APPENDIX D

WATER TREATMENT COST BASIS AND ESTIMATE
CHINO CLOSURE/CLOSEOUT PLAN
2007 UPDATE

BASIS OF COST ESTIMATE FOR
WATER TREATMENT WITH COMMINGLING

August 2007
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1.0 INTRODUCTION

This report presents the cost estimate bases for the proposed mine-wide water treatment portion of the Chino Mines Company (Chino) Closure/Closeout Plan (CCP) Update. The water treatment approach involves lime treatment and high-density sludge (lime/HDS) technology, along with commingling of the effluent with unimpacted waters and treatment system effluents to meet regulatory criteria for the discharge. This is the approach currently included in the Supplemental Discharge Plan for Closure DP-1340 (DP-1340) and has been previously presented in the 2001 CCP (M3, 2001a). This approach generally consists of the following principal elements:

- long-term collection of impacted water from NMA sources (groundwater inflow and runoff in the Santa Rita Pit, NMA interceptor wells, and runoff and seepage from stockpiles) with conveyance to the NMA water treatment facility;
- short-term collection of process solutions, runoff from uncovered stockpiles and pit walls and seepage with conveyance to a process solution elimination system (evaporative treatment system);
- conveyance of impacted water from the Cobre mining operations, north of Chino, to the NMA water treatment facility;
- conveyance of treated effluent from the NMA water treatment facility to the South Mine Area (SMA);
- commingling of the NMA water treatment facility effluent, treated Lake One water effluent, tailing interceptor well water and the SMA production well water such that the NMWQCC discharge criteria are met; and
- discharge of final effluents.

Figure 1 depicts the overall flow diagram for the Water Treatment with Commingling approach.

Cost estimates for initial capital and long-term operations and maintenance (O&M) associated with this scenario were developed, and include two treatment plants:

- a lime/HDS process for a variety of source waters in the NMA; and
- a lime/HDS plant at the former Hurley Smelter site in the Hurley Operations Area for treatment of Lake One waters.

In addition to the two treatment plants, it is assumed the evaporative treatment system (ETS) will be used during post-closure years 1 through 5. This system will be constructed to work off the process water inventory existing at closure, estimated at approximately 2.5 billion gallons (M3, 2004). In
addition to the process water inventory, the runoff and seepage from the uncovered leached stockpiles will be conveyed to the ETS. At the end of year 5, as the leach stockpiles are covered and draindown has decreased significantly, the runoff and seepage will be re-routed to the NMA lime/HDS plant for treatment. Treated effluents from the NMA and the SMA lime/HDS plants will then be commingled with tailing interceptor well water and SMA make-up water in a mixing pond prior to discharge.

There are six subsystems that make up the Treatment with Commingling System as follows: the two lime/HDS treatment facilities, the ETS for process solutions elimination, treated water commingling system, influent water collection, and conveyance and sludge disposal. The cost estimation bases for each of these six subsystems are described below. Total capital and O&M costs are arrived at by summing the subsystem costs.
2.0 QUANTITY AND QUALITY OF WATER TO BE TREATED

2.1 North Mining Area (NMA) Sources

The estimated quantities and qualities for the NMA at years 0, 10, 15, 25, 32, 40, and 100 were developed using a variety of dynamic system modeling (DSM) runs and calculation techniques. As noted above, it was assumed the process solutions and unleached sources will be segregated. Table 1 presents a summary of the modeled flow rates, TDS concentrations, and sulfate concentrations in years 0, 5, 10, 15, 25, 32, 40, and 100 for process solutions and unleached sources. In years 0 through 5 the ETS will be utilized for treatment of the process solutions and the lime/HDS treatment systems for the balance of the flows. No changes in water quality or flow were predicted by modeling after year 40.

The predicted quantity of water to be treated is 1,025 gallons per minute (gpm) on average through the course of year 1, with an increase to 1,121 gpm in year 5, and a gradual decrease from that point onward. For capital cost estimating purposes, a nominal treatment throughput capacity of 1,200 gpm was used. Operations and maintenance (O&M) costs are based on the projected flow rates and water quality characterizations at the designated time steps.

2.2 South Mining Area (SMA) Sources

There are three sources of water from the SMA including impacted tailing interceptor well water and Lake One water, and unimpacted production well water. Available data and assumptions regarding each source are summarized as follows and shown on Table 2.

TailingInterceptor Well Water. Four references were reviewed for data on tailing interceptor well water as follows.

- 2001 CCP (M3, 2001) Appendix G, a report by SRK (SRK, 2001);
- Lake One Alternatives Analysis Report (Golder, 2004);
- 2006 Interceptor Well Sampling Data (Golder, 2006); and
- Gary Van Riper calculations (GVR, 2007).

The individual tailing interceptor well data and the flow-weighted averages for sulfate and TDS concentrations from each source are summarized as follows.
Based on this data, the conditions and chemistry of the tailing water have not changed significantly (less than 20%) over the past several years. The flow rate and chemistry developed by Golder in 2006 will be used for the purposes of this CCP Update.

Flow rates from each of these sources are for year 0. Golder (2004) summarized tailing flow changes with time. These flow rates were used for purposes of this CCP Update.

**Lake One.** Available data for Lake One quantity and quality include the following:

- 2001 CCP (M3, 2001) Appendix G, a report by SRK (SRK, 2001); and
- Lake One Closure Alternatives Analysis Report (Golder, 2004).

The analytical data from the individual sources is summarized as follows:

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Flow gpm</th>
<th>TDS mg/L</th>
<th>Sulfate mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRK, 2001</td>
<td>2,820</td>
<td>1,532</td>
<td>1,065</td>
</tr>
<tr>
<td>Golder, 2004</td>
<td>2,820</td>
<td>1,532</td>
<td>1,066</td>
</tr>
<tr>
<td>Golder, 2006</td>
<td>2,312</td>
<td>1,725</td>
<td>1,027</td>
</tr>
<tr>
<td>GVR, 2007</td>
<td>--</td>
<td>1,800</td>
<td>1,100</td>
</tr>
</tbody>
</table>

It is unknown why there was a discrepancy in the SRK reported values. However, the values from the Golder (2004) became the basis for the CCP Update for the Lake One area. In addition, the Golder values are based on statistical analysis of a larger data set than used by SRK. Therefore, the values from Golder (2004) will be used to represent flow from Lake One.

**South Mine Area Water Well Make-up Water.** This is the unimpacted source of water used to ensure that NMWQCC discharge criteria are achieved. The 2001 CCP (M3, 2001) and the Lake One Closure Alternatives Analysis Report (Golder, 2004) use a sulfate concentration of 30 mg/L and a TDS of 310 mg/L for this source. These values were used for the purposes of the CCP Update.
3.0 BASIS FOR COST ESTIMATE–NMA LIME/HDS TREATMENT

3.1 Capital Cost Estimate

The primary source for capital cost estimation for the NMA lime/HDS system is an earlier cost estimate developed for the Summitville Mine site (RTG, 2004). Summitville is a “Superfund” cleanup site, with long-term water treatment being jointly funded by the U.S. Environmental Protection Agency (USEPA) and the Colorado Department of Public Health and Environment (CDPHE). The RTG (2004) cost estimate 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 estimate exhibit parallels to Chino’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 (RTG, 2004). The similarities in process between the Summitville and the Chino Treatment with Commingling designs, level of detail, and relatively recent preparation lend viability to the Summitville estimate as a basis for the Chino estimate.

