REPORT

TYRONE MINE CLOSURE/CLOSEOUT PLAN UPDATE

BASIS OF COST ESTIMATE FOR WATER MANAGEMENT AND TREATMENT

Freeport-McMoRan
Silver City, New Mexico

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1.0 INTRODUCTION

This Freeport-McMoRan Tyrone, Inc. (Tyrone) report describes the cost basis for the updated post-closure mine water management and treatment system for the Closure Closeout Plan (CCP). Tyrone is an open pit copper mine located off State Highway 90, approximately 10 miles southeast of Silver City, Grant County, New Mexico. The principal mine facilities and main mine components at Tyrone include: open pits; waste rock, leach ore, and overburden stockpiles; mine operation facilities (e.g., warehouse, shop, and office buildings, and power plant); solution extraction-electrowinning (SX/EW) plant; lubrication shop; acid-unloading facility and decommissioned precipitation plant; reclaimed mill and concentrator area; reclaimed tailing dams; water management system (including wells, tanks, pipelines, process water ponds); and ancillary infrastructure (roads/railway, fuel storage tanks, power lines, storm water controls).

This report includes the following components:

- Description of processes for water management and treatment;
- Characterization of the influent design basis (IDB) from flow and water quality predictions; and
- Capital and operating and maintenance (O&M) cost estimates for post-closure water management and treatment.

2.0 BACKGROUND

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 one hundred years. Impacted waters are to be treated to ensure compliance with Section 20.6.2.3103 NMAC prior to discharge (Standards for Groundwater of 10,000 mg/l TDS concentration or less). Tyrone completed a process solution elimination (PSE) study as required by NMED's Supplemental Discharge Permit for Closure DP-1341 under Condition 88 (NMED 2003) and the PSE study has been updated herein. The Tyrone water management plan in part is based on the PSE study results.

The components of the water management and treatment plan include the following:

- A PSE system for treatment of highly concentrated process water, seepage and runoff water, and pit dewatering water during the first six years after closure;
- Membrane and lime/high density sludge (HDS) processes, referred to as the Water Treatment (WT) system, for treatment of impacted seepage, runoff, residual process solutions, and pit dewatering water for years six through 100; and
- A sludge disposal facility (SDF) for sludge produced by the HDS system.

The following sections describe these water treatment components.

2.1 PSE System

Impacted waters from surface water runoff, seepage collection systems and interceptor systems, pit dewatering water, and process solutions that are on site when mining operations cease would be collected and treated through evaporation by the PSE system during the first six years after closure, however, the time of operation may be slightly shorter or longer based on actual results. Using the evaporation systems for impacted water and residual process solutions allows for optimization of operational costs. PSE system cost estimates were originally developed as part of the 2004 PSE study conducted by M3 Engineering and Technology Corporation (2004) and subsequently updated in 2006 (M3 2006). These cost estimates have been updated herein with more current estimates of the volume and sources of residual fluids that would be required to be handled upon cessation of mining operations and more current information on mechanical evaporative spray units employed within the PSE system.

The PSE system consists of forced and wetted surface evaporation. Forced evaporation maximizes the evaporation rate through a network of mechanical spray systems. Wetted surface evaporation will occur from the surfaces of the existing impoundments and at the wetted rock surfaces. Operational duration for the PSE system is projected at 67 months to eliminate the residual fluids that would be required to be handled upon cessation of mining operations. At the end of year five, it was estimated that the volume of the concentrated process solutions will be reduced sufficiently to treat the remaining sources of impacted water with the water treatment system and without the use of the PSE system.

The residual volume of concentrated process solutions would continue to be handled through the PSE system through the 67th month of system operation.

2.2 WT System

The WT system will consist of membrane filtration and high density sludge (HDS) lime precipitation as the primary processes for metals and sulfate removal for years six through one hundred. A flow diagram of the WT system is presented in **Figure 2.1**. This conceptual treatment configuration optimizes capital and operating costs while meeting regulatory limits for discharge of treated effluent.

Surface water runoff, water collected from seepage collections and interceptor systems, pit dewatering water, and residual process solutions (i.e., PLS and raffinate) will be separated into high sulfate and low sulfate streams prior to treatment. Low sulfate streams will be sent to the membrane system consisting of microfiltration (MF) and nanofiltration (NF) for treatment. The MF unit provides suspended solids removal to prevent fouling of the NF membrane. Treated effluent (permeate) from the MF unit will be sent to the NF unit. The NF unit utilizes a series of semi-permeable membranes that can remove dissolved constituents including metals and sulfate.

High sulfate streams and the MF and NF reject streams will be treated by chemical precipitation utilizing calcium oxide (lime) addition with sludge recycle to form HDS. Chemical precipitation is a conventional and widely utilized 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 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. Sulfuric acid will be added to the clarified process stream to achieve neutral pH prior to discharge.

Precipitated solids removed during clarification will be further dewatered by pressure filtration. A flocculent will be added prior to dewatering to assist in achieving approximately fifty percent solids by weight in the dewatered sludge. Dewatered sludge will be sent to the onsite SDF.

The NF permeate and clarified overflow from the lime precipitation system will be combined prior to discharge and will ensure compliance with Section 20.6.2.3103 NMAC groundwater standards for discharge.

2.3 SDF System

Dewatered sludge will be hauled to and stored at the SDF located at the 8C waste rock stockpile within the open pit surface drainage area (OPSDA). The design basis for the SDF is based on the “Preliminary Sludge Handling Plan and Cost Estimate completed for Tyrone in 2004 (Van Riper Consulting, 2004). The sludge volume is calculated based on the results of treatability studies and predicted plant influent at the lime/HDS treatment plant. 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.

3.0 INFLUENT DESIGN BASIS

Surface water runoff, groundwater, seepage water, and residual process solutions will be managed and/or treated for one hundred years following cessation of mining operations. There are five sources of water that are likely to be sent to the proposed water treatment system and include the following:

- Residual process solutions from the leach operation;
- Meteoric water that infiltrates through the acid-generating stockpiles to seepage collection;
- Storm water runoff that comes into contact with un-reclaimed stockpiles;
- Dewatering water from the existing open pits; and
- Impacted groundwater captured in seepage collection and interceptor well systems.

Residual process solutions from the leach operation will be treated by the PSE system during years one through six. Impacted water from the stockpile seepage collections, pit dewatering water, impacted stormwater runoff collection points, and groundwater collected from seepage collection and interceptor well systems will be treated by the PSE system during years one through five. During years six through one hundred, the impacted water from the stockpile seepage collections, pit dewatering water, impacted stormwater runoff collection points, and groundwater collected from seepage collection and interceptor well systems will be treated by the WT system. Residual PLS is also assumed to be present for 20 years following the PSE system operation, with PLS flows diminishing through time as leach stockpile draindown progresses following leach operations.

3.1 PSE System

The influent design basis (IDB) for the PSE system is dependent on the quantity of water requiring treatment or elimination. The sources of impacted water and residual process solutions include the following:

- Impacted waters from stockpile seepage collections, pit dewatering water, impacted stormwater runoff collection points, and groundwater collected from seepage collection and interceptor well systems;
- PLS surface impoundments, overflow ponds, and tanks (collectively referred to as surface impoundments); and
- Average Circulated Inventory within the process solution circuit.

The quantity of impacted water and residual process solutions to be eliminated by the PSE system is based on recorded operational flow and extraction data, design capacity information for the surface impoundments obtained from Tyrone representatives, and previous engineering experience. The estimate of inventoried impacted water and residual process solutions 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 3.1** identifies the estimated total inventoried process solutions as 1,535,690,400 gallons.

A detailed analysis of PSE IDB development is provided in *Process Solution Elimination Plan Technical Memorandum* dated June 24, 2013 in **Attachment A** (Golder 2013).

3.2 WT and SDF Systems

The IDB for the proposed WT and SDF systems were developed from data including flow and sulfate predictions for the various water sources onsite for the 100-year treatment period.

During the mining and copper leaching operations at Tyrone, approximately 28,600 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 at Tyrone typically averages eight percent of the initial raffinate flow rate. Therefore, after cessation of the mining operations, leaching operations are expected to discontinue and the PLS flow rate is estimated at 92 percent of the initial raffinate flow rate. Additionally, based on experience at Tyrone, the PLS flow rate at a leach stockpile diminishes to approximately ten percent of the full flow rate in 45 days after raffinate application is stopped (FMI Tyrone, 2012b). Based on these assumptions, the total ACI of process solutions for PSE is approximately 1,534,515,900 gallons.

Estimates of the flow rates and sulfate concentrations for the individual seepage collection and interceptor well systems at the Tyrone Mine was based on existing flow and water quality data for the individual systems that is recorded by Tyrone in accordance with applicable operational discharge plans (DPs). Sources of water in-flow and water quality to the system related to open pit dewatering were based on the DBS&A Stage 2 Abatement Plan Proposal groundwater flow model and associated water quality predictions (DBS&A, 2012) updated with the 2014 base case mine plan configuration and associated regrade plan.

Surface water runoff flows and sulfate concentration estimates were derived from implementation of a conceptual mathematical dynamic system model (DSM) using the GoldSim simulation software platform and the proposed reclamation plan presented in this updated CCP report. The DSM is a dynamic, probabilistic simulation model that projects the behavior of the mine system and the influence of various closure activities have on its performance. Runoff sources are segregated into impacted and non-impacted flows in the DSM. Runoff from reclaimed stockpile and tailing surfaces is non-impacted and can be discharged to the environment and is not conveyed to the water treatment system.

Tables 3.2, 3.3 and 3.4 present a summary of the modeled flow rates and sulfate predictions in years six through one hundred for the combined low sulfate stream, combined high sulfate stream and the HDS feed stream (high sulfate stream plus NF reject), respectively.

Estimated sludge volume to be sent to the SDF was calculated from the projected sulfate concentrations. **Table 3.5** presents the sludge mass predictions to be sent to the SDF; an estimated 4,013,117 tons of sludge will require storage at the SDF during the 100-year management plan.

4.0 COST ESTIMATION

Capital and O&M cost estimates were developed using similar methodology as described in the *Tyrone and Chino Closure Closeout Plan Updates Bases for Water Treatment Facility Cost Estimating Technical Memorandum* (Golder, 2008).

4.1 PSE System

The PSE system will be used during the first six years after closure to evaporate the process water inventory existing at closure, runoff and seepage from the uncovered leach stockpiles, water extracted from the pit sumps, and impacted water from groundwater extraction systems. Capital and O&M cost estimates for the PSE system are described in the following sections. Cost estimate tables for the PSE system are provided in **Attachment B**.

4.1.1 Capital Cost Estimate

The basis for PSE capital cost estimate is described in the 2006 *Process Solution Elimination Study* (M3 2006) and has been updated herein with current vendor quotes and updated information on the process distribution system at the mine. The estimated constructed cost of the Tyrone PSE system is $2,400,000. This includes new evaporation units, with use of existing piping and pumps.

4.1.2 Operations & Maintenance Costs

The updated PSE cost estimates provided in **Attachment B** show that the estimate of annual O&M costs for the first year is highest and the costs decrease through the next five years as the flows decrease. The total O&M estimate is $9,259,000 for six years of PSE operation. O&M cost estimates include labor, maintenance and energy costs for pumping. Labor costs were estimated from previous experience. Routine maintenance and capital replacement were estimated to be 1.5 and 1.0 percent, respectively, of the total estimated capital cost.

4.2 WT System

Impacted surface water and groundwater will be treated by the WT system during years 6 through 100 and includes the membrane (MF/NF) and lime/HDS systems. Residual PLS is also assumed to be present for 20 years following completion of PSE system operation, with PLS flows diminishing through time as leach stockpile draindown progresses following leach operations. These solutions will be treated with the PSE system for years 1 through 6, and with the WT system for years 7 through 26. Capital and O&M cost estimates for the WT system are described in the following sections. Cost estimate tables are provided in **Attachment C**.

4.2.1 Capital Cost Estimate

Capital cost for the membrane system was determined by previous vendor estimations and engineering experience based on construction of existing facilities of similar design and capacity. The primary source for the capital cost estimate for the lime/HDS system is the construction costs for the water treatment system at the Summitville Mine site (Golder 2009). The Summitville construction was for a new treatment system, replacing an existing system, and based on a series of treatability studies to determine optimal treatment pH and HDS system design parameters. The Summitville design and construction exhibit parallels to Tyrone's, including nominal flow rate and water quality characterization, and utilizes similar technology for removal of mining-derived contaminants with a permitted effluent discharge to surface water (Golder 2009). The similarities in process between the Summitville and the Tyrone water treatment designs, level of detail, and relatively recent preparation lend viability to the Summitville construction costs as a basis for the Tyrone estimate. Costs were scaled down from the Summitville construction and escalated for inflation (2009 dollars escalated to 2012). Flow rate and facility size corrections were made as a function of the lower estimated flow rates at Tyrone. Process equipment costs were also scaled from the Summitville costs and adjusted based on the higher solids levels expected from the Tyrone water.

Equipment installation and site construction were estimated based on craft personnel, labor hours, and prevailing wage rate. Other costs, including mobilization/demobilization, freight, and commissioning were estimated as lump sums. These costs are estimated based on engineering judgment, previous Golder experience with treatment plant construction, and equipment installation projects. The total direct capital cost estimate for the WT system is estimated at $8,727,000.

4.2.2 Operations and Maintenance Costs

O&M cost estimates include labor, reagents, maintenance, sampling and analysis costs and electrical power for conveyance and treatment. The cost basis for these items is described in the following sections.

4.2.2.1 Labor

Operations labor, supervision, and maintenance staffing levels were estimated based on Golder experience with operations of similar treatment plants. Labor rates and markup for benefits for all categories were based on previous Tyrone CCP (M3, 2001) adjusted to 2012 dollars, and experience in the operations of similar systems at former mine sites in the Western US. Labor is estimated at $59,440,000 (approximately $629,000 per year)

4.2.2.2 Reagents

Reagents needed for lime/HDS processing include lime, flocculent and acid. Projected lime consumption in the O&M cost estimate was based on the 2002 treatability study (Van Riper Consulting, 2002) and adjusted based on the increased sulfate loading to the lime/HDS system. A lime unit cost of $185.94 per ton (including freight) is based on the lime cost from a nearby facility (L'hoist North America, 2012). Average annual consumption of lime, flocculent and acid is estimated as follows:

- Lime, 5,240 tons per year;

- Flocculent, 125 tons per year;
- Acid, 30 tons per year.

A relatively small dose of flocculent is required as a settling aid in the clarifier, while a much greater quantity is required at the belt press. Flocculent cost was estimated at $2.37 per pound based on a current vendor quote and usage rates were based on operational experience at other mine sites and vendor recommendations (Ciba, 2007).

Sulfuric acid is used to adjust effluent pH of the lime treated clarified water. Acid cost was estimated at $0.23 per pound. The usage is based on the values reported in the 2002 treatability study (Van Riper Consulting, 2002) and adjusted based on the increased sulfate loading to the lime/HDS system.

The membrane system requires MF and NF cleaning chemicals, biocide and antiscalant to prevent membrane fouling and increase removal efficiency of the contaminants of concern. Membrane chemical costs were estimated at $213,000 per year on average based on vendor quotes and engineering experience.

4.2.2.3 Maintenance

Through the duration of plant operations, equipment will be routinely maintained by replacing “wear” parts and replacing components (pumps, mixers, conveyance piping, etc.) due to life cycle failure. Routine maintenance and capital replacement cost are estimated to be 1.5 and 1.0 percent, respectively, of the estimated total capital cost that would include the water conveyance system (approximately $300,000 annually).

4.2.2.4 Sampling and Analysis

Sampling and analysis is required for compliance with groundwater discharge permit conditions and for measurement of plant performance. Analyses and frequency of analyses are defined within the permit and incorporated into the O&M cost estimate. Through the duration of water treatment operations, the frequency of sampling and analysis required drops from quarterly to semi- annually to annually as follows:

- Tailings, quarterly in years 2 through 8, semi-annually in years 9 through 18 and annually in years 19 through 28;
- Stockpiles, quarterly in years 9 through 13, semi-annually in years 14 through 18 and annually in years 19 through 100;
- Pit, quarterly in years 2 through 8, semi-annually in years 9 through 18 and annually in years 19 through 100.

The change in number of samples collected and analyzed is accounted for in the long-term O&M cost estimate. The sampling will be a routine duty for plant operators. Analytical costs are approximately $22,000 per year on average and were escalated from 2007 estimates (Energy Laboratories Inc., 2007).

Costs are inclusive of packaging, handling, shipping, quality assurance/quality control and lab results report preparation.

4.2.2.5 Electrical Power Consumption

Electrical power is estimated based on development of a motor list, motor efficiency and operating diversity (run time) for the pumps required to convey impacted water and residual PLS to the WT system, similar to the methodology used in the Tyrone CCP (M3, 2001). The post-closure water distribution pipeline network and pump systems are presented in **Figure 4.1**. The motor list, motor efficiency and operating diversity (run time) for the pumps required to convey impacted water and residual PLS to the WT system is presented in **Table 4.1**. Total kilowatt-hours (kWh) per year are calculated and summed, a unit cost of $0.057 per kWh is used to estimate total electrical power cost in year one of operations. The unit cost for electric power is based on the August 2011 Public Service Company of New Mexico rate schedule for industrial power service. In out-years, the power consumption is scaled down in direct proportion to the decreasing flow rate through the plant. The power consumption includes the water treatment equipment as well as the collection system pumps. Electrical cost for the WT system is estimated at $13,013,000 for the 100-year management plan.

4.3 SDF System

The SDF will be developed on site within the OPSDA. The capacity of the disposal facility is adequate for all sludge produced by operation of the WT system. Capital and O&M cost estimates for the SDF system are described in the following sections. Cost estimates are included in the WT system cost estimates and are provided in **Attachment C**.

4.3.1 Capital Cost Estimate

The Tyrone capital cost is estimated by scaling up the known cost for a similar proposed sludge disposal facility (Van Riper Consulting, 2004). The capital cost estimates are increased to accommodate changes in sludge volume due to increases in the sulfate concentrations of the incoming water to the water treatment facility. The capital cost estimate is $1,524,000 and was escalated using the ratio of the current projected sludge volume to the sludge volume projected in 2004.

