

STATE OF  
COLORADO

Eschberger - DNR, Amy &lt;amy.eschberger@state.co.us&gt;

---

## Schwartzwalder M-1977-300 - Denver Water's Additional Comments

---

**Arnold, Daniel J.** <Daniel.Arnold@denverwater.org>

Wed, Apr 13, 2022 at 9:46 AM

To: "Eschberger - DNR, Amy" &lt;amy.eschberger@state.co.us&gt;, Jim Harrington &lt;jimharrington@ensero.com&gt;

Cc: "Witheridge, Alison" &lt;Alison.Witheridge@denverwater.org&gt;, "Poncelet, Nicole" &lt;Nicole.Poncelet@denverwater.org&gt;, Jason Kerstiens &lt;JKerstiens@geosyntec.com&gt;, Emmy Apostol &lt;eapostol@geosyntec.com&gt;

Dear Ms. Eschberger and Mr. Harrington,

Attached, please find Denver Water's transmittal letter and a technical memorandum prepared by Geosyntec in response to CLL's January 12, 2022 submittal related to Permit Amendment 6. If you have any questions regarding the attached, please let me know.

**Daniel J. Arnold | Attorney | Office of General Counsel****Denver Water** | t: 303-628-6469 | e: [daniel.arnold@denverwater.org](mailto:daniel.arnold@denverwater.org)[denverwater.org](http://denverwater.org) | [denverwater.org/TAP](http://denverwater.org/TAP)

---

### 2 attachments

**20220412 Draft Revsied AM-06 Letter to DRMS Re Schwartzwalder (002).pdf**

199K

**20220412 DW - AM06 RTC Memo\_Updated-041122.pdf**

1766K

Sent Via Email

April 13, 2022

Amy Eschberger  
Environmental Protection Specialist  
Division of Reclamation, Mining and Safety  
Colorado Dept. of Natural Resources  
1313 Sherman Street, Room 215  
Denver, CO 80203  
[amy.eschberger@state.co.us](mailto:amy.eschberger@state.co.us)

Re: Schwartzwalder Mine – File No. M-1977-300, Colorado Legacy Land, LLC –  
Amendment Application (Amendment 6)

Dear Ms. Eschberger:

On September 15, 2021, Denver Water requested modifications and/or in the alternative, objected pursuant to Hard Rock/Metal Mining Rule 1.4.9(1) to approval of Amendment 6 for mine permit M-1977-300 (“Amendment 6”) submitted by Colorado Legacy Land LLC (“CLL”) concerning the Schwartzwalder Mine in Golden, Colorado. On January 12, 2022 CLL submitted “Response to Secondary Adequacy Review on Application” including a response to comment matrix and Revised Amendment 6. Denver Water has reviewed these materials to evaluate if the requested modifications were addressed, and is submitting additional comments to the Division of Reclamation, Mining and Safety based upon Denver Water’s review.

Denver Water appreciates the extensive effort taken by CLL to address comments and concerns in the revised Amendment 6 and comment summary table. However, based upon CLL’s response to the adequacy review Denver Water remains concerned about CLL’s future strategy. Revised Amendment 6 suggests CLL’s plan relies on indefinitely lowering the mine pool elevation and running the reverse osmosis (RO) treatment system. If so, the following is needed: 1) assurance that proper funding is available in the future, 2) demonstration the strategy will protect Ralston Creek if environmental conditions change (e.g., through natural variations in hydrologic conditions, changing climactic conditions, natural disasters such as floods or fires, etc.), and 3) contingency plans if the management strategy is no longer effective.

### **Background**

On June 23, 2021, CLL submitted an application to its 112d Designated Mining Reclamation Permit with the Colorado Mine Land Reclamation Board under the provisions of the Colorado Mined Land Reclamation Act. CLL proposes to reclaim the affected land to wildlife habitat. In addition, CLL submitted a report prepared by Ensero Solutions US, Inc. dated June 2021 (“Amendment 6 Report”) apparently intended to satisfy conditions number 2 and 3 of the DRMS

revised approval of the transfer of permit and succession of operator ("SO-01") letter dated February 20, 2018. As set forth in SO-01, conditions number 2 and 3 require CLL to:

2. ...amend Permit No. M-1977-300, pursuant to Rules 1.1(6) and 1.10, affirming the permanent cessation of mining activities, provide a conceptual site model, provide a plan addressing the physical and chemical stabilization of the mine pool and specifically addressing the concentrations of dissolved uranium and other constituents as required under the conditions of the permit, and updating the reclamation and environmental protection plans (the "Amendment"). ...

3. Subsequent to the Division's review and approval of the permit Amendment described above, CLL may further modify the permit through the Technical Revision or Amendment process, addressing the long term cost of operating of the water treatment plant and managing the mine pool. The Division anticipates such demonstration will be based on three consecutive years of data which verify the physical and chemical stabilization of the mine pool. Upon such demonstration CLL may request a reduction in financial warranty in accordance with Rules and Regulations for that portion of the financial warranty attributable to the water treatment and management of the mine pool.