A process flow diagram and equipment list for Chino’s NMA lime/HDS plant were generated (Figure 2 and Table 3). Costs for common process components such as reaction tanks, mixers, flocculation tanks, reagent tanks, pumps, lime addition subsystem components, sludge tanks and ancillary equipment were scaled from the Summitville estimate and escalated for inflation (2004 dollars escalated to 2007). The clarifier and belt press are subject to cost impacts other than inflation, and new estimates were obtained for these items (Sepco, 2007). Utility and ancillary equipment items were estimated as lump sums and include the following: electrical equipment, pipe, fittings, valves, instrumentation, and controls.

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 engineer’s judgment and previous Golder experience with treatment plant construction and equipment installation projects. Finally indirect costs including contingency, subcontractor overhead and profit, design, construction management, and New Mexico Reclamation Fee were applied at project standard factors of the total direct cost. The capital cost estimate for the NMA lime/HDS plant is presented in Table 3.
3.2 Basis for NMA Operations and Maintenance (O&M) Costs

Operations and maintenance (O&M) costs include labor, reagents, sludge disposal, capital for equipment replacement, routine maintenance parts cost, sampling and analysis costs, and electrical power. The cost bases for these items are as follows.

**Labor.** Operations labor (six full-time equivalents, or FTE), supervision (one FTE), and maintenance staffing (2 FTE) 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 Chino (M3, 2001a) and Tyrone (M3, 2001b) CCPs. Overtime was estimated based on Golder experience with operations of similar facilities.

**Reagents.** Reagents needed for lime/HDS processing include lime, flocculent and acid. Lime is required for chemical precipitation of dissolved metals and sulfate in the influent water. Projected lime consumption in the O&M cost estimate was based on calculations utilizing water chemistry data and treatability studies. The precipitated metals and sulfate are separated in the clarifier into the sludge underflow, leaving a clarified water overflow that has greatly reduced contaminant concentrations. Lime unit cost is based on a vendor quote (Chemical Lime Company, 2007). The lime cost is based on the projected lime consumption values, and it is possible that a discounted price could be negotiated with a vendor.

Flocculent is added to increase the settling rate of precipitated solids and later in the process to increase the efficiency of sludge densification (water removal) in the belt press. A relatively small amount of flocculent is required as a settling aid, while a much greater quantity is required at the belt press. The trade-off in cost benefit is in final sludge disposal volume. A final sludge waste that is approximately 50 percent solids can be produced in a flocculent-aided belt press on a continuous basis. The alternative is to dewater the sludge in a filter press with no flocculent addition. Utilization of a filter press is more labor intensive, requiring batch-wise operation of filling and emptying the press and it produces a final sludge waste that may be lower in solids content and higher in volume than the final sludge from the belt press. Flocculent cost was obtained by 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. Lime treatment for precipitation of metals and sulfate requires a pH of approximately 10. The effluent discharge limit for
pH requires a range of 6 to 9. Acid is added and mixed inline to control effluent pH within the discharge limit range. Since the treated water from the lime/HDS system is to be mixed with a number of other sources of lower pH the acid consumption will be lower than a typical lime/HDS effluent. Usage is based on plant flow rate, lime addition, residual sulfate, the characteristics of the other water sources at the commingling pond and experience at other sites. The unit cost is based on the low end of the typical range for similar type systems. The low end of the range is utilized due to the commingling with other lower pH sources.

**Sludge disposal.** The cost of sludge disposal is estimated at $0.13 per cubic foot of 50 percent solids sludge. This cost includes loading, hauling and unloading of sludge in an onsite sludge disposal facility. The sludge volume is calculated based on the results of treatability studies and modeling for predicted plant influent in years 1, 5, 10, 15, 25, 32, and 40 at the NMA lime/HDS treatment plant. The computer modeling 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 “out-year” O&M costs account for the gradual reduction in sludge production.

**Capital replacement and routine maintenance parts.** Through the duration of plant operations, equipment will be routinely maintained by replacing “wear” parts and by less frequently replacing entire components (pumps, mixers, etc) due to life cycle failure. Capital replacement and routine maintenance parts are estimated as percentages of the capital cost estimate. Routine maintenance parts are factored at 1 percent of the estimated total constructed cost and capital replacement is factored at 1.5 percent of the estimated total constructed cost. These factors are based on experience at other sites and the estimates completed for the Summitville Mine site (RTG, 2004).

**Sampling and analysis.** Sampling and analysis is required for compliance with effluent discharge permit conditions and for measurement of plant performance. Analyses required by permit and the frequency at which the analyses are to be performed are 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. The change in number of samples collected and analyzed is accounted for in the long-term O&M cost estimate. No labor cost is assigned to the sampling effort. It is assumed that the sampling will be a routine duty for plant operators and does not need an additional cost associated. Analytical costs are estimated based on laboratory pricing guide (Energy Laboratories Inc., 2007). Costs are inclusive of packaging, handling, shipping, quality assurance/quality control and lab results report preparation.
Electrical power consumption. Electrical power is estimated based on development of a motor list, motor efficiency and operating diversity (run time), similar to methodology used in the Tyrone CCP (M3, 2001b). Total kilowatt-hours (kWh) per year are calculated and summed, and a unit cost of $0.06 per kWh is used to estimate total electrical power cost in year one of operations. In out-years, the power consumption is scaled down in direct proportion to the decreasing flow rate through the plant.

3.3 NMA Lime/HDS Treatment Estimated Life Cycle O&M Cost

The O&M costs as described above were calculated for operational years 1, 5, 10, 15, 25, 32, and 40. Changes in flow rate and water chemistry, as predicted by dynamic system modeling (DSM), are carried into the calculation of reagent use and electrical power consumption. At year 40 it is assumed that no further changes in flow or water quality will occur and the plant will continue to operate through year 100 in steady state for flow rate and water quality. O&M costs for these years are presented in Tables 4 through 10.

A total estimated O&M current cost was calculated by multiplying the “time step” year’s annual cost by the number of years to the next step. This calculation also provided an annual O&M cost estimate for interim years between time steps (years 2 through 4, years 6 through 9, years 11 through 14, etc). The subsystem O&M cost estimate summed for 100 years of operation for the NMA lime/HDS treatment plant is $204,733,000.
4.0 BASIS FOR COST ESTIMATE–EVAPORATIVE TREATMENT SYSTEM

The evaporative treatment system (ETS) for process solution elimination may also be used to treat segregated NMA sources from leached stockpiles runoff and toe seepage. These sources are predicted to display higher concentrations of metals, sulfate and total dissolved solids than the other NMA sources. A significant contaminant load can be eliminated from active treatment (NMA lime/HDS) by segregating the high concentration sources and routing them to the ETS for the duration of ETS operations. Utilizing the ETS for treatment of the leached sources provides a cost benefit. The ETS is needed for process solution elimination, but can also accommodate treatment of leached sources for the first 5 years after closure. This approach effectively reduces the O&M costs associated with the NMA lime/HDS system.