4.3.2 O&M Cost Estimate

The cost of sludge disposal from the *Preliminary Sludge Handling Plan and Cost Estimate* completed for Tyrone is estimated at $0.17 per cubic foot of sludge consisting of 50 percent solids (Van Riper Consulting, 2004). This cost includes loading, hauling, and unloading of sludge to the onsite SDF. The sludge volume is calculated based on the results of treatability studies and predicted plant influent in years six through 100 at the WT facility. 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.

Total volume of sludge produced through year 100 is estimated at approximately four million tons. The subsystem O&M cost estimate for sludge generated for 95 years of operation is $13,692,000.

4.4 Total Cost Estimate for the Water Management

A summary of the water management cost estimates is provided in **Table 4.2**. Capital cost estimates were calculated for each component of the water management plan as described in the previous sections which results in a total direct capital cost estimate of $12,651,000. Indirect costs of $2,846,475 were calculated and include:

- Mobilization and demobilization;
- Contingency;
- Engineering redesign;
- Contractor profit and overhead; and
- Closeout plan management.

Indirect costs in total are estimated at 22.5 percent of the estimated direct capital cost. The total direct O&M cost estimate is $311,311,860. Indirect O&M costs of $14,762,860 were calculated at 14 percent of the direct O&M cost, excluding electrical power and reagent cost. Total life cycle cost for the 100-year management and treatment plan is estimated to be $326,809,335 in current cost.

5.0 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

GOLDER ASSOCIATES INC.

Peter Lemke
Project Engineer

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TABLES

Table 3.1: Summary of Residual Process Solution Quantity to be Handled by the PSE System

Parameter	Volume (gal)
PLS Surface Impoundments/Tanks	12,046,700
PLS Overflow Impoundments[1]	10,872,200
Average Circulated Inventory	1,534,515,900
Inventoried Process Water – Projected[2]	**1,535,690,400**

Notes:

[1] – Residual process water would be added to the PLS overflow impoundments at the beginning of the PSE system operation and this volume is subtracted from the projected inventoried process water volume.

[2] – Inventoried Process Water = Water in PLS impoundments/tanks (12,046,700 gal.) - PLS added to empty overflow ponds (10,872,200 gal.) + Average Circulated Inventory (1,534,515,900 gal).

Table 3.2: Summary of Estimated Water Flow and Sulfate Concentrations for Low Sulfate Water Sources (NF Feed)

Year	Flow Rate (gpm)	Sulfate (mg/L)
6	1,941	2,674
10	1,595	2,628
15	1,305	2,883
25	1,200	2,947
32	1,155	3,012
40	1,126	3,081
100	917	3,369

Table 3.3: Summary of Estimated Water Flow and Sulfate Concentrations for High Sulfate Water Sources

Year	Flow Rate (gpm)	Sulfate (mg/L)
6	88	45,240
10	104	47,062
15	94	42,600
25	60	19,658
32	44	11,971
40	44	11,971
100	44	11,971

Table 3.4: Summary of Estimated Water Flow and Sulfate Concentrations for HDS Feed (High Sulfate Water plus NF Reject)

Year	Flow Rate (gpm)	Sulfate (mg/L)
6	476	19,271
10	423	21,476
15	355	21,882
25	300	15,721
32	275	14,567
40	269	14,844
100	228	15,901

Table 3.5: Estimated Annual Rate of Sludge Generation

Year	Sludge (tons/yr)
6	84,130
10	83,241
15	71,009
25	43,210
32	36,753
40	36,656
100	1,552

Table 4.1 - Motor List and Operating Diversity for the Pumps Required to Convey Impacted Water and Residual PLS to the WT System

Pipeline Name[a]	Pump[a]	Operational Conditions[b]							Post-Closure Conditons[b]								
		Maximum Flow	Head	Efficiency	Number of Pumps	Maximum Flow Per Pump	Brake hp per pump	Total Average Power	Total Daily Flow	Flow Rate Into Tank/Pond	Tank/Pond Capacity at 80% Capacity	Tank/Pond Fill Time to 80%	Pump Cycles Per Day	Tank/Pond Evacuation Time @ 80%	Total Daily Pump Run Time	Brake hp per pump	Total Daily Power
		gpm	ft	%	---	gpm	hp	kW	gallons	gallons/minute	gallons	minutes	---	minutes	hours	hp	kW
PLS 1A to 1B	Goulds 3196_A	2,970	141	0.84	1	2,970	132	101	43,200	30	19,040	635	2.3	6	0.24	132	25
PLS 1 to 1B	Goulds 3196_A	2,970	141	0.84	1	2,970	132	101	194,400	135	1,796	13	108.2	1	1.09	132	111
PLS 1B to FP and 3 Booster	Goulds VIC-T	3,785	512	0.81	1	3,785	634	488	288,000	200	37,600	188	7.7	10	1.27	634	618
3A to FP - via PLS 3A-FP	Goulds VIT-FF	2,673	611	0.78	1	2,673	555	427	288,000	200	100,000[c]	500	2.9	37	1.80	555	766
PLS 2 to FP	Hazelton E Type VSM	2,645	460	0.69	3	882	156	359	703,200	1465	100,000[c]	68	21.1	38	13.29	156	531
NR Sump to Feed Pond	16DMC	2,007	550	0.42	1	2,007	697	536	72,000	50	100,000[c]	2,000	0.7	50	0.60	697	320
PLS GP to HW	Goulds VIT	1,594	470	0.60	1	1,594	331	255	93,600	65	100,000[c]	1,538	0.9	63	0.98	331	249
HW to EM Booster	Highwall	1,612	560	0.65	1	1,612	368	283	94,663	65	---	1,538	0.9	63	0.98	368	277
PLS EM Booster to FP	Goulds VIT-FF	3,008	460	0.85	1	3,008	434	334	496,800	345	100,000[c]	290	5.0	33	2.75	434	919
PLS MP to Decant Pond	Hazelton E Type VSM	2,594	450	0.74	4	1,635	264	811	1,329,477	1465	100,000[c]	68	21.1	39	13.55	264	687
PLS MP to Savannah Pit	Hazelton E Type VSM	2,757	426	0.75	2	1,379	208	319	8,640	12	100,000[c]	8,333	0.2	36	0.10	208	8
CMP to CMB	N-23960	814	272	0.55	1	814	107	82	72,000	50	100,000[c]	2,000	0.7	123	1.47	107	121
Seepage Collections and Interceptor Wells[d]	---	---	---	---	---	---	---	---	244	---	---	---	---	---	13.44	---	562

Notes:

--- Not analyzed or not applicable.

[a] - Pipeline name and pump identification from *Steady State and Transient Hydraulic Analysis Report* (Golder, 2012).

[b] - Operational conditions represent maximum flows during mine operations; post-closure flows represent estimated flows from individual components following the first five years of process solution elimination system operations.

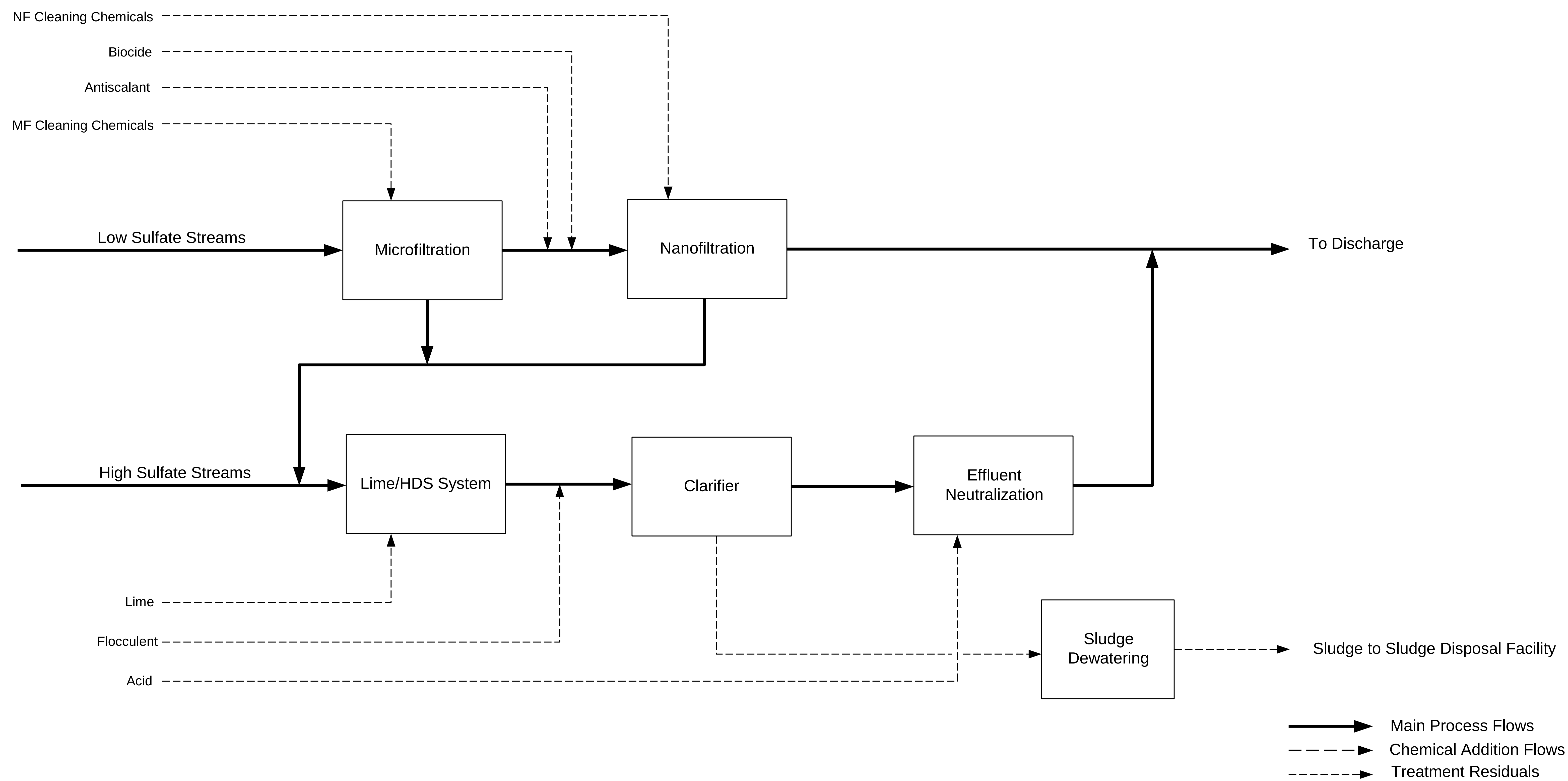
[c] - Pond capacity at 80% capacity is much greater than 100,000 gallons. Assumed that the ponds would be allowed to fill up 100,000 gallons between purges.

[d] - Estimated post-closure flows from individual seepage collection systems and interceptor well systems. A total of 21 individual seepage collection systems and interceptor well systems containing 57 operating pumps are included, with the pump types varying by location. The numbers presented are for the entire 21 individual seepage collection systems and interceptor well systems. Pump run times represent the average run time for all 57 pumps.

Table 4.2: Summary of Capital and O&M Cost for the Water Management Plan at Tyrone

Capital Cost Estimates	**2012 Current Cost (US$)**
Process Solution Elimination	2,400,000
Water Treatment Facility	8,727,000
Sludge Disposal Facility	1,524,000
Subtotal, Direct Capital	12,651,000
Indirect Capital Costs	2,846,475
Subtotal, Capital	*15,497,475*
O&M Cost Estimates	
Process Solution Elimination – Labor	352,000
Process Solution Elimination – Maintenance	1,434,000
Process Solution Elimination - Electrical Power	7,473,000
Water Treatment Facility – Labor	59,440,000
Water Treatment Facility – Maintenance	28,356,000
Water Treatment Facility – Reagents	170,614,000
Membrane Plant - Electrical Power	3,061,000
Lime/HDS Plant - Electrical Power	4,210,000
Water Conveyance - Electrical Power	5,742,000
Sludge Disposal	13,692,000
Sampling & Analytical	2,175,000
Subtotal, Direct O&M	296,549,000
Indirect O&M Costs	14,762,860
Subtotal, O&M	*311,311,860*
Total Capital & O&M Cost Estimates	**326,809,335**

FIGURES



Golder Associates

Denver, Colorado

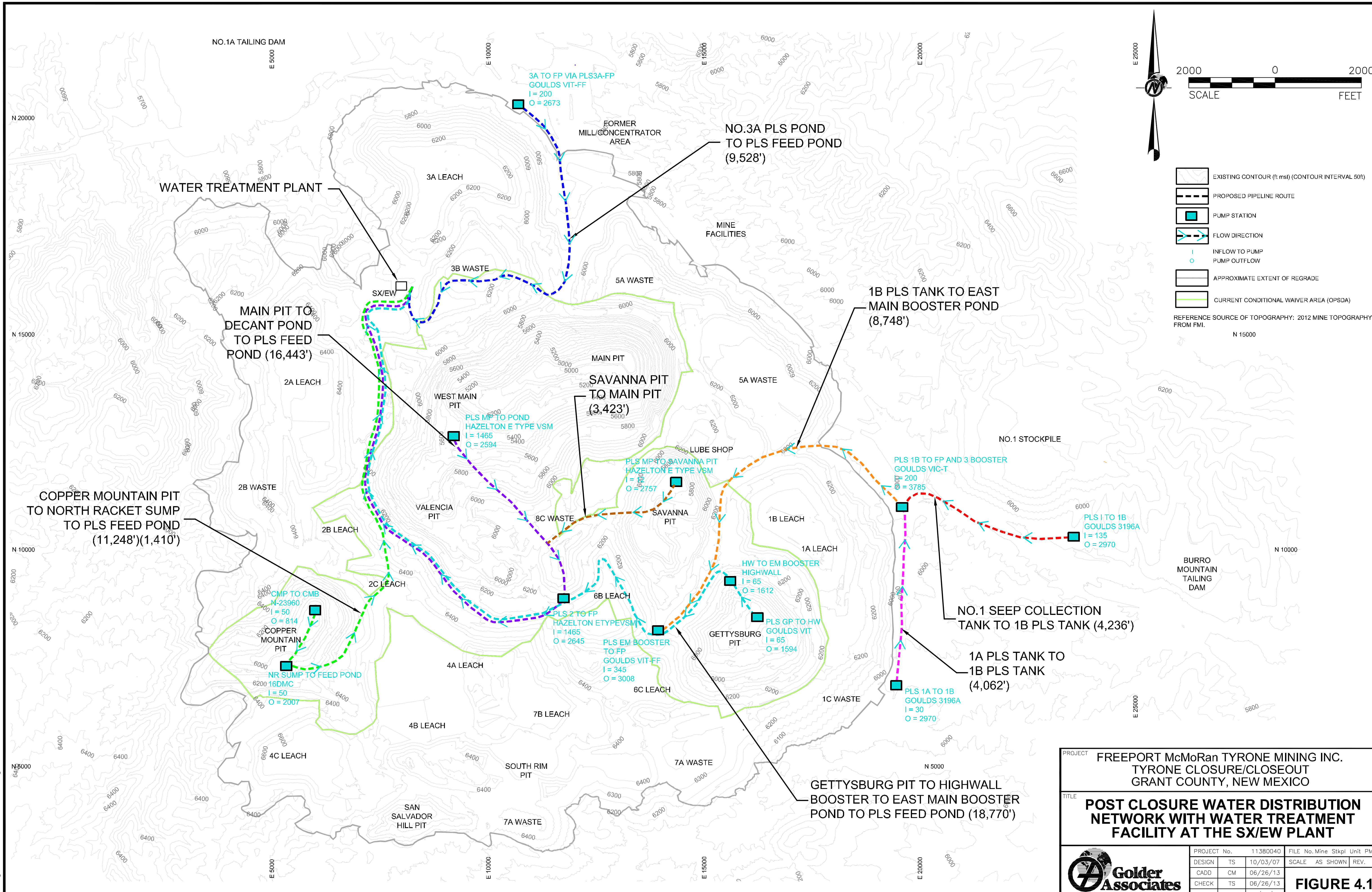
CLIENT/PROJECT

Freeport-McMoRan
Tyrone Mine

TITLE

Water Treatment System Block Flow Diagram

DRAWN	KMB	DATE	November 2012	JOB NO.	113-80040
CHECKED	PRL	SCALE	Not To Scale	DWG. NO.	na
REVIEWED	xxx	FILE NO.		FIGURE NO.	2.1



PROJECT
FREEPORT McMoRan TYRONE MINING INC.
TYRONE CLOSURE/CLOSEOUT
GRANT COUNTY, NEW MEXICO

TITLE
POST CLOSURE WATER DISTRIBUTION NETWORK WITH WATER TREATMENT FACILITY AT THE SX/EW PLANT

Golder Associates
Albuquerque, New Mexico

PROJECT No.	11380040	FILE No. Mine Stkpl Unit PMLU		
DESIGN	TS	10/03/07	SCALE AS SHOWN	REV. 0
CADD	CM	06/26/13		
CHECK	TS	06/26/13		
REVIEW	TS	06/26/13		

FIGURE 4.1

ATTACHMENT A
PROCESS SOLUTION ELIMINATION PLAN
TECHNICAL MEMORANDUM

TECHNICAL MEMORANDUM

Date:	June 24, 2013	**Project No.:**	113-80040
To:	Todd Stein	**Company:**	Golder Associates Inc.
From:	Anna Modereski		
cc:		**Email:**	amoderski@golder.com

RE: TYRONE MINIE PROCESS SOLUTION ELIMINATION PLAN

1.0 INTRODUCTION

The New Mexico Environment Department (NMED) issued Supplemental Discharge Permit for Closure, DP-1341 to Freeport McMoRan Tyrone Mine (Tyrone) on April 8, 2003 (NMED, 2003a). Condition 88 of DP-1341 required that Tyrone perform a process solution elimination study. Condition 88 states:

> *"Tyrone shall perform a process solution elimination study. In accordance with the schedule approved under Condition 74, Tyrone shall submit to NMED for approval a work plan including an implementation schedule for a process solution elimination study. The purposes of the study is to evaluate alternatives and identify environmentally sound and cost effective methods to treat or eliminate the process solutions following Cessation of Operation or closure at the Tyrone Mines Facility. The study shall evaluate factors including but not limited to treatment plant size, pump size(s), number of pumps, pump rating, type of emitters, acreages and number of leach piles in the evaporation circuit, evaporation rates, and the use of evaporation ponds. Based upon the study results, Tyrone shall submit to NMED for approval a method for process water elimination."*

In accordance with Condition 88, an initial process solution elimination (PSE) study was conducted in 2004 (M3, 2004) based on post-mining water management and water treatment flow rates provided in the 2001 Tyrone Mine Closure/Closeout Plan (M3, 2001). The initial PSE was revised in 2006 based on comments received from the NMED on the initial PSE study (M3, 2006). This technical memorandum provides an update to the 2006 PSE Study and is based on current post-mining water management and water treatment flow rates, more current information on mechanical evaporative spray units employed within the PSE system, and updated mine plans.