Denver Water retained Geosyntec Consultants to review and evaluate Revised Amendment 6 Report and to prepare a technical memorandum evaluating CLL's changes to the: 1) conceptual site model; 2) claim that the data demonstrate the physical and chemical stabilization of the mine pool; and 3) long-term cost of operating the water treatment plant and managing the mine pool. A summary of the findings is provided below.

### **Evaluation of Revisions to Amendment 6**

CLL revised the application and provided a comment summary table. Based on the review of these documents, the following summarizes our conclusions and remaining concerns.

- 1) CLL's Conceptual Site Model has been updated substantially to reflect current conditions; however, it is still missing key information.
- 2) Under current environmental conditions and pumping, the mine pool may be physically stable; however, the overall trend of uranium concentrations in the mine pool is increasing.
- 3) The long-term operational costs to minimize harm to the prevailing hydrologic balance and avoid unauthorized discharges are deficient resulting in an underestimation of costs.

Revised Amendment 6 suggests CLL's plan relies on indefinitely lowering the mine pool elevation and running the reverse osmosis (RO) treatment system. If so, the following is needed:

- 1) assurance that proper funding is available in the future,

- 2) demonstration the strategy will protect Ralston Creek if environmental conditions change (e.g., through natural variations in hydrologic conditions, changing climactic conditions, natural disasters such as floods or fires, etc.), and
- 3) contingency plans if the management strategy is no longer effective.

Denver Water requests that CLL address the concerns described above with Revised Amendment 6 and/or in the alternative, objects pursuant to Hard Rock/Metal Mining Rule 1.4.9(1) to approval of Amendment 6 without the modifications requested herein.

In closing, I want to thank you for your consideration of our comments. If you have any questions regarding Denver Water's comments set forth in this letter or the enclosed technical memoranda, please feel free to contact me.

Sincerely,

Daniel J. Arnold  
Attorney  
Denver Water

Cc: Jim Harrington, Colorado Legacy Land, LLC

Enc. April 12, 2022 Geosyntec Consultants Final Memorandum

## **Final Memorandum**

Date: April 12, 2022

To: Nicole Poncelet, Denver Water Director of Water Quality & Treatment Team

From: Emmy Apostol, David Adilman, Jennifer Nyman, and Jason Kerstiens, Geosyntec Consultants

Subject: Schwartzwalder Mine Amendment 6 – Evaluation of Response to Secondary Adequacy Review on Application and Response to Comment Matrix

---

### **OBSERVATIONS AND CONCLUSIONS**

Colorado Land Legacy, LLC (CLL), current operator of the Schwartzwalder Mine, has submitted an application for Amendment 6 to the mine permit M-1977-300 to the Division of Reclamation, Mining and Safety (DRMS). Denver Water retained Geosyntec Consultants, Inc. (Geosyntec) to review and evaluate Amendment 6, including the most recent revision provided on January 14, 2022. Based upon its review of Revised Amendment 6, Geosyntec has the following overall observations:

- CLL's conceptual site model (CSM) has been updated substantially to reflect current conditions; however, it is still missing key information, as further discussed below.
- Under current environmental conditions and pumping, the mine pool may be physically stable; however, the overall trend of uranium concentrations in the mine pool is increasing.
- The long-term operational costs projections for the WTP are underestimated.

Revised Amendment 6 suggests CLL's plan relies on indefinitely lowering the mine pool elevation and running the reverse osmosis (RO) treatment system. For this plan to be considered acceptable, the following is needed:

- Assurance that proper funding is available in the future

- Ongoing demonstration the strategy will protect Ralston Creek if environmental conditions change (e.g., through natural variations in hydrologic conditions, changing climactic conditions, natural disasters such as floods or fires, etc.)
- Contingency plans if the management strategy is no longer effective

## **BACKGROUND**

The purpose of Amendment 6 to the mine permit M-1977-300 is to satisfy the conditions of the revised Succession of Operations (SO-1) approval letter dated February 20, 2018, which include providing a CSM, a plan addressing the physical and chemical stabilization of the mine pool (specifically addressing the concentrations of dissolved uranium and other constituents), an updated Reclamation Plan, and an updated Environment Protection Plan (EPP).

Geosyntec's evaluation of Amendment 6 was summarized in three memoranda discussing the CSM, the plan for physical and chemical stabilization of the mine pool, and long-term operational costs of the water treatment plant (WTP); it was provided to DRMS and CLL on September 15, 2021. CLL has since submitted "Response to Secondary Adequacy Review on Application" including a response to comment matrix and Revised Amendment 6. This Technical Memorandum summarizes Geosyntec's review of these documents and an evaluation of the technical revisions provided addressing the CSM, the physical and chemical stabilization of the Mine Pool, and the long-term operational costs of the WTP as described in the Reclamation Plan in of the Revised Amendment 6. Specific comments on revisions are provided in the following sections.

