners	33265	HDPE PE4710	2	11	$5.42	$180,355		0	NA	NA	NA	NA	NA
Hanover Dam Extraction Wells	Tailing Thickeners	1650	HDPE PE4710	2	17	$5.42	$8,946		0	NA	NA	NA	NA	NA
Lampbright Extraction Wells (1 well)	Northeast Stockpile Collection	3095	HDPE PE4710	2	15.5	$5.42	$16,780		0	NA	NA	NA	NA	NA
Lampbright Extraction Wells (4 wells)	SW Lampbright Stockpile Collection	11200	HDPE PE4710	2	17	$5.42	$60,724		0	NA	NA	NA	NA	NA
Tailing Thickeners	Groundhog	3400	HDPE PE4710	6	17	$10.39	$35,326	RS Means bare costs for materials and installation (Line No. 331413350200)	15	90	NA	NA	NA	NA
Tailing Pond 7 Interceptor System (18 wells)	South Treatment Facility	23744	HDPE PE4710	16	9	$37.21	$883,514	RS Means bare costs for materials and installation (Line No. 331413350700)	25	80	NA	NA	NA	NA
Dam 12	Dam 10	1376	HDPE PE4710	2	17	$5.42	$7,460	RS Means bare costs for materials and installation, based on a curve fit of individual bare rate costs for pipe sizes provided in RS Means (Line No's. 331413350100 through 331413350900)	25	80	NA	NA	NA	NA
Dam 14-1	Dam 14	1949	HDPE PE4710	2	17	$5.42	$10,567		25	80	NA	NA	NA	NA
Dam 14-2	Dam 14	1542	HDPE PE4710	2	17	$5.42	$8,360		25	80	NA	NA	NA	NA
Dam 14-3	Dam 14-2	192	HDPE PE4710	2	17	$5.42	$1,041		25	80	NA	NA	NA	NA
Groundhog	South Treatment Facility	53258	HDPE PE4710	10	17	$18.14	$966,100	RS Means bare costs for materials and installation (Line No. 331413350400)	15	90	NA	NA	NA	NA
						Total Piping:	**$2,804,418**	For entire list of pipelines						

Tab 2: WATER TREATMENT CONVEYANCE SYSTEM - CAPEX at Start of STS (Beginning of Year 6 Following Closure
Rev. B

Created by: Arielle Dobrowolski
Checked by: Wade Wang
Approved by: JP Wu
Revised by: Todd Stein (11/4/2018)

Pumps CAPEX and Replacement Schedule

From	To	Quantity	Design Flow Rate (gpm)	Total Head (ft)	Assumed Motor Rating, hp	Material Cost	Total Installed Direct Cost	Comments	Assumed Age at Start of STS (Yr 6)	1st Relacement Year	2nd Relacement Year	3rd Relacement Year	4th Relacement Year	5th Relacement Year
East Pit Sump	Estrella Pit	1	50	521.44	15	$13,000	$19,269		10	15	35	55	75	95
Lee Hill Pit Sump	Estrella Pit	1	150	465.09	35	$20,000	$29,852		10	15	35	55	75	95
Estrella Pit Sump	Booster #1	1	450	138.21	30	$18,000	$27,852		10	15	35	55	75	95
Booster #1	Booster #2	1	450	406.46	75	$35,000	$52,913		10	15	35	55	75	95
Booster #2	Booster #3	1	450	376.59	75	$35,000	$52,913		10	15	35	55	75	95
Booster #3	Booster #4	1	450	358.47	70	$35,000	$52,913		10	15	35	55	75	95
Booster #4	Tailing Thickeners	1	450	94.36	20	$15,000	$24,852		10	15	35	55	75	95
Dam 10	Tailing Thickeners	1	10	25.38	1	$7,500	$13,769		10	15	35	55	75	95
Dam 11	Tailing Thickeners	1	10	107.96	1	$7,500	$13,769		10	15	35	55	75	95
Dam 13	Dam 14	1	10	11.66	1	$7,500	$13,769		10	15	35	55	75	95
Dam 14	Tailing Thickeners	1	20	90.13	1	$7,500	$13,769		10	15	35	55	75	95
Dam 15	Tailing Thickeners	1	5	30.83	1	$7,500	$13,769		10	15	35	55	75	95
Dam 16 Seep	Tailing Thickeners	1	5	113.49	1	$7,500	$13,769	Sump pump estimate based on historical database of actual pump costs on various Golder projects. Unit hours required to install each pump were taken from Estimator Piping Man-Hour Manual Book, based on pump horse power. $85/hr was used for labor rate.	10	15	35	55	75	95
Dam 18 Seep	Dam 11	1	5	8.04	1	$7,500	$13,769		10	15	35	55	75	95
Dam 19 Seep	Dam 13	1	5	10.05	1	$7,500	$13,769		10	15	35	55	75	95
Dam 20 (runoff)	Tailing Thickeners	1	5	55.55	1	$7,500	$13,769		10	15	35	55	75	95
North Stockpile	NE Stockpile Conveyance Pipe	1	5	957.04	5	$10,000	$16,269		0	25	45	65	85	NA
Northwest Stockpile	NE Stockpile Conveyance Pipe	1	5	27.38	1	$7,500	$13,769		0	25	45	65	85	NA
Northeast Stockpile	Tailing Thickeners	1	10	107.24	1	$7,500	$13,769		0	25	45	65	85	NA
Upper South Stockpile	Tailing Thickeners	1	15	446.15	5	$10,000	$16,269		0	25	45	65	85	NA
STS2 Stockpile	Upper South Conveyance Pipe	1	10	19.00	1	$7,500	$13,769		0	25	45	65	85	NA
3A Stockpile	Upper South Conveyance pipe	1	20	58.22	1	$7,500	$13,769		0	25	45	65	85	NA
SW Lampbright Stockpile	Tailing Thickeners	1	10	366.04	5	$10,000	$16,269		0	25	45	65	85	NA
Hanover Dam Extraction Wells	Tailing Thickeners	1	5	101.13	1	$7,500	$13,769		10	15	35	55	75	95
Lampbright Extraction Wells (1 well)	Northeast Stockpile Collection	1	10	235.10	5	$10,000	$16,269		10	15	35	55	75	95
Lampbright Extraction Wells (4 wells)	SW Lampbright Stockpile Collection	1	5	134.83	1	$7,500	$13,769		10	15	35	55	75	95
Tailing Thickeners	Groundhog	1	620	134.32	40	$25,000	$38,434		10	15	35	55	75	95
Tailing Pond 7 Interceptor System (18 wells)	South Treatment Facility	1	1210	453.41	250	$48,000	$58,748	Centrifugal pump estimate based on historical database of actual pump costs on various Golder projects. Unit hours required to install each pump were taken from Estimator Piping Man-Hour Manual Book, based on pump horse power. $85/hr was used for labor rate.	10	15	35	55	75	95

Total Pumps: **$629,363** For entire list of pumps
ALLOWANCE FOR MINOR MECHANICAL, ELECTRICAL, INSTRUMENTATION, AND UNDEFINED SCOPE (5%) $171,689.04 5% Allowance on all pumps
TOTAL CONSTRUCTION COST: **$3,605,500** For entire list of pipelines and pumps
Notes: **$754,459** For new pipelines and pumps at the beginning of STS operation
Pump Life Expectancy – 20 years $ 37,723 5% Allowance on new pipelines and pumps at the beginning of STS operation
HDPE Pipeline Life Expectancy – 100 years **$792,182** For new pipelines and pumps at the beginning of STS operation
NA - Not applicable
1. Pump estimates derived from averages of previous quotes with similar specifications in Golder pump database
2. Installation cost of pump assumes labor cost of $85/hr using Flour Estimating manual to calculate number of hours based on pump size. Crane equipment cost of $146/day is added assuming a 4 man crew
3. Golder assumes any pump motor above 70hp to be a centrifugal pump and any below 70hp a vertical submersible pump

Tab 3: WATER TREATMENT CONVEYANCE SYSTEM - CAPEX at Start of STS (Beginning of Year 6 Following Closure)
Rev. B

Created by: Todd Stein
Date: 2/5/2019

Reservoirs, Seep Collections, and Tanks CAPEX and Replacement Schedule

Reservoir/Tank ID	Current Size (ac)	New/Replacement Size (ac)	New/Replacement Size (sf)	New/Replacement Cost	Assumed Age at Start of STS (Yr 6)	CAPEX	1st Relacement Year	2nd Relacement Year	3rd Relacement Year
Tailing Thickeners	5.2	2.6	113,256	$ 126,339	25		10	40	70
North Stockpile	NA		10,000	$ 11,155	0	$ 11,155	35	65	95
Northwest Stockpile	NA		10,000	$ 11,155	0	$ 11,155	35	65	95
Northeast Stockpile	NA		10,000	$ 11,155	0	$ 11,155	35	65	95
Upper South Stockpile	NA		10,000	$ 11,155	0	$ 11,155	35	65	95
STS2 Stockpile	NA		10,000	$ 11,155	0	$ 11,155	35	65	95
3A Stockpile	NA		10,000	$ 11,155	0	$ 11,155	35	65	95
SW Lampbright Stockpile	NA		10,000	$ 11,155	0	$ 11,155	35	65	95
Notes:	**Total:**			**$ 204,425**	Entire list	**$ 78,086**	For new components at the beginning of STS operations		

Assume WR seep collections will be 100' x 100'
Steel Tank Life Expectancy (yr) 50
Lined Pond Life Expectancy (yr) 30
80 mil Geomembrane Liner $ 1.12 $/SF RSMeans 2018 (1500 sf daily output), Pond and reservoir liners, membrane lining systems HDPE, 100,000 S.F. or more, 80 mil thick, per S.F.
HDPE liner inside of concrete thickner cells to be replaced every 30 years, assumed 20 years old at the EOY 2018

Tab 4: STS Treated Water DischargeSystem - CAPEX
Rev.C

Created by: Arielle Dobrowolski
Checked by: Wade Wang
Approved by: JP Wu
Revised: T. Stein

Pipeline

From	To	Length (ft)	Material	Nom. Pipe Size[2] (in)	Pipe Schedule	Material and Installation Unit Cost[1,2]	Total Installed Direct Cost	Comments
STS WATER TREATMENT PLANT	Tributary Arroyo to Whitewater Creek, South of Tailing Pond 7	16000	HDPE PE4710	14	DR17	$35.97	$575,520	RS Means bare costs for materials and installation (Line No. 331413350600) open shop, Las Cruces, 2019 Q1.

Tank

Location	Quantity	Total Retention Time (min)	Retention Volume (gal)	Tank height (ft)	Tank Diameter (ft)	Material Cost	Installation Cost	Total Installed Direct Cost	Comments
STS WATER TREATMENT PLANT	1	61	18,500	20	20	$66,867	$37,016	$103,883	Carbon Steel Tank estimate based on historical data (Tank material + installation cost = 86,606 in 2013), escalated 3% per year up to the EOY 2018

Articulated Concrete Block (ACB) Energy Dissipation Structure (costs and energy dissipation details from Telesto Earthworks reclamation cost estimate)

Location	Component	Area (sf)	Volume (cf)	Unit Cost[3]	Total Installed Direct Cost	Comments
TRIBUTARY ARROYO TO WHITEWATER CREEK, SOUTH OF TAILING POND 7	70T ACB	320	---	$10.65	$3,408	See Telesto's Downdrain Unit Cost Detail Sheet for Additional Specifications
	Installation	320	---	$4.63	$1,482	
	40T ACB	506	---	$7.42	$3,755	
	Installation	506	---	$4.63	$2,343	
	Cutoff Wall (cast in-place concrete)	---	14	$254.97	$3,570	
Grand Total:					$14,556.48	

TOTAL DIRECT COST: **$693,959**

TOTAL CONSTRUCTION COST: **$693,960**

Notes:
1. Pipe material cost based on $1.3 per lb
2. Piping and energy dissipator structure sized for estimated flows plus a 30% contingency.
3. Quote from Contech ES 2018; Downdrain ACB installation includes fine grade base/subgrade soils (assuming subgrade at + 0.5 ft); equipment is D6 LGP dozer with Power Angle Tilt Blade (PAT) and GPS Blade Control

Tab 5: Energy Dissipation Structure Cost Estimate Details

From Telesto Solutions, Inc, Chino CCP Reclamation Cost Estimate

Downdrain Unit Cost

Rough Grade

Task Description	Equipment	Productivity (cy/hr)	Material Factor[1]	Grade Factor[1]	Soil Weight[1] (lb/cy)	Production Method/Blade Factor[1]	Centroid to Centroid Push Distance[1] (ft)	Normal Production (cy/hr)	Operator Factor[1]	Work Hour[1] (min/hr)	Visibility Factor[1]	Elevation Factor[1]	Transmission Factor[1]	Volume (cy/ft)	Productivity (hrs/ft)	Fuel Cost ($/hr)	Equipment Cost ($/hr)	Operator Cost (IV) ($/hr)	Dozer Cost ($/hr)	Equipment w/o Fuel Cost ($/ft)	Fuel Cost ($/ft)	Total Excavation Cost ($/ft)
Excavate	Cat D11T CD	1741	1.2	1.6	2900	1.0	175	1851	0.75	50	1.0	1.0	1.0	1.9	0.0011	$69.62	$254.44	$27.41	$281.85	$0.31	0.0774699	$0.39
Waste	Cat D11T CD	1542	1.2	1.6	2900	1.0	200	1649	0.75	50	1.0	1.0	1.0	1.9	0.0012	$69.62	$254.44	$27.41	$281.85	0.3521381	0.088975	$0.44
																				$0.67	$0.16	$0.83

Finish Grade & Place ACB

	Area (sf/ft)	Unit Cost ($/sf)	$/ft
Downdrain ACBs			
40T[1]	31	$7.42	$230.02
Installation[1]	31	$4.63	$143.53
		ACB Cost/ft	$373.55
Total Downdrain Cost ($/ft)			$374.38

Place ACB

Dissipater ACBs	Area (sf)	Unit Cost ($/sf)	$/sf
70T[1]	320	$10.65	$3,408.00
Installation[1]	320	$4.63	$1,481.60
40T[1]	506	$7.42	$3,754.52
Installation[1]	506	$4.63	$2,342.78
		ACB Cost per Dissipater	$10,986.90