2.0 BACKGROUND

The purpose of the PSE study was to evaluate alternatives and identify environmentally sound and cost effective methods to treat or eliminate the process solutions following cessation of operation or closure at the Tyrone Mine Facility including the open pits, leach stockpiles, mine waste stockpiles

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and the solvent extraction-electrowinning (SXEW) facility. The study assumed that processing of residual fluids for copper recovery ceases at the close of operations. The purpose of this update to the original PSE study is to describe the "current proposed water management plan to reduce the projected process water inventory over a six year period in the event of a default mine closure scenario to allow treatment of the remaining solutions". In practice leach stockpiles will continue to operate and generate copper production for many years after ore shipment to stockpiles end. Over time the copper and associated metals will decrease until leaching is no longer economic, therefore this is a conservative water treatment cost estimate only intended for closure/closeout planning.

Tyrone prepared and submitted for regulatory review the following PSE-related studies:

- Feasibility Study, Solution Management of Process Water for Closure, Phelps Dodge Tyrone, Inc. Tyrone, New Mexico dated April 2002 (M3, 2002);
- Process Solution Elimination Study Work Plan Tyrone Mine Facility, Phelps Dodge Tyrone, Inc. Tyrone, New Mexico dated October 2003;
- Process Solution Elimination Study Phelps Dodge Tyrone, Inc. Tyrone, New Mexico dated June 2004 (M3, 2004); and
- Revised Process Solution Elimination Study Phelps Dodge Tyrone, Inc. Tyrone, New Mexico dated March 2006 (M3, 2006).

2.1 Climate

The Tyrone Mine is located in a semiarid region in southwestern New Mexico, with elevations ranging from about 5,100 to 8,000 feet above mean sea level (AMSL). The climate of Tyrone is warm and semi-arid. 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 short and intense thunderstorms. About sixty percent of the precipitation comes in summer. Precipitation is characterized by small magnitude events ranging from 0.1 to 0.25 inches per day. Larger magnitude rainfall events (greater than one inch) also occur in the summer months, but at a much lower frequency. The probability of exceeding one-inch of rainfall in a 24-hour period is less than one percent. Monthly precipitation is generally less than an inch per month from November through June, with July, August, and September averaging two and three inches per month, decreasing to about one inch in October. The average annual precipitation in the area is 15.61 inches as reported for the Fort Bayard weather station. Evaporative demand far exceeds annual precipitation. The average annual evaporation rate is estimated at 93.85 inches for the project location. After applying a factor of 0.7 to the annual evaporation rate to approximate evaporation losses from free water surfaces, an evaporation rate of 65.70 inches per year is used in this updated analysis.

3.0 PREVIOUS PSE OPTIONS EVALUATED

The previous studies proposed process solution elimination by natural and forced evaporation on previously disturbed stockpile areas. The inventoried solutions to be handled by the PSE system were comprised of residual mine process solutions, and impacted water from stockpile seepage collections, stormwater runoff from stockpiles, and groundwater from inceptor wells and open pit sumps. Two PSE options were examined:

- Option 1: Recirculation; Forced Spray Evaporation and Drip Irrigation System; and
- Option 2: Recirculation and Drip Irrigation System.

The previous PSE studies projected both alternatives as capable of evaporating the inventoried process solutions and impacted water within the prescribed time period. Option 1 was the recommended alternative due to the smaller stockpile surface areas required, higher evaporative loss rates, and overall lower costs. As such, this updated PSE analysis is based on recirculation of impacted water and residual process solutions with drip irrigation systems and forced spray evaporation systems.

3.1 Estimated Quantity of Process Solutions

The first step of the updated PSE analysis is to identify the volume of the solutions requiring treatment or elimination. During the mining and copper leaching operations approximately 28,600 gallons per minute (gpm) of leach solution is circulated through the copper production system. 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 updated PSE plan supports financial assurance cost estimates for closure/closeout based on the end of year (EOY) 2014 mine plan. Use of the EOY 2014 mine plan is consistent with the snapshot in time philosophy that was adopted by Tyrone and the Agencies early in the closure planning process and represents the year with the greatest volume of regrading and cover placement required between 2012 and 2017. If mining activities were to cease between the years 2012 and 2017, the highest financial assurance requirements would be associated with the EOY 2014 conditions.

Table 1 details the operational status of the solution management system and **Figure 1** outlines the projected configuration of the stockpiles at the EOY 2014 from the Tyrone mine planning group. **Table 2** 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, and tanks.

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 2** identifies the total estimated quantity of residual process solutions to be evaporated at the beginning of the PSE operation at 1,535,690,400 gallons.

3.1.1 Solutions in Surface Impoundments, Overflow Ponds and Tanks

The estimated volume of process solutions within the surface impoundments, overflow ponds, and tanks requiring elimination at the cessation of operations is calculated according to the following methodology:

- Volumes of process solutions within the surface impoundments and storage tanks at the start of evaporation program are assumed to be at 60 percent of their capacities;
- For HDPE-lined overflow ponds, it is assumed that process solutions will be added to the ponds (60 percent of their capacities) from the circuit at the start of the evaporation program to enhance surface evaporation of the fluids;
- The 4C and 6C collection ponds are actually collection points with drains at the base and do not store process solutions; and
- The overflow ponds will contain no process solutions at the inception of PSE system operation.

A summary of the surface impoundments, overflow ponds, and tanks included in the analysis are provided in **Table 3** along with the estimated annual evaporation from each. The total volume of process solutions contained in the PLS surface impoundments and tanks is estimated to be approximately 12,000,000 gallons, and the estimated volume of process solutions added to, and maintained within, the overflow ponds is approximately 11,000,000 gallons.

3.1.2 Average Circulated Inventory

The initial ACI is calculated based on experience with leach operations at Tyrone. During mining and copper leaching operations, approximately 28,600 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 eight 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 92 percent of the initial raffinate flow rate. Additionally, based on experience at Tyrone, 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 (FMI Tyrone, 2012b). Based on these assumptions, the total estimated initial ACI is approximately 1,534,516,000 gallons.

3.2 Estimated Quantity of Impacted Water

Estimated flows for the individual sources contributing impacted water to the PSE system are provided in **Table 5**. The estimates of the flow rates and sulfate concentrations for the individual seepage collection and interceptor well systems at the Tyrone Mine was based on existing flow and water quality data for the individual systems that is recorded by Tyrone in accordance with applicable operational discharge plans

(DPs). Sources of water in-flow and water quality to the system related to open pit dewatering were based on the DBS&A Stage 2 Abatement Plan Proposal groundwater flow model and associated water quality predictions (DBS&A, 2012) updated with the 2014 base case mine plan configuration and associated regrade plan.

Surface water runoff flows and sulfate concentration estimates were derived from implementation of a conceptual mathematical dynamic system model (DSM) using the GoldSim simulation software platform and the proposed reclamation plan presented in this updated CCP report. The DSM is a dynamic, probabilistic simulation model that projects the behavior of the mine system and the influence of various closure activities have on its performance. Runoff sources are segregated into impacted and non-impacted flows in the DSM. Runoff from reclaimed stockpile and tailing surfaces is non-impacted and can be discharged to the environment and is not conveyed to the water treatment system.

4.0 OPERATIONAL PERIOD

The updated PSE analysis is based on an operational period of six years and includes recirculation of impacted water and residual process solutions with both drip irrigation systems and forced spray evaporation systems. Following cessation of the PSE operation at the end of year six, any residual process solutions present will continue to be collected in the existing surface impoundments and tanks. The residual solutions will be treated through the post-closure water treatment system. Impacted water from the stockpile seepage collections, pit dewatering systems, impacted stormwater runoff collection points, and groundwater collected from seepage collection and interceptor well systems will also be distributed within this system for the first five years of operation. In year 6, these impacted waters will be conveyed to the water treatment system.

4.1 Recirculation System

As part of the recirculation system, the existing mine process solution distribution system will be utilized to recirculate all impacted water and residual process solutions to be evaporated to the top surface areas of the 2A, 2C, 3A, 4A, 4B, 4C, 6B, 6C, 7B and the Savanna Pit leach stockpiles (or portions thereof) for six years. Evaporation will mostly occur at the top surface of the leach stockpiles and to a lesser amount at the surface impoundments, overflow ponds and tanks listed in **Table 3**. The impacted waters and 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 PSE system operation, 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 percent of their maximum capacities, the transfer is complete. This is the assumed maximum fill level and operational level for these facilities for the 6 year PSE 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 2A, 2C, 3A, 4A, 4B, 4C, 6B, 6C 7B and the Savanna Pit leach stockpiles through the existing raffinate distribution system. Residual process solutions that are not evaporated will drain through the stockpiles and be pumped through the existing distribution system back to the SX/EW feed pond to complete the recirculation loop. Impacted water from the stockpile seepage collections, pit dewatering systems, impacted stormwater runoff collection points, and groundwater collected from seepage collection and interceptor well systems will also be distributed within this system for the first five years of operation. In year 6, these impacted waters will be conveyed to the water treatment system.

4.2 Forced Spray and Drip Irrigation System

The PSE system will utilize a forced evaporation system and the existing PLS drip systems to maximize the evaporation rate of the impacted water and residual process solutions distributed to the top surface areas of the 2A, 2C, 3A, 4A, 4B, 4C, 6B, 6C, 7B and the Savanna Pit leach stockpiles. Forced evaporation of process water will be accomplished with a mechanical spray system designed to handle flows up to 380 gpm per unit. Additional evaporation will occur from the top surface of the stockpiles from the existing drip irrigation system at Tyrone, and at the surfaces of the surface impoundments, overflow ponds and tanks. The stockpile areas that will be utilized for both drip irrigation and forced spray evaporation are provided in **Table 4** and shown on **Figure 1**. The surface impoundments and overflow ponds and tanks to be utilized in the PSE system are included in **Table 3**. 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. **Tables 5 and 6** outline the estimated quantity of impacted water and residual process solutions that will be handled as part of the PSE system, and **Table 7** provides a summary of the estimated flows and water quality associated with the existing and future planned seepage collection systems and groundwater interceptor systems at the mine.

The PSE system is estimated to require 67 months of operation, with the stockpile top surface area requirements falling each year of operation. During the first year of PSE system operation it is assumed that evaporation of the impacted water and residual process solutions will occur through drip irrigation alone. During this first year, the mechanical forced spray systems will be installed on top of the 6B and Savanna Pit leach stockpiles and will be fully operational by the beginning of year 2 of PSE system operation. The forced spray evaporation and drip irrigation evaporation systems will operate concurrently for years 2 through 6. As shown on **Table 4**, approximately 500 acres of stockpile top surface area is required for PSE system operation during the first year of operation. The stockpile top surface area requirements drop off to 235 acres in year 2, 190 acres in year 3, 160 acres in year 4, and 110 acres in years 5 and 6.

4.3 Water Quality

The water quality of the impacted water sources and residual process solutions is estimated to be the same as that which is currently collected from the individual sources listed in Section 3.1. Changes in concentration and pH of the impacted water sources and recirculated process solutions are not expected to adversely impact the operation of the evaporation system.

5.0 CONCLUSION

The PSE system incudes recirculation, forced spray evaporation and drip irrigation as a means to eliminate impacted water and residual process solutions that are expected to be present at mine closure. The PSE system utilizes evaporation for streams which exhibit high concentrations of constituents of concern and can be readily isolated for diversion. This includes: leached stockpile drain down; groundwater inflows in the open pits; seepage from waste rock and leach stockpiles; groundwater extracted from interceptor systems; impacted surface water runoff; and residual process solutions at the mine. Using the combined evaporation system for these streams allows for optimization of operational costs for six years. At the end of year five, as the drain down solution volumes decrease significantly, all sources of impacted water from surface water runoff from uncovered areas, seepage from waste rock and leach stockpiles, groundwater inflows into the open pits, and groundwater extracted from interceptor systems are routed to the water treatment plant. The recirculated process solutions from the areas utilized in the PSE system continue to be handled and evaporated through the 67th month of PSE system operation.

6.0 REFERENCES

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TABLES

Table 1: Operational Status of Solution Management System

Unit		Status	
		Current (2012)	Base Case (2014)
Waste Rock Stockpile Facilities	No. 1C Waste Stockpile	Reclaimed	Reclaimed
	No. 2B Waste Stockpile	Not Actively Leached	Not Actively Leached
	No. 3B Waste Stockpile	Not Actively Leached	Not Actively Leached
	No. 5A Waste Stockpile	Not Actively Leached	Not Actively Leached
	No. 7A Waste Stockpile	Reclaimed	Reclaimed
	No. 8C Waste Stockpile	Not Actively Leached	Not Actively Leached
	No. 9A Waste Stockpile	Not Actively Leached	Not Actively Leached
Leach Stockpile Facilities	No. 1 Leach Stockpile	Reclaimed	Reclaimed
	No. 1A Leach Stockpile	Actively Leached	Actively Leached
	No. 1B Leach Stockpile	Actively Leached	Actively Leached
	No. 2A Leach Stockpile	Actively Leached	Actively Leached
	No. 2B Leach Stockpile	Not Leached Since 2002	Not Leached Since 2002
	No. 2C Leach Stockpile	Actively Leached	Actively Leached
	No. 3A Leach Stockpile	Actively Leached	Actively Leached
	No. 4A Leach Stockpile	Actively Leached	Actively Leached
	No. 4B Leach Stockpile	Actively Leached	Actively Leached
	No. 4C Leach Stockpile	Actively Leached	Actively Leached
	No. 4D Leach Stockpile	Not Present in 2012	Actively Leached
	Copper Mountain Leach Stockpile	Partially Reclaimed	Reclaimed
	East Main Pit Leach Stockpile (No. 6B)	Actively Leached	Actively Leached
	Gettysburg Pit Leach Stockpile (In Pit, Out Pit) (No.6C)	Actively Leached	Actively Leached
	No. 6D Leach Stockpile	Actively Leached	Actively Leached
	Savannah In-Pit Leach Stockpile	Not Present in 2012	Actively Leached

Table 1: Operational Status of Solution Management System

Unit		Status	
		Current (2012)	Base Case (2014)
Process Water Storage/Management Facilities	No. 1A Leach Stockpile Overflow Impoundment	Process water storage/management	Process water storage/management
	No. 1A Leach PLS AST	Process water storage/management	Process water storage/management
	No. 1B Leach Stockpile Overflow Impoundment	Process water storage/management	Process water storage/management
	No. 1B Leach PLS AST	Process water storage/management	Process water storage/management
	No. 2 PLS Collection Impoundment	Process water storage/management	Process water storage/management
	No. 2A East PLS AST	Process water storage/management	Process water storage/management
	No. 2A West PLS AST	Process water storage/management	Process water storage/management
	No. 2A Decant Pond	Process water storage/management	Process water storage/management
	No. 3A PLS Collection Impoundment	Process water storage/management	Process water storage/management
	No. 3A Overflow Impoundment	Process water storage/management	Process water storage/management
	4C PLS Collection Pond	Process water storage/management	Process water storage/management
	6C PLS Collection Pond	Process water storage/management	Process water storage/management
	6150 Pond	Process water storage/management	Process water storage/management
	North Racket PLS Pond	Process water storage/management	Process water storage/management
	East Main Booster Pond	Process water storage/management	Process water storage/management
	Pennington Pond	Process water storage/management	Process water storage/management
	Plant Oxidation Pond (a)	wastewater storage/management	Process water storage/management
	Plant Oxidation Pond (b)	wastewater storage/management	Process water storage/management
	Savanna Booster Pond[4]	Process water storage/management	Process water storage/management
	SX/EW PLS Feed Pond	Process water storage/management	Process water storage/management
	Main Pit Lake/Sump	Process water storage/management	Process water storage/management
	Copper Mountain Pit Lake/Sump	Process water storage/management	Process water storage/management
	Gettysburg Pit Lake/Sump	Process water storage/management	Process water storage/management

Table 1: Operational Status of Solution Management System

Unit		Status	
		Current (2012)	Base Case (2014)
Environmental Systems Water Storage/Management Facilities	No. 1 Leach Stockpile Seepage Collection AST	Seepage collection water storage/ management	Seepage collection water storage/ management
	No. 1 Leach Stockpile Overflow Impoundment	Seepage collection water storage /management	Seepage collection water storage/ management
	5E Seepage Collection Pond	Seepage collection water storage/ management	Seepage collection water storage/ management
	1X Tailing Seepage Collection Pond	Seepage collection water storage/ management	Seepage collection water storage/ management
	SPCC Pond	Stormwater storage/management	Process water storage/management

Table 2: Inventoried Process Solutions at the Beginning of the PSE System Operation[2]

Parameter	Volume gallons
PLS Surface Impoundments	12,046,700
PLS Overflow Impoundments[1]	10,872,200
Average Circulated Inventory	1,534,515,900
Surface Impoundments (at the beginning of the PSE system operation)	
Location	Estimated Volume at Start of Evaporation Program (gallons)
No. 1A Leach Stockpile Overflow Impoundment	#N/A
No. 1A Leach PLS AST	14,280
No. 1B Leach Stockpile Overflow Impoundment	#N/A
No. 1B Leach PLS AST	28,200
No. 2 PLS Collection Impoundment	2,980,657
No. 2A East PLS AST	30,000
No. 2A West PLS AST	90,000
No. 3A PLS Collection Impoundment	4,905,406
No. 3A Overflow Impoundment	#N/A
4C PLS Collection Pond	#N/A
6C PLS Collection Pond	#N/A
6150 Pond	900,000
North Racket PLS Pond	2,230,446
East Main Booster Pond	267,700
Pennington Pond	#N/A
SX/EW PLS Feed Pond	600,000
Sub Total	*12,046,689*
Rounded Total	***12,046,700***
Average Circulated Inventory (ACI) (at the beginning of the PSE system operation)	
Initial Raffinate Flow (gpm)	28,600
Make-Up Water Requirement	8%
PLS from Stockpile Diminish	10%
PLS from Stockpile Diminish Duration (days)	45
Sub Total	*1,534,515,840*
Rounded Total	***1,534,515,900***

Notes:
[1] – Residual process solutions would be added to the PLS overflow impoundments at the beginning of the PSE system operation and this volume is subtracted from the projected inventoried process water volume.
[2] – Inventoried Process Solutions = Water in PLS impoundments/tanks (12,046,700 gal.) - PLS added to empty overflow ponds (10,872,200 gal.) + Average Circulated Inventory (1,534,515,900 gal.).