4.1 Capital Cost Estimate

Previous study (M3, June 2004) has documented alternatives for process solution elimination and capital cost estimates for each alternative. The total constructed cost of the Pit Option Evaporation Treatment System (ETS) was estimated at $5,496,210. Escalating this estimate to 2007 dollars provides the current capital cost estimate of $6,036,000.

4.2 Basis for Evaporative Treatment System Operations & Maintenance (O&M) Costs

The Process Solution Elimination Study (M3, 2004) also provides an estimate of annual operations cost for the ETS at $645,800 for year 1 and $228,000 annually for years 2 through 5. As with the capital cost estimate, escalation of the ETS O&M costs to 2007 dollars results in an estimate of $709,200 for year 1, and $250,400 for years 2 through 5.

4.3 Evaporative Treatment System Estimated Life Cycle O&M Costs

The ETS will operate only as long as necessary to eliminate the bulk of the process solutions in inventory at the cessation of mining operations. This operational period is estimated at 5 years. The total O&M cost estimate is derived by summing the estimated annual O&M costs as described above. The life cycle O&M cost estimate for the ETS is $1,710,800. Upon shutdown of the ETS and reclamation of the leached stockpiles, long-term seepage will be treated through the NMA lime/HDS treatment facility.
5.0 BASIS FOR COST ESTIMATE–LAKE ONE LIME/HDS TREATMENT

The Lake One lime/HDS treatment plant is located at the former Hurley Smelter site (now referred to as the Hurley Operations Area). Modeling predictions of long-term flow rate and water quality characterizations indicate that a constant flow rate and constant water quality characterization (i.e., no changes in water chemistry through time) are applicable. Cost estimating is based on a constant flow rate of 100 gallons per minute (gpm) and water quality parameters that affect lime consumption and sludge production, including influent concentrations of metals, sulfate and total dissolved solids.

Much of the process equipment required for the Lake One lime/HDS treatment plant is in place due to previous treatment of former Hurley smelter discharge waters. The capital cost estimate accounts for re-use of existing equipment and infrastructure.

5.1 Capital Cost Estimate

The Lake One lime/HDS capital costs include concrete and structural additions to existing buildings, provision of a new polymer feed building, and upgrades or new installation of process equipment, piping, electrical subsystems/components, instrumentation and controls. The current cost estimate is based on a previous (2004) estimate and was escalated for inflation to the 2007 cost estimate. The estimate subtotal for direct capital cost was then used to develop total cost by applying factors for the following:

- contingency;
- subcontractor overhead;
- subcontractor profit;
- design;
- construction management/controls; and
- New Mexico Reclamation fee.

The Lake One capital cost estimate is presented in Table 11.
5.2 Basis for Lake One Operations and Maintenance (O&M) Costs

O&M costs include labor, reagents, sludge disposal, capital for equipment replacement, routine maintenance parts cost, and electrical power. The basis for these items is as follows.

**Labor.** Operations labor and supervision for the Lake One lime/HDS plant is assumed covered by the operators and supervisor at the NMA lime/HDS plant. Maintenance labor is estimated at 320 hours per year (approximately 6 hours per week). 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 Chino and Tyrone CCP updates. Overtime was estimated based on Golder experience with operations of similar facilities.

**Reagents.** Reagents needed for lime/HDS processing include lime, flocculent, and acid. The bases for estimated reagent costs for the Lake One plant are the same as discussed above, for the NMA plant.

**Sludge disposal.** The cost of sludge disposal is estimated at $0.13 per cubic foot of 50 percent solids sludge. This cost includes loading and unloading of sludge in an onsite sludge disposal facility. An additional sludge transportation cost of $300 per week is included for Lake One sludge disposal, assuming that the sludge disposal facility is located near the NMA plant requiring a longer haul from the Lake One site. The Lake One plant does not include a belt press or filter press for dewatering, so the sludge to be hauled will be of a greater volume (lower density) due to the lower percent solids.

**Capital replacement and routine maintenance parts.** Through the duration of plant operations, equipment will be routinely maintained by replacing “wear” parts and by less frequently replacing components (pumps, mixers, etc) due to life cycle failure. Capital replacement and routine maintenance parts are estimated as percentages of the capital cost estimate. Routine maintenance parts are estimated at 1 percent of the initial capital cost and capital replacement is estimated at 1.5 percent of initial capital cost. These factors have basis in experience on other operations projects, including the Summitville Mine (RTG, 2004).

**Sampling and Analysis.** The cost estimate basis for sampling and analysis at Lake One is the same as described above for the NMA.
**Electrical power consumption.** Electrical power is estimated with two bases: 1) power required for pumping from various locations (extraction wells, stormwater sumps, and barrier wall pumps) to the headworks of the Lake One Treatment plant; and 2) power required for operation of the treatment processing equipment. The treatment process power estimate is scaled based on flow rate, from an estimate developed for a similar process operated at 1,200 gpm. Total kilowatt-hours (kWh) per year are calculated and summed, and a unit cost of $0.06 per kWh is used to estimate total electrical power cost in year one of operations. Flow to the Lake One treatment plant is constant throughout the life of the plant at 100 gpm, and the power consumption is likewise assumed to be level in years one through cessation.

The Lake One O&M cost estimate for year 1 through cessation of operations is presented in Table 12.

**5.3 Lake One Lime/HDS Treatment Estimated Life Cycle O&M Cost**

The O&M costs as described above were calculated for operational year 1. No changes in flow rate and water chemistry are predicted. The estimate of O&M annual current cost for year one was multiplied by 100 to develop a total current cost for 100 years of Lake One treatment operations. The subsystem O&M cost estimate summed for 100 years of operation for the Lake One lime/HDS treatment plant is $13,200,000.
6.0 BASIS FOR COST ESTIMATE–COMMINGLING EQUIPMENT

6.1 Capital Cost Estimate

The primary source for capital cost estimation for the commingling equipment is the 2001 Chino CCP (M3, 2001a). The projected commingling sources and flow rates have not changed appreciably since the 2001 CCP was prepared. The 2001 CCP equipment and piping cost estimates were escalated to 2007 dollars. Items included in the capital cost estimate for commingling are:

- pivots;
- irrigation piping sized for a flow of 10,000 gpm;
- irrigation piping sized for a flow of 2,000 gpm;
- pipe-fittings (tees, ells, cleanouts, etc.);
- computerized modules;
- 10,000-gallon capacity mixing tanks;
- power supply;
- commingling pond; and
- first year crops.

Pumps for the commingling system are in place as part of mining water/wastewater operations. No new capital cost will be incurred for pumps. Costs calculated by factors of the capital equipment include:

- contingency;
- subcontractor overhead;
- subcontractor profit;
- design;
- construction management/controls; and
- New Mexico Reclamation fee.

The capital cost estimate for commingling equipment is presented in Table 13.
6.2 Basis for Commingling Operations and Maintenance (O&M) Costs

O&M costs for commingling equipment include electrical power only. An operating load of 447 kilowatts (kW) for pumping was estimated. This load is applied continuously, with an assumed uptime ratio of 95 percent (8,322 runtime hours annually). The unit cost is $0.06 per kWh.

O&M line item costs assumed to be covered in the NMA and Lake One estimates include labor, capital replacement and routine maintenance parts.

O&M line items which are not applicable to the commingling equipment include reagents, sludge disposal and sampling and analysis.

6.3 Commingling Equipment Estimated Life Cycle O&M Cost

The O&M costs as described above were calculated for operational year 1. No significant changes in flow rate for the commingling equipment are predicted. The estimate of O&M annual current cost for year one was multiplied by 100 to develop a total current cost for 100 years of commingling equipment operations. The subsystem O&M cost estimate summed for 100 years of operation for the commingling equipment is $22,320,000.
7.0 BASIS FOR COST ESTIMATE–WATER COLLECTION AND CONVEYANCE

7.1 Capital Cost Estimate

The primary source for capital cost estimation for the water collection and conveyance are site maps and proximal locations of collection points. Estimates of pipeline lengths are based on review of locations, and pipeline sizes are based on predicted flows from influent sources. Pipeline estimates are as follows:

- Santa Rita Pit to NMA treatment plant - 20,000 feet;
- Reservoir 8 to NMA treatment plant - 33,420 feet; and
- Reservoir 7 to NMA treatment plant - 250 feet.

In addition to the pipelines, a one million gallon influent pond at the NMA treatment plant and a 1-million-gallon lift pond in the Santa Rita Pit are included in the capital cost estimate for collection and conveyance.

Pumps for the collection and conveyance system are assumed to be in place as part of mining water/wastewater operations. No new capital cost will be incurred for pumps. Costs calculated by factors of the capital equipment include:

- contingency;
- subcontractor overhead;
- subcontractor profit;
- design;
- construction management/controls; and
- New Mexico Reclamation fee.

The capital cost estimate for collection and conveyance is presented in Table 14.

7.2 Basis for Collection and Conveyance Operations and Maintenance (O&M) Costs

For the purpose of this estimate, the O&M costs for collection and conveyance equipment include electrical power only. An operating load of 257 kilowatts (kW) for pumping was estimated. This
load is applied continuously, with an assumed uptime ratio of 95 percent (8,322 runtime hours annually). The unit cost for power is $0.06 per kWh.

O&M line item costs assumed to be covered in the NMA and Lake One estimates include labor, capital replacement and routine maintenance parts.

7.3 Collection and Conveyance Equipment Estimated Life Cycle O&M Cost

The O&M costs as described above were calculated for operational year 1. No significant changes in flow rate for the collection and conveyance equipment are predicted for subsequent years. The estimate of O&M annual current cost for year one was, therefore, multiplied by 100 to develop a total current cost for 100 years of commingling equipment operations. The subsystem O&M cost estimate summed for 100 years of operation for the water collection and conveyance equipment is $12,900,000.
8.0 BASIS FOR COST ESTIMATE–SLUDGE DISPOSAL FACILITY

8.1 Capital Cost Estimate

The sludge disposal facility will be developed on site. The capacity of the disposal facility is adequate for sludge produced for 100 years of operation of the NMA and Lake One lime/HDS treatment plants. The capital cost is estimated by scaling from known cost for a similar proposed sludge disposal facility at Tyrone.

8.2 Basis for Sludge Disposal Facility Operations and Maintenance (O&M) Costs

The O&M costs for the sludge disposal facility are incorporated into the NMA and Lake One lime/HDS treatment plant O&M costs as described above.

8.3 Sludge Disposal Facility Estimated Life Cycle O&M Cost

**NMA lime/HDS treatment plant.** The O&M costs developed for sludge disposal within the NMA lime/HDS plant O&M costs were calculated for operational years 1, 5, 10, 15, 25, 32, and 40. Sludge quantities were calculated based on water flow rate and chemistry, and treatability studies. Changes in flow rate and water chemistry as predicted by DSM modeling are carried into the calculation of sludge production. At year 40 it is assumed that no further changes in flow or water quality will occur and the plant will continue to operate through year 100 in steady state for flow rate and water quality.

A total estimated sludge disposal O&M current cost was calculated by multiplying the “time step” year’s annual cost by the number of years to the next step. This calculation also provided an annual O&M cost estimate for interim years between time steps (years 2 through 4, years, 6 through 9, years, 11 through 14).

**Lake One lime/HDS treatment plant.** The O&M costs developed for sludge disposal within the Lake One lime/HDS plant O&M costs were calculated for operational year 1 only. No changes in flow rate or influent water quality characterization are predicted for Lake One. The 100-year O&M current cost estimate for sludge disposal from Lake One is obtained by multiplying the annual cost by 100.
The subsystem O&M cost estimate for sludge generated at both the NMA and Lake One facilities, summed for 100 years of operation is $13,144,000.
9.0 TOTAL COST ESTIMATE FOR TREATMENT WITH COMMINGLING

Capital cost estimates for each of the six subsystems that together comprise the Treatment with Commingling system were summed to generate a total capital cost estimate.

O&M cost estimates were developed for operational years 1, 5, 10, 15, 25, 32, and 40 for the NMA lime/HDS treatment plant. No changes in flow rate or influent water quality characterization are predicted to occur from year 40 to year 100. Interim year O&M annual costs were held level with the time step cost (i.e., year one cost is used in years 1, 2, 3, and 4; year 5 cost is used in years 5, 6, 7, 8, and 9, etc.). The current cost for 100 years of operation is then summed from the capital cost estimates applied in year one and all O&M annual cost estimates (year 1 through 100). Summary capital and current costs for 100 years of O&M are presented in Table 15.
10.0 REFERENCES


Steffen, Robertson and Kirsten (SRK), 2001. See M3 Engineering and Technology Corporation (M3). 2001a. for Appendix G.
# TABLES
Table 1
Chino CCP Update
NMA leached flows as influent to lime/HDS treatment

<table>
<thead>
<tr>
<th>Year</th>
<th>Segregated (Unleached Flows)</th>
<th>Leached Flows</th>
<th>Combined Influent to NMA Treatment System</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Average flow between intervals, gal/min</td>
<td>Average sulfate between intervals, mg/l</td>
<td>TDS (mg/L)</td>
</tr>
<tr>
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<td>6,636</td>
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<tr>
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# Table 2

Chino CCP Update

South Mine Area Sources

<table>
<thead>
<tr>
<th>Year</th>
<th>Lake One Influent</th>
<th>Tailing Pumpback Water</th>
<th>SMA Water Well Make-up</th>
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<tr>
<td></td>
<td>Average flow between intervals, gal/min</td>
<td>Average sulfate between intervals, mg/l</td>
<td>TDS (mg/L)</td>
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<td>3,188</td>
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<tr>
<td>5</td>
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<td>3,188</td>
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<tr>
<td>15</td>
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<td>25</td>
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<td>40</td>
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<tr>
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<td>3,188</td>
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<td>Item</td>
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<td>Qty</td>
<td>UOM</td>
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<tr>
<td>----------------------------------</td>
<td>------------------------------</td>
<td>-----</td>
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<tr>
<td><strong>Equipment Cost</strong></td>
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<tr>
<td>Reaction Tank #1</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>Reaction Tank Mixer #1</td>
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<td>Floc Tank #1</td>
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<tr>
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<td>Thickener/Clarifier #1</td>
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<td>Sludge Pump #1</td>
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<td>Underflow Pump #1</td>
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<td>Polymer system</td>
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<td>pH Control System (Acid addition)</td>
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</tr>
<tr>
<td>Belt Press Waste Pump</td>
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</tr>
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<td>Belt Press Polymer System</td>
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<td>Footer depth</td>
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<tr>
<td>Building Electrical</td>
<td>Materials/equipment</td>
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<td>$150,000</td>
</tr>
<tr>
<td>Crew size</td>
<td>6 men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration</td>
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<tr>
<td>Labor subtotal</td>
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<td>Other Project Costs</td>
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<td>$50,000</td>
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<td>0 $</td>
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<td>$0</td>
</tr>
<tr>
<td>Total Other Project Costs</td>
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<td>Total Capital Cost</td>
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<td>Total Direct Cost</td>
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<td></td>
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<tr>
<td>Contingency</td>
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<td>$141,940</td>
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<td>$7,097,000</td>
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<td>$7,097,000</td>
<td>$1,490,370</td>
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<td>Subcontractor Profit</td>
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<td>Construction Management/Controls</td>
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<td>Bonds</td>
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<td>$7,097,000</td>
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<td>Total Capital Cost</td>
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### Table 4
Chino CCP Update
Operating Cost - North Mine Area Lime/HDS Plant Year 1

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<tr>
<th>Year - 1 Following Cessation of Operation</th>
<th>1,025 gpm Chemical Treatment</th>
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<tbody>
<tr>
<td><strong>Cost Item</strong></td>
<td><strong>Hours per year</strong></td>
</tr>
<tr>
<td>Water Treatment Facilities Labor</td>
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</tr>
<tr>
<td>Operations Labor</td>
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<tr>
<td>Operations Supervisor</td>
<td>2</td>
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<tr>
<td>Maintenance Labor</td>
<td></td>
</tr>
<tr>
<td>Overtime</td>
<td></td>
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<tr>
<td><strong>Sub-total Water Treatment Facilities Labor Cost</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Cost Item</strong></th>
<th><strong>Treatment Flow Rate (gpm)</strong></th>
<th><strong>Consumption Rate</strong></th>
<th><strong>Annual Consumption</strong></th>
<th><strong>Unit Cost</strong></th>
<th><strong>Annual Cost</strong></th>
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</thead>
<tbody>
<tr>
<td>Water Treatment Facilities Reagents</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lime</td>
<td>1.025</td>
<td>22.33</td>
<td>lbs./1,000 gallons</td>
<td>6,000</td>
<td>$114.50</td>
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<tr>
<td>Polymer (Flocculant)</td>
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<td>0.54</td>
<td>lbs./1,000 gallons</td>
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<td>$1.65</td>
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<tr>
<td>Effluent pH Adjust</td>
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<td>0.42</td>
<td>lbs./1,000 gallons</td>
<td>226,300</td>
<td>$0.50</td>
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<td><strong>Sub-total Water Treatment Facilities Reagent Cost</strong></td>
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<td>$1,279,000</td>
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<table>
<thead>
<tr>
<th><strong>Cost Item</strong></th>
<th><strong>Total Constructed Cost Estimate</strong></th>
<th><strong>Routine Maintenance</strong></th>
<th><strong>Capital Replacement</strong></th>
<th><strong>Annual Cost</strong></th>
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<tr>
<td>Water Treatment Facilities Parts</td>
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<tr>
<td>Maintenance</td>
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<td>1.00%</td>
<td>1.50%</td>
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<td>Capital Replacement</td>
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<th><strong>Unit Cost</strong></th>
<th><strong>Annual Cost</strong></th>
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<tr>
<td>Water Treatment and Environmental Sampling &amp; Analytical</td>
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<tr>
<td>Sampling: Sample Analysis, Reporting</td>
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<td><strong>Sub-total Sampling &amp; Analytical</strong></td>
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<th><strong>Sludge Disposal</strong></th>
<th><strong>Usage</strong></th>
<th><strong>Jnts</strong></th>
<th><strong>Cost</strong></th>
<th><strong>Unit</strong></th>
<th><strong>Annual Cost</strong></th>
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<tbody>
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<td>$/ft³</td>
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<table>
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<th><strong>Electric Power</strong></th>
<th><strong>Usage</strong></th>
<th><strong>Jnts</strong></th>
<th><strong>Cost</strong></th>
<th><strong>Unit</strong></th>
<th><strong>Annual Cost</strong></th>
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<p>| <strong>Total Annual Water Treatment Facilities Operating Cost</strong> | $2,213,000      |</p>
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<th>Hourly Rate</th>
<th>Annual Salary basis</th>
<th>Annual Cost</th>
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<td>Mandated and Voluntary Labor Benefits</td>
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<td>81,744</td>
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| Sub-total Water Treatment Facilities Labor Cost | $395,000 |

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<tr>
<th>Cost Item</th>
<th>Treatment Flow Rate (gpm)</th>
<th>Consumption Rate</th>
<th>Annual Consumption</th>
<th>Unit Cost</th>
<th>Annual Cost</th>
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<td>Water Treatment Facilities Reagents</td>
<td>Lime</td>
<td>1,121</td>
<td>46.62 lbs./1,000 gallons</td>
<td>13,700 Tons</td>
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<tr>
<td></td>
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| Sub-total Water Treatment Facilities Reagent Cost | $2,785,000 |

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<td>1.00%</td>
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| Sub-total Water Treatment Facilities Parts Cost | $246,000 |

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<th>Cost Item</th>
<th>Sludge Generation Rate</th>
<th>Unit Cost</th>
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<td>Water Treatment Facilities Electric Power</td>
<td>Electric Power Usage</td>
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| Sub-total Water Facilities Electric Power | $126,000 |

<p>| Total Annual Water Treatment Facilities Operating Cost | $3,901,000 |</p>
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<th>Cost Item</th>
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<tr>
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<th>Treatment Flow Rate (gpm)</th>
<th>Consumption Rate</th>
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<th>Unit Cost</th>
<th>Annual Cost</th>
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<td>Water Treatment Facilities Reagents</td>
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<tr>
<td>Lime</td>
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<td>Ton</td>
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<td>Polymer (Flocculant)</td>
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<td>1.15</td>
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<td>Effluent pH Adjust</td>
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<td>Water Treatment Facilities Parts</td>
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<tr>
<td>Maintenance</td>
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<td>1.50%</td>
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<tr>
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<tr>
<td>Capital Replacement</td>
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<td><strong>Sub-total Water Treatment Facilities Parts Cost</strong></td>
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<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Annual Cost</th>
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<tbody>
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<td>Sampling, Sample Analysis, Reporting</td>
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<table>
<thead>
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<th>Sludge Generation</th>
<th>Unit Cost</th>
<th>Annual Cost</th>
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<tbody>
<tr>
<td>Sludge Disposal</td>
<td>2.264,852 ft³/yr</td>
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<table>
<thead>
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<th>Cost Item</th>
<th>Annual Cost</th>
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<tbody>
<tr>
<td>Water Treatment Facilities Electric Power</td>
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<tr>
<td>Electric Power</td>
<td>2,043,411 kWh</td>
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**Total Annual Water Treatment Facilities Operating Cost** $3,862,000
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<th>Number of Personnel</th>
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<th>Annual Salary basis</th>
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<td>Unit</td>
<td>Annual Consumption Rate</td>
<td>Unit</td>
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<td>Lime</td>
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<td><strong>Sub-total Water Treatment Facilities Parts Cost</strong></td>
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<td>Unit</td>
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<td><strong>Water Treatment Facilities Labor</strong></td>
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<td>$ 81,744</td>
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<td>$ 98,290</td>
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### Table 9
Chino CCP Update
Operating Cost - North Mine Area Lime/HDS Plant Year 32

#### Year - 32 Following Cessation of Operation

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<tr>
<th>Cost Item</th>
<th>Number of Personnel</th>
<th>Hours per year</th>
<th>Hourly Rate</th>
<th>Annual Salary basis</th>
<th>Annual Cost</th>
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<tbody>
<tr>
<td>Water Treatment Facilities Labor</td>
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<td></td>
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<td></td>
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</tr>
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<td>2,080</td>
<td>$12.50</td>
<td>$</td>
<td>$156,000</td>
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<tr>
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<td>1</td>
<td>2,080</td>
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<tr>
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<td>2,080</td>
<td>$18.00</td>
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<td>$74,880</td>
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<td>Overtime</td>
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<td>$</td>
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<td>$</td>
<td>$81,744</td>
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<td><strong>Sub-total Water Treatment Facilities Labor Cost</strong></td>
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<td></td>
<td>$396,000</td>
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<thead>
<tr>
<th>Cost Item</th>
<th>Treatment Flow Rate (gpm)</th>
<th>Consumption Rate</th>
<th>Annual Consumption</th>
<th>Unit Cost</th>
<th>Annual Cost</th>
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<tbody>
<tr>
<td>Water Treatment Facilities Reagents</td>
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<td>Rate</td>
<td>Unit</td>
<td>Rate</td>
<td>Unit</td>
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<tr>
<td>Lime</td>
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<td>Ton</td>
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<td>Polymer (Flocculant)</td>
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<td>Effluent pH Adjust</td>
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<td>188,900</td>
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<th>Capital Replacement</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Treatment Facilities Parts</td>
<td>$9,829,000</td>
<td>1.00%</td>
<td>1.50%</td>
<td>$98,290</td>
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<td><strong>Sub-total Water Treatment Facilities Parts Cost</strong></td>
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<table>
<thead>
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<th>Cost Item</th>
<th>Sludge Generation</th>
<th>Unit Cost</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Treatment and Environmental Sampling &amp; Analytical</td>
<td>Sludge Generation</td>
<td>Unit</td>
<td>$18,000</td>
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<tr>
<td>Sub-total Sampling &amp; Analytical</td>
<td>Sludge Generation</td>
<td>Unit</td>
<td>$18,000</td>
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<tr>
<td>Water Treatment Facilities Electric Power</td>
<td>Sludge Disposal</td>
<td>861,511 ft³/yr</td>
<td>$0.13/ft³</td>
</tr>
<tr>
<td>Sub-total Water Treatment Facilities Electric Power</td>
<td>Sludge Disposal</td>
<td>861,511 ft³/yr</td>
<td>$0.13/ft³</td>
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</tbody>
</table>

<table>
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<tr>
<th>Cost Item</th>
<th>Usage</th>
<th>Units</th>
<th>Cost</th>
<th>Unit Cost</th>
<th>Annual Cost</th>
</tr>
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<td>Water Treatment Facilities Electric Power</td>
<td>Usage</td>
<td>Units</td>
<td>Cost</td>
<td>Unit</td>
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<td>Usage</td>
<td>Units</td>
<td>Cost</td>
<td>Unit</td>
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<table>
<thead>
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<th><strong>Total Annual Water Treatment Facilities Operating Cost</strong></th>
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<td></td>
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### Table 10
Chino CCP Update
Operating Cost - North Mine Area Lime/HDS Plant Year 40

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<tr>
<th>Years - 40 Onward Following Cessation of Operation</th>
<th>827 gpm Chemical Treatment</th>
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<td><strong>Cost Item</strong></td>
<td><strong>Number of Personnel</strong></td>
<td><strong>Hours per year</strong></td>
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<tr>
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<td>2,080</td>
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<td>Overtime</td>
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<tr>
<td>Mandated and Voluntary Labor Benefits</td>
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<td><strong>Sub-total Water Treatment Facilities Labor Cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Cost Item</strong></td>
<td><strong>Treatment Flow Rate (gpm)</strong></td>
</tr>
<tr>
<td><strong>Water Treatment Facilities Reagents</strong></td>
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<tr>
<td>Lime</td>
<td>827</td>
<td>17.94</td>
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<td>Polymer (Flocculant)</td>
<td>827</td>
<td>0.43</td>
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<tr>
<td>Effluent pH Adjust</td>
<td>827</td>
<td>0.42</td>
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<td><strong>Sub-total Water Treatment Facilities Reagent Cost</strong></td>
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</tr>
<tr>
<td></td>
<td><strong>Cost Item</strong></td>
<td><strong>Total Constructed Cost Estimate</strong></td>
</tr>
<tr>
<td><strong>Water Treatment Facilities Parts</strong></td>
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</tr>
<tr>
<td>Maintenance</td>
<td>$9,829,000</td>
<td>1.00%</td>
</tr>
<tr>
<td>Routine Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Replacement</td>
<td></td>
<td></td>
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<tr>
<td><strong>Sub-total Water Treatment Facilities Parts Cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Cost Item</strong></td>
<td><strong>Sludge Generation</strong></td>
</tr>
<tr>
<td><strong>Water Treatment Facilities Electric Power</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total Water Facilities Electric Power</strong></td>
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<tr>
<td><strong>Total Annual Water Treatment Facilities Operating Cost</strong></td>
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<td></td>
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## Table 11
**Chino CCP Update**