## **CSM**

Based on the review of the CSM provided in the Revised Amendment 6, we identified the following remaining deficiencies:

- Conclusions regarding the hydraulic gradient are based on few data points; there are only three wells across the entire site that are being used to monitor bedrock groundwater including one background well and two cross-gradient wells; we continue to recommend installation of an additional monitoring well.
- CLL did not update climate data for the region or provide analyses on potential impacts from increased flooding or other climate changes such as wildfires; the CSM should account for the full range of potential natural conditions.
- No contingency plans were offered if the current strategy were to fail, and CLL indicates that they will continue with their current approach through 20 years with no description of a plan beyond that time.

## PHYSICAL AND CHEMICAL STABILIZATION OF THE MINE POOL

The following summarizes the outstanding comments from the Revised Amendment 6 on the physical and chemical stabilization of the mine pool:

- We appreciate the pumping groundwater contour figure that was provided with Revised Amendment 6. Please provide:
  - The basis for the assumption that the mine workings are a fully connected infinite hydraulic conductivity feature, and
  - Reasoning for selecting the elevation of 6,434 feet for water in the mine workings as a constant head feature.
- A stagnation zone in bedrock may exist between the downgradient end of the mine pool and the Creek such that a portion of impacted groundwater in bedrock (not necessarily the mine pool) could discharge to Ralston Creek; we continue to recommend an additional monitoring well and continued environmental monitoring (see CLL response to Denver Water Comment #15).
- CLL’s argument on stable discharged uranium concentrations does not sufficiently address the overall increasing uranium concentrations in the mine pool over the past few years. See the graph and Mann-Kendall trends provided as Attachments A and B, respectively (see CLL response to Denver Water Comments #2a, 20, 21, 23).
- CLL has not sufficiently addressed that the most recent in situ treatment did not decrease uranium concentrations (see CLL’s response to Denver Water Comments #2a, 17, 18). CLL’s response to Denver Water Comment #17 states that “CLL is not relying on in-situ treatment for the operations of the RO treatment systems” and that the mine pool is chemically stable. However, mine pool uranium concentration trends are increasing (Attachment A), despite increased frequencies of in situ treatments.
- CLL argues that the bulk total dissolved solids (TDS) of the mine water has not changed, indicating that the RO reject is not impacting the concentrations within the mine and that the mine is chemically stable. TDS concentrations are not an indicator of uranium trends within the mine pool and this argument does not address the chemical stabilization of the mine pool for key constituents such as uranium.
- CLL has not established a contingency plan if uranium levels continue to rise in the mine pool and in situ treatments are no longer effective and/or the RO system is less effective (see CLL responses to Denver Water Comments #2a, 17, 18).

## **LONG-TERM OPERATING COSTS OF THE WTP**

We conducted a preliminary review of CLL’s projected long-term operating costs (Attachment C), as presented by CLL in the Revised Amendment 6. CLL’s estimate costs do not appear to provide an accurate financial calculation for 20 years of operation under the presented Reclamation Plan because they do not account for the following:

- Costs were inaccurately calculated for caustic soda – the price listed by CLL is only enough for one year of caustic soda, resulting in a discrepancy of approximately \$380,000 over the subsequent 19 years of WTP operation using CLL’s calculation methodology for other annual costs such as barium chloride and antifoulant.
- More description of the assumptions for the “sustaining capital” line item is needed. Useful life of major assets is not factored into the CLL cost analysis; therefore, it underestimates asset replacement costs and sustaining capital needs at the WTP over the 20-year period. Examples of likely asset replacements include feed pumps, system pumps, filter housing, electrical components, etc.
- CLL’s cost analysis does not account for rate increases or inflation for key line operational/maintenance cost categories such as labor, power, and chemicals.
- There is no contingency plan if uranium and other site contaminants of concern concentrations continue to rise, causing more frequent membrane change outs or start-up and operation/maintenance of an ion exchange treatment system.
- No estimates of use or costs were provided for potable water.

Based on these items, the estimated increase in costs could be up to \$2 million or more based on our preliminary review of CLL’s cost estimate provided in Attachment C. Thus, the costs provided are not sufficient for operating the water treatment plant for 20 years. Furthermore, the long-term operating strategy requires pumping the mine pool indefinitely, therefore the costs should account for a longer assurance time than 20 years.