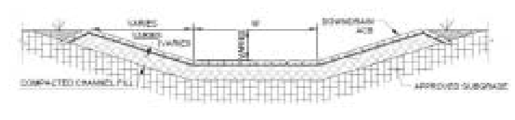
Install Cutoff Wall

Cutoff Wall (cast in place concrete)	cubic yard	$/cubic yard	$/dissipater[3]
RSMeans (2018)	14	$ 254.97	$3,569.58
Total Dissipator Cost ($/each)			$14,556.48

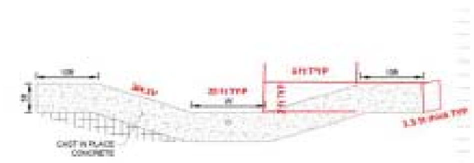
	Downdrains Lengths[5] (ft)	Downdrain Dissipators[5] (ft)
South	6474	2
STS2	0	0
Main LB	9299	4
South LB	0	0
West	4893	4
NW	0	0
LH	0	0
NE	0	0
N	0	0
8A	0	0
Santa Rita	0	0
Upper South	0	0
Triangle	0	0
Auxflow	0	0
TP7	2280	0
TP-6W & TP-6E	319	0
	23266	10

DOWNDRAIN Dimensions:		
Left Side Slope:[2]	3	H:1V
Left Side Slope:[2]	3	H:1V
Depth:[2]	2	ft
Perimeter:[2]	31	ft
Excavation Area[2]	52	sf
ACB Area[2]	31	sf

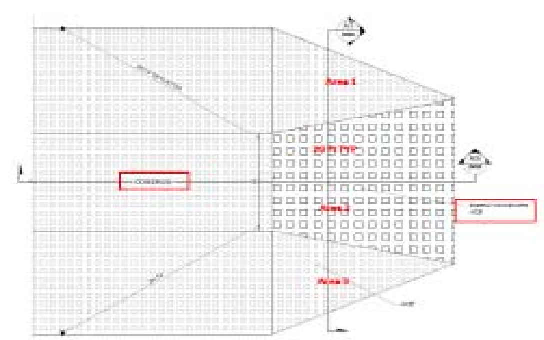
DISSIPATERS		ACB[2] Surface Area 1 (sf)	Surface Area 2 (sf)	Surface Area 3 (sf)	Total (sf)	Cutoff Wall[3,4] Cross-Sectional Area (sf)	Thickness (ft)	Volume (cy)
Main Lampbright Stockpile	1	253	320	25.6	825	260	1.5	14
	2	253	320	25.6	825	260	1.5	14
	3	253	320	25.6	825	260	1.5	14
	4	253	320	25.6	825	260	1.5	14
West Stockpile	1	253	320	25.6	825	260	1.5	14
	2	253	320	25.6	825	260	1.5	14
	3	253	320	25.6	825	260	1.5	14
	4	253	320	25.6	825	260	1.5	14
South Stockpile	1	253	320	25.6	825	260	1.5	14
	2	253	320	25.6	825	260	1.5	14



TYPICAL DOWNDRAIN SECTION



TYPICAL CUTOFF WALL SECTION



TYPICAL TOE ENERGY DISSIPATOR PLAN DETAIL

1. Quote from Contech ES 2018; Downdrain ACB installation includes fine grade base/subgrade soils (assuming subgrade at + 0.5 ft); equipment is D6 LGP dozer with Power Angle Tilt Blade (PAT) and GPS Blade Control
2. Data from Golder Takeoffs Spreadsheet 2018
3. One cutoff wall per dissipator
4. Typical flow depth is 2'; concrete depth is 5' (diagram is not drawn to scale); concrete thickness is 1.5'
5. Data from Table 3 and 4 of the Process Summary (SOW), Nov 2017 (Telesto)
6. Excavation volume is smaller than SOW because ACB's require less excavation than riprap

ATTACHMENT C5

Sludge and Salt Disposal Cost Backup Details

Tab 1
Sludge and Salt Disposal Construction Cost Details

Stage	Line No.	Direct / Indirect	Item Name	Neat Qty	Qty UoM	Composite Cost/Unit	Composite Cost $/UoM	Cost	Cost Source / Remarks
Sludge Disposal Facility									
1000 Sitework					**Sludge Disposal Facility Sub-total:**			**$138,682**	
	1	Direct	Diversion Ditch	3,985	CY	$ 1.25	$/CY	$4,982	
	2	Direct	Compact Surface (prep below sludge, evap, berm, ditch	1,071,438	SF	$ 1.69	$/SF	$33,532	
	3	Direct	Evap Berm	3,866	CY		$/CY	$0	Place ditch excavation to build berm
	4	Direct	Evap Pond					-	
	4A	Direct	80-mil HDPE Liner	88,800	SF	$ 1.12	$/SF	$99,058	
	4B	Direct	Anchor Trench	176	CY	$ 6.30	$/CY	$1,111	
Salt Disposal Facility									
3000 Sitework					**Salt Disposal Facility : Sub-total:**			**$534,816**	
	1	Direct	Evap Berm	2,803	CY	$ 1.25	$/CY	$3,504	
	2	Direct	Compact Stockpile Surface (prep below salt, berm)	461,000	SF	$ 1.69	$/SF	$14,428	
	3	Direct	80-mil HDPE Liner	461,000	SF	$ 1.12	$/SF	$514,252	
	4	Direct	Anchor Trench	418	CY	$ 6.30	$/CY	$2,632	
		Direct	Evap Pond					-	No evaporation pond associated with Salt Disposal Facility, salts will be allowed to drain and evaporate at Reservoir 7
		Direct	80-mil HDPE Liner	-	SF	$ 1.12	$/SF	$0	
		Direct	Anchor Trench	-	CY	$ 6.30	$/CY	$0	
						Total:		**$673,498**	