**Total Constructed Cost Estimate for the Lake One Water Treatment Facility**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>UNITS</th>
<th>UNIT COST</th>
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<tr>
<td><strong>CAPITAL COSTS</strong></td>
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<td></td>
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<tr>
<td><strong>2000 Concrete</strong></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Place Concrete Slabs</td>
<td>14.8</td>
<td>cy</td>
<td>185.99 $</td>
<td>2,753 $</td>
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<tr>
<td>Forms</td>
<td>120</td>
<td>sf</td>
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<td>1,499 $</td>
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<tr>
<td>Reinforcing Steel</td>
<td>0.6</td>
<td>ton</td>
<td>2,416 $</td>
<td>1,450 $</td>
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<tr>
<td>Embedded Metals</td>
<td>0.03</td>
<td>ton</td>
<td>6,890 $</td>
<td>207 $</td>
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<tr>
<td>Misc Concrete Materials</td>
<td>1</td>
<td>lot</td>
<td>886 $</td>
<td>886 $</td>
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<tr>
<td>Construction Equipment - Concrete</td>
<td>9</td>
<td>cr-hr</td>
<td>67.29 $</td>
<td>606 $</td>
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<tr>
<td><strong>3000 Structural</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Light Steel</td>
<td>1.5</td>
<td>ton</td>
<td>3,740 $</td>
<td>5,610 $</td>
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<tr>
<td>Construction Equipment - Steel</td>
<td>4.5</td>
<td>cr-hr</td>
<td>143 $</td>
<td>641 $</td>
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<tr>
<td><strong>4000 Architectural</strong></td>
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<td></td>
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<tr>
<td>Polymer Feed Building</td>
<td>200</td>
<td>sf</td>
<td>85 $</td>
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<tr>
<td><strong>5000 Process Equipment</strong></td>
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<td></td>
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<tr>
<td>Reagent Equipment</td>
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<td>lot</td>
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<td>Rehab and Modify Existing Equipment</td>
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<td>lot</td>
<td>13,179 $</td>
<td>13,179 $</td>
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<td>29,148 $</td>
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<td>ea</td>
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<tr>
<td>Collection Well Pump</td>
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<td>ea</td>
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<td>21,441 $</td>
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<td>Construction Equipment - Process</td>
<td>110</td>
<td>cr-hr</td>
<td>135 $</td>
<td>14,823 $</td>
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<tr>
<td><strong>6000 Piping</strong></td>
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<tr>
<td>Process Pipe</td>
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<td>lf</td>
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<td>lf</td>
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<td><strong>7000 Electrical</strong></td>
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<td></td>
</tr>
<tr>
<td>Treatment Plant Electrical Equipment</td>
<td>1</td>
<td>lot</td>
<td>33,000 $</td>
<td>33,000 $</td>
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<tr>
<td>Wiring and Installation</td>
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<td>lot</td>
<td>17,267 $</td>
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<td><strong>8000 Instrumentation</strong></td>
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<tr>
<td>Treatment Plant Control Equipment</td>
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<td>11,000 $</td>
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<tr>
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<td>Contingency</td>
<td>2</td>
<td>%</td>
<td>$ 10,440</td>
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<td>Subcontractor General Conditions</td>
<td>0</td>
<td>%</td>
<td>$ -</td>
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<td>Subcontractor Overhead</td>
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<td>Construction Management/Controls</td>
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<td>$ 26,100</td>
<td></td>
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<tr>
<td>New Mexico Reclamation Fee</td>
<td>2</td>
<td>%</td>
<td>$ 10,440</td>
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<tr>
<td>Bonds</td>
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<td>$ -</td>
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<tr>
<td><strong>TOTAL CAPITAL COST</strong></td>
<td></td>
<td></td>
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<tr>
<td>Cost Item</td>
<td>Number of Personnel</td>
<td>Hours per year</td>
<td>Hourly Rate</td>
<td>Hourly Salary Rate</td>
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<td>---------------------------------------------------------------------------</td>
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<tr>
<td>Water Treatment Facilities Labor</td>
<td>1</td>
<td>320</td>
<td>15.00</td>
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<td>Maintenance Labor</td>
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<td></td>
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<tr>
<td>Overtime</td>
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<tr>
<td>Mandated and Voluntary Labor Benefits</td>
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<tr>
<td>Sub-total Water Treatment Plant Labor Cost</td>
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<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Treatment Flow Rate (gpm)</th>
<th>Consumption Rate</th>
<th>Annual Consumption</th>
<th>Unit Cost</th>
</tr>
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<tbody>
<tr>
<td>Water Treatment Facilities Reagents</td>
<td>100</td>
<td>12.4</td>
<td>300</td>
<td>14.50</td>
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<td>Sub-total Water Treatment Facilities Reagent Cost</td>
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<td>Water Treatment Facilities Equipment</td>
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<td>Labor Rate</td>
<td>MLS Rate</td>
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<td>Maintenance</td>
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<td>1.50%</td>
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</tr>
<tr>
<td>Sub-total Water Treatment Facilities Parts Cost</td>
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<tr>
<td>Water Treatment Facilities Analytical</td>
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<td>Sampling, Sample Analysis, Reporting</td>
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<td>Sub-total Water Treatment Facilities Analytical</td>
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<tr>
<td>Bunker Wall Pumps</td>
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<tr>
<td>Electric Power</td>
<td>$3,300</td>
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<td></td>
</tr>
<tr>
<td>Sub-total Bunker Wall Pumps</td>
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<tr>
<td>Storm Water Pumps</td>
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<tr>
<td>Electric Power</td>
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<td></td>
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</tr>
<tr>
<td>Sub-total Storm Water Pumps</td>
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<td></td>
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<td>Sludge Disposal</td>
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<tr>
<td>Transportation</td>
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<tr>
<td>Sub-total Sludge Disposal</td>
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<td>Process Rate Contingency</td>
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<td>Process rate Contingency - Allowance</td>
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<tr>
<td>Water Treatment Facilities Electric Power</td>
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<td>Water Treatment Facilities Electric Power</td>
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<tr>
<td>Sub-total Water Treatment Facilities Electric Power</td>
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<td>Total Annual Water Treatment Facilities Operating Cost</td>
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### Table 13
Chino CCP Update
Total Constructed Cost Estimate for Effluent Commingling