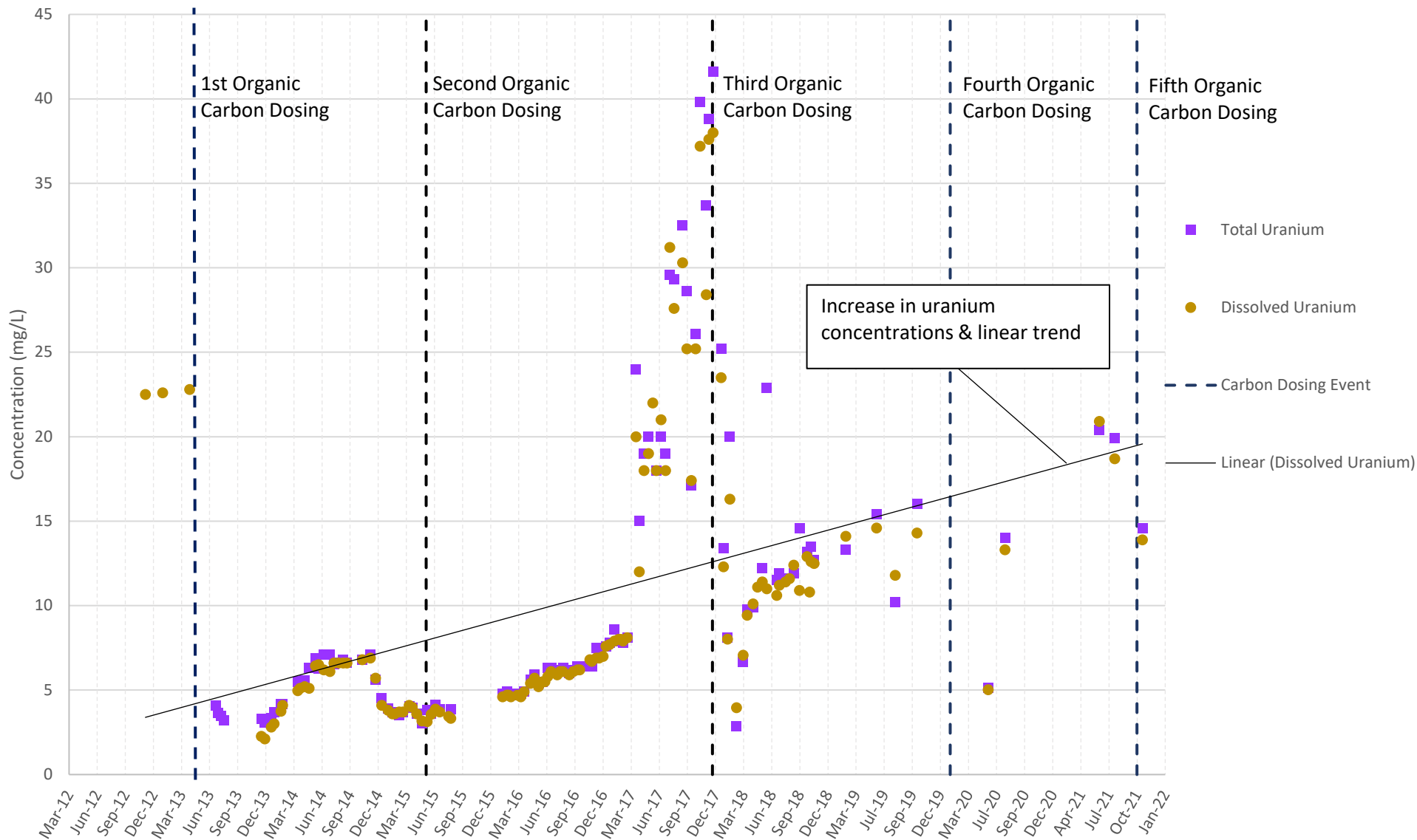
Lastly, it is not clear why the updated schedule for remaining work or anticipated durations of the remaining work is different for operating the water treatment plant compared to other reclamation activities such as environmental monitoring or in-situ treatments. Data collection and other reclamation activities that support the long-term plan for operating the water treatment should be calculated for the full period of reclamation. If a reduction in time and/or money is being sought, the existing information does not support a conclusion that the “reclamation activities” will achieve a condition consistent with Rule 3.1 at the end of the reclamation period.

The cost analysis provided herein is not considered a calculation of financial warranty, and addressing the comments provided above should not result in a reduction in the financial warranty for water treatment plant operations in the future.



Enclosures:      Attachment A: Graph of Mine Pool Uranium Concentrations  
                         Attachment B: Mann-Kendall Trends in Mine Pool  
                         Attachment C: Comments on Exhibit L

\* \* \*



**Note:**

1. Total and dissolved uranium concentrations in the mine pool since the beginning of carbon dosing (in-situ treatment).
2. Acronyms: mg/L = milligrams per liter

**Mine Pool Uranium Concentrations**

Schwartzwalder Mine, CO

**Geosyntec**  
consultants

Lakewood, CO

March 2022

Attachment

**A**

**Table 1**  
**Mann Kendall Trend Analysis of the Mine Pool**  
**Amendment 6 Comments - Physical and Chemical Stabilization of the Mine Pool**