Tab 2
Rollup Cost Estimate Details For Sludge Disposal and Salt Disposal Facilities (Construction and Reclamation)

Stage	Line No.	Direct / Indirect	Item Name	Neat Qty	Qty UoM	Composite Cost/Unit	Composite Cost $/UoM	Cost	Cost Source / Remarks
Sludge Disposal Facility									
1000 Sitework					**Sludge Disposal Facility Sub-total:**			**$324,428**	
	1	Direct	Diversion Ditch	3,985	CY	$ 1.25	$/CY	$4,982	
	2	Direct	Compact Surface (prep below sludge, evap, berm, ditch	1,071,438	SF	$ 1.69	$/SF	$33,532	
	3	Direct	Evap Berm	3,866	CY		$/CY	$0	Place ditch excavation to build berm
	4	Direct	Cell #1					-	
	5	Direct	Cover Pit Sludge Cell #1 (load & haul)	24,625	CY	$ 1.31	$/CY	$32,259	
	6	Direct	Cover Pit Sludge Cell #1 (spread)	5.1	AC	$ 53.13	$/AC	$270	
	7	Direct	Revegetate Sludge Cell #1	5.1	AC	$ 897.14	$/AC	$4,564	
	8	Direct	Maintain Sludge Cell #1 Vegetation	3.1	AC	$ 897.14	$/AC	$2,739	Assume 60% of initial acreage
	9	Direct	Cell #2					-	
	10	Direct	Cover Pit Sludge Cell #2 (load & haul)	24,625	CY	$ 1.31	$/CY	$32,259	
	11	Direct	Cover Pit Sludge Cell #2 (spread)	5.1	AC	$ 53.13	$/AC	$270	
	12	Direct	Revegetate Sludge Cell #2	5.1	AC	$ 897.14	$/AC	$4,564	
	13	Direct	Maintain Sludge Cell #2 Vegetation	3.1	AC	$ 897.14	$/AC	$2,739	Assume 60% of initial acreage
	14	Direct	Cell #3					-	
	15	Direct	Cover Pit Sludge Cell #3 (load & haul)	24,625	CY	$ 1.31	$/CY	$32,259	
	16	Direct	Cover Pit Sludge Cell #3 (spread)	5.1	AC	$ 53.13	$/AC	$270	
	17	Direct	Revegetate Sludge Cell #3	5.1	AC	$ 897.14	$/AC	$4,564	
	18	Direct	Maintain Sludge Cell #3 Vegetation	3.1	AC	$ 897.14	$/AC	$2,739	Assume 60% of initial acreage
	19	Direct	Cell #4					-	
	20	Direct	Cover Pit Sludge Cell #4 (load & haul)	24,625	CY	$ 1.31	$/CY	$32,259	
	21	Direct	Cover Pit Sludge Cell #4 (spread)	5.1	AC	$ 53.13	$/AC	$270	
	22	Direct	Revegetate Sludge Cell #4	5.1	AC	$ 897.14	$/AC	$4,564	
	23	Direct	Maintain Sludge Cell #4 Vegetation	3.1	AC	$ 897.14	$/AC	$2,739	Assume 60% of initial acreage
	24	Direct	Evap Pond					-	
	25	Direct	80-mil HDPE Liner	88,800	SF	$ 1.12	$/SF	$99,058	
	26	Direct	Anchor Trench	176	CY	$ 6.30	$/CY	$1,111	
	27	Direct	Backfill Evap Pond to within 3 FT of Surface Prior to Cover	8,500	CY	$ 1.31	$/CY	$11,135	
	28	Direct	Grade Evap Pond Backfill	2.0	AC	$ 53.13	$/AC	$108	
	29	Direct	Cover Evap Pond (load & haul)	9,300	CY	$ 1.31	$/CY	#REF!	
	30	Direct	Cover Evap Pond (spread)	1.2	AC	$ 53.13	$/AC	$65	
	31	Direct	Revegetate Evap Pond	2.0	AC	$ 897.14	$/AC	$1,829	
	32	Direct	Maintain Vegetation	1.2	AC	$ 897.14	$/AC	$1,097	Assume 60% of initial acreage

Tab 2

Rollup Cost Estimate Details For Sludge Disposal and Salt Disposal Facilities (Construction and Reclamation)