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit of measure</th>
<th>Unit cost</th>
<th>Extended total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pivots</td>
<td>8</td>
<td>ea</td>
<td>$103,500</td>
<td>$828,000</td>
</tr>
<tr>
<td>Irrigation piping - 10,000 gpm</td>
<td>26,400</td>
<td>ft</td>
<td>$29</td>
<td>$760,320</td>
</tr>
<tr>
<td>Irrigation piping - 2,000 gpm</td>
<td>52,800</td>
<td>ft</td>
<td>$8</td>
<td>$411,840</td>
</tr>
<tr>
<td>T's</td>
<td>8</td>
<td>ea</td>
<td>$720</td>
<td>$5,760</td>
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<tr>
<td>Computerized modules</td>
<td>8</td>
<td>ea</td>
<td>$5,500</td>
<td>$44,000</td>
</tr>
<tr>
<td>Mixing tanks - 10,000 gals</td>
<td>4</td>
<td>ea</td>
<td>$11,000</td>
<td>$44,000</td>
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<tr>
<td>Water pump</td>
<td>existing</td>
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</tr>
<tr>
<td>Power supply</td>
<td>79,200</td>
<td>feet</td>
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<td>$44,867</td>
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<td>Commingling pond</td>
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<td>ea</td>
<td>$102,099</td>
<td>$102,099</td>
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<tr>
<td>First year crops</td>
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<td>ls</td>
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<td>$733,498</td>
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<td><strong>TOTAL DIRECT COST</strong></td>
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### Indirect Costs

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<tr>
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<th>Percentage</th>
<th>% of total direct cost</th>
<th>Cost</th>
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<tr>
<td>Contingency</td>
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<td>%</td>
<td>$59,480</td>
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<tr>
<td>Subcontractor General Conditions</td>
<td>0</td>
<td>%</td>
<td>-</td>
</tr>
<tr>
<td>Subcontractor Overhead</td>
<td>21</td>
<td>%</td>
<td>$624,540</td>
</tr>
<tr>
<td>Subcontractor Profit</td>
<td>4</td>
<td>%</td>
<td>$118,960</td>
</tr>
<tr>
<td>Design</td>
<td>5</td>
<td>%</td>
<td>$133,830</td>
</tr>
<tr>
<td>Construction Management/Controls</td>
<td>5</td>
<td>%</td>
<td>$148,700</td>
</tr>
<tr>
<td>New Mexico Reclamation Fee</td>
<td>2</td>
<td>%</td>
<td>$59,480</td>
</tr>
<tr>
<td>Bonds</td>
<td>0</td>
<td>%</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL CAPITAL COST</strong></td>
<td></td>
<td></td>
<td><strong>$4,119,000</strong></td>
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<td>Description</td>
<td>Quantity</td>
<td>Unit of measure</td>
<td>Unit cost</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>----------</td>
<td>-----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Pipeline from Pit to Ivanhoe Site</td>
<td>20,000</td>
<td>ft</td>
<td>21.67</td>
</tr>
<tr>
<td>Pipeline from Reservoir 8 to Ivanhoe Site</td>
<td>33,420</td>
<td>ft</td>
<td>12.32</td>
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<td>Pipeline from Reservoir 7 to Ivanhoe Site</td>
<td>250</td>
<td>ft</td>
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<td>1MM Gallon Influent Pond at Ivanhoe (includes sump structure)</td>
<td>1</td>
<td>LS</td>
<td>150,000</td>
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<tr>
<td>1MM Gallon Lift Pond Out of Pit (includes sump structure)</td>
<td>1</td>
<td>LS</td>
<td>150,000</td>
</tr>
<tr>
<td>Pump</td>
<td>4</td>
<td>ea</td>
<td>50,000</td>
</tr>
<tr>
<td>Pump</td>
<td>2</td>
<td>ea</td>
<td>15,000</td>
</tr>
<tr>
<td>Pump</td>
<td>2</td>
<td>ea</td>
<td>5,000</td>
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<tr>
<td><strong>TOTAL DIRECT COST</strong></td>
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<table>
<thead>
<tr>
<th>Indirect Costs</th>
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<tbody>
<tr>
<td>Contingency</td>
<td>2</td>
<td>%</td>
<td></td>
<td>27,764</td>
</tr>
<tr>
<td>Subcontractor General Conditions</td>
<td>0</td>
<td>%</td>
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<tr>
<td>Subcontractor Overhead</td>
<td>21</td>
<td>%</td>
<td></td>
<td>291,526</td>
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<tr>
<td>Subcontractor Profit</td>
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<td>55,529</td>
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<tr>
<td>Design</td>
<td>5</td>
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<td>62,470</td>
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<td>Construction Management/Controls</td>
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<td>%</td>
<td></td>
<td>69,411</td>
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<td>New Mexico Reclamation Fee</td>
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<td>27,764</td>
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<tr>
<td>Bonds</td>
<td>0</td>
<td>%</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL INDIRECT COST</strong></td>
<td></td>
<td></td>
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<td><strong>$ 534,463</strong></td>
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</table>

**TOTAL CAPITAL COST** $ 1,922,680
## Table 15
Chino CCP Update
Capital and O&M Cost Summary

<table>
<thead>
<tr>
<th>Capital Cost Elements</th>
<th>Water Treatment with Commingling</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Mine Area Lime/HDS Plant</td>
<td>$ 9,829,000</td>
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<tr>
<td>Evaporative Treatment System</td>
<td>$ 6,036,000</td>
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<tr>
<td>Lake One - Hurley Treatment System</td>
<td>$ 723,000</td>
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<tr>
<td>Commingling System</td>
<td>$ 4,119,000</td>
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<tr>
<td>Water Collection /Conveyance</td>
<td>$ 1,923,000</td>
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<tr>
<td>Sludge Disposal Facility</td>
<td>$ 1,434,000</td>
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<tr>
<td>Subtotal, Capital</td>
<td>$ 24,064,000</td>
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</table>

<table>
<thead>
<tr>
<th>Operations &amp; Maintenance Costs</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>North Mine Area Lime/HDS Plant</td>
<td>$ 204,733,000</td>
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<tr>
<td>Evaporative Treatment System</td>
<td>$ 1,711,000</td>
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<td>Lake One - Hurley Treatment System</td>
<td>$ 13,200,000</td>
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<td>Commingling System</td>
<td>$ 22,320,000</td>
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<td>Water Collection/Conveyance</td>
<td>$ 12,900,000</td>
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<td>Sludge Disposal</td>
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<td>Subtotal, Operations and Maintenance</td>
<td>$ 268,008,000</td>
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<td>Total</td>
<td>$ 292,072,000</td>
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FIGURES
North Mine Area
- Open Pit
  - Stockpiles
- Cobre Mine
  - Evaporation System
  - Leached Runoff and Seepage
- Year 0-5

South Mine Area
- Tailing Interception
  - Lake One
  - South Mine Area Make-up Water

North Mine Area Lime Treatment
- Year 6-100

Mixing Pond
- Discharge

Process Schematic
Water Treatment with Commingling

CLIENT/PROJECT: Chino Mine CCP Update

DRAWN: PCS
CHECKED: BCH
REVIEWED: KWC
DATE: 8/10/07
FILE NO.: J:07J066/073-80007 Chino CCPCost Backup Figure.vsd
JOB NO.: 073-80007
SCALE: Not To Scale
FIGURE NO.: 1