| Location | Analyte                  | N  | Detection Frequency (%) | Mann-Kendall (S) | COV    | Probability | Confidence in Trend | Concentration Trend | Previous Trend      |
|----------|--------------------------|----|-------------------------|------------------|--------|-------------|---------------------|---------------------|---------------------|
| Raw Feed | Arsenic D                | 15 | 100                     | 19               | 0.549  | 0.372       | 0.628               | No Trend            | Probably Increasing |
| Raw Feed | Arsenic T                | 14 | 86                      | 10               | 0.558  | 0.622       | 0.378               | No Trend            | No Trend            |
| Raw Feed | Iron D                   | 15 | 100                     | 44               | 0.717  | 0.03313     | 0.967               | Increasing          | Increasing          |
| Raw Feed | Iron T                   | 15 | 100                     | 49               | 0.302  | 0.017531    | 0.98                | Increasing          | Increasing          |
| Raw Feed | Manganese D              | 15 | 100                     | 11               | 0.0656 | 0.618       | 0.382               | No Trend            | No Trend            |
| Raw Feed | Manganese T              | 15 | 100                     | -13              | 0.0470 | 0.548       | 0.4520              | Stable              | No Trend            |
| Raw Feed | Molybdenum D             | 14 | 100                     | 48               | 0.329  | 0.009970    | 0.99                | Increasing          | Increasing          |
| Raw Feed | Molybdenum T             | 13 | 100                     | 43               | 0.363  | 0.010       | 0.9897              | Increasing          | Increasing          |
| Raw Feed | Radium-226 D             | 7  | 100                     | 1                | 0.276  | 0.500       | 0.500               | No Trend            | No Trend            |
| Raw Feed | Radium-226 T             | 13 | 100                     | 30               | 0.357  | 0.076       | 0.924               | Probably Increasing | Increasing          |
| Raw Feed | Radium-226; Radium-228 T | 13 | 100                     | 32               | 0.355  | 0.056       | 0.944               | Probably Increasing | Increasing          |
| Raw Feed | Radium-228 T             | 13 | 100                     | 21               | 0.592  | 0.222       | 0.778               | No Trend            | No Trend            |
| Raw Feed | Uranium D                | 15 | 100                     | 37               | 0.1923 | 0.075       | 0.925               | Probably Increasing | Increasing          |
| Raw Feed | Uranium T                | 13 | 100                     | 17               | 0.2202 | 0.328       | 0.672               | No Trend            | Probably Increasing |

**Notes:**

COV - coefficient of variation calculated as the ratio of sample standard deviation to the sample mean.

Confidence in Trend is calculated as 1-Probability.

Mann-Kendall (S) = Mann-Kendall test statistic.

N = sample size.

NA = not analyzed due to < 50% detection frequency.

Probability = the probability of observing a Mann-Kendall test statistic as extreme as the one actually observed.

-- = not calculated due to < 50% detection frequency.

For sample sizes  $n \leq 10$ , exact probability were obtained from Table A-12b (EPA, 2009).

## Attachment C: Comments on Exhibit L



SCHWARTZWALDER MINE

### **EXHIBIT L. RECLAMATION COSTS**

The revisions in Table L-1 reflect the reclamation plan presented in Exhibit E of this document and are consistent with the remaining scope of work at the Site.

| TAR RECLAMATION COSTS                                         |              |          |            |                 |                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------|--------------|----------|------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Item                                                          | Unit Cost    | Quantity | Unit       | Total Cost      | Notes/Basis of Estimate                                                                                                                                                                                                                                                              |
| <b>Water Treatment Plant Operations (20-year time period)</b> |              |          |            |                 |                                                                                                                                                                                                                                                                                      |
| Water Treatment Plant Operator                                | \$ 23.93     | 19,200   | hour       | \$ 459,456.00   | U.S. Department of Labor, Service Contract Act hourly wage for a Water Treatment Plant Operator (20 years *6 months*4 weeks *40 hours).                                                                                                                                              |
| Controller                                                    | \$ 8,982.90  | 2        | controller | \$ 17,965.80    | Replacement for WTP controllers (remote monitoring of plant). Expected to be replaced once every 10 years. Quote from Tank Equipment.                                                                                                                                                |
| Internet                                                      | \$ 59.00     | 240      | month      | \$ 14,160.00    | Mountain Broadband monthly internet service                                                                                                                                                                                                                                          |
| Electricity                                                   | \$ 4,719.72  | 240      | month      | \$ 1,132,732.80 | United Power. Average monthly electric bill at the Site.                                                                                                                                                                                                                             |
| Potable Water                                                 | \$ -         | 0        | gallon     | \$ -            | Potable water for bathroom facilities provided by WTP.                                                                                                                                                                                                                               |
| Columbia Sanitary                                             | \$ 325.00    | 60       | service    | \$ 19,500.00    | Pump septic tank onsite three times per year.                                                                                                                                                                                                                                        |
| Waste Management                                              | \$ 164.00    | 120      | month      | \$ 19,680.00    | Monthly trash service (6 months per year).                                                                                                                                                                                                                                           |
| Office Trailer                                                | \$ 18,500.00 | 1        | trailer    | \$ 18,500.00    | Office trailer for jobsite. Quote provided by JobBox for 40-foot standard office                                                                                                                                                                                                     |
| Caustic Soda (Sodium Hydroxide, Liquid 25%)                   | \$ 0.30      | 66,720   | lbs        | \$ 19,682.40    | Caustic soda is used for pH stabilization, "Clean in Place", or CIP washing of tanks. The WTP uses 1 tote (2,780-lbs) every 4 weeks (24 totes/year).                                                                                                                                 |
| Barium Chloride (55 lb bag of crystals)                       | \$ 6.50      | 6,600    | lbs        | \$ 42,900.00    | Interstate Chemical Company. Crystals in 55 lb bags/drum. The WTP uses 1 bag per month.                                                                                                                                                                                              |
| Antifoulant or RO anti-scale (RO 1302 NSF)                    | \$ 2.57      | 25,050   | lbs        | \$ 64,378.50    | Midsouth Chemical Company. Each chemical tote is 2,502 lbs. The WTP uses 1 tote every 2 years.                                                                                                                                                                                       |
| EDTA (39% solution)                                           | \$ 0.71      | 2,380    | bs         | \$ 1,689.80     | Interstate Chemical Company. Each drum is 595 lbs. drum every 5 years for CIP.                                                                                                                                                                                                       |
| RO Membranes (LG 400 Energy Saving Membranes)                 | \$ 441.00    | 192.00   | membrane   | \$ 84,672.00    | Utilizing a 6-month or less operational period, RO membranes are expected to be replaced every 5 years. The WTP requires 48 membranes (2 RO skids * 6 tubes per RO * 4 membranes = 48 membranes). Unit price includes delivery fees. Costs provided by Consolidated Water Solutions. |
| Cannister filters (1 Micron 40")                              | \$ 13.18     | 2,880    | filter     | \$ 37,958.40    | Cannister filters are replaced once every two months of operations. Unit price includes shipping. Optimum Filter.                                                                                                                                                                    |
| Sustaining capital                                            | \$ 2,000.00  | 20       | year       | \$ 40,000.00    | Sustaining capital costs are for maintenance, repair, or replacement of other WTP equipment not listed above.                                                                                                                                                                        |

Unit Costs should account for annual rate increases due to inflation for categories including labor, power, and chemicals (highlighted)

No cost or use associated with this line item

Incorrect Calculation:  
 $1 \text{ tote} = 2,780 \text{ lbs} * 24 \text{ totes/year} = 66,720 \text{ lbs/year} * 20 \text{ years} = 1,334,400 \text{ lbs}$ ; Total Cost = \$400,320; discrepancy of approximately \$380,000

more membrane replacements as a contingency to account for degrading water quality in the mine pool

Provide more details describing this assumption. Useful life of major assets are not factored into this total including such items as feed pumps, system pumps, filter housing

**TABLE L-1. REVISED SCHWARTZWALDER MINE RECLAMATION COSTS**

| Item                                           | Unit Cost    | Quantity | Unit     | Total Cost    | Notes/Basis of Estimate                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------|--------------|----------|----------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Discharge permit sampling                      | \$ 1,988.20  | 120      | month    | \$ 238,584.00 | Discharge sampling only occurs for 6 months of the year when the plant is operating (6 months * 20 years = 120 months). Unit costs for samples are provided by contract laboratories SeaCrest and ACZ.                                                                                                                                                                                                                                                         |
| <b>In-situ Treatment (10-year time period)</b> |              |          |          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Ethanol                                        | \$ 4.70      | 33,655   | gallon   | \$ 158,178.50 | 5 additional in (6,731 gallon) per inj erstate Chemical Com                                                                                                                                                                                                                                                                                                                                                                                                    |
| Phosphoric Acid                                | \$ 0.80      | 54,285   | lbs      | \$ 43,428.00  | 5 additional in (6,731 tote is 3,619-H chemical e provided by In                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Alluvial Valley Excavation</b>              |              |          |          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Mobilization                                   | \$ 17,000.00 | 1        | event    | \$ 17,000.00  | Heavy equipment already onsite. However in the event the State needs to perform the work, mobilization costs presented here are for a Dozer - John Deere 750, Haul Truck - Caterpillar D250E , Excavator -Caterpillar 320 , and Loader- Caterpillar 950G (or equivalent). These were mobilized from the nearest Wagner rental facility in Denver. Verbal quote provided by Wagner.                                                                             |
| Demobilization                                 | \$ 17,000.00 | 1        | event    | \$ 17,000.00  | Demobilization of equipment expected to equal mobilization of equipment.                                                                                                                                                                                                                                                                                                                                                                                       |
| Excavate and place soil onsite                 | \$ 5.33      | 6,256    | CY       | \$ 33,344.48  | South Zone Soils (identified in TR-14 and SR-9) are estimated with the following calculation:<br><br>Overage Percent (15%) x Volume of Soils in South Zone (5,440 CY) = Estimated Overage Volume (6,256 CY)<br><br>This unit rate per cubic yard includes labor and equipment (Dozer - John Deere 750 or equivalent, Haul Truck - Caterpillar D250E or equivalent, Excavator -Caterpillar 320 or equivalent, and Loader-Caterpillar 950G or equivalent) costs. |
| Confirmation sampling, soil analysis           | \$ 158.80    | 48       | sample   | \$ 7,622.40   | A total of 12 soil samples for each of the 4 survey units are proposed (4*12 = 48). Unit costs for samples are provided by contract laboratory ACZ. Exact sample quantities shall be presented in the Final Status Survey Work Plan document.                                                                                                                                                                                                                  |
| Remove 18-in bypass pipeline                   | \$ 8,000.00  | 1        | lump sum | \$ 8,000.00   | Lump sum estimate to remove bypass pipeline at the Site. Bid provided by Kessler Reclamation and Construction.                                                                                                                                                                                                                                                                                                                                                 |