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Table 3: P L S Impoundment/Pond Evaporation Schedule

Location	Impoundment Surface Area (acres)	Calculated Impoundment Water Surface Area[1] (acres)	Estimated Capacity (Gallons)	Estimated Impoundment Volume at Start of Evaporation Program[2] (gallons)	Average Annual Evaporation (gallons per year)[3]	Estimated Number of Years to Complete Evaporation
No. 1A Leach Stockpile Overflow Impoundment[4]	0.9	0.75	3,618,781	2,171,269	1,020,017	2.1
No. 1A Leach PLS AST[5,6]	0.01	0.01	23,800	14,280	13,600	1.0
No. 1B Leach Stockpile Overflow Impoundment[4]	1.24	1.00	5,712,472	3,427,483	1,364,102	2.5
No. 1B Leach PLS AST[5,6]	0.02	0.02	47,000	28,200	27,200	1.0
No. 2 PLS Collection Impoundment [4]	0.99	0.78	4,967,761	2,980,657	1,056,737	2.8
No. 2A East PLS AST[5,6]	0.01	0.01	50,000	30,000	13,600	2.2
No. 2A West PLS AST[5,6]	0.01	0.01	150,000	90,000	13,600	6.6
No. 3A PLS Collection Impoundment [4]	1.67	1.34	8,175,677	4,905,406	1,822,430	2.7
No. 3A Overflow Impoundment [4]	1.43	1.13	6,717,297	4,030,378	1,536,825	2.6
4C PLS Collection Pond[4]						
6C PLS Collection Pond[4]						
6150 Pond [7]	0.46	0.28	1,500,000	900,000	375,366	2.4
North Racket PLS Pond[8]	0.93	0.56	3,717,410	2,230,446	758,893	2.9
East Main Booster Pond[4]	0.16	0.10	446,167	267,700	130,562	2.1
Pennington Pond[4]	0.49	0.37	2,071,693	1,243,016	505,928	2.5
SX/EW PLS Feed Pond[6]	0.39	0.23	1,000,000	600,000	318,245	1.9
Total	**8.71**	**6.59**	**38,198,058**	**22,918,835**	**8,957,108**	

Notes:

[1] - Operational water surface areas for impoundments/ponds is based on stage-storage curves provided by FMI assuming they are at 60 percent of capacity at the start of the evaporation program. For impoundments/ponds that do not have stage-storage curves, the surface areas are assumed to be 60 percent of the impoundment surface areas, tank surface areas remain the same.

2 - Estimated impoundment volumes at start of evaporation program are assumed to be 60 percent of the capacities for impoundments and tanks. For overflow ponds, it is assumed that PLS will be added to the ponds at the start of the evaporation program from the PLS circuit (i.e., there is no PLS present in the overflow ponds during mine operations).

3 - Mean annual evaporation of 93.85 inches calculated from historical pan evaporation data from the Tyrone Mine (Tailing Dam #1, Tailing Dam #3, and No. 1A Stockpile). Mean annual evaporation for the surface impoundments was estimated at 65.7 inches by applying a pan coefficient of 0.70. Total evaporation from surface impoundments of 50.09 inches accounts for long-term (1897 to 2011) average annual precipitation of 15.61 inches reported for the Fort Bayard weather station.

4 - Based on Tyrone pond capacity and surface area spreadsheets provided by Bret Ashford and Dick Thornburg of FMI on 8/23/2012. The 4C and 6C PLS collection ponds are actually collection points with drains at the base and do not store PLS.

5 - Based on information provided in Table 3-3 of Conceptual Site-Wide Water Balance Model for the Tyrone Mine (Golder, 2011).

6 - Based on pond dimensions and capacities provided by Chuck Johnson and Dick Thornburg of FMI on 8/22/2012 and 8/24/2012.

7 - 20120820_Savanna_Waste_Stockpile_Development_-_Conceptual[1] pdf sent by Chuck Johnson on August 21, 2012. The 6150 Pond is a replacement of the 7B PLS Pond.

8 - Based on information provided in “Pond Capacity Calc.xlsx” from FMI, represents active capacity of pond.

Table 4: 2014 Process Solution Elimination System Schedule and Areas Utilized at the Tyrone Mine

Leach Stockpile Facility	Top Surface Area (acres)	Outslope Area (acres)	Year 1 (acres)		Year 2 (acres)		Year 3 (acres)		Year 4 (acres)		Year 5 (acres)		Year 6 (acres)	
			Drip Irrigation	Forced Spray Evaporation	Drip Irrigation	Forced Spray Evaporation	Drip Irrigation	Forced Spray Evaporation	Drip Irrigation	Forced Spray Evaporation	Drip Irrigation	Forced Spray Evaporation	Drip Irrigation	Forced Spray Evaporation
1A/1B	26	280												
2A/2B	102	320	8											
2B	9	68												
2C/4A/4B/7B	230	324	230		129		80		50		50		50	
3A/3B	43	368	43											
4C	92	113	86											
6B	50	55	50			50		50		50				
6C	28	52	28											
8C	48	166												
Savanna Pit	56	117	55			56		56		56		56		
Total Area (acres)			**500**	**0**	**129**	**106**	**80**	**106**	**50**	**106**	**50**	**56**	**50**	**56**

Table 5. Post Mining Water Management and Water Treatment Flow Rates - Process Solution Elimination System Followed By Water Treatment Plant Operations
100-Year Water Handling Plan with Water Treatment Plan
Tyrone 2012 Closure/Closeout Plan

Year Following Closure	Evaporation Schedule				System Inflows - Impacted Water									Water Treatment Schedule		
	Evaporation System Water Flow Rates			Water to be Evaporated	Pit Water In-flows						Stockpile Water In-flows			Total Impacted Water Flows	Water Treatment Schedule	Water For Beneficial Use
	(1) Evaporation System Flow Rate (gpm)	(2) Evaporation System Water Loss (gallons per year)	(3) Impacted Water Included In Evaporation System Flow Rate (gpm)	(4) Water in Storage at the End of Year (gallons)	(5) Main Pit Groundwater Inflow (gpm)	(6) Gettysburg Pit Groundwater Inflow (gpm)	(7) Copper Mountain Pit Groundwater Inflow (gpm)	(8) Main Pit Storm Water Run-on Inflow (gpm)	(9) Gettysburg Pit Storm Water Run-on Inflow (gpm)	(10) Copper Mt. Pit Storm Water Run-on Inflow (gpm)	(11) Storm Water Run-Off Outside Waiver Area (gpm)	(12) Flow from Toe Collections and GW Interceptor Systems (gpm)	(13) Residual PLS Following PSE System Operations (gpm)	(14) Combined Impacted Water Flow Rate (gpm)	(15) Flow Rate to Water Treatment Plant (gpm)	(16) Total Water Flow Rate to Beneficial Use (gpm)
1	28,600	1,244,672,114	2,103	1,396,355,086	1,425	61	56	75	6	8	159	312	-	2,103	-	-
2	21,363	1,507,324,252	2,086	985,432,434	1,416	61	51	75	6	8	159	309	-	2,086	-	-
3	15,021	1,384,528,762	2,071	689,421,271	1,407	60	48	75	6	8	159	306	-	2,071	-	-
4	10,453	1,310,385,920	2,056	459,668,951	1,399	60	45	75	6	8	159	303	-	2,056	-	-
5	6,908	923,418,818	2,042	609,525,333	1,391	59	42	75	6	8	159	301	-	2,042	-	-
6	9,220	923,418,818	-	-	1,383	59	40	75	6	8	159	298	-	2,028	2,028	2,028
7		-		-	1,375	58	39	75	6	8	159	295	20	2,035	2,035	2,035
8		-		-	1,093	58	38	75	6	8	159	292	20	1,749	1,749	1,749
9		-		-	1,085	57	36	75	6	8	159	289	20	1,736	1,736	1,736
10		-		-	1,078	56	35	75	6	8	159	286	20	1,724	1,724	1,724
11		-		-	1,070	56	34	75	6	8	159	268	20	1,697	1,697	1,697
12		-		-	1,063	55	33	75	6	8	159	265	20	1,685	1,685	1,685
13		-		-	990	54	31	68	7	8	-	262	20	1,440	1,440	1,440
14				-	983	53	30	68	7	8	-	256	20	1,426	1,426	1,426
15				-	976	53	29	68	7	8	-	251	20	1,412	1,412	1,412
16				-	969	52	28	68	7	8	-	246	20	1,398	1,398	1,398
17				-	962	51	27	68	7	8	-	241	5	1,369	1,369	1,369
18				-	940	50	26	68	7	8	-	236	5	1,340	1,340	1,340
19				-	933	50	25	68	7	8	-	232	5	1,327	1,327	1,327
20				-	926	49	24	68	7	8	-	229	5	1,316	1,316	1,316
21				-	920	48	23	68	7	8	-	227	5	1,306	1,306	1,306
22				-	914	47	22	68	7	8	-	225	5	1,296	1,296	1,296
23				-	908	46	21	68	7	8	-	222	5	1,286	1,286	1,286
24				-	903	46	20	68	7	8	-	220	5	1,277	1,277	1,277
25				-	898	45	19	68	7	8	-	218	5	1,268	1,268	1,268
26				-	893	44	18	68	7	8	-	215	5	1,259	1,259	1,259
27				-	889	44	17	68	7	8	-	213	-	1,246	1,246	1,246
28				-	880	43	16	68	7	8	-	211	-	1,234	1,234	1,234
29				-	876	43	16	68	7	8	-	208	-	1,226	1,226	1,226
30				-	872	42	15	68	7	8	-	206	-	1,219	1,219	1,219
31				-	868	42	14	68	7	8	-	204	-	1,212	1,212	1,212
32				-	865	41	14	68	7	8	-	201	-	1,205	1,205	1,205
33				-	862	41	13	68	7	8	-	200	-	1,199	1,199	1,199
34				-	859	40	13	68	7	8	-	200	-	1,195	1,195	1,195
35				-	856	40	12	68	7	8	-	200	-	1,191	1,191	1,191
36				-	853	39	12	68	7	8	-	200	-	1,187	1,187	1,187
37				-	850	39	11	68	7	8	-	200	-	1,183	1,183	1,183
38				-	847	38	11	68	7	8	-	200	-	1,180	1,180	1,180
39				-	845	38	10	68	7	8	-	200	-	1,176	1,176	1,176
40				-	842	37	10	68	7	8	-	200	-	1,173	1,173	1,173
41				-	840	37	9	68	7	8	-	200	-	1,170	1,170	1,170
42				-	838	37	9	68	7	8	-	200	-	1,167	1,167	1,167
43				-	835	36	8	68	7	8	-	200	-	1,164	1,164	1,164
44				-	833	36	8	68	7	8	-	200	-	1,161	1,161	1,161
45				-	831	36	8	68	7	8	-	200	-	1,158	1,158	1,158
46				-	829	35	7	68	7	8	-	200	-	1,155	1,155	1,155

Table 5. Post Mining Water Management and Water Treatment Flow Rates - Process Solution Elimination System Followed By Water Treatment Plant Operations
100-Year Water Handling Plan with Water Treatment Plan
Tyrone 2012 Closure/Closeout Plan

Year Following Closure	Evaporation Schedule				System Inflows - Impacted Water									Water Treatment Schedule		
	Evaporation System Water Flow Rates			Water to be Evaporated	Pit Water In-flows						Stockpile Water In-flows			Total Impacted Water Flows	Water Treatment Schedule	Water For Beneficial Use
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Evaporation System Flow Rate (gpm)	Evaporation System Water Loss (gallons per year)	Impacted Water Included In Evaporation System Flow Rate (gpm)	Water in Storage at the End of Year (gallons)	Main Pit Groundwater Inflow (gpm)	Gettysburg Pit Groundwater Inflow (gpm)	Copper Mountain Pit Groundwater Inflow (gpm)	Main Pit Storm Water Run-on Inflow (gpm)	Gettysburg Pit Storm Water Run-on Inflow (gpm)	Copper Mt. Pit Storm Water Run-on Inflow (gpm)	Storm Water Run-Off Outside Waiver Area (gpm)	Flow from Toe Collections and GW Interceptor Systems (gpm)	Residual PLS Following PSE System Operations (gpm)	Combined Impacted Water Flow Rate (gpm)	Flow Rate to Water Treatment Plant (gpm)	Total Water Flow Rate to Beneficial Use (gpm)
47				-	827	35	7	68	7	8	-	200	-	1,153	1,153	1,153
48				-	825	35	7	68	7	8	-	200	-	1,150	1,150	1,150
49				-	823	34	6	68	7	8	-	200	-	1,148	1,148	1,148
50				-	823	34	6	68	7	8	-	200	-	1,146	1,146	1,146
51				-	823	34	5	68	7	8	-	82	-	1,027	1,027	1,027
52				-	822	33	5	68	7	8	-	82	-	1,026	1,026	1,026
53				-	822	33	5	68	7	8	-	82	-	1,025	1,025	1,025
54				-	821	33	5	68	7	8	-	82	-	1,024	1,024	1,024
55				-	820	33	4	68	7	8	-	82	-	1,022	1,022	1,022
56				-	819	32	4	68	7	8	-	82	-	1,021	1,021	1,021
57				-	818	32	4	68	7	8	-	82	-	1,019	1,019	1,019
58				-	817	32	3	68	7	8	-	82	-	1,018	1,018	1,018
59				-	816	32	3	68	7	8	-	82	-	1,016	1,016	1,016
60				-	814	32	3	68	7	8	-	82	-	1,014	1,014	1,014
61				-	813	31	3	68	7	8	-	82	-	1,012	1,012	1,012
62				-	811	31	2	68	7	8	-	82	-	1,010	1,010	1,010
63				-	810	31	2	68	7	8	-	82	-	1,008	1,008	1,008
64				-	808	31	2	68	7	8	-	82	-	1,007	1,007	1,007
65				-	807	31	2	68	7	8	-	82	-	1,005	1,005	1,005
66				-	806	30	1	68	7	8	-	82	-	1,003	1,003	1,003
67				-	804	30	1	68	7	8	-	82	-	1,001	1,001	1,001
68				-	803	30	1	68	7	8	-	82	-	1,000	1,000	1,000
69				-	802	30	1	68	7	8	-	82	-	998	998	998
70				-	801	30	1	68	7	8	-	82	-	996	996	996
71				-	799	29	0	68	7	8	-	82	-	995	995	995
72				-	798	29	0	68	7	8	-	82	-	993	993	993
73				-	797	29	0	68	7	8	-	82	-	992	992	992
74				-	796	29	0	68	7	8	-	82	-	991	991	991
75				-	795	29	0	68	7	8	-	82	-	989	989	989
76				-	794	29	0	68	7	8	-	82	-	988	988	988
77				-	793	29	0	68	7	8	-	82	-	987	987	987
78				-	792	28	0	68	7	8	-	82	-	986	986	986
79				-	791	28	0	68	7	8	-	82	-	985	985	985
80				-	790	28	0	68	7	8	-	82	-	984	984	984
81				-	789	28	0	68	7	8	-	82	-	983	983	983
82				-	788	28	0	68	7	8	-	82	-	981	981	981
83				-	787	28	0	68	7	8	-	82	-	980	980	980
84				-	786	28	0	68	7	8	-	82	-	979	979	979
85				-	785	27	0	68	7	8	-	82	-	978	978	978
86				-	785	27	0	68	7	8	-	82	-	977	977	977
87				-	784	27	0	68	7	8	-	82	-	976	976	976
88				-	783	27	0	68	7	8	-	82	-	976	976	976
89				-	782	27	0	68	7	8	-	82	-	975	975	975
90				-	781	27	0	68	7	8	-	82	-	974	974	974
91				-	781	27	0	68	7	8	-	82	-	973	973	973
92				-	780	27	0	68	7	8	-	82	-	972	972	972

Table 5. Post Mining Water Management and Water Treatment Flow Rates - Process Solution Elimination System Followed By Water Treatment Plant Operations
100-Year Water Handling Plan with Water Treatment Plan
Tyrone 2012 Closure/Closeout Plan

Year Following Closure	Evaporation Schedule				System Inflows - Impacted Water									Water Treatment Schedule		
	Evaporation System Water Flow Rates			Water to be Evaporated	Pit Water In-flows						Stockpile Water In-flows			Total Impacted Water Flows	Water Treatment Schedule	Water For Beneficial Use
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Evaporation System Flow Rate (gpm)	Evaporation System Water Loss (gallons per year)	Impacted Water Included In Evaporation System Flow Rate (gpm)	Water in Storage at the End of Year (gallons)	Main Pit Groundwater Inflow (gpm)	Gettysburg Pit Groundwater Inflow (gpm)	Copper Mountain Pit Groundwater Inflow (gpm)	Main Pit Storm Water Run-on Inflow (gpm)	Gettysburg Pit Storm Water Run-on Inflow (gpm)	Copper Mt. Pit Storm Water Run-on Inflow (gpm)	Storm Water Run-Off Outside Waiver Area (gpm)	Flow from Toe Collections and GW Interceptor Systems (gpm)	Residual PLS Following PSE System Operations (gpm)	Combined Impacted Water Flow Rate (gpm)	Flow Rate to Water Treatment Plant (gpm)	Total Water Flow Rate to Beneficial Use (gpm)
93				-	779	27	0	68	7	8	-	82	-	971	971	971
94				-	778	26	0	68	7	8	-	82	-	970	970	970
95				-	778	26	0	68	7	8	-	82	-	969	969	969
96				-	777	26	0	68	7	8	-	82	-	969	969	969
97				-	776	26	0	68	7	8	-	82	-	968	968	968
98				-	775	26	0	68	7	8	-	82	-	967	967	967
99				-	775	26	0	68	7	8	-	82	-	966	966	966
100				-	774	26	0	68	7	8	-	82	-	965	965	965

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 28,600 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 existing leach drip system as an evaporation system in combination with new spray systems 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 operations and it will be reduced as the water in storage is depleted.

(2) - "Evaporation Sytem Water Water Loss" (EWL) is based on daily potential evaporation from UNSAT-H Model Run 3 No Plants, 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. Assume 12 and 8 spray units will be employed Evaporation from PLS surface impoundments/tanks is also included as well as the average annual precipitation (15.61 inches) on the stockpile areas under drip. A pan coefficient of 0.7 was applied to pan evaporation data for surface impoundment evaporation estimates. Drip System only in Year 1 with 500 acres under drip. Requires a 12 spray system operating for years 2 through 4, 8 spray system operating for years 5 and 6. Drip areas (yr 1: 500 acres; yr 2: 129 acres; yr 3: 80 acres; yrs 4 through 6: 50acres).

(3) - For Years 1 through 5, Total Combined Impacted Water In-flow (column-14) will be included in the evaporation sytem. For Years-6 through Year-100, Total Combined Impacted Water In-Flow (column-14) will be included in the Flow Rate to Water Treatment Plant

(4) - Water in Storage at the end of a year in the schedule. Initial "Water in Storage" (WIS) = Water in PLS impoundments/tanks (12,046,689 gal.) - PLS added to empty overflow ponds (10,872,146 gal.) plus "Average Circulated Inventory" (ACI). "Average Circulated Inventory" (ACI) is calculated based on experience with leach operations which show that when raffinate application is stopped, PLS flow rates from stockpiles diminish to 10% of the full application flow rate in 45 days. Make-up water requirement = 8% of Raffinate Flow Rate during leaching (Therefore 92% of the Raffinate Flow Rate reports to PLS.). For an initial raffinate flow rate of 28,600 gallons per minute (average measured flow rates for 2010 and 2011), the ACI is calculated as follows: ((28,600 gpm x 92%) x 60 min/hr x 24 hr/day x 45 day drain-down cycle) x 0.90 = 1,534,515,840 gallons. And the initial water in storage can be calculated as follows: Initial "Water in Storage" = (12,046,689 - 10,872146 + 1,534,515,840) gallons = 1,535,690,383 gallons (1,535,690,400 gal. rounded).

(5) - Sources of water in-flow to the system related to the Main Pit groundwater inflows and the estimated flow rates based on DBS&A Stage 2 Abatement Plan GW flow model updated with 2014 base case mine plan configuration and associated regrade plan.

(6) - Sources of water in-flow to the system related to the Gettysburg Pit groundwater inflows and the estimated flow rates based on DBS&A Stage 2 Abatement Plan GW flow model updated with 2014 base case mine plan configuration and associated regrade plan.

(7) - Sources of water in-flow to the system related to the Copper Mountain Pit groundwater inflows and the estimated flow rates based on DBS&A Stage 2 Abatement Plan GW flow model updated with 2014 base case mine plan configuration and associated regrade plan.

(8) - Sources of water in-flow to the system related to the Main Pit storm water run-on and the estimated average flow rates for both 2014 base-case (uncovered stockpile surfaces Yrs 1 through 12) and post closure periods (covered stockpile surfaces Yrs 13 though 100). Includes storm water run-on in Savanna Pit which is assumed to be pumped into Main Pit. (Golder, 2012)

(9) - Sources of water in-flow to the system related to the Gettysburg Pit storm water run-on and the estimated average flow rates for both 2014 base-case (uncovered stockpile surfaces Yrs 1 through 12) and post closure periods (covered stockpile surfaces Yrs 13 though 100). (Golder, 2012)

(10) - Sources of water in-flow to the system related to the Copper Mountain Pit storm water run-on and the estimated average flow rates for both 2014 base-case (uncovered stockpile surfaces Yrs 1 through 12) and post closure periods (covered stockpile surfaces Yrs 13 though 100). (Golder, 2012)

(11) - Sources of water in-flow to the system related to storm water run-off outside pit watershed areas and the estimated average flow rates for both 2014 base-case operational and post closure periods. Assumed all stockpiles are covered by year 20 and surface water runoff will be directed to natural drainages at this point. (Golder, 2012)

(12) - Sources of water in-flow to the system from the stockpile toe collections and groundwater interceptor systems and the estimated average flow rate of each source. The flow volumes for first five years will be included in the evaporation system flow rate. After the fifth year the flow will report to the water treatment plant. Estimated flows and water quality for these systems is presented in Table 7.

(13) - Water in-flow to the system related to the residual PLS draindown from the leach stockpiles following the 6 years of process solution elimination operations and the estimated average flow rate. Residual PLS draindown is assumed to be 20 gpm between years 7 through 16, and then 5 gpm between years 17 through 26. The residual PLS draindown is assumed to report to water treatment plant.

(14) - Combined Impacted Water In-Flow Rate (CIW) is total of in-flows columns, column-5 through column-13.

(15) - Flow Rate to Water Treatment Plant is the flow rate that is the basis for determining the WTP operating cost.

(16) - Treated water flow rate going to beneficial use

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Table 6: PSE Water Management Flow Rates

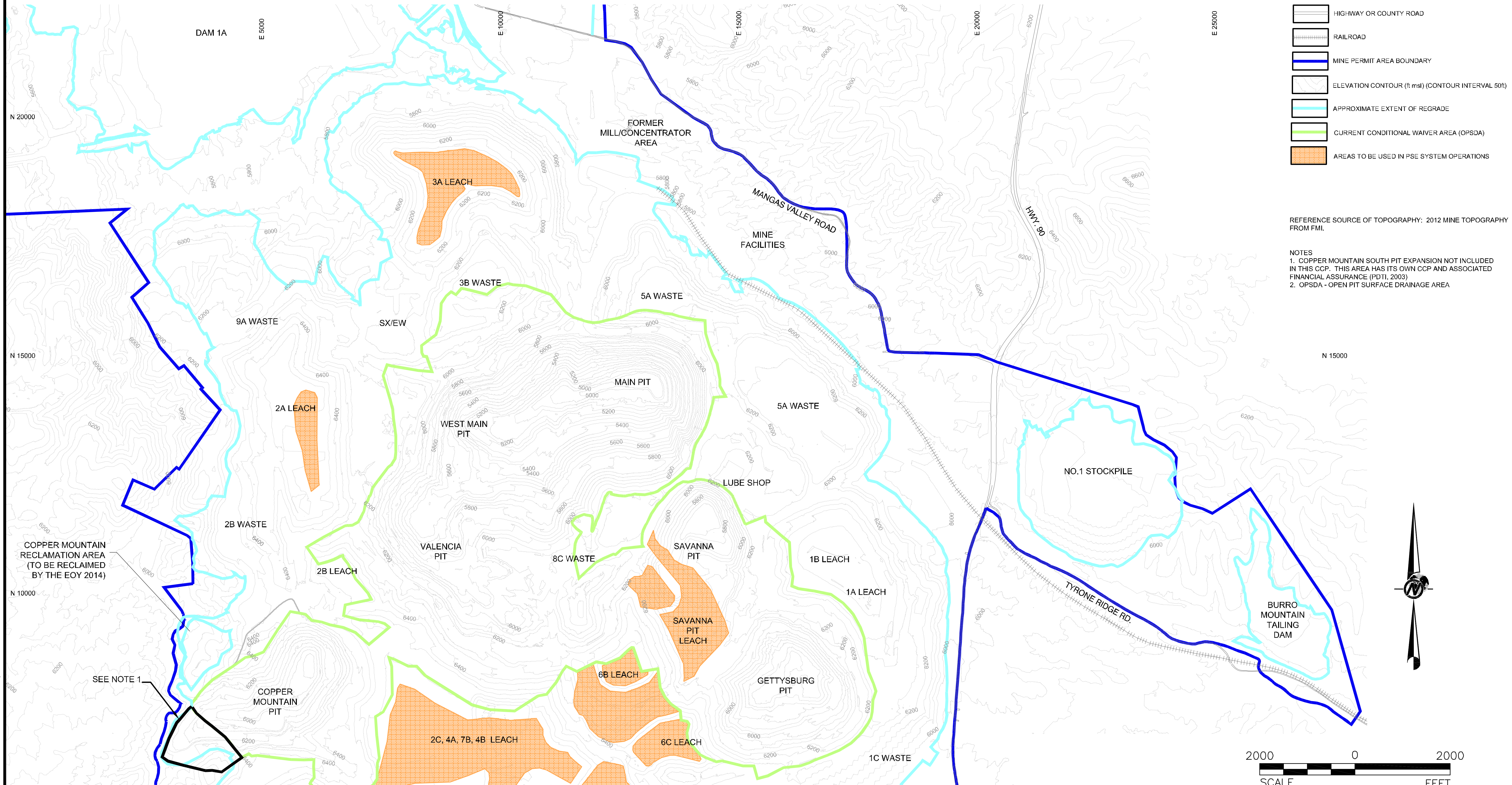
Month	Evaporation System Flow Rate	Evaporation System Water Loss	Spray Hours/Month	Evaporation Rate	Evaporated Volume	Impacted Water Included in Evaporation System Flow	Water Addition Volume to System	Water In Storage at Start of Period
	gpm	%	hrs	gpm	gal	gpm	gal	gal
0								1,534,515,900
1	28,600	8%	744	2,368	105,711,878	2103	93,877,920	1,522,681,942
2	28,600	8%	672	2,368	95,481,696	2103	84,792,960	1,511,993,205
3	28,600	8%	744	2,368	105,711,878	2103	93,877,920	1,500,159,247
4	28,600	8%	720	2,368	102,301,818	2103	90,849,600	1,488,707,030
5	28,600	8%	744	2,368	105,711,878	2103	93,877,920	1,476,873,071
6	28,600	8%	720	2,368	102,301,818	2103	90,849,600	1,465,420,854
7	28,600	8%	744	2,368	105,711,878	2103	93,877,920	1,453,586,896
8	28,600	8%	744	2,368	105,711,878	2103	93,877,920	1,441,752,937
9	28,600	8%	720	2,368	102,301,818	2103	90,849,600	1,430,300,720
10	28,600	8%	744	2,368	105,711,878	2103	93,877,920	1,418,466,762
11	28,600	8%	720	2,368	102,301,818	2103	90,849,600	1,407,014,544
12	28,600	8%	744	2,368	105,711,878	2103	93,877,920	1,395,180,586
13	21,363	13%	744	2,868	128,019,320	2086	93,119,040	1,360,280,306
14	21,363	13%	672	2,868	115,630,354	2086	84,107,520	1,328,757,472
15	21,363	13%	744	2,868	128,019,320	2086	93,119,040	1,293,857,192
16	21,363	13%	720	2,868	123,889,665	2086	90,115,200	1,260,082,728
17	21,363	13%	744	2,868	128,019,320	2086	93,119,040	1,225,182,447
18	21,363	13%	720	2,868	123,889,665	2086	90,115,200	1,191,407,983
19	21,363	13%	744	2,868	128,019,320	2086	93,119,040	1,156,507,703
20	21,363	13%	744	2,868	128,019,320	2086	93,119,040	1,121,607,423
21	21,363	13%	720	2,868	123,889,665	2086	90,115,200	1,087,832,958
22	21,363	13%	744	2,868	128,019,320	2086	93,119,040	1,052,932,678
23	21,363	13%	720	2,868	123,889,665	2086	90,115,200	1,019,158,214
24	21,363	13%	744	2,868	128,019,320	2086	93,119,040	984,257,934
25	15,021	18%	744	2,634	117,590,114	2071	92,449,440	959,117,260
26	15,021	18%	672	2,634	106,210,426	2071	83,502,720	936,409,554
27	15,021	18%	744	2,634	117,590,114	2071	92,449,440	911,268,880
28	15,021	18%	720	2,634	113,796,885	2071	89,467,200	886,939,195
29	15,021	18%	744	2,634	117,590,114	2071	92,449,440	861,798,521
30	15,021	18%	720	2,634	113,796,885	2071	89,467,200	837,468,837
31	15,021	18%	744	2,634	117,590,114	2071	92,449,440	812,328,163
32	15,021	18%	744	2,634	117,590,114	2071	92,449,440	787,187,488
33	15,021	18%	720	2,634	113,796,885	2071	89,467,200	762,857,804
34	15,021	18%	744	2,634	117,590,114	2071	92,449,440	737,717,130
35	15,021	18%	720	2,634	113,796,885	2071	89,467,200	713,387,445
36	15,021	18%	744	2,634	117,590,114	2071	92,449,440	688,246,771
37	10,453	24%	744	2,493	111,293,051	2056	91,779,840	668,733,560
38	10,453	24%	672	2,493	100,522,756	2056	82,897,920	651,108,725
39	10,453	24%	744	2,493	111,293,051	2056	91,779,840	631,595,514
40	10,453	24%	720	2,493	107,702,952	2056	88,819,200	612,711,762
41	10,453	24%	744	2,493	111,293,051	2056	91,779,840	593,198,551
42	10,453	24%	720	2,493	107,702,952	2056	88,819,200	574,314,799
43	10,453	24%	744	2,493	111,293,051	2056	91,779,840	554,801,588
44	10,453	24%	744	2,493	111,293,051	2056	91,779,840	535,288,377
45	10,453	24%	720	2,493	107,702,952	2056	88,819,200	516,404,625
46	10,453	24%	744	2,493	111,293,051	2056	91,779,840	496,891,414
47	10,453	24%	720	2,493	107,702,952	2056	88,819,200	478,007,662
48	10,453	24%	744	2,493	111,293,051	2056	91,779,840	458,494,451
49	6,908	25%	744	1,757	78,427,352	2042	91,154,880	471,221,979
50	6,908	25%	672	1,757	70,837,608	2042	82,333,440	482,717,812
51	6,908	25%	744	1,757	78,427,352	2042	91,154,880	495,445,340
52	6,908	25%	720	1,757	75,897,437	2042	88,214,400	507,762,303
53	6,908	25%	744	1,757	78,427,352	2042	91,154,880	520,489,831
54	6,908	25%	720	1,757	75,897,437	2042	88,214,400	532,806,794
55	6,908	25%	744	1,757	78,427,352	2042	91,154,880	545,534,322
56	6,908	25%	744	1,757	78,427,352	2042	91,154,880	558,261,851
57	6,908	25%	720	1,757	75,897,437	2042	88,214,400	570,578,814
58	6,908	25%	744	1,757	78,427,352	2042	91,154,880	583,306,342
59	6,908	25%	720	1,757	75,897,437	2042	88,214,400	595,623,305
60	6,908	25%	744	1,757	78,427,352	2042	91,154,880	608,350,833
61	9,220	19%	744	1,757	78,427,352	0	-	529,923,482
62	9,220	19%	672	1,757	70,837,608	0	-	459,085,874
63	9,220	19%	744	1,757	78,427,352	0	-	380,658,522
64	9,220	19%	720	1,757	75,897,437	0	-	304,761,085
65	9,220	19%	744	1,757	78,427,352	0	-	226,333,733
66	9,220	19%	720	1,757	75,897,437	0	-	150,436,296
67	9,220	19%	744	1,757	78,427,352	0	-	72,008,945
68	9,220	19%	744	1,757	78,427,352	0	-	-
69	9,220	19%	720	1,757	75,897,437	0	-	-
70	9,220	19%	744	1,757	78,427,352	0	-	-
71	9,220	19%	720	1,757	75,897,437	0	-	-
72	9,220	19%	744	1,757	78,427,352	0	-	-

Table 7: Estimated Flows and Water Quality Associated with Tyrone Seepage Collection Systems and Interceptor Wells (10/15/12)