Stage	Line No.	Direct / Indirect	Item Name	Neat Qty	Qty UoM	Composite Cost/Unit	Composite Cost $/UoM	Cost	Cost Source / Remarks
Salt Disposal Facility									
3000 Sitework						**Salt Disposal Facility : Sub-total:**		**$615,334**	
	33	Direct	Evap Berm	2,803	CY	$ 1.25	$/CY	$3,504	
	34	Direct	Compact Stockpile Surface (prep below salt, berm)	461,000	SF	$ 1.69	$/SF	$14,428	
	35	Direct	80-mil HDPE Liner	461,000	SF	$ 1.12	$/SF	$514,252	
	36	Direct	Anchor Trench	418	CY	$ 6.30	$/CY	$2,632	
	37	Direct	Cell #1					-	
	38	Direct	Cover Pit Sludge Cell #1 (load & haul)	12,444	CY	$ 1.31	$/CY	$16,302	
	39	Direct	Cover Pit Sludge Cell #1 (spread)	2.6	AC	$ 53.13	$/AC	$137	
	40	Direct	Revegetate Sludge Cell #1	2.6	AC	$ 897.14	$/AC	$2,307	
	41	Direct	Maintain Sludge Cell #1 Vegetation	1.5	AC	$ 897.14	$/AC	$1,384	Assume 60% of initial acreage
	42	Direct	Cell #2					-	
	43	Direct	Cover Pit Sludge Cell #2 (load & haul)	12,444	CY	$ 1.31	$/CY	$16,302	
	44	Direct	Cover Pit Sludge Cell #2 (spread)	2.6	AC	$ 53.13	$/AC	$137	
	45	Direct	Revegetate Sludge Cell #2	2.6	AC	$ 897.14	$/AC	$2,307	
	46	Direct	Maintain Sludge Cell #2 Vegetation	1.5	AC	$ 897.14	$/AC	$1,384	Assume 60% of initial acreage
	47	Direct	Cell #3					-	
	48	Direct	Cover Pit Sludge Cell #3 (load & haul)	12,444	CY	$ 1.31	$/CY	$16,302	
	49	Direct	Cover Pit Sludge Cell #3 (spread)	2.6	AC	$ 53.13	$/AC	$137	
	50	Direct	Revegetate Sludge Cell #3	2.6	AC	$ 897.14	$/AC	$2,307	
	51	Direct	Maintain Sludge Cell #3 Vegetation	1.5	AC	$ 897.14	$/AC	$1,384	Assume 60% of initial acreage
	52	Direct	Cell #4					-	
	53	Direct	Cover Pit Sludge Cell #4 (load & haul)	12,444	CY	$ 1.31	$/CY	$16,302	
	54	Direct	Cover Pit Sludge Cell #4 (spread)	2.6	AC	$ 53.13	$/AC	$137	
	55	Direct	Revegetate Sludge Cell #4	2.6	AC	$ 897.14	$/AC	$2,307	
	56	Direct	Maintain Sludge Cell #4 Vegetation	1.5	AC	$ 897.14	$/AC	$1,384	Assume 60% of initial acreage
						Total:		**$939,762**	

See Tab 3 for unit rate buildup details

Tab 3
Unit Rate Buildups for Sludge Disposal and Salt Disposal Facilites

Sludge Disposal Facility	Bare Rate	Unit of Measure	Reference	Comment
Ditch Excavation / Berm Placement				
Excavate	$ 1.25	$/CY	RS Means 312316420250	1000 CY per day, Excavating, bulk bank measure, 1-1/2 C.Y. capacity = 125 C.Y./hr, backhoe, hydraulic, crawler mounted, excluding truck loading
Cover				
Load, Haul & Place				
Load/Haul	1.31	$/LCY	Telesto 10/31/18	
Spread	$ 53.13	$/acre	Telesto 10/31/18	
Revegetation				
Revegetate	$ 897.14	$/acre	Telesto 10/31/18	Cost with 22.5% indirects removed (w/ indirects $1,099/acre)
Surface Prep Evap Pond				
Compaction				
Compaction	0.15	$/ECY	RS Means 312323235060	Compaction, riding, vibrating roller, 2 passes, 12" lifts
Water Truck	1.54	$/ECY	RS Means 312323239030	Compaction, water for, 6,000 gallon wagon, 3 mile haul
Total	$ 1.69	$/ECY		
Geomembrane				
80 mil	$ 1.12	$/SF	-	RSMeans 2018 (1500 sf daily output), Pond and reservoir liners, membrane lining systems HDPE, 100,000 S.F. or more, 80 mil thick, per S.F.
Anchor Trench Fill				
Excavate Trench				
Excavate	$ 3.98	$/BCY	RS Means 312316130060	Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering
Backfill:				
Loader	0.37	$/LCY	RS Means 312316430200	Excavating, large volume projects,200,000 B.C.Y., 8 C.Y. bucket, loader, 110% fill factor, unrestricted operation
Compaction				
Compaction	0.41	$/ECY	RS Means 312323237200	Compaction, 2 passes, 21" wide,12" lifts, walk behind, vibrating plate
Water Truck	1.54	$/ECY	RS Means 312323239030	Compaction, water for, 6,000 gallon wagon, 3 mile haul
Total	$ 6.30	$/CY		
Geomembrane				
80 mil	$ 1.12	$/SF	-	RSMeans 2018 (1500 sf daily output), Pond and reservoir liners, membrane lining systems HDPE, 100,000 S.F. or more, 80 mil thick, per S.F.
Sludge Excavation and Disposal				
Load, Haul & Place				
Excavate	0	$/BCY	RS Means 312316466040	There would'nt be any excavation associtaed with the sludge, would be directly loading from a stockpile or from a hopper.
Load	$ 0.37	$/LCY	RS Means 312316430200	Excavating, large volume projects,200,000 B.C.Y., 8 C.Y. bucket, loader, 110% fill factor, unrestricted operation
Round Trip Haul Distance (ft)	2640			STS to sludge disposal facility
Haul	2.94	$/LCY	RS Means 312323206800 to 312323206810	Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 25 min load/wait/unload, 34 C.Y. truck, cycle 2 mile to 4 mile, 20 MPH, excludes loa
Place	2.03	$/BCY	RS Means 312316465540	Excavating, bulk, dozer, open site, bank measure, common earth, 460 HP dozer, 150' haul
	$ 5.34	$/LCY		

