REPORT

UPDATED CLOSURE/CLOSEOUT PLAN FOR THE LITTLE ROCK MINE

Submitted to:

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LIST OF ACRONYMS AND ABBREVIATIONS

ABA	Acid-Base Accounting
ac-ft/yr	Acre-Feet per Year
APP	Abatement Plan Proposal
BLM	U.S. Bureau of Land Management
BMP	Best Management Practices
CCP	Closure/Closeout Plan
CDQAP	Construction Design Quality Assurance Plan
CFR	Code of Federal Regulations
CN	Curve Number
Copper Mine Rule	New rules for the copper mining industry adopted in late 2013 under 20.6.7 NMAC
Corps	U.S. Army Corps of Engineers
CQA	Construction Quality Assurance
CQAP	Construction Quality Assurance Plan
CQAR	Construction Quality Assurance Report
CQC	Construction Quality Control
DBS&A	Daniel B. Stephens and Associates, Inc.
DNA	Determination of NEPA Adequacy
DP	Discharge Permