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Technical Memorandum

To:	Jeff Smith	**Date:**	August 7, 2019
Company:	New Mexico Copper Corporation	**From:**	Filiz Toprak
Copy to:	Jeff Parshley, SRK	**Reviewed by:**	
Subject:	Copper Flat Life-of-Mine Revised Basis of Reclamation and Closure Cost Estimate – Revision 2	**Project #:**	191000.060

1. Introduction and Scope

SRK Consulting (U.S.), Inc. (SRK) was retained by New Mexico Copper Corporation (NMCC) to compile an estimate of life-of-mine (LOM) reclamation and closure cost estimate for the Copper Flat mine to support NMCC's financial assurance (FA) proposal submitted to the New Mexico Mining and Minerals Division (NMMMD) in August 2018 (Revision 0). The Basis of Estimate (BOE) and its accompanying LOM reclamation and closure cost estimate spreadsheet, prepared using the Standardized Reclamation Cost Estimator (SRCE) Version 2.0, and its supporting attachments have been revised to incorporate changes requested by the NMMMD and the other reviewing agencies, i.e. the New Mexico Environment Department (NMED) and the US Bureau of Land Management (BLM), following review of the August 2018 submittal and submitted in December 2018 as Revision 1. This document (Revision 2) is the result of modifications to the FA proposal addressing agency comments received in January 2019.

For this estimate, SRK utilized the full set of reclamation and closure plans and designs included with the NMCC Permit Application Package determined by MMD to be approvable in accordance with 19.10.6.605(E) (MMD letter to NMCC dated July 13, 2018). Furthermore, SRK has relied on the relevant experience of New Mexico contractors and suppliers to develop an estimate in compliance with Agency regulations applicable to the Copper Flat Mine.

The following subheadings describe SRCE methodology and inputs used to generate the Copper Flat Estimate. Section 2 describes the general estimate methodology employed by SRCE. Section 3 describes the Copper Flat Cost Data File (CDF), which provides unit costs for labor, equipment and material costs to SRCE. Section 4 describes earthwork takeoffs and productivities specific to the Copper Flat Plans. Section 5 describes reclamation and closure methodologies applied specific to the Copper Flat facilities. Section 6 describes indirect costs used in the estimate. Section 7 summarizes the bottom line direct and total with indirect costs for reclamation and long-term monitoring of the Copper Flat Mine Site.

2. Estimate Methodology

2.1 General

This BOE describes the methodology in estimating third party costs of reclamation for the purpose of developing financial assurance for the Copper Flat Mine Operation and Reclamation Plan (MORP) (VEMS, 2017). The LOM reclamation and closure cost estimate has been developed to reflect LOM obligations throughout the course of mining and processing operations. In preparing the LOM cost estimate, SRK has also prepared a cost schedule consistent with the LOM plan. Concurrent reclamation activities are included in the LOM costs and scheduled according to the mine reclamation and closure plan described in the Copper Flat MORP.

2.2 Regulatory Basis

This estimate is prepared in accordance with the requirements of NMAC 19.10.12. NMCC is required to file financial assurance for the new operations (NMAC 19.10.12.1201.A). Costs have been estimated for a third-party contractor to complete reclamation work (NMAC 19.10.12.1201.A and NMAC 19.10.12.1205.A).

The scope of the estimate covers the entire permit area (NMAC 19.10.12.1202.A.1) for the LOM plan and includes costs to reclaim and close facilities as well as mobilization and demobilization, contract administration, engineering redesign, profit and overhead, procurement costs, and contingencies. No credit is taken for salvage of any equipment or materials (NMAC 19.10.12.1205.A). The estimate also recognizes that certain reclamation activities described in the MORP reclamation plan are not included in the estimate because these reclamation actions are performed at the beginning of mine development prior to operations. These costs are, therefore, more appropriately associated with mine development or operating costs.

The estimate is broken into annual increments that match the reclamation sequence and schedule presented in the Copper Flat MORP.

2.3 Cost Estimation Model

2.3.1 Standardized Reclamation Cost Estimator (SRCE)

Closure costs associated with the project were calculated using SRCE Version 2.0. The SRCE is spreadsheet software that was developed to facilitate accuracy, completeness and consistency in the calculation of costs for mine site reclamation. The model is available in the public domain and hosted on the web site: http://www.nvbond.com.

The benefits of using the SRCE model to develop an estimate of reclamation and closure costs include:

- SRCE provides a standardized and systematic methodology for mine closure cost estimates. The routines provided in the model cover different operation units and aspects of mining projects. SRCE bases its estimates on accepted first principles basis. Facility dimensions are defined by the user. Equipment and personnel productivities for given tasks are established through widely accepted published statistics. In this regard, equipment productivities are taken from Caterpillar Performance Handbook (Edition 47) (CAT, 2017). Personnel as well as other relevant productivities are established through the use of RSMeans Heavy Construction Cost Data (Gordian, 2006). When possible and appropriate, information for specific tasks is obtained through contractor or consultant quotation to reflect New Mexico regulatory requirements and/or relevant field experience for input into the model.

- SRCE is flexible in cost estimation, allowing utilization of local rates and unit costs.
- Given SRCE bases estimates on first principles, the model is used and accepted in a range of geographies and jurisdictions for different project types. SRCE is a platform suitable for use in any geography or jurisdiction.

As mentioned above, equipment and crew productivities obtained from public sources are used; these are used to estimate the time it takes to complete a task. This time is multiplied by equipment and labor rates and/or equipment, labor, and material unit costs with facility dimensions to estimate the cost of completing a task.

The flexibility of SRCE allows the user to adjust productivities to reflect site conditions and experience, realistic labor and equipment productivities, and local regulations. SRCE allows the user to adjust the estimate for compliance with NMAC 19.10.12.1205.A(1) ("reflect the probable difficulty of reclamation or closure, giving consideration to such factors as topography, geology, hydrology, revegetation potential and approved post-mining land use") and reflect third-party costs per NMAC 19.10.12.1205.B ("The amount of the financial assurance shall be sufficient to assure the completion of the reclamation plan or closeout plan if the work has to be performed by the state of New Mexico or a contractor with the state in the event of forfeiture").

The SRCE model file is provided in Attachment A. Attachment B provides the figures in support of the model.

2.3.2 Cost Data File (CDF)

Unit rates for operating labor, equipment, and materials are compiled in the Cost Data File (CDF), which is loaded into the SRCE file to populate the necessary cells to estimate costs. The types of costs are described in Section 3. The Cost Data File is provided in Attachment C.

2.4 Site Layout and Facilities Inputs

SRCE utilizes specific design data such as lengths, areas, volumes, flow rates, quantities, etc., provided or estimated by the user (based on the reclamation or closure designs and plan). This data is combined with separately input or derived productivities to estimate time required to perform a plan required task, which is then multiplied by local labor and equipment rates specific to the region and plan.

2.5 Productivities

SRCE uses several different sources and methods for calculating equipment productivities. The primary source is the CAT Performance Handbook Edition 47, followed by RSMeans Heavy Construction Costs (Gordian, 2006) published by Gordian Group Inc. Additional productivity data has been compiled for use in SRCE using historical industry field experience where appropriate.

3. Copper Flat Cost Data File

This section describes the labor and equipment rates and material unit costs used in this estimate for the Copper Flat project, consisting of the following:

- Labor rates
    - Equipment operators
    - Laborers
    - Project management staff
- Equipment rates
- Material unit costs
- Miscellaneous unit costs

3.1 Labor Rates

The cost data file accounts for labor rates of operators' groups and other labor categories. SRK has used Davis Bacon labor rates for New Mexico's Sierra County where Copper Flat is located to the extent possible. The WDOL (2018) website provides these as basic rates and fringes for different labor categories. These are documented in the SRCE file worksheet "User 07" and included in the CDF. See Attachment D for details on the labor rates.

3.1.1 Equipment Operator Rates

In the CDF, there are categories for the following operators:

- Bulldozers
- Wheeled dozers
- Motor graders
- Track excavators
- Scrapers
- Wheeled loaders
- Shovels/excavators
- Other equipment
- Truck drivers

The key equipment operator labor rates (base rate and fringes) in "User 07" as obtained from WDOL (2018) that were utilized include the following:

- Laborer: Common or General
- Operator: Backhoe
- Operator: Grader/Blade
- Operator: Loader (Front End)
- Operator: Scraper
- Truck Driver: Dump Truck
- Truck Driver: Water Truck

For the purposes of this estimate, the following assumptions have been made:

- Bulldozer operator labor rates are equivalent to motor grader operator labor rates.

- Track excavator operator labor rates are equivalent to those of wheeled loader operator labor rates.
- Crane operator labor rates are equivalent to those for wheeled loader operator labor rates.
- Haul truck operator labor rates are equivalent to those for water truck operator labor rates.

Some equipment is not operated by equipment operators. They accompany laborers, supervisors, etc. Therefore, there are no equipment operator rates included for this equipment.

- Light Truck - 1.5 Ton
- Supervisor's Truck
- Flatbed Truck
- Concrete Pump
- Generator 5KW
- HDEP Welder (pipe or liner)

Relevant sheet(s)/file(s): CDF "Labor Rates" (Attachment C); Attachment D; SRCE "User 07" and "Labor Rates."

3.1.2 Other Labor Rates

Other labor rates (base rate and fringes) in the CDF that are relevant to this estimate include the following:

- General Laborer
- Skilled Laborer
- Foreman
- Field Geologist/Engineer
- Field Tech/Sampler
- Range Scientist

The rates for general laborer were obtained from WDOL (2018). The labor rate for skilled laborer was not available through the WDOL (2018). Therefore, SRK developed a skilled labor rate for this estimate by utilizing the proportion of a carpenter's labor rate provided in the WDOL (2018) rates and that of a typical carpenter's rate as found in standard cost data files in the mining context (see NDEP, 2017) and applied this proportion to input a rate for a skilled worker in the cost data file.

3.1.3 Labor Indirects

The labor rates described above are the sum of the base rates and fringes. In addition to these, the following indirects apply:

- Unemployment (%)
- Retirement/SS/Medicare (%)
- Workman's Compensation (%)

Retirement/SS/Medicare and workman's compensation were obtained from RSMeans data (R013113-60) (Gordian, 2018). Unemployment was obtained from DWS (2018).

3.2 Equipment Rates

Equipment rates have been compiled from multiple sources. Preferred sources are Wagner Equipment, the New Mexico Caterpillar Dealer, and Kiewit, a large US based contractor operating with extensive operations in New Mexico. Where necessary, unit costs are taken from EquipmentWatch Blue Book and RSMeans (Gordian, 2018). These are documented in Attachment E.

Relevant sheet(s)/file(s): CDF "Equipment Rates" (Attachment C); Attachment E.

3.3 Material Unit Costs

Material unit costs include the following:

- Fuel (Attachment F)
- Power (Attachment G)
- Seed mix (Attachment H)
- Water quality analysis costs (Attachment I)

Fuel cost is for red dyed (Off-Road) diesel delivered to mine as of October 2017 (Attachment F). Power cost is as of November 2017 from the local power provider, Sierra Electric Cooperative, Inc. (Attachment G).

The cost for the seed mix described in the MORP (VEMS, 2017) is an average of costs obtained from two local suppliers (Attachment H).

Water quality analysis costs were obtained from NMCC and are documented in Attachment I together with the proposed monitoring schedule.

Relevant sheet(s)/file(s): CDF "Reclamation Material Costs" and "Misc. Unit Costs"; SRCE "Material Costs"; Attachments F, G, H, and I.

3.4 Miscellaneous Unit Costs

Miscellaneous unit costs include the following:

- Revegetation labor and equipment unit costs per unit area ($/acre): These costs have been developed by averaging supplier quotes for performing work described in the Copper Flat MORP (Attachment H). The calculations are documented in SRCE worksheet "User 03" and replicated in the CDF (see CDF worksheet "Misc. Unit Costs" section "Revegetation") and imported into the SRCE (see SRCE worksheet "Misc. Unit Costs" section "Revegetation" and worksheet "Material Costs" section "Revegetation Method").
- Waste disposal costs:
    - Solid (inert) wastes
    - Process Wastes
    - hazardous wastes
    - hydrocarbon wastes including contaminated soils
- Miscellaneous linear projects:
    - fence installation/removal material unit costs per unit length
    - pipe and drainpipe installation/removal material costs per unit length
    - powerline removal costs per unit length

- transformer removal costs per unit
- Liner supply and installation costs

Relevant sheet(s)/file(s): CDF “Misc. Unit Costs”; SRCE “Misc. Unit Costs”; Attachment J; Attachment N; User 20.

4. Copper Flat Earthwork Takeoffs and Productivities

This Section describes how costs for the major types of activities are developed. They include, but are not limited to, regrading, cover placement and backfilling, ripping, scarifying, revegetation, building demolition, etc. SRCE uses user inputs to estimate quantities (lengths, areas, volumes, etc.) and public-domain data for productivities to estimate time to accomplish a task. All times estimated are multiplied by the equipment hourly operation costs and operator labor rates to obtain total cost to accomplish a task.

4.1 Regrading

Unless the quantities of earth regraded is calculated elsewhere, in the case of waste rock stockpile lifts, the cost of regrading is estimated by considering the original slope grade (typically angle of repose) and the slope to which the lift will have to be regraded for physical stability. Then, using the height and the mid-bench length of the lift, the volume of material moved to reduce the slope is estimated. SRCE uses public-domain productivities of equipment which are then used to estimate the time it takes to accomplish each task.

Relevant SRCE sheet(s) or Attachments: Fleets (Crews).

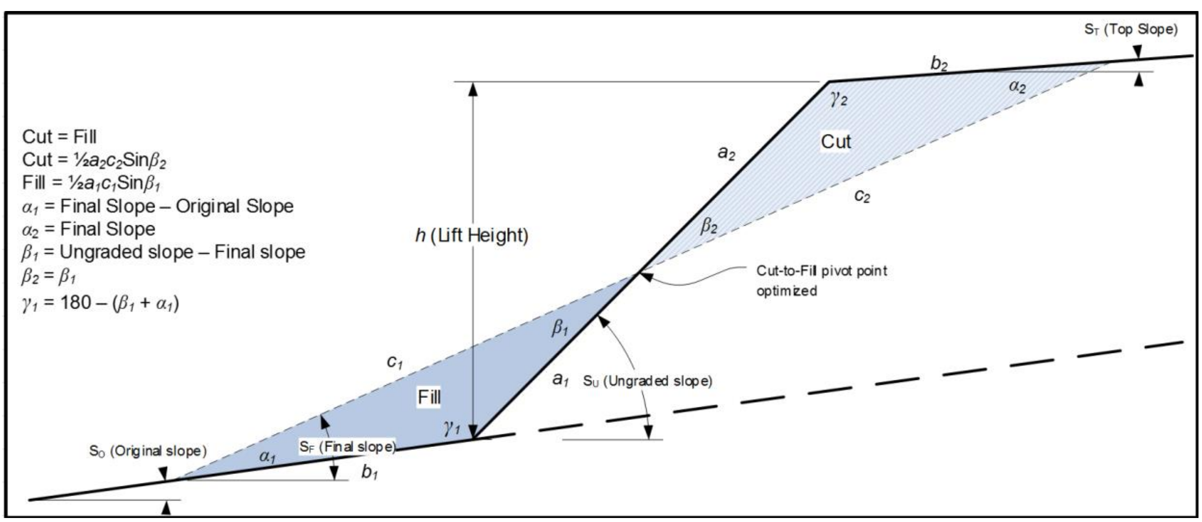

Illustration 1 Slope regrading parameters

4.2 Growth Media/Cover Placement and Preparation

The volume of growth media/cover material to be placed is estimated through the input for final regraded area and the thickness of material. Over-rides on fleet components are made in the “Fleets” and the “Waste Rock Stockpile” sheets, as necessary. SRCE estimates the number of trucks required to accomplish a haulage task based on haul distance with the goal of maximizing loader productivity.

The loader productivity is the most significant component in truck fleets as it determines the number of hours required to accomplish the task.

Earthworks at the various different areas are considered independently to allow flexibility in designating different reclamation activities for different parts of the facility and maximizing productivity. While all disturbed areas will be reclaimed in one fashion or another, the amount and thickness of the growth media/cover place will vary. Selection of the appropriate equipment to be used is important to maximize productivity and control cost.

The revised FA proposal accounts for scarifying all growth media surfaces to prepare for seeding, including disturbed areas where sufficient growth media already exists. Equipment appropriate for use in ripping operations where ripping is required and equipment appropriate for use in scarifying operations have been identified to maximize productivity. For example, use of a dozer with ripping attachments is specified for ripping operations and use of a motor grader is specified for scarifying operations.

Relevant SRCE sheet(s) or Attachments: Fleets (Crews).

4.3 Revegetation

Revegetation costs are estimated by input of data from contractor quotes for equipment, labor, and mobilization to the Copper Flat Site along with data from supplier quotes for a specified seed mix. Revegetation costs include labor per diem based on supplier estimated productivities to complete the task at Copper Flat. The revegetation estimate includes surface discing by the seeding contractor, seed cost, seed application, mulching, contractor mobilization, and crew per diem, etc. As stated in the previous section, the revised estimate also includes general scarification of all areas that will be seeded following placement of the growth media.

Relevant SRCE sheet(s) or Attachments: Reclamation Material Costs; Misc. Unit Costs.

4.4 Demolition

SRCE estimates time to demolish buildings through RSMeans productivities (Gordian, 2006) that focus on building volume, wall area, and slab volume. Fleet hours are estimated and multiplied by crew rates.

SRCE assumes two dump trucks will be used to haul the debris offsite for disposal offsite, a conservative assumption relative to the Copper Flat Plan for onsite disposal of inert demolition debris.

Relevant SRCE sheet(s) or Attachments: Foundations & Buildings; Fleets (Crews).

4.5 Backfill

Backfilling will occur in several locations at reclamation, most notably at the various impoundments constructed for operations. The “Process Ponds” module of the SRCE is utilized to estimate the cost of the primary activities of backfilling impoundments and covering with growth media.

Relevant SRCE sheet(s) or Attachments: Process Ponds.

4.6 Excavation

The cost of excavation of diversion ditches and channels as specified in the reclamation plan is estimated in the “Sediment & Drainage Control” module of the SRCE.

Relevant SRCE sheet(s) or Attachments: Sediment & Drainage Control.

4.7 Solution Management

Solution management for the project consists of the equipment and materials required for pumping water generated during TSF drain-down after mining has ceased and operating the active evaporation system outlined in the reclamation plan. SRCE estimates the cost to pump water from one location to another using Manning's Equation and standard hydraulic formulae which require the user to input pipeline diameter and material type, static head between locations, flow rate, etc., to estimate the energy required to accomplish the task. This quantity of energy is then multiplied by the electricity price for the site to estimate costs. Equipment costs are obtained from supplier quotations.

Relevant SRCE sheet(s) or Attachments: Solution Mgmt.

5. Facility Specific Reclamation and Closure Actions

The below headings describe reclamation and closure actions per facility. The headings also make references to relevant documents such as the SRCE or an attachment to this basis of estimate. In addition to the referenced documents, the figures listed in Table 5-1 provide the backup to measurements documented in Attachment B and input in the SRCE file (Attachment A).

Table 5-1 Figures List

Figure Number	Description
Figure 1	End of Mine Life Facility Footprints
Figure 2	EWRSP-1 Diversion Channels
Figure 3	EWRSP-1 Midbenches
Figure 4	EWRSP-2B Diversion Channels
Figure 5	EWRSP-2B Midbenches
Figure 6	EWRSP-3 and Plant Diversion Channels
Figure 7	EWRSP-3 Midbenches
Figure 8	EWRSP-4 Diversion Channels
Figure 9	EWRSP-4 End of Mine Life
Figure 10	EWRSP-4 Reclaimed
Figure 11	Haul Routes
Figure 12	Pit Berm
Figure 13	Pits Diversion Channels
Figure 14	Combined Plant Disturbance
Figure 15	Plant Area Reclamation Grading Sections
Figure 16	TSF and Evaporation Pond and Diversion Channels
Figure 17	TSF Areas and Midbenches
Figure 18	TSF Underdrain Pond - Operational
Figure 19	WRSP-1 and EWRSP-2A Diversion Channels
Figure 20	WRSP-1 and EWRSP-2A End of Mine Life
Figure 21	WRSP-1 and EWRSP-2A Reclaimed
Figure 22	WRSP-2 and WRSP-3 Diversion Channels
Figure 23	WRSP-2 and WRSP-3 Midbenches
Figure 24	WRSP-2 and WRSP-3 Reclaimed

5.1 Waste Rock Stockpiles

Waste rock stockpiles on site consist of existing waste rock stockpiles from previous operations and new proposed waste rock stockpiles that are proposed by NMCC for the Copper Flat mine. Attachment B provides the waste rock stockpile inputs required for estimating costs to reclaim the waste rock stockpiles. (Golder, 2017a)

Existing waste rock stockpiles consist of EWRSP-1, EWRSP-2A, EWRSP-2B, EWRSP-3, and EWRSP-4. Proposed waste rock stockpiles include WRSP-1, WRSP-2, and WRSP-3. Reclamation of EWRSP-1, 2B and portions of 4 will be conducted during the pre-production phase as part of site development. The proposed WRSPs, EWRSP-2B, EWRSP-3 and the remainder of EWRSP-4 will be reclaimed after mining has ceased as outlined in the reclamation plan. EWRSP-3 will be reclaimed as part of the Plant Area.

The “buildup” of the area west of the pit and southeast of EWRSP-1 is part of the mine development phase of the project and is, therefore, a project development cost not a reclamation cost. However, reclamation of area will occur at the end of mining and is included in the cost estimate.

EWRSP-4 will be partially reclaimed during the pre-production phase. Slopes that drain to the Grayback Arroyo will be graded and covered per the reclamation plan. The top of the stockpile will be graded and used as a laydown yard during operations and reclaimed at the end of operations.

Reclamation of the proposed waste rock stockpiles will consist of regrading all slopes steeper than 2.75H:1V, placement of 36 inches of cover material, and revegetation.

Relevant SRCE sheet(s) or Attachments: Waste Rock Dumps; Haul Materials; Yards; Other User; User 12; Attachment L.

5.1.1 Slope and Channel Armoring

Slope and channel armoring will be placed around specified parts of the facilities for long-term stability. These areas will be first prepared for placement of armoring, and then the locally-sourced riprap material or, in certain cases where identified in the reclamation plan, articulated concrete block structure will be placed.

Relevant SRCE sheet(s) or Attachments: Yards; Misc. Costs\Rip-Rap & Rock Lining

5.2 Mine Pit

5.2.1 Pit Perimeter Berm and Fence

An earthen berm will be constructed around the perimeter of the open pit to limit public access and ensure that the pit area does not pose a current or future hazard to public health or safety. The berm will be constructed from local rock and soils and will be 15 to 20-foot wide at the base and 5- to 6-feet high with side slopes angled at 1.5H:1V. Disturbed areas around the pit perimeter will be seeded for revegetation.

Furthermore, a barbed wire fence will be installed around the outside perimeter of the pit safety berm to exclude livestock and other large mammals. Signs will be posted at 500-ft intervals along the security fence/earthen berm and at all access points. Costs to replace this fence twice over the course of the long-term monitoring period are also included.

Relevant SRCE sheet(s) or Attachments: Quarries & Borrow Pits; Yards; Misc. Costs; Other User; User 03.

5.2.2 Pit Rapid Fill

The open pit will remain a hydrologic sink capturing groundwater flowing from all directions during post-closure. NMCC will conduct rapid filling of the mine pit with fresh water provided from the off-site well field as the initial step in commencing reclamation/closure until it reaches an average steady-state condition.

The inputs for rapid filling consist of monthly rapid fill rates for six months. Pipeline length and the static head required to pump the water were estimated based on the topography of the site.

Relevant SRCE sheet(s) or Attachments: Solution Mgmt; User 08.

5.2.3 In-pit Reclamation

A water conveyance channel will be constructed along the existing pit haul road to direct surface water flows to the pit lake. Growth media at 18-in. thickness will be placed on the haul road and benches identified in the reclamation plan to provide a sufficient root zone for vegetation. The narrow catch benches left in pit walls and other areas that cannot be safely accessed will be allowed to revegetate themselves through natural processes. See Attachment K for details on in-pit reclamation. The crest slopes identified for reclamation will be dozed during excavation of the pit; costs for this activity are considered to be operating cost and are therefore not included in the estimate.

Relevant SRCE sheet(s) or Attachments: Quarries & Borrow Pits.

5.3 Tailings Storage Facility (TSF)

5.3.1 Embankment Reclamation

The TSF embankment will be constructed at 3H:1V or less as the coarse fraction of mill tailings (sand) are deposited during the operations phase. As such there will be no need for general regrading of the embankment for reclamation. The TSF embankment will be allowed approximately 2 to 3 years to drain sufficiently to begin reclamation. Because the TSF embankment will be constructed using the centerline method, concurrent construction of diversion channels on the out-slope of the embankment is not possible. Therefore, the cross-face drainage and diversion channels on the TSF embankment will be built after the end of operations. The excavation costs associated with construction of these structures are included in the reclamation costs. The embankment out-slopes of the TSF will be covered with 36 inches of growth media and seeding upon completion of their construction. The liner at the toe berm and the pipeline contained therein at the bottom of the out-slope of the TSF embankment will be removed after the active evaporation system is decommissioned. The exposed liner will be cut at toe of embankment and disposed of within the TSF. The outer berm will then be pushed into the embankment and graded to blend into the embankment and the resulting disturbed area will be covered with 36 inches of growth media and revegetated.

Relevant SRCE sheet(s) or Attachments: Tailings; Sediment & Drainage Control; Yards; Other User; User 22.

5.3.2 Tailings Surface Reclamation

The impoundment and dam underdrain collection systems installed in the TSF at construction will function throughout the operation of the TSF and both systems will continue to function and capture drain down solutions from the TSF after operations end. During the active evaporation phase, drain down water will be pumped to the top surface for active evaporation (discussed in Section 5.3.3 below). Operation of the active evaporation system will be managed to allow areas of the impoundment to dry, which will allow grading and cover placement to begin on areas that become sufficiently dry to accept machinery. It is anticipated that some reclamation of the impoundment can begin within 5 years of cessation of operations as the impoundment continues to drain and dry**.** The goal of the active phase of evaporation is to reduce the volume of water stored in the impoundment and begin drying the surface for reclamation. After grading, the top surface of the TSF will be covered with 36 inches of growth media and revegetated.

The tailings surface will be reclaimed as it dries. The top surface will be graded to a final grade of between 1 and 5% in a manner that directs storm water to the north west side of the TSF. Growth media will be placed at 36 inches thickness. Diversion channels on the TSF surface will be built after the surface has dried sufficiently.

Relevant SRCE sheet(s) or Attachments: Tailings; Sediment & Drainage Control.

5.3.3 Draindown Management

The underdrain systems will continue to operate after cessation of mining and processing as drain-down of the TSF will continue to produce water for a number of years thereafter. This estimate assumes that drain-down will continue for a total of 25 years, which is comprised of 5 years of active water management and 20 years of passive water management. The “active” evaporative water management program (short-term AEWMS) will be implemented at the end of operations, followed by “passive” evaporative water management system (PEWMS) when draindown flows can be managed through passive evaporation from the expanded TSF underdrain pond. During active water management water captured in the TSF underdrain collection pond will be pumped back to the impoundment surface of the TSF where it will be force-evaporated through evaporators. Crews are assumed shared between the operation of the recirculation pumping and the forced evaporation for this phase.

Evaporator costs are provided in Attachment E.

The passive evaporation water management will begin be implemented upon completion of placement of the TSF impoundment cover. The TSF will continue to drain at an ever-decreasing rate and allow drainage to be managed through passive evaporation. To facilitate this, and prior to the start of the PEWMS, the operational TSF underdrain pond will be expanded to provide sufficient surface area to passively evaporate the residual drain down waters from the TSF. The cost estimate assumed that the passive evaporation phase will last 20 years after cessation of operations. (Golder, 2017b).

Relevant SRCE sheet(s) or Attachments: Solution Mgmt; User 02; User 15.

5.3.1 Slope Armoring

Slope armoring will be placed between the TSF and the reclaimed GMSP-1 footprint. This area will be first prepared for placement of armoring, and then the locally-sourced riprap material will be placed.

Relevant SRCE sheet(s) or Attachments: Yards; Misc. Costs\Rip-Rap & Rock Lining

5.4 Impoundments and Ponds

5.4.1 Impoundments

Impoundments built around the waste rock stockpiles and the tailings storage facility will have their HDPE liners be ripped, folded over and buried in place and backfilled with clean fill, surfaces graded to drain and blend into the natural topography. The surface area around the impoundments will be ripped and scarified, as necessary, and covered with 6-inches of suitable cover material where unsuitable growth media exists after grading.

Relevant SRCE sheet(s) or Attachments: Process Ponds; User 06; User 11.

5.4.2 TSF Underdrain Pond - Operations/TSF Underdrain Pond - Passive Evaporation

The TSF underdrain pond will be expanded during the transition from AEWMS to PEWMS to provide the passive evaporation pond. This will consist of excavating an area around the existing collection pond and lining the excavated area as described in the reclamation plan. At reclamation, the liner will be ripped, folded over and buried in place with backfill. The surface will be regraded, covered with 6 inches of suitable cover material and revegetated.

Liner installation will take place in two events during/after closure. These will be in Year 17 (expansion of primary and secondary liners) during expansion of operational TSF underdrain pond to TSF underdrain pond for passive evaporation. Liner replacement of primary liner at the footprint of the operational TSF underdrain pond will take place in Year 30 in consideration of the lifespan of the geomembrane following years of exposure to UV radiation during project construction, operation, and closure.

Unit pricing for liner material and installation is based on Southwest Liner Services quote provided in Attachment N. The liner quantity is estimated by plan view measurements of pond areas with 10% increase to include seam overlaps, anchoring, pond slopes, material loss, etc.

Relevant SRCE sheet(s) or Attachments: Process Ponds; Other User; User 20; Attachment N.

5.5 Foundations and Buildings

5.5.1 Buildings

All fuel tanks, reagent storage facilities, and equipment will be removed from the site and disposed of in an approved manner according to applicable federal and state laws; concrete foundations will be broken, walls toppled, backfilled, and covered with 36" of growth media; remaining disturbed areas will be graded, ripped, and covered with 6" of growth media.

The “Foundations & Buildings” sheet uses the following crews:

- Small building demolition: B-3
- Large building demolition: B-8
- Wall and slab demolition (Small - Cat 325F Excavator w/ H120E s Hammer; Medium - Cat 349F Excavator w/ H160E s Hammer; or Large - Cat 374F Excavator w/ H180E s Hammer)
- Truck fleets for cover and/or growth media.

The RSMeans small and large building demolition crews (B-3 and B-8, respectively) by default include two dump trucks. These are assumed to be hauling debris the equivalent of 20 miles during the time the other elements of the demolition crew (excavators, cranes, etc.) are busy. This will cover costs to haul demolition debris to an on-site landfill or to the TSF for burial. Debris haulage costs that are part of the demolition costs in the “Foundations & Buildings” sheet are provided in User 14 for information purposes.

For the process components, added costs have been estimated to reflect removal of utilities and other structures.

This cost estimate includes a 20% markup on concentrator building demolition to cover equipment, miscellaneous infrastructure, and utilities removal per agreement with the reviewing agencies. This markup is applied to the following areas:

- Concentrator Building, Grinding Area.
- Concentrator Building, Flotation Area.
- Concentrator Building, Maintenance Area.
- Concentrator Building, Concentrate Handling & Storage Area.

The markup is applied to the demolition activities of building demolition, wall demolition, and slab demolition.

Relevant SRCE sheet(s) or Attachments: Foundations & Buildings; User 14; User 24; Fleets(Crews).

5.5.2 Tanks

This estimate includes costs to cut steel tanks prior to demolition. The costs are calculated using the productivity and crew designation provided in RSMeans (Gordian, 2018) for steel cutting, using the labor and equipment rates input into the cost data file (to the extent applicable). Costs for the demolition of the tanks and hauling of debris are included in the Foundations & Buildings sheet.

Relevant SRCE sheet(s) or Attachments: User 03; User 04; User 13; Foundations & Buildings.

5.5.3 Decommissioning

Residual sediments and fluids will be flushed from the pipelines and placed in the TSF prior to reclamation of this facility, or at an approved location. Above-ground pipelines will be disposed of in the TSF prior to reclamation of this facility, or at a nearby approved construction and debris landfill. Buried pipelines will be capped at both ends. Disturbed surfaces will be graded and covered with 6-inches of suitable cover material where unsuitable growth media exists.

The removal of 48,000 LF of above-ground pipelines is included in the “Misc. Costs” sheet. Costs include labor to cut and haulage to the disposal area at the tailings.

Relevant SRCE sheet(s) or Attachments: Solution Mgmt; Misc. Costs.

5.6 Roads

Roads not needed for closure and post-closure access will be reclaimed by ripping and revegetating the surfaces. Roads will be ripped and covered with 6-inches of suitable cover material where unsuitable growth media exists. Culverts will be removed if they are not needed for post-closure storm water management and disposed of in an approved manner. Closure and post-closure roads will be reduced to a width suitable for small vehicle access. Existing roads utilized for closure and post-closure access that are wider than that required for single vehicle access will be narrowed during reclamation by ripping, grading and covering with 6-inches of suitable cover material where unsuitable growth media exists.

This cost estimate includes costs for reclaiming 26,000 LF (5 miles) of roads across the site. The costs of road reclamation are characterized herein in terms of cost/acre as commonly used industry terminology. The Copper Flat reclamation plan has identified 16.67 acres of road disturbance.

Relevant SRCE sheet(s) or Attachments: Roads; User 17.

5.7 Yards

Surfaces aside from the major facilities such as the waste rock stockpiles, TSF, ponds, pit, roads, and buildings will be graded, ripped or scarified, as necessary, and covered with 6 inches of suitable cover material where unsuitable growth media exists.

5.7.1 Plant Area/ Pipeline Corridors

Residual sediments and fluids will be flushed from the process pipelines and placed in the TSF prior to reclamation of this facility, or at an approved location. Above-ground pipelines will be placed in the TSF prior to reclamation of this facility (in compliance with applicable federal and state laws), or at a nearby approved construction and debris landfill.

Buried pipelines will be capped at both ends. Disturbed surfaces will be graded and covered with 6-inches of suitable cover material where unsuitable growth media exists. (Golder, 2017a) These areas are accounted for under “Plant area” or “Cyclone station pad.”

The reclamation plan sets forth that the plant area will be covered with 6 inches of growth media and specifies that a 10 acre area within the plant area and the concentrator foundation to covered with 36 inches of growth media after grading and re-contouring, and revegetated...

Downslope channels and diversion structures will be constructed as identified in the reclamation plan. Regrading/reclamation of the access road in this area is accounted for in road reclamation.

Relevant SRCE sheet(s) or Attachments: Yards.

5.7.2 Cyclone Plant Area

All structures and equipment at the cyclone plant will be removed from the site and disposed of in an approved manner according to applicable federal and state laws; concrete foundations will be broken and covered with 36" of growth media; remaining disturbed areas will be graded, ripped or scarified as necessary, covered with 6" of growth media and revegetated.

Relevant SRCE sheet(s) or Attachments: Yards.

5.7.3 Land Bridges

The two land bridges crossing Grayback Arroyo and associated culverts will be removed. The disturbance will be reclaimed to allow the Grayback Arroyo to flow freely after reclamation. The estimate assumes the work will be performed by an excavator in one to two passes across the length of the bridge. Trucks will haul the excavated material to the plant site for use in re-contouring the site, A dozer will be used to spread the material around the plant site. Quantities of material to be excavated have been estimated from the CAD designs.

Material takeoffs were completed using the CAD designs and the cost updated to reflect the material takeoff.

Relevant SRCE sheet(s) or Attachments: Yards; Other User; User 12; Attachment L; Misc. Costs.

5.7.4 Disturbance Around the Pit

The reclamation strategy at the Copper Flat mine generally includes providing a minimum 18-in. root zone for revegetation using a combination of ripping and/or placement of growth media materials as described in the reclamation plan. For the waste rock stockpiles, this will be accomplished by placing growth media at 36-in. thickness and seeding.

It is assumed there will be an approximate 100-foot-wide disturbance area around the pit that will be ripped and revegetated. The 100-foot width is a generalized approximate average width of disturbance around the pit perimeter that occurs during mining operations. The actual width of disturbance will vary by location. In some areas there may be little or no disturbance.

Relevant SRCE sheet(s) or Attachments: Yards; Quarries and Borrow Areas.

5.7.1 Growth Media Stockpiles

Growth media stockpiles consist of GMSP-1, GMSP-2, and GMSP-3. The footprint areas of the growth media stockpiles will be graded to drain and re-contoured to blend into the natural topography. It is anticipated that the only area that may require cover is GMSP-3 which is underlain by andesitic bedrock. The other two stockpile areas are underlain by alluvial materials (suitable growth media).

Relevant SRCE sheet(s) or Attachments: Yards.

5.7.2 Tailings Pipeline Corridor

The approximate 1,000-foot long tailings pipeline corridor that facilitates the tailings pipeline will be partially backfilled to allow for the construction of the conveyance channel that will direct stormwater flows from the covered top surface and the northwest slopes of the TSF to Grayback Arroyo. The pipeline corridor will be backfilled with clean fill in lifts, and each lift will be compacted. The remaining exposed slopes of the pipeline corridor will be graded to a slope of 3.0H:1V and covered with 36 inches of growth media. These areas are accounted for under “Plant area” or “Cyclone station pad.”

Relevant SRCE sheet(s) or Attachments: Sediment & Drainage Control; Sediment & Drainage Control; User 19; Attachment L.

5.8 Conveyance Channels

Surface water conveyance channels will be constructed on and around the waste rock stockpiles, TSF, yards, and around the north, east, and south perimeter of the pit (immediately upstream of the perimeter berm/security fence) and along the existing haul road to direct surface water around and into the pit. Riprap material for these channels will be sourced on-site from approved sources and by mining.

The riprap type selected is “Rip-Rap 450 mm min thick, no grout.” The average cost of hauling these from the source across the site to various facilities is included in the “Haul Material” sheet. Some of the channels are expected to have high flow velocity. For these sections, instead of riprap, articulated concrete blocks will be used. The costs for these are included in “Other User” and unit costs were obtained from a supplier.

This cost estimate includes costs to construct benches for the channels to be built on.

Production of rip rap will occur onsite. Rip-rap identified in the reclamation plan will be produced in the early stages of operation from the existing tailings storage facility footprint and, if needed, an on-site quarry developed within the footprint of proposed WRSP-3. The material will be stockpiled on-site in a stockpile located adjacent to the cyclone plant at the TSF.

The costs for producing the material are based on production of grizzly run material excavated at the TSF during TSF construction and/or from the quarry. Current costs for both the grizzly run and for quarrying have been developed from historical knowledge of similar operations andl assume 50% of the material needed will be produced in the TSF construction by the grizzly and 50% will be produced from the quarry.

Relevant SRCE sheet(s) or Attachments: Sediment & Drainage Control; Misc. Unit Costs; Other User; Haul Material; User 10; User 18; User 21.

5.9 Slope Armoring

Slope armoring will be necessary on slopes around certain facilities.

The costs are calculated through the “Yards” and “Misc. Costs” worksheets as discussed in Sections 5.1.1 and 5.3.1.

5.10 Energy Dissipaters

Energy dissipaters will be constructed at channel outlets to reduce erosive velocities where necessary. The dimensions have been assumed to be such that the length of the basin will be twice the width of the channel and the width of the dissipater will be 1.5 times the width of the channel. The depth of the dissipater will be 1.5 times the depth of the channel.

Relevant SRCE sheet(s) or Attachments: Sediment & Drainage Control.

5.11 Waste Disposal

The estimate includes an allowance for disposal of waste including solid wastes, hazardous wastes, and hydrocarbon-contaminated soils. The quantities of solid and hazardous wastes were assumed based on project size and experience with similar operations. The hydrocarbon-contaminated soil quantities are estimated based on the size of buildings (such as the mine shop).

General building demolition costs and waste disposal actions are further clarified and detailed in User 14.

Waste takeoffs are broken into 4 different types: inert; hydrocarbon; process; hazardous. Quantities and costs for each type have been developed as well as rates at permitted waste disposal sites locations.

Relevant SRCE sheet(s) or Attachments: Waste Disposal; User 14; User 26.

5.12 Miscellaneous Costs

5.12.1 Powerlines

On-site overhead lines and power poles (owned by Sierra Electric Cooperative, Inc.) will be disconnected from the 115kV line owned by Tri- State Generation and Transmission. The electrical substation and associated on-site transmission lines will be closed and removed once they are no longer needed. Power cables will be removed from the site and recycled and power poles will be disposed onsite in a permitted landfill or recycled offsite. Disturbed surfaces along corridor will be graded, ripped, and covered with 6-inches of suitable cover material where unsuitable growth media exists (included in various disturbances in the “Yards” sheet). This cost estimate includes costs to remove the on-site powerline and a transformer.

Relevant SRCE sheet(s) or Attachments: Misc. Costs.

5.13 Monitoring

Monitoring costs for long term monitoring have been developed consistent with the pending permits to be issued for the Copper Flat project. Monitoring consists of reclamation monitoring and water quality monitoring.