Tab 3
Unit Rate Buildups for Sludge Disposal and Salt Disposal Facilites

Salt Disposal Facility	Bare Rate	Unit of Measure	Reference	Comment
Ditch Excavation / Berm Placement				
Excavate	$ 1.25	$/CY	RS Means 312316420250	1000 CY per day, Excavating, bulk bank measure, 1-1/2 C.Y. capacity = 125 C.Y./hr, backhoe, hydraulic, crawler mounted, excluding truck loading
Surface Prep Evap Pond				
Compaction				
Compaction	0.15	$/ECY	RS Means 312323235060	Compaction, riding, vibrating roller, 2 passes, 12" lifts
Water Truck	1.54	$/ECY	RS Means 312323239030	Compaction, water for, 6,000 gallon wagon, 3 mile haul
Total	$ 1.69	$/ECY		
Anchor Trench Fill				
Excavate Trench				
Excavate	$ 3.98	$/BCY	RS Means 312316130060	Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering
Backfill:				
Loader	0.37	$/LCY	RS Means 312316430200	Excavating, large volume projects,200,000 B.C.Y., 8 C.Y. bucket, loader, 110% fill factor, unrestricted operation
Compaction				
Compaction	0.41	$/ECY	RS Means 312323237200	Compaction, 2 passes, 21" wide,12" lifts, walk behind, vibrating plate
Water Truck	1.54	$/ECY	RS Means 312323239030	Compaction, water for, 6,000 gallon wagon, 3 mile haul
Total	$ 6.30	$/CY		
Geomembrane				
80 mil	$ 1.12	$/SF	-	RSMeans 2018 (1500 sf daily output), Pond and reservoir liners, membrane lining systems HDPE, 100,000 S.F. or more, 80 mil thick, per S.F.
Cover				
Load, Haul & Place				
Load/Haul	1.31	$/LCY	Telesto 10/31/18	
Spread	$ 53.13	$/acre	Telesto 10/31/18	
Revegetation				
Revegetate	$ 897.14	$/acre	Telesto 10/31/18	Cost with 22.5% indirects removed (w/ indirects $1,099/acre)
Salt Excavation and Disposal				
Load, Haul & Place				
Excavate	2.68	$/BCY	RS Means 312316466040	Excavating, bulk, dozer, open site, bank measure, common earth, 700 HP dozer, 150' haul
Load	$ 0.37	$/LCY	RS Means 312316430200	Excavating, large volume projects,200,000 B.C.Y., 8 C.Y. bucket, loader, 110% fill factor, unrestricted operation
Round Trip Haul Distance (ft)	3410			Res 7 to Res 6 (1,705' one way)
Haul	2.97	$/LCY	RS Means 312323206800 to 312323206810	Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 25 min load/wait/unload, 34 C.Y. truck, cycle 2 mile to 4 mile, 20 MPH, excludes loa
Place	2.03	$/BCY	RS Means 312316465540	Excavating, bulk, dozer, open site, bank measure, common earth, 460 HP dozer, 150' haul
	$ 8.055			