In-situ Treatment time period should be consistent with the WTP Operational Time period (20-year time period)  
Adds \$390,096 to total cost

**TABLE L-1. REVISED SCHWARTZWALDER MINE RECLAMATION COSTS**

| Item                                                    | Unit Cost | Quantity | Unit   | Total Cost   | Notes/Basis of Estimate                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------|-----------|----------|--------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fill Soil                                               | \$ -      | 0        | CY     | \$ -         | Sufficient quantities of suitable soil have been identified during the alluvial valley excavation. CLL intends to regrade the alluvial valley consistent with the surrounding slopes by pushing adjacent fill materials to fill in excavated potholes.                                    |
| Top Soil/Plant Growth Medium                            | \$ -      | 0        | CY     | \$ -         | Sufficient quantities of suitable soil have been identified during the alluvial valley excavation. CLL intends to regrade the alluvial valley consistent with the surrounding slopes by pushing adjacent fill materials to fill in excavated potholes.                                    |
| Seed Mix                                                | \$ 450.00 | 12.7     | acre   | \$ 5,715.00  | Seed mix shown in Table E-1 of Application Amendment #5. All disturbed areas shall be reseeded. Figure L-2 identifies all disturbed areas (12.7 acres) from mining operations that will be reseeded.                                                                                      |
| Trees (planted above the cut-off wall)                  | \$ 60.00  | 174      | tree   | \$ 10,440.00 | Transported in 10-gallon pots. Riparian Area trees (Ponderosa Pine, Juniper, Cottonwood & Peachleaf Willow) associated with habitat restoration above the cutoff wall and 18" creek bypass pipeline (~4 acres). Quantities from biological opinion submitted with TR-23.                  |
| Willow Stakes (planted above the cut-off wall)          | \$ 4.00   | 615      | willow | \$ 2,460.00  | Transported as cuttings. Remaining habitat restoration above the cutoff wall and 18" creek bypass pipeline (~4 acres). Quantities from biological opinion submitted with TR-23.                                                                                                           |
| Trees (planted in reclaimed valley below cut off wall)  | \$ 60.00  | 89       | tree   | \$ 5,340.00  | Transported as 10-gallon pots. Upland Area trees (Ponderosa Pine, Juniper, Cottonwood, Douglas Fir, Engelmann Spruce) associated with areas impacted by excavation below the cut off wall. Planted over a 6-acre area. Estimated quantities from biological opinion submitted with TR-23. |
| Shrubs (planted in reclaimed valley below cut off wall) | \$ 20.00  | 65       | shrub  | \$ 1,300.00  | Transported as 1-gallon pots. Upland Area shrubs (Mountain Mahogany, Hawthorne, Willow, and Fringed Sage) associated with areas impacted by excavation below the cut off wall. Planted over a 6-acre area. Estimated quantities from biological opinion submitted with TR-23.             |
| Shrubs (planted in reclaimed valley below cut off wall) | \$ 37.00  | 66       | shrub  | \$ 2,442.00  | Transported as 5-gallon pots. Upland Area shrubs (Mountain Mahogany, Hawthorne, Willow, and Fringed Sage) associated with areas impacted by excavation below the cut off wall. Planted over a 6-acre area. Estimated quantities from biological opinion submitted with TR-23.             |
| Hydro mulching                                          | \$ 25.00  | 0        | CY     | \$ -         | Only required on 2H:1V and steeper slopes, which are not present in the valley.                                                                                                                                                                                                           |