Reclamation monitoring costs include time for a field geologist/engineer and a range scientist to conduct site visits to monitor the general site as well as the diversion channels and provide reports. Reclamation monitoring will also include time to monitor the tailings dam and wildlife.

A water quality monitoring schedule for the closure and post-closure periods has been developed based on assumptions made with current operations-period monitoring requirements. In particular, the post-closure water quality monitoring period is assumed to be 100 years, beginning at the end of mining. The length of actual closure and post-closure monitoring schedule will be determined based on the success of reclamation based on monitoring results. The assumed schedule and costs are based on Attachment I. Costs include water quality analysis costs, labor costs for samplers to collect the samples, and reporting. The estimate also includes costs to replace a number of wells during long-term closure, as discussed in Section 5.14.

Relevant SRCE sheet(s) or Attachments: Monitoring; Attachment I.

5.14 Well Abandonment

Production wells will be left once mine operations cease. The monitoring wells to be used during closure and post-closure will remain until end of the monitoring period and plugged and abandoned per regulatory requirements. Well plugging and abandonment costs have been developed based on information specific to well depth with the assistance of third-party consultants familiar with New Mexico regulatory requirements. The estimate reflects individual specifications for the Copper Flat monitor well network and NM agency well abandonment requirements.

The schedule of well abandonment is based on the schedule provided in Attachment I. The estimate also includes costs for well repair during the closure period and also during the long-term closure. Data on expected well life, new construction costs, and existing well maintenance frequency/costs has been developed by third-party consultants familiar with long-term monitoring needs.

Relevant SRCE sheet(s) or Attachments: Other User; User 27; Attachment M.

5.15 Mobilization

This cost estimate includes mobilization and demobilization (M&D) costs for equipment that will be required for reclamation activities. Different mobilization and demobilization campaigns have been assigned to different phases of the reclamation and closure activities. An equipment list has been developed for the Copper Flat reclamation designs and schedule. The costs applied were obtained from specific and relevant supplier quotes, specific to the Copper Flat location, i.e., quotes from suppliers in the Albuquerque to El Paso corridor. The estimate provide delivery and return costs and includes labor. M&D costs have been broken out by reclamation campaign (concurrent, end of mine life, E-cell conversion, etc.) to ensure full cost coverage. The majority of M&D actions have been developed as specific line items. However in cases where small equipment or short term discrete activities are identified, such as seeding, monitor well plugging and abandonment and/or replacement, the M&D estimate for such activities are included in unit rates developed for the activities and are identified for clarity.

Relevant SRCE sheet(s) or Attachments: Mobilization; User 16.

6. Project Indirect Costs

Indirect costs are costs not directly accountable to a direct cost line described above. Indirect costs include engineering, contractor profit and overhead, contract administration, procurement, and contingency. Typically, indirect costs are calculated as a percentage of total direct costs, with the exception of liability insurance, which is based on direct labor cost.

Increasing the scope of activities estimated as a direct cost increases the certainty of the estimate, which leads to a corresponding reduction in the project contingency rate. For this estimate, SRK and NMCC have made an effort to define more costs within a specific direct cost line item versus pushing to a less specific indirect rate.

Indirect costs input into the Copper Flat SRCE are consistent with agency guidance, including NMMMD and BLM. Rates for indirect cost line items are summarized in the following table.

Table 6-1 Table of Copper Flat Project Indirect Rates (% of Total Direct Cost Unless Noted)

% of Total Direct Cost Unless Noted	
Indirect Cost Line Item	**Rate Applied**
Engineering Redesign	4.00%
Contractor Profit and Overhead	10.00%
Contract/Reclamation Administration	5.00%
Performance & Payment Bonds	3.00%
State Procurement	2.00%
BLM Indirects	1.50%
Contingency	6.00%
Indirect Rate before Liability Insurance	31.50%
Liability insurance, % of Direct Labor	1.5%

SRCE applies all indirect rates as a percentage of total direct cost, necessitating conversion of the liability insurance rate (specified as percentage of direct labor cost). The liability insurance rate has been converted by summing direct labor, calculating labor as a percentage of total direct cost, and applying this factor to the 1.5% specified rate. Completing this conversion results in a 31.8% overall indirect rate to be applied to total direct cost.

SRCE User 25 contains details of indirect cost rates applied to the Copper Flat estimate.

7. Results

Total direct costs for the project are calculated at $54.1M. Applying 31.8% indirect cost rate results in indirect costs totaling $17.2M. When combined, the total estimated cost the Copper Flat LOM project, including direct and indirect, is $71.3M. The costs are provided in current US dollars (no discounting) and do not take credit for any salvage of equipment or materials.

Table 7-1 Summary of Copper Flat LOM Reclamation and Closure Costs

Activity Type	Cost ($)
WRD	12,468,576
Tailings Storage Facility	18,458,394
TSF Draindown Management	2,835,919
Buildings	2,202,281
Pits	3,753,725
Pit Rapid Fill	446,337
Roads	68,883
Impoundments	2,154,350
Yards	1,358,635
Wells	308,940
Waste Disposal	128,445
Miscellaneous Linear Facilities	254,714
Monitoring	3,944,766
Reclamation Maintenance	979,872
Mob/demob	649,194
Construction Management	3,621,192
Riprap Supply	457,306
Total Direct Costs	**54,091,528**
Engineering, Design and Construction Plan	2,163,661
Contingency	3,245,492
Contractor OH and Profit	5,409,153
Contract Administration	6,378,810
Total Indirect Costs	**17,197,116**
GRAND TOTAL	**71,288,644**

8. References

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Attachment A: SRCE File

Attachment B: Figures

Attachment C: Cost Data File

Attachment D: Labor Rates

Attachment E: Equipment Rates

Attachment F:Fuel Costs

Attachment G: Power Cost

Attachment H: Seed Cost

Attachment I: Analysis Costs

Attachment J: RSMeans

Attachment K: In-pit Reclamation

Attachment L: Miscellaneous Earthworks

Attachment M: Wells

Attachment N: Liner Installation Unit Costs