Tab 4
Calculating Quantities for Sludge Disposal and Salt Disposal Facilites

Sludge Disposal Facility Construction			
3D SA of Sludge Top/Slopes	886,500	SF	End of life: surface area - top of sludge
3D SA of Prep Below Sludge	871,200	SF	Surface prep under SDF, prior to waste dumping
Perimeter (ft)	4,110	FT	Length around just the SDF
Haul Distance to Stockpile			
Haul Distance to Upper South Stockpi	10,580	FT	
Evap Pond			
Graded SA HDPE (sqft)	88,800	SF	Prep SA before HDPE Liner under evap pond
Anchor trench (ft)	1,190	FT	Perimeter of pond
Anchor trench (ft)	176	CY	Assume 2' x 2' Anchor Trench
Ditch			3 feet deep, 2:1 side slope berm, 2 feet bottom width
X-sect Area (sqft)	29	SF	X-sectional area
Perimeter Length (ft)	3,660	FT	Length around SDF, empty into evap pond
Bottom length (ft)	15	FT	X-sectional top length of berm
Entire surface of ditch (sqft)	56,364	SF	Aerial/overhead surface area of prep
Berm			3 feet high, 2:1 side slope berm
X-sect Area (sqft)	25	SF	X-sectional area
Perimeter Length (ft)	4,110	FT	Length around entire SDF and Evap Pond
Top length (ft)	13	FT	X-sectional top length of berm
Entire surface area of berm (sqft)	55,074	SF	Aerial/overhead surface area of prep

Tab 4
Calculating Quantities for Sludge Disposal and Salt Disposal Facilites

Sludge Disposal Facility Reclamation			
Structural Excavation			
Structural Backfill			
Diversion Ditch	3,985	CY	
Evap Berm	3,866	CY	
Cell #1			
Cover Pit Sludge Cell #1	24,625	CY	
Revegetate Sludge Cell #1	5.1	AC	
Maintain Sludge Cell #1 Vegetation	3.1	AC	Assume 5% failure rate for 12 years
Cell #2			
Cover Pit Sludge Cell #2	24,625	CY	
Revegetate Sludge Cell #2	5.1	AC	
Maintain Sludge Cell #2 Vegetation	3.1	AC	
Cell #3			
Cover Pit Sludge Cell #3	24,625	CY	
Revegetate Sludge Cell #3	5.1	AC	
Maintain Sludge Cell #3 Vegetation	3.1	AC	
Cell #4			
Cover Pit Sludge Cell #4	24,625	CY	
Revegetate Sludge Cell #4	5.1	AC	
Maintain Sludge Cell #4 Vegetation	3.1	AC	
Rip Stockpile Surface	1,071,438	SF	
Compact Stockpile Surface	1,071,438	SF	
HDPE Liner	88,800	SF	
Anchor Trench	1,190	FT	
Backfill Evap Pond to within 3 feet of Surface Prior to Cover	8,500	CY	
Cover Evap Pond	9,300	CY	
Revegetate Sludge Evap Pond	2.0	AC	
Maintain Sludge Cell #1 Vegetation	1.2	AC	

Tab 4
Calculating Quantities for Sludge Disposal and Salt Disposal Facilites

Salt Disposal Facility Construction			
3D SA of Waste Top/Slopes (sqft)	448,000	SF	End of life: surface area - top of sludge
Perimeter (ft)	2,750	SF	Surface prep under SDF, prior to waste dumping
2D SA of Prep, salt and berm	461,000	SF	SDF only
	10.58	ac	
Haul Distance to Reservoir 6	1,705	FT	Google Earth
	Berm		3 feet high, 2:1 side slope berm
X-sect Area (sqft)	25	SF	X-sectional area
Length (ft)	2,980	FT	Length around entire Salt Disposal Facility

Salt Disposal Facility Reclamation			
Structural Excavation			
Structural Backfill			
Diversion Ditch	NA	CY	
Evap Berm	2,803	CY	
Cell #1			
Cover Pit Sludge Cell #1	12,444	CY	
Revegetate Sludge Cell #1	2.6	AC	
Maintain Sludge Cell #1 Vegetation (5%/yr for 5 yrs)	1.5	AC	
Cell #2			
Cover Pit Sludge Cell #2	12,444	CY	
Revegetate Sludge Cell #2	2.6	AC	
Maintain Sludge Cell #2 Vegetation (5%/yr for 5 yrs)	1.5	AC	
Cell #3			
Cover Pit Sludge Cell #3	12,444	CY	
Revegetate Sludge Cell #3	2.6	AC	
Maintain Sludge Cell #3 Vegetation (5%/yr for 5 yrs)	1.5	AC	
Cell #4			
Cover Pit Sludge Cell #4	12,444	CY	
Revegetate Sludge Cell #4	2.6	AC	
Maintain Sludge Cell #4 Vegetation (5%/yr for 5 yrs)	1.5	AC	
Rip Stockpile Surface	461,000	SF	
Compact Stockpile Surface	461,000	SF	
HDPE Liner for Disposal Facility	461,000	SF	10.58
Anchor Trench	2,820	FT	
Anchor Trench	418	CY	Assume 2' x 2' Anchor Trench
Evap Pond	NA		
Cover Evap Pond	NA		
Revegetate Evap Pond	NA		
Maintain Vegetation	NA		
Maintain Evap Pond Vegetation (5%/yr for 5 yrs)	NA		

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