**TABLE L-1. REVISED SCHWARTZWALDER MINE RECLAMATION COSTS**

| Item                                                             | Unit Cost   | Quantity | Unit   | Total Cost    | Notes/Basis of Estimate                                                                                                                                                               |
|------------------------------------------------------------------|-------------|----------|--------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excavator                                                        | \$ 120.00   | 0        | hour   | \$ -          | Excavator -Caterpillar 320 or equivalent, Loader- Caterpillar 950G or equivalent. Equipment costs included in unit cost (\$/CY) for soil.                                             |
| Dozer                                                            | \$ 100.00   | 80       | hour   | \$ 8,000.00   | Dozer - John Deere 750 or equivalent. Regrading alluvial valley is expected to take 2 weeks (80-hours).                                                                               |
| Labor                                                            | \$ 42.00    | 80       | hour   | \$ 3,360.00   | Regrading the alluvial valley is expected to take one operator 2 weeks (80-hours).                                                                                                    |
| <b>Environmental Monitoring (10 year time period)</b>            |             |          |        |               |                                                                                                                                                                                       |
| Surface Water Monitoring                                         | \$ 722.40   | 260      | sample | \$ 187,824.00 | Quarterly sampling of Ralston Creek at 13 stations. As is dry or inaccessible due to snow 50% of the time.                                                                            |
| Groundwater Monitoring                                           | \$ 722.40   | 280      | sample | \$ 202,272.00 | Groundwater monitoring network includes 13 wells (sumps and mine pool) however 1 well is only monitoring levels. Assume wells are dry or inaccessible due to snow 50% of the time.    |
| Monitoring Well Abandonment                                      | \$ 20.00    | 2,511    | well   | \$ 50,220.00  | Typical unit rate (\$20/foot) provided verbally by Drilling Engineers Inc. 13 monitoring wells onsite totaling 2,511 linear feet.                                                     |
| Sump Removal/Abandonment                                         | \$ 2,000.00 | 1        | sump   | \$ 2,000.00   | Abandon /remove the master sump.                                                                                                                                                      |
| <b>Mine Opening Closure: Gate Closure</b>                        |             |          |        |               |                                                                                                                                                                                       |
| Minnesota Adit                                                   | \$ -        | 1        | gate   | \$ -          | Gate closure already in place.                                                                                                                                                        |
| Sunshine Decline                                                 | \$ -        | 1        | gate   | \$ -          | Gate closure already in place.                                                                                                                                                        |
| Steve Adit                                                       | \$ -        | 1        | gate   | \$ -          | Gate closure already in place.                                                                                                                                                        |
| CV/ Charline                                                     | \$ -        | 1        | gate   | \$ -          | Gate closure already in place.                                                                                                                                                        |
| Peirce Adit                                                      | \$ -        | 1        | gate   | \$ -          | Gate closure already in place.                                                                                                                                                        |
| <b>Mine Opening Closure: Black Forest Mine, Backfill Closure</b> |             |          |        |               |                                                                                                                                                                                       |
| Fill Soil                                                        | \$ 8.00     | 60       | CY     | \$ 480.00     | Sufficient quantities of fill soil have been identified during the alluvial valley excavation work. The haul/push distance for this material is estimated to be less than 1,000 feet. |
| Top Soil/Plant Growth Medium                                     | \$ 14.50    | 161      | CY     | \$ 2,334.50   | Sufficient quantities of topsoil have been identified during the alluvial valley excavation work. The haul/push distance for this material is estimated to be less than 1,000 feet.   |
| Seed Mix                                                         | \$ 450.00   | 0.1      | acre   | \$ 45.00      | Seed mix shown in Table E-1 of Application Amendment #5.                                                                                                                              |

Assumption indicates that only two data points a year will be available for surface water and groundwater monitoring, and no data will be available when the pump is off-line

Environmental Monitoring time period should be consistent with the WTP Operational Time period (20-year time period)  
Adds \$201,607 to total



**TABLE L-1. REVISED SCHWARTZWALDER MINE RECLAMATION COSTS**

| Item              | Unit Cost | Quantity | Unit | Total Cost             | Notes/Basis of Estimate                                                                                                                                                                              |
|-------------------|-----------|----------|------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hydro mulching    | \$ 25.00  | 10       | CY   | \$ 250.00              | Unit rate includes costs for tackifier. Application rate is approximately 0.75 tons per acre (1,500 pound per acre).                                                                                 |
| Rock              | \$ 650.00 | 4        | ton  | \$ 2,600.00            | Sufficient quantities of large diameter rock (<1 foot) have been identified during the alluvial valley excavation work. The haul distance for this material is estimated to be less than 1,000 feet. |
| Excavator         | \$ 120.00 | 8        | hour | \$ 960.00              | 1 day. Caterpillar 320 or equivalent.                                                                                                                                                                |
| Loader            | \$ 120.00 | 8        | hour | \$ 960.00              | 1 day. Caterpillar 950G or equivalent.                                                                                                                                                               |
| Dozer             | \$ 100.00 | 8        | hour | \$ 800.00              | 1 day. John Deere 750 or equivalent.                                                                                                                                                                 |
| Haul Truck        | \$ 115.00 | 8        | hour | \$ 920.00              | 1 day. Caterpillar D250E or equivalent.                                                                                                                                                              |
| Labor             | \$ 42.00  | 48       | hour | \$ 2,016.00            | Team of three people for two 8-hour days.                                                                                                                                                            |
| <b>Cost Total</b> |           |          |      |                        |                                                                                                                                                                                                      |
|                   |           |          |      | \$ 2,989,171.58        | Subtotal of direct costs (equipment and materials)                                                                                                                                                   |
| -                 |           |          |      | \$ 127,039.79          | Engineering Work &/or Contract/Bid Prep. (4.25% of direct costs)                                                                                                                                     |
| -                 |           |          |      | \$ 149,458.58          | Reclamation management &/or Admin. (5% of direct costs)                                                                                                                                              |
|                   |           |          |      | <b>\$ 3,265,669.95</b> | <b>Grand total</b>                                                                                                                                                                                   |