Data Type	Locations and Data Sources																				
	No. 3 Stockpile												No. 1X	East Side							Deadman Canyon
	Regional Groundwater at Toe of Stockpile (Stockpile Drainage)						Perched Seepage Zone (Stockpile Drainage)	Regional Groundwater Outside of Toe of Stockpile					Regional Groundwater	Perched Seepage Zone						Regional Groundwater	Perched Seepage Zone
	Old Canyon 4	Old Canyon 7	Old Canyons 8 and 9	Old Canyons 10 and 11	Old Canyon 6	New Canyon 6 Area	Interceptor/Barrier Trenches	Trestle	Mangas Flats	L Line	New Collections North of Canyon 7	New Collections North of Canyons 10 and 11	1X Interceptor System	Oak Grove Interceptor/Barrier Trenches	Oak Grove/Brick Kiln Gulch Pumpback Collections	Upper Oak Grove and 1C Seepage Collection Systems	Future Oak Grove Wash Slurry Wall	No. 1B Stockpile Seepage Collections	No. 1 Stockpile Seepage Collection Systems	Future 1C Stockpile Area Extraction System	Existing and Planned Future Deadman Canyon Seepage Collection Systems
Pumping Wells/Collection Systems	286-2008-08	P-174, P-177, P-194, P-196, P-209, P-211, P-212	P-178, P-185, P-192, P-195, P-205, P-206, P-210, P-220, P-221, P-234, P-235	P-203, P-215, P-216, P-217, P-236, P-237, P-238, P-239, P-240, P-241	P-12A, P-182, P-188, P-189, P-198	286-2008-04, 286-2008-05	Canyons 1, 4, 5, 6, 7, 8, 10 and 11; Mangas Wash; Lower Canyons	P-30, P-39, P-40, P-41, P-42, P-53, P-76, P-162, P-164	P-29, P-33, P-38	P-54, P-55, P-56, P-57, P-70	286-2006-01, 286-2007-47, 286-2007-49, 286-2007-50, 286-2007-51	286-2007-21, 286-2007-23, 286-2007-25, 286-2007-27, 286-2007-29, 286-2007-31, 286-2007-33	1X Interceptor System	OGTU-1, OGTU-2, OGTU-3	Oak Grove Transects 1, 6, 7, 9	1C-T1,T2,T3; 7R-1A,1B,2A2B3A,4A	Future OGW Slurry Wall	1BU-1, 1BU-2	1-D1,D2,D3,D4,D5	Future Planned Extraction Well	Seeps 2,3,4,5E,DC2-1
Initial Flow Rate by Individual Collection (gpm)	0.42 (Average flow measured between 01/10 and 06/12)	0.01 (Average flow measured between 01/10 and 06/12)	0.15 (Average flow measured between 01/10 and 06/12)	6.32 (Average flow measured between 01/10 and 06/12)	2.1 (Average flow measured between 01/10 and 06/12)	14.98 (Average flow measured between 01/10 and 12/11)	8.81 (Average flow measured between 01/10 and 06/12)	0.71 (Average flow measured between 01/10 and 06/12)	0.09 (Average flow measured between 01/10 and 06/12)	5.07 (Average flow measured between 01/10 and 06/12)	26.85 (Average flow measured between 01/10 and 12/11)	30.38 (Average flow measured between 01/10 and 12/11)	9.9 (Average flow between 2005 and 2010 from Table C-2 of Stage II APP Report), gets shut off after 10 years (DBS&A)	36.1 (Average flow measured between 01/10 and 06/12)	1.27 (Average flow measured between 01/10 and 06/12)	43.50 (Average flow measured between 11/08 and 08/11) Linear Reduction of Flow to 39.48 at the EOY 2014	31 (Average flow estimated by DBS&A)	21.98 (Average flow measured between 01/10 and 06/12)	19.4 (Measured flows at the No. 1 AST between 01/11 and 05/12) Linear Reduction of Flow to 17.68 at the EOY 2014	50 (Estimated for future system)	5 (existing average); 5 (future system estimate by DBS&A)
Initial Flow Rate by Source (gpm)	32.79							0.71	0.09	5.07	26.85	30.38	9.90	36.1	1.27	39.48	31	21.98	17.68	50	10.0
Flow Rate at 20 Years Following Cover Placement (gpm)	5.18							0.71 (System to be shut off at year 50) (DBS&A)	0.00 (System to be shut off at year 10) (DBS&A)	0.00 (System to be shut off at year 10) (DBS&A)	26.85 (Systems to be shut off at year 50) (DBS&A)	30.38 (Systems to be shut off at year 50) (DBS&A)	0.0 (System to be shut off at year 10) (DBS&A)	36.1 (DBS&A)	1.27 (DBS&A)	3.3	31	3.06	2.2	30.38 (System to be shut off at year 50) (DBS&A)	4.6
Drainage Rate at 20 Years Following Cover Placement (in/yr)	0.22							NA	NA	NA	NA	NA	NA	NA	NA	0.22	NA	0.22	0.22	NA	0.22
Representative Water Quality	286-2008-08 (Concentrations from original sample collected from this well in 11/08) [SO4 = 1,890 mg/L; TDS = 3,200 mg/L]	P-196 (Average concentrations between 02/10 and 2/12) [SO4 = 11,800 mg/L; TDS = 18,400 mg/L]	P-178 (Average concentrations between 02/10 and 2/12) [SO4 = 19,000 mg/L; TDS = 29,500 mg/L]	P-203 (Average concentrations between 02/10 and 2/12) [SO4 = 1,366 mg/L; TDS =2,956 mg/L]	286-2008-04, 286-2008-05 (Average concentrations from original samples collected from these wells in 11/08) [SO4 = 21,850 mg/L; TDS = 39,000 mg/L]	286-2008-04, 286-2008-05 (Average concentrations from original samples collected from these wells in 11/08) [SO4 = 21,850 mg/L; TDS = 39,000 mg/L]	MV-4 (Average concentrations between 2007 and 2008) [SO4 = 464 mg/L; TDS = 750 mg/L]	P-14A (Average concentrations between 03/10 and 8/12) [SO4 = 667 mg/L; TDS = 1,318 mg/L]	6-2R (Average concentrations between 02/10 and 8/12) [SO4 = 574 mg/L; TDS = 1,094 mg/L]	P-49 (Average concentrations between 02/10 and 8/12) [SO4 = 499 mg/L; TDS = 874 mg/L]	286-2006-02, 286-2007-02, P-168, P-176 (Flow weighted average concentrations for each extraction well between 02/10 and 08/12) [SO4 = 774 mg/L; TDS = 1,635 mg/L]	286-2007-24, 286-2007-28, 286-2007-34 (Flow weighted average concentrations for each extraction well between 02/10 and 08/12) [SO4 = 496 mg/L; TDS = 1,350 mg/L]	Well 18 (Average concentrations between 01/10 and 06/12) [SO4 = 1,123 mg/L; TDS = 1,926 mg/L]	OGTU-1 (Average concentrations between 04/10 and 04/12) [SO4 = 59,300 mg/L; TDS = 82,640 mg/L]	OG-23, OG-25, OG-40, OG-46 (Average concentrations between 01/10 and 07/12) [SO4 = 3,804 mg/L; TDS = 5,974 mg/L]	396-2006-07 through 396-2006-12 (Average concentrations between 01/10 and 05/12) [SO4 = 9,344 mg/L; TDS = 14,540 mg/L]	OG-25 (Average 01/10 to 4/12 concentrations provided by DBS&A) [SO4 = 3,390 mg/L; TDS = 4,903 mg/L]	1BU-1, 1BU-2 (Average concentrations between 01/10 and 07/12) [SO4 = 45,590 mg/L; TDS = 70,100 mg/L]	896-2007-AST (Average concentrations between 04/10 and 04/12) [SO4 = 36,380 mg/L; TDS = 54,920 mg/L]	396-2006-02, MB15A, MB32, MB37 (Average concentrations between 01/10 and 07/12) [SO4 = 1,629 mg/L; TDS = 2,435 mg/L]	Seep 5E (Existing systems - average concentrations between 03/10 and 06/12); 166-2006-03 (Future system - average concentrations between 03/10 and 06/12) [SO4 = 617 mg/L; TDS = 955 mg/L]

Assumptions:
NA - not applicable.
The stockpiles are assumed to be regraded, covered and revegetated by the end of year 12 (2026).
For the No. 1 Stockpile, it is assumed that final cover placement occurred at the end of 2008
For the 1C/7A Stockpile Complex, it is assumed that final cover placement occurred at the end of 2009
The transition in the drainage rate from the uncovered to covered condition is assumed to occur over a 20 year period at which time the infiltration and drainage rates will be equal.
The drainage rate over the 20-year period is assumed to reduce linearly.
Only stockpiles with active seeps are included in the analysis, all other stockpiles are handled as recharge in the DBS&A GW flow model
Current seep flow rates are used for the uncovered flow rates, and the UNSAT-H covered and revegetated stockpile drainage estimate from the Stage 2 APP (0.22 in/yr) is used for the end point of the 20 year transition period
Stockpile areas are taken from MWH's 2014 mine plan and regrade stockpile area delineations

FIGURES



REFERENCE SOURCE OF TOPOGRAPHY: 2012 MINE TOPOGRAPHY FROM FMI.

NOTES
1. COPPER MOUNTAIN SOUTH PIT EXPANSION NOT INCLUDED IN THIS CCP. THIS AREA HAS ITS OWN CCP AND ASSOCIATED FINANCIAL ASSURANCE (PDTI, 2003)
2. OPSDA - OPEN PIT SURFACE DRAINAGE AREA

PROJECT
FREEPORT MCMORAN TYRONE, INC.
TYRONE CLOSURE/CLOSEOUT PLAN
GRANT COUNTY, NEW MEXICO

TITLE
AREAS UTILIZED FOR PROCESS SOLUTION ELIMINATION SYSTEM

Golder Associates
Albuquerque, New Mexico

PROJECT No.	11380040		FILE No.	Tech Memo Fig01
DESIGN	TS	10/03/07	SCALE AS SHOWN	REV. 0
CADD	CM	06/06/13		
CHECK	TS	06/06/13		
REVIEW	TS	06/06/13		

FIGURE 1

Drawing file: Tech Memo Fig01.dwg Jul 09, 2013 – 3:01pm

ATTACHMENT B
PROCESS SOLUTION ELIMINATION SYSTEM
COST ESTIMATION TABLES

Life Cycle Cost Analysis

Client	Freeport McMoRan	**Date:**	6-Mar-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	2
Project Location	New Mexico	**Prepared:**	AMM
Estimate Type	Capital Estimates for PSE System	**Checked:**	KMB
Estimate Details	ROM	**Reviewed:**	PRL

Item	**Description**		**Qty**	**UOM**	**Unit $**	**Extended**
	Equipment Cost					
Evaporation Units			12	each	$ 200,000	$ 2,400,000
Total Direct Equipment						**$ 2,400,000**
	Installation Cost					
Equipment Placement	Materials/equipment		1	ls	$0	$ -
	Crew size	0 men				
	Duration	0 days				
	Labor subtotal		0	hrs	$39	$ -
Tank Erection	Materials/equipment		1	ls	$ -	$ -
	Crew size	0 men				
	Duration	0 days				
	Labor subtotal		0	hrs	$39	$ -
Process Mechanical	Materials/equipment		1	ls	$ -	$ -
	Crew size	0 men				
	Duration	0 days				
	Labor subtotal		0	hrs	$39	$ -
Process Electrical	Materials/equipment		1	ls	$ -	$ -
	Crew size	0 men				
	Duration	0 days				
	Labor subtotal		0	hrs	$39	$ -
Process Controls	Materials/equipment		1	ls	$ -	$ -
	Crew size	0 men				
	Duration	0 days				
	Labor subtotal		0	hrs	$39	$ -
Total Installation Cost						**$ -**
	Facility Cost					
Site Work			1	allow	$0	$ -
Foundations	Pad area	0 ft^2				
	Average thickness	2 ft				
	Foundation wall width	1 ft				
	Foundation wall depth	3 ft				
	Footer width	3 ft				
	Footer depth	1 ft				
	Additional allowance	25 %				
	Total concrete		0	cy	$700	$ -
Building Envelope	Building area	0 ft^2	0	ft^2	$200	$ -
Building Electrical	Materials/equipment		1	ls	$0	$ -
	Crew size	0 men				
	Duration	0 days				
	Labor subtotal		0	hrs	$100	$ -
Total Facility Cost						**$ -**
	Total Capital Cost					
Total Direct Cost						**$ 2,400,000**

Life Cycle Cost Analysis

Client	Freeport-McMoRan	**Date:**	7-Mar-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	2
Project Location	New Mexico	**Prepared:**	AMM
Estimate Type	O&M Estimates for PSE System - Yr 1	**Checked:**	KMB
Estimate Details	ROM	**Reviewed:**	PRL

Item	**Description**				**Unit $**	**Extended**
Labor Cost						
Foreman						
OT/Callouts						
Operations hours	40	hours/year				
Operations Labor Cost	$55.00	/hour				$ 2,200
Mechanic						
OT/Callouts						
Operations hours	40	hours/year				
Operations Labor Cost	$50.00	/hour				$ 2,000
Pipefitter/Welder						
OT/Callouts						
Operations hours	40	hours/year				
Operations Labor Cost	$42.32	/hour				$ 1,693
Electrician						
OT/Callouts						
Operations hours	40	hours/year				
Operations Labor Cost	$46.47	/hour				$ 1,859
Laborer						
OT/Callouts						
Operations hours	40	hours/year				
Operations Labor Cost	$35.70	/hour				$ 1,428
Welder Equipment						
OT/Callouts						
Operations hours	40	hours/year				
Operations Labor Cost	$9.32	/hour				$ 373
Truck Equipment						
OT/Callouts						
Operations hours	40	hours/year				
Operations Labor Cost	$11.65	/hour				$ 466
Operators						
OT/Callouts						
Operations hours	4,992	hours/year				
Operations Labor Cost	$19.50	/hour				$ 97,344
Maintenance Technicians						
OT/Callouts						
Maintenance hours	2,288	hours/year				
Maintenance Labor Cost	$28.00	/hour				$ 64,064
Operations Supervisor	0.00	FTE	$70,000	$/year		$ -
ES&H Supervisor	0.00	FTE	$65,000	$/year		$ -
Maintenance Supervisor	0.00	FTE	$65,000	$/year		$ -
Administrative Support	0.00	FTE	$30,000	$/year		$ -
Engineering Support	0.00	FTE	$80,000	$/year		$ -
Compliance Support	0.00	FTE	$70,000	$/year		$ -
Total Labor Cost						**$ 172,000**
Utilities Cost						
On-line factor	90	%				
Motor efficiency factor	75	%				
Connected load, average	6382	HP				
Duration	52	weeks				
Power cost	26,300,562	kw-hr	$0.057	$/kw-hr		$ 1,499,132
Gas consumption, average	0	BTU/hr				
Gas cost	0	therms/ye	$0.60	$/therm		$ -
Water	$0.00	allowance/year				$ -
Sewer	$0.00	allowance/year				$ -
Total Utility Cost						**$ 1,500,000**
Maintenance	$9,537,800	Total direct capital cost (w/ pumps/pipes)				
	1.50%	Routine maintenance		$ 143,067.00		
	1.00%	Capital replacement		$ 95,378.00		$ 238,445
Administrative materials	$0.00	allowance/year				$ -
Total Miscellaneous Cost						**$ 239,000**
Total O&M Cost						
Direct O&M Cost						**$ 1,911,000**

Golder Associates Inc.
Life Cycle Cost Analysis

Client	Freeport-McMoRan	**Date:**	7-Mar-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	2
Project Location	New Mexico	**Prepared:**	AMM
Estimate Type	O&M Estimates for PSE System - Yr 2	**Checked:**	KMB
Estimate Details	ROM	**Reviewed:**	PRL

Item	**Description**				**Unit $**	**Extended**
Labor Cost						
Foreman						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$55.00	/hour				$ 440
Mechanic						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$50.00	/hour				$ 400
Pipefitter/Welder						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$42.37	/hour				$ 339
Electrician						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$46.50	/hour				$ 372
Laborer						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$35.75	/hour				$ 286
Welder Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$9.37	/hour				$ 75
Truck Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$11.62	/hour				$ 93
Operators						
OT/Callouts						
Operations hours	1,248	hours/year				
Operations Labor Cost	$19.50	/hour				$ 24,336
Maintenance Technicians						
OT/Callouts						
Maintenance hours	343	hours/year				
Maintenance Labor Cost	$28.00	/hour				$ 9,610
Operations Supervisor	0.00	FTE	$70,000	$/year		$ -
ES&H Supervisor	0.00	FTE	$65,000	$/year		$ -
Maintenance Supervisor	0.00	FTE	$65,000	$/year		$ -
Administrative Support	0.00	FTE	$30,000	$/year		$ -
Engineering Support	0.00	FTE	$80,000	$/year		$ -
Compliance Support	0.00	FTE	$70,000	$/year		$ -
Total Labor Cost						**$ 36,000**
Utilities Cost						
On-line factor	90	%				
Motor efficiency factor	75	%				
Connected load, average	6909	HP				
Duration	52	weeks				
Power cost	28,472,357	kw-hr	$0.057	$/kw-hr		$ 1,622,924
Gas consumption, average	0	BTU/hr				
Gas cost	0	therms/year	$0.60	$/therm		$ -
Water	$0.00	allowance/year				$ -
Sewer	$0.00	allowance/year				$ -
Total Utility Cost						**$ 1,623,000**
Maintenance	$9,537,800	Total direct equipment cost				
	1.50%	Routine maintenance			$ 143,067.00	
	1.00%	Capital replacement			$ 95,378.00	$ 238,445
Administrative materials	$0.00	allowance/year				$ -
Total Miscellaneous Cost						**$ 239,000**
Total O&M Cost						
Direct O&M Cost						**$ 1,898,000**

Client	Freeport-McMoRan	**Date:**	7-Mar-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	2
Project Location	New Mexico	**Prepared:**	AMM
Estimate Type	O&M Estimates for PSE System - Yr 3	**Checked:**	KMB
Estimate Details	ROM	**Reviewed:**	PRL

Item	**Description**				**Unit $**	**Extended**
Labor Cost						
Foreman						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$55.00	/hour				$ 440
Mechanic						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$50.00	/hour				$ 400
Pipefitter/Welder						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$42.37	/hour				$ 339
Electrician						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$46.50	/hour				$ 372
Laborer						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$35.75	/hour				$ 286
Welder Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$9.37	/hour				$ 75
Truck Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$11.62	/hour				$ 93
Operators						
OT/Callouts						
Operations hours	1,248	hours/year				
Operations Labor Cost	$19.50	/hour				$ 24,336
Maintenance Technicians						
OT/Callouts						
Maintenance hours	343	hours/year				
Maintenance Labor Cost	$28.00	/hour				$ 9,610
Operations Supervisor	0.00	FTE	$70,000	$/year		$ -
ES&H Supervisor	0.00	FTE	$65,000	$/year		$ -
Maintenance Supervisor	0.00	FTE	$65,000	$/year		$ -
Administrative Support	0.00	FTE	$30,000	$/year		$ -
Engineering Support	0.00	FTE	$80,000	$/year		$ -
Compliance Support	0.00	FTE	$70,000	$/year		$ -
Total Labor Cost						**$ 36,000**
Utilities Cost						
On-line factor	90	%				
Motor efficiency factor	75	%				
Connected load, average	5821	HP				
Duration	52	weeks				
Power cost	23,988,651	kw-hr	$0.057	$/kw-hr		$ 1,367,353
Gas consumption, average	0	BTU/hr				
Gas cost	0	therms/year	$0.60	$/therm		$ -
Water	$0.00	allowance/year				$ -
Sewer	$0.00	allowance/year				$ -
Total Utility Cost						**$ 1,368,000**
Maintenance	$9,537,800	Total direct equipment cost				
	1.50%	Routine maintenance			$ 143,067.00	
	1.00%	Capital replacement			$ 95,378.00	$ 238,445
Administrative materials	$0.00	allowance/year				$ -
Total Miscellaneous Cost						**$ 239,000**
Total O&M Cost						
Direct O&M Cost						**$ 1,643,000**

Life Cycle Cost Analysis

Client	Freeport-McMoRan	**Date:**	7-Mar-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	2
Project Location	New Mexico	**Prepared:**	AMM
Estimate Type	O&M Estimates for PSE System - Yr 4	**Checked:**	KMB
Estimate Details	ROM	**Reviewed:**	PRL

Item	**Description**				**Unit $**	**Extended**
Labor Cost						
Foreman						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$55.00	/hour				$ 440
Mechanic						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$50.00	/hour				$ 400
Pipefitter/Welder						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$42.37	/hour				$ 339
Electrician						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$46.50	/hour				$ 372
Laborer						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$35.75	/hour				$ 286
Welder Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$9.37	/hour				$ 75
Truck Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$11.62	/hour				$ 93
Lead Operators						
OT/Callouts						
Operations hours	1,248	hours/year				
Operations Labor Cost	$19.50	/hour				$ 24,336
Maintenance Technicians						
OT/Callouts						
Maintenance hours	343	hours/year				
Maintenance Labor Cost	$28.00	/hour				$ 9,610
Operations Supervisor	0.00	FTE	$70,000	$/year		$ -
ES&H Supervisor	0.00	FTE	$65,000	$/year		$ -
Maintenance Supervisor	0.00	FTE	$65,000	$/year		$ -
Administrative Support	0.00	FTE	$30,000	$/year		$ -
Engineering Support	0.00	FTE	$80,000	$/year		$ -
Compliance Support	0.00	FTE	$70,000	$/year		$ -
Total Labor Cost						**$ 36,000**
Utilities Cost						
On-line factor	90	%				
Motor efficiency factor	75	%				
Connected load, average	4935	HP				
Duration	52	weeks				
Power cost	20,337,398	kw-hr	$0.057	$/kw-hr		$ 1,159,232
Gas consumption, average	0	BTU/hr				
Gas cost	0	therms/year	$0.60	$/therm		$ -
Water	$0.00	allowance/year				$ -
Sewer	$0.00	allowance/year				$ -
Total Utility Cost						**$ 1,160,000**
Maintenance	$9,537,800	Total direct equipment cost				
	1.50%	Routine maintenance			$ 143,067.00	
	1.00%	Capital replacement			$ 95,378.00	$ 238,445
Administrative materials	$0.00	allowance/year				$ -
Total Miscellaneous Cost						**$ 239,000**
Total O&M Cost						
Direct O&M Cost						**$ 1,435,000**

Client	Freeport-McMoRan	**Date:**	7-Mar-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	2
Project Location	New Mexico	**Prepared:**	AMM
Estimate Type	O&M Estimates for PSE System - Yr 5	**Checked:**	KMB
Estimate Details	ROM	**Reviewed:**	PRL

Item	**Description**				**Unit $**	**Extended**
			Labor Cost			
Foreman						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$55.00	/hour				$ 440
Mechanic						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$50.00	/hour				$ 400
Pipefitter/Welder						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$42.37	/hour				$ 339
Electrician	1	FTE				
OT/Callouts	0%	%				
Operations hours	8	hours/year				
Operations Labor Cost	$46.50	/hour				$ 372
Laborer						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$35.75	/hour				$ 286
Welder Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$9.37	/hour				$ 75
Truck Equipment						
OT/Callouts						
Operations hours	8	hours/year				
Operations Labor Cost	$11.62	/hour				$ 93
Lead Operators						
OT/Callouts						
Operations hours	1,248	hours/year				
Operations Labor Cost	$19.50	/hour				$ 24,336
Maintenance Technicians						
OT/Callouts						
Maintenance hours	343	hours/year				
Maintenance Labor Cost	$28.00	/hour				$ 9,610
Operations Supervisor	0.00	FTE		$70,000	$/year	$ -
ES&H Supervisor	0.00	FTE		$65,000	$/year	$ -
Maintenance Supervisor	0.00	FTE		$65,000	$/year	$ -
Administrative Support	0.00	FTE		$30,000	$/year	$ -
Engineering Support	0.00	FTE		$80,000	$/year	$ -
Compliance Support	0.00	FTE		$70,000	$/year	$ -
Total Labor Cost						**$ 36,000**
			Utilities Cost			
On-line factor	90	%				
Motor efficiency factor	75	%				
Connected load, average	3553	HP				
Duration	52	weeks				
Power cost	14,642,102	kw-hr		$0.057	$/kw-hr	$ 834,600
Gas consumption, average	0	BTU/hr				
Gas cost	0	therms/year		$0.60	$/therm	$ -
Water	$0.00	allowance/year				$ -
Sewer	$0.00	allowance/year				$ -
Total Utility Cost						**$ 835,000**
Maintenance	$9,537,800	Total direct equipment cost				
	1.50%	Routine maintenance			$ 143,067.00	
	1.00%	Capital replacement			$ 95,378.00	$ 238,445
Administrative materials	$0.00	allowance/year				$ -
Total Miscellaneous Cost						**$ 239,000**
			Total O&M Cost			
Direct O&M Cost						**$ 1,110,000**

Life Cycle Cost Analysis

Client	Freeport-McMoRan	**Date:**	7-Mar-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	2
Project Location	New Mexico	**Prepared:**	AMM
Estimate Type	O&M Estimates for PSE System - Yr 6	**Checked:**	KMB
Estimate Details	ROM	**Reviewed:**	PRL

Item	**Description**		**Unit $**		**Extended**
		Labor Cost			
Foreman					
OT/Callouts					
Operations hours	8	hours/year			
Operations Labor Cost	$55.00	/hour			$ 440
Mechanic					
OT/Callouts					
Operations hours	8	hours/year			
Operations Labor Cost	$50.00	/hour			$ 400
Pipefitter/Welder					
OT/Callouts					
Operations hours	8	hours/year			
Operations Labor Cost	$42.37	/hour			$ 339
Electrician					
OT/Callouts					
Operations hours	8	hours/year			
Operations Labor Cost	$46.50	/hour			$ 372
Laborer					
OT/Callouts					
Operations hours	8	hours/year			
Operations Labor Cost	$35.75	/hour			$ 286
Welder Equipment					
OT/Callouts					
Operations hours	8	hours/year			
Operations Labor Cost	$9.37	/hour			$ 75
Truck Equipment					
OT/Callouts					
Operations hours	8	hours/year			
Operations Labor Cost	$11.62	/hour			$ 93
Lead Operators					
OT/Callouts					
Operations hours	1,248	hours/year			
Operations Labor Cost	$19.50	/hour			$ 24,336
Maintenance Technicians					
OT/Callouts					
Maintenance hours	343	hours/year			
Maintenance Labor Cost	$28.00	/hour			$ 9,610
Operations Supervisor	0.00	FTE	$70,000	$/year	$ -
ES&H Supervisor	0.00	FTE	$65,000	$/year	$ -
Maintenance Supervisor	0.00	FTE	$65,000	$/year	$ -
Administrative Support	0.00	FTE	$30,000	$/year	$ -
Engineering Support	0.00	FTE	$80,000	$/year	$ -
Compliance Support	0.00	FTE	$70,000	$/year	$ -
Total Labor Cost					**$ 36,000**
		Utilities Cost			
On-line factor	90	%			
Motor efficiency factor	75	%			
Connected load, average	4198	HP			
Duration	52	weeks			
Power cost	17,300,181	kw-hr	$0.057	$/kw-hr	$ 986,110
Gas consumption, average	0	BTU/hr			
Gas cost	0	therms/year	$0.60	$/therm	$ -
Water	$0.00	allowance/year			$ -
Sewer	$0.00	allowance/year			$ -
Total Utility Cost					**$ 987,000**
Maintenance	$9,537,800	Total direct equipment cost			
	1.50%	Routine maintenance		$ 143,067.00	
	1.00%	Capital replacement		$ 95,378.00	$ 238,445
Administrative materials	$0.00	allowance/year			$ -
Total Miscellaneous Cost					**$ 239,000**
		Total O&M Cost			
Direct O&M Cost					**$ 1,262,000**

ATTACHMENT C
WATER TREATMENT AND SLUDGE DISPOSAL FACILITY SYSTEMS
COST ESTIMATION TABLES

Life Cycle Cost Analysis

Client	Attorney-Client Privileged and Confidential	**Date:**	18-Jun-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	5
Project Location	New Mexico	**Prepared:**	KMB
Estimate Type	Capital Estimates for NF/HDS System	**Checked:**	RJS
Estimate Details	ROM	**Reviewed:**	PRL

Item	Description		Qty	UOM	Unit $	Extended
Equipment Cost						
Reaction Tank #1			1	each	$ 28,000	$ 28,000
Reaction Tank Mixer #1			1	each	$ 17,000	$ 17,000
Floc Tank #1			1	each	$ 25,000	$ 25,000
Floc Tank Mixer #1			1	each	$ 7,000	$ 7,000
Mixing Tank #1			1	each	$ 24,000	$ 24,000
Mixing Tank Mixer #1			1	each	$ 6,000	$ 6,000
Thickener/Clarifier #1			1	each	$ 292,000	$ 292,000
Sludge Pump #1			2	each	$ 8,000	$ 16,000
Underflow Pump #1			2	each	$ 8,000	$ 16,000
Polymer system			1	each	$ 42,000	$ 42,000
Lime Silo and Slaker System			1	each	$ 189,000	$ 189,000
pH control system (lime addition)			1	each	$ 30,000	$ 30,000
Sludge Holding Tank			2	each	$ 41,000	$ 82,000
Sludge Holding Tank Mixer			2	each	$ 12,000	$ 24,000
Belt Press System			4	each	$ 224,000	$ 896,000
Belt Press Polymer System			1	each	$ 42,000	$ 42,000
Wash Tank			1	each	$ 10,000	$ 10,000
Process Water Tank			1	each	$ 10,000	$ 10,000
Process Water Return Pump			2	each	$ 9,000	$ 18,000
Air Compressor			1	each	$ 19,000	$ 19,000
Air Receiver			1	each	$ 3,000	$ 3,000
Electrical Equipment			1	each	$ 89,000	$ 89,000
Valves			1	each	$ 42,000	$ 42,000
Instrumentation			1	each	$ 25,000	$ 25,000
Control System			1	ls	$ 30,000	$ 30,000
Microfiltration and Nanofiltration System			1	ls	$ 2,350,000	$ 2,350,000
Total Direct Equipment						**$ 4,332,000**
Installation Cost						
Equipment Placement	Materials/equipment		1	ls	$71,000	$ 71,000
	Crew size	6 men				
	Duration	36 days				
	Labor subtotal		1,728	hrs	$57	$ 100,000
Tank Erection	Materials/equipment		1	ls	$ 89,000	$ 89,000
	Crew size	8 men				
	Duration	33 days				
	Labor subtotal		2,112	hrs	$57	$ 122,000
Process Mechanical	Materials/equipment		1	ls	$ 82,000	$ 82,000
	Crew size	6 men				
	Duration	31 days				
	Labor subtotal		1,488	hrs	$65	$ 98,000
Process Electrical	Materials/equipment		1	ls	$ 47,000	$ 47,000
	Crew size	4 men				
	Duration	41 days				
	Labor subtotal		1,312	hrs	$65	$ 86,000
Process Controls	Materials/equipment		1	ls	$ 11,000	$ 11,000
	Crew size	4 men				
	Duration	8 days				
	Labor subtotal		256	hrs	$65	$ 17,000
Structural Steel			1	ls	$54,000	$ 54,000
Membrane Installation			1	ls	$1,000,000	$ 1,000,000
Total Installation Cost						**$ 1,777,000**
Facility Cost						
Site Work			1	allow	$85,000	$ 85,000
Foundations	Pad area	9315 ft^2				
	Average thickness	2 ft				
	Foundation wall width	1 ft				
	Foundation wall depth	3 ft				
	Footer width	3 ft				
	Footer depth	1 ft				
	Additional allowance	25 %				
	Total concrete		930	cy	$700	$ 651,000
Building Envelope	Building area	9315 ft^2	9,315	ft^2	$165	$ 1,537,000
Building Electrical	Materials/equipment		1	ls	$109,000	$ 109,000
	Crew size	4 men				
	Duration	30 days				
	Labor subtotal		960	hrs	$65	$ 63,000
Building Plumbing			1	ls	$71,000	$ 71,000
Building HVAC			1	ls	$102,000	$ 102,000
Total Facility Cost						**$ 2,618,000**
Total Capital Cost						
Total Direct Cost						**$ 8,727,000**

Client	Freeport McMoRan	**Date:**	14-Jun-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	7
Project Location	New Mexico	**Prepared:**	KMB
Estimate Type	O&M Estimates for NF/HDS System	**Checked:**	RJS
Estimate Details	ROM	**Reviewed:**	PRL

	2012 Current Cost											
			Reagents						**Electrical Power**			
Year	**Labor**	**Maintenance**	**Lime**	**Polymer**	**pH Adjust**	**MF/NF Chemcials**	**Analytical**	**Sludge Disposal**	**Membrane System**	**HDS System**	**Water Conveyance**	**Total Direct O&M**
0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	**$ -**
1	$ -	$ -	$ -	$ -	$ -	$ -	$ 19,817	$ -	$ -	$ -	$ -	**$ 19,817**
2	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,222	$ -	$ -	$ -	$ -	**$ 25,222**
3	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,222	$ -	$ -	$ -	$ -	**$ 25,222**
4	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,222	$ -	$ -	$ -	$ -	**$ 25,222**
5	$ 314,496	$ 150,027	$ 981,419	$ 598,163	$ 12,014	$ 190,300	$ 36,032	$ 145,093	$ 28,751	$ 39,020	$ 51,295	**$ 2,546,610**
6	$ 628,992	$ 300,054	$ 2,161,626	$ 1,317,485	$ 24,827	$ 378,261	$ 36,032	$ 319,576	$ 57,148	$ 80,634	$ 107,813	**$ 5,412,447**
7	$ 628,992	$ 300,054	$ 1,994,242	$ 1,215,466	$ 22,076	$ 324,716	$ 36,032	$ 294,830	$ 49,058	$ 71,699	$ 93,226	**$ 5,030,390**
8	$ 628,992	$ 300,054	$ 1,972,431	$ 1,202,173	$ 21,786	$ 319,929	$ 36,032	$ 291,605	$ 48,335	$ 70,759	$ 91,883	**$ 4,983,978**
9	$ 628,992	$ 300,054	$ 1,958,644	$ 1,193,769	$ 21,627	$ 317,685	$ 75,666	$ 289,567	$ 47,996	$ 70,243	$ 91,233	**$ 4,995,475**
10	$ 628,992	$ 300,054	$ 1,942,097	$ 1,183,685	$ 21,325	$ 312,649	$ 75,666	$ 287,120	$ 47,235	$ 69,260	$ 89,822	**$ 4,957,906**
11	$ 628,992	$ 300,054	$ 1,928,224	$ 1,175,229	$ 21,161	$ 310,311	$ 75,666	$ 285,069	$ 46,882	$ 68,728	$ 89,147	**$ 4,929,465**
12	$ 628,992	$ 300,054	$ 1,840,498	$ 1,121,761	$ 18,738	$ 264,784	$ 75,666	$ 272,100	$ 40,004	$ 60,858	$ 76,669	**$ 4,700,124**
13	$ 628,992	$ 300,054	$ 1,777,500	$ 1,083,365	$ 18,383	$ 260,362	$ 75,666	$ 262,786	$ 39,336	$ 59,704	$ 75,352	**$ 4,581,500**
14	$ 628,992	$ 300,054	$ 1,717,101	$ 1,046,552	$ 18,138	$ 258,078	$ 49,544	$ 253,857	$ 38,991	$ 58,909	$ 74,617	**$ 4,444,831**
15	$ 628,992	$ 300,054	$ 1,656,713	$ 1,009,746	$ 17,893	$ 255,810	$ 49,544	$ 244,929	$ 38,648	$ 58,115	$ 73,886	**$ 4,334,329**
16	$ 628,992	$ 300,054	$ 1,434,778	$ 874,480	$ 16,928	$ 253,553	$ 49,544	$ 212,118	$ 38,307	$ 54,980	$ 72,521	**$ 3,936,255**
17	$ 628,992	$ 300,054	$ 1,357,213	$ 827,205	$ 16,505	$ 248,504	$ 49,544	$ 200,651	$ 37,544	$ 53,607	$ 71,002	**$ 3,790,819**
18	$ 628,992	$ 300,054	$ 1,301,368	$ 793,168	$ 16,286	$ 246,321	$ 49,544	$ 192,395	$ 37,214	$ 52,894	$ 70,312	**$ 3,688,547**
19	$ 628,992	$ 300,054	$ 1,251,693	$ 762,892	$ 16,108	$ 244,500	$ 30,177	$ 185,051	$ 36,939	$ 52,317	$ 69,742	**$ 3,578,463**
20	$ 628,992	$ 300,054	$ 1,202,150	$ 732,696	$ 15,933	$ 242,727	$ 30,177	$ 177,726	$ 36,671	$ 51,747	$ 69,184	**$ 3,488,058**
21	$ 628,992	$ 300,054	$ 1,152,945	$ 702,706	$ 15,763	$ 241,067	$ 30,177	$ 170,452	$ 36,421	$ 51,197	$ 68,658	**$ 3,398,430**
22	$ 628,992	$ 300,054	$ 1,104,040	$ 672,899	$ 15,599	$ 239,506	$ 30,177	$ 163,222	$ 36,185	$ 50,663	$ 68,158	**$ 3,309,492**
23	$ 628,992	$ 300,054	$ 1,055,402	$ 643,255	$ 15,439	$ 238,035	$ 30,177	$ 156,031	$ 35,962	$ 50,144	$ 67,683	**$ 3,221,173**
24	$ 628,992	$ 300,054	$ 1,022,590	$ 623,256	$ 15,283	$ 236,640	$ 30,177	$ 151,180	$ 35,752	$ 49,638	$ 67,228	**$ 3,160,789**
25	$ 628,992	$ 300,054	$ 1,008,133	$ 614,445	$ 15,131	$ 235,312	$ 30,177	$ 149,043	$ 35,551	$ 49,143	$ 66,792	**$ 3,132,772**
26	$ 628,992	$ 300,054	$ 940,010	$ 572,924	$ 14,741	$ 234,047	$ 30,177	$ 138,971	$ 35,360	$ 47,877	$ 66,161	**$ 3,009,313**
27	$ 628,992	$ 300,054	$ 920,069	$ 560,771	$ 14,535	$ 231,904	$ 30,177	$ 136,023	$ 35,036	$ 47,207	$ 65,492	**$ 2,970,261**
28	$ 628,992	$ 300,054	$ 905,962	$ 552,173	$ 14,389	$ 230,705	$ 30,177	$ 133,938	$ 34,855	$ 46,734	$ 65,091	**$ 2,943,068**
29	$ 628,992	$ 300,054	$ 892,162	$ 543,762	$ 14,248	$ 229,602	$ 25,222	$ 131,898	$ 34,688	$ 46,276	$ 64,717	**$ 2,911,621**
30	$ 628,992	$ 300,054	$ 878,497	$ 535,433	$ 14,110	$ 228,544	$ 25,222	$ 129,877	$ 34,529	$ 45,826	$ 64,354	**$ 2,885,438**
31	$ 628,992	$ 300,054	$ 864,954	$ 527,179	$ 13,973	$ 227,527	$ 25,222	$ 127,875	$ 34,375	$ 45,383	$ 64,003	**$ 2,859,537**
32	$ 628,992	$ 300,054	$ 857,489	$ 522,629	$ 13,881	$ 226,610	$ 25,222	$ 126,772	$ 34,236	$ 45,085	$ 63,713	**$ 2,844,683**
33	$ 628,992	$ 300,054	$ 856,913	$ 522,278	$ 13,839	$ 225,796	$ 25,222	$ 126,686	$ 34,114	$ 44,949	$ 63,492	**$ 2,842,334**
34	$ 628,992	$ 300,054	$ 856,437	$ 521,988	$ 13,799	$ 225,016	$ 25,222	$ 126,616	$ 33,996	$ 44,818	$ 63,279	**$ 2,840,216**
35	$ 628,992	$ 300,054	$ 856,047	$ 521,751	$ 13,761	$ 224,264	$ 25,222	$ 126,558	$ 33,882	$ 44,693	$ 63,074	**$ 2,838,298**
36	$ 628,992	$ 300,054	$ 855,739	$ 521,563	$ 13,723	$ 223,541	$ 25,222	$ 126,513	$ 33,773	$ 44,572	$ 62,877	**$ 2,836,568**
37	$ 628,992	$ 300,054	$ 855,507	$ 521,421	$ 13,687	$ 222,843	$ 25,222	$ 126,478	$ 33,667	$ 44,455	$ 62,687	**$ 2,835,014**
38	$ 628,992	$ 300,054	$ 855,346	$ 521,323	$ 13,653	$ 222,169	$ 25,222	$ 126,455	$ 33,565	$ 44,343	$ 62,503	**$ 2,833,623**
39	$ 628,992	$ 300,054	$ 855,253	$ 521,266	$ 13,619	$ 221,518	$ 25,222	$ 126,441	$ 33,467	$ 44,234	$ 62,326	**$ 2,832,392**
40	$ 628,992	$ 300,054	$ 855,223	$ 521,248	$ 13,587	$ 220,888	$ 12,161	$ 126,436	$ 33,372	$ 44,129	$ 62,154	**$ 2,818,244**
41	$ 628,992	$ 300,054	$ 855,254	$ 521,267	$ 13,556	$ 220,279	$ 12,161	$ 126,441	$ 33,280	$ 44,027	$ 61,988	**$ 2,817,299**
42	$ 628,992	$ 300,054	$ 855,344	$ 521,322	$ 13,525	$ 219,690	$ 12,161	$ 126,454	$ 33,191	$ 43,928	$ 61,828	**$ 2,816,489**
43	$ 628,992	$ 300,054	$ 855,490	$ 521,411	$ 13,496	$ 219,120	$ 12,161	$ 126,476	$ 33,105	$ 43,833	$ 61,672	**$ 2,815,809**
44	$ 628,992	$ 300,054	$ 855,689	$ 521,532	$ 13,468	$ 218,567	$ 12,161	$ 126,505	$ 33,021	$ 43,741	$ 61,522	**$ 2,815,251**
45	$ 628,992	$ 300,054	$ 855,937	$ 521,683	$ 13,440	$ 218,031	$ 12,161	$ 126,542	$ 32,940	$ 43,651	$ 61,376	**$ 2,814,807**
46	$ 628,992	$ 300,054	$ 856,234	$ 521,864	$ 13,413	$ 217,512	$ 12,161	$ 126,586	$ 32,862	$ 43,564	$ 61,234	**$ 2,814,477**
47	$ 628,992	$ 300,054	$ 856,572	$ 522,070	$ 13,387	$ 217,006	$ 12,161	$ 126,636	$ 32,786	$ 43,480	$ 61,096	**$ 2,814,241**
48	$ 628,992	$ 300,054	$ 856,954	$ 522,303	$ 13,362	$ 216,516	$ 12,161	$ 126,692	$ 32,711	$ 43,398	$ 60,963	**$ 2,814,105**
49	$ 628,992	$ 300,054	$ 857,181	$ 522,442	$ 13,348	$ 216,254	$ 12,161	$ 126,726	$ 32,672	$ 43,354	$ 60,891	**$ 2,814,074**
50	$ 628,992	$ 300,054	$ 857,642	$ 522,723	$ 13,325	$ 215,789	$ 12,161	$ 126,794	$ 32,602	$ 43,277	$ 60,765	**$ 2,814,122**
51	$ 628,992	$ 300,054	$ 829,338	$ 505,471	$ 12,111	$ 192,196	$ 12,161	$ 122,610	$ 29,037	$ 39,335	$ 54,336	**$ 2,725,639**
52	$ 628,992	$ 300,054	$ 827,602	$ 504,414	$ 12,088	$ 191,759	$ 12,161	$ 122,353	$ 28,971	$ 39,262	$ 54,217	**$ 2,721,872**
53	$ 628,992	$ 300,054	$ 825,907	$ 503,380	$ 12,067	$ 191,333	$ 12,161	$ 122,102	$ 28,907	$ 39,191	$ 54,101	**$ 2,718,193**
54	$ 628,992	$ 300,054	$ 824,251	$ 502,371	$ 12,045	$ 190,919	$ 12,161	$ 121,858	$ 28,844	$ 39,121	$ 53,988	**$ 2,714,602**

Client	Freeport McMoRan	**Date:**	14-Jun-13
Project Name	Tyrone Mine Closure Closeout Plan	**Revision**	7
Project Location	New Mexico	**Prepared:**	KMB
Estimate Type	O&M Estimates for NF/HDS System	**Checked:**	RJS
Estimate Details	ROM	**Reviewed:**	PRL

	2012 Current Cost											
			Reagents					Sludge	Electrical Power			
Year	**Labor**	**Maintenance**	**Lime**	**Polymer**	**pH Adjust**	**MF/NF Chemcials**	**Analytical**	**Disposal**	**Membrane System**	**HDS System**	**Water Conveyance**	**Total Direct O&M**
55	$ 628,992	$ 300,054	$ 822,632	$ 501,384	$ 12,024	$ 190,515	$ 12,161	$ 121,618	$ 28,783	$ 39,054	$ 53,878	**$ 2,711,095**
56	$ 628,992	$ 300,054	$ 821,049	$ 500,419	$ 12,004	$ 190,122	$ 12,161	$ 121,384	$ 28,724	$ 38,988	$ 53,771	**$ 2,707,668**
57	$ 628,992	$ 300,054	$ 819,502	$ 499,477	$ 11,985	$ 189,739	$ 12,161	$ 121,156	$ 28,666	$ 38,924	$ 53,666	**$ 2,704,321**
58	$ 628,992	$ 300,054	$ 817,989	$ 498,554	$ 11,965	$ 189,366	$ 12,161	$ 120,932	$ 28,610	$ 38,862	$ 53,564	**$ 2,701,048**
59	$ 628,992	$ 300,054	$ 816,507	$ 497,651	$ 11,947	$ 189,001	$ 12,161	$ 120,713	$ 28,555	$ 38,801	$ 53,465	**$ 2,697,846**
60	$ 628,992	$ 300,054	$ 815,061	$ 496,770	$ 11,928	$ 188,647	$ 12,161	$ 120,499	$ 28,501	$ 38,742	$ 53,369	**$ 2,694,723**
61	$ 628,992	$ 300,054	$ 813,641	$ 495,904	$ 11,910	$ 188,300	$ 12,161	$ 120,289	$ 28,449	$ 38,684	$ 53,274	**$ 2,691,657**
62	$ 628,992	$ 300,054	$ 812,252	$ 495,057	$ 11,893	$ 187,962	$ 12,161	$ 120,084	$ 28,398	$ 38,627	$ 53,182	**$ 2,688,661**
63	$ 628,992	$ 300,054	$ 810,891	$ 494,228	$ 11,876	$ 187,632	$ 12,161	$ 119,882	$ 28,348	$ 38,572	$ 53,092	**$ 2,685,728**
64	$ 628,992	$ 300,054	$ 809,555	$ 493,414	$ 11,860	$ 187,310	$ 12,161	$ 119,685	$ 28,299	$ 38,518	$ 53,004	**$ 2,682,850**
65	$ 628,992	$ 300,054	$ 808,248	$ 492,617	$ 11,843	$ 186,995	$ 12,161	$ 119,492	$ 28,251	$ 38,466	$ 52,918	**$ 2,680,037**
66	$ 628,992	$ 300,054	$ 806,967	$ 491,837	$ 11,828	$ 186,688	$ 12,161	$ 119,302	$ 28,205	$ 38,414	$ 52,835	**$ 2,677,282**
67	$ 628,992	$ 300,054	$ 805,709	$ 491,070	$ 11,812	$ 186,388	$ 12,161	$ 119,116	$ 28,160	$ 38,364	$ 52,753	**$ 2,674,578**
68	$ 628,992	$ 300,054	$ 804,471	$ 490,315	$ 11,797	$ 186,093	$ 12,161	$ 118,933	$ 28,115	$ 38,315	$ 52,673	**$ 2,671,919**
69	$ 628,992	$ 300,054	$ 803,259	$ 489,577	$ 11,782	$ 185,806	$ 12,161	$ 118,754	$ 28,072	$ 38,267	$ 52,594	**$ 2,669,318**
70	$ 628,992	$ 300,054	$ 802,070	$ 488,852	$ 11,768	$ 185,525	$ 12,161	$ 118,578	$ 28,029	$ 38,220	$ 52,518	**$ 2,666,767**
71	$ 628,992	$ 300,054	$ 800,903	$ 488,141	$ 11,754	$ 185,251	$ 12,161	$ 118,406	$ 27,988	$ 38,174	$ 52,443	**$ 2,664,265**
72	$ 628,992	$ 300,054	$ 799,754	$ 487,441	$ 11,740	$ 184,982	$ 12,161	$ 118,236	$ 27,947	$ 38,129	$ 52,370	**$ 2,661,806**
73	$ 628,992	$ 300,054	$ 798,630	$ 486,755	$ 11,726	$ 184,720	$ 12,161	$ 118,070	$ 27,908	$ 38,086	$ 52,299	**$ 2,659,400**
74	$ 628,992	$ 300,054	$ 797,562	$ 486,104	$ 11,715	$ 184,502	$ 12,161	$ 117,912	$ 27,875	$ 38,049	$ 52,239	**$ 2,657,164**
75	$ 628,992	$ 300,054	$ 796,503	$ 485,459	$ 11,704	$ 184,290	$ 12,161	$ 117,755	$ 27,843	$ 38,014	$ 52,181	**$ 2,654,956**
76	$ 628,992	$ 300,054	$ 795,459	$ 484,822	$ 11,693	$ 184,081	$ 12,161	$ 117,601	$ 27,811	$ 37,979	$ 52,124	**$ 2,652,777**
77	$ 628,992	$ 300,054	$ 794,433	$ 484,197	$ 11,683	$ 183,877	$ 12,161	$ 117,449	$ 27,780	$ 37,945	$ 52,069	**$ 2,650,638**
78	$ 628,992	$ 300,054	$ 793,422	$ 483,581	$ 11,673	$ 183,676	$ 12,161	$ 117,300	$ 27,750	$ 37,911	$ 52,014	**$ 2,648,533**
79	$ 628,992	$ 300,054	$ 792,426	$ 482,974	$ 11,662	$ 183,479	$ 12,161	$ 117,153	$ 27,720	$ 37,878	$ 51,960	**$ 2,646,460**
80	$ 628,992	$ 300,054	$ 791,444	$ 482,375	$ 11,653	$ 183,285	$ 12,161	$ 117,007	$ 27,691	$ 37,846	$ 51,908	**$ 2,644,415**
81	$ 628,992	$ 300,054	$ 790,471	$ 481,782	$ 11,643	$ 183,094	$ 12,161	$ 116,864	$ 27,662	$ 37,814	$ 51,855	**$ 2,642,391**
82	$ 628,992	$ 300,054	$ 789,510	$ 481,197	$ 11,633	$ 182,906	$ 12,161	$ 116,721	$ 27,634	$ 37,783	$ 51,804	**$ 2,640,394**
83	$ 628,992	$ 300,054	$ 788,565	$ 480,620	$ 11,623	$ 182,721	$ 12,161	$ 116,582	$ 27,606	$ 37,752	$ 51,754	**$ 2,638,429**
84	$ 628,992	$ 300,054	$ 787,635	$ 480,054	$ 11,614	$ 182,541	$ 12,161	$ 116,444	$ 27,578	$ 37,721	$ 51,705	**$ 2,636,499**
85	$ 628,992	$ 300,054	$ 786,713	$ 479,492	$ 11,605	$ 182,362	$ 12,161	$ 116,308	$ 27,551	$ 37,692	$ 51,656	**$ 2,634,585**
86	$ 628,992	$ 300,054	$ 785,799	$ 478,935	$ 11,596	$ 182,185	$ 12,161	$ 116,173	$ 27,525	$ 37,662	$ 51,608	**$ 2,632,689**
87	$ 628,992	$ 300,054	$ 784,902	$ 478,388	$ 11,587	$ 182,013	$ 12,161	$ 116,040	$ 27,499	$ 37,633	$ 51,561	**$ 2,630,829**
88	$ 628,992	$ 300,054	$ 784,015	$ 477,848	$ 11,578	$ 181,843	$ 12,161	$ 115,909	$ 27,473	$ 37,605	$ 51,515	**$ 2,628,992**
89	$ 628,992	$ 300,054	$ 783,141	$ 477,315	$ 11,570	$ 181,676	$ 12,161	$ 115,780	$ 27,448	$ 37,577	$ 51,469	**$ 2,627,181**
90	$ 628,992	$ 300,054	$ 782,277	$ 476,788	$ 11,561	$ 181,512	$ 12,161	$ 115,652	$ 27,423	$ 37,550	$ 51,424	**$ 2,625,394**
91	$ 628,992	$ 300,054	$ 781,425	$ 476,269	$ 11,553	$ 181,351	$ 12,161	$ 115,526	$ 27,399	$ 37,523	$ 51,380	**$ 2,623,632**
92	$ 628,992	$ 300,054	$ 780,588	$ 475,759	$ 11,545	$ 181,193	$ 12,161	$ 115,402	$ 27,375	$ 37,496	$ 51,337	**$ 2,621,901**
93	$ 628,992	$ 300,054	$ 779,762	$ 475,255	$ 11,537	$ 181,038	$ 12,161	$ 115,280	$ 27,351	$ 37,470	$ 51,295	**$ 2,620,195**
94	$ 628,992	$ 300,054	$ 778,942	$ 474,755	$ 11,529	$ 180,885	$ 12,161	$ 115,159	$ 27,328	$ 37,445	$ 51,253	**$ 2,618,503**
95	$ 628,992	$ 300,054	$ 778,136	$ 474,264	$ 11,521	$ 180,735	$ 12,161	$ 115,040	$ 27,306	$ 37,420	$ 51,213	**$ 2,616,841**
96	$ 628,992	$ 300,054	$ 777,336	$ 473,777	$ 11,514	$ 180,587	$ 12,161	$ 114,922	$ 27,283	$ 37,395	$ 51,172	**$ 2,615,191**
97	$ 628,992	$ 300,054	$ 776,546	$ 473,296	$ 11,506	$ 180,441	$ 12,161	$ 114,805	$ 27,261	$ 37,371	$ 51,132	**$ 2,613,564**
98	$ 628,992	$ 300,054	$ 775,765	$ 472,820	$ 11,499	$ 180,297	$ 12,161	$ 114,689	$ 27,240	$ 37,347	$ 51,093	**$ 2,611,957**
99	$ 628,992	$ 300,054	$ 774,994	$ 472,349	$ 11,492	$ 180,156	$ 12,161	$ 114,575	$ 27,218	$ 37,323	$ 51,055	**$ 2,610,369**
Total	**$ 59,440,000**	**$ 28,356,000**	**$ 92,613,000**	**$ 56,447,000**	**$ 1,297,000**	**$ 20,257,000**	**$ 2,175,000**	**$ 13,692,000**	**$ 3,061,000**	**$ 4,210,000**	**$ 5,742,000**	**$ 287,285,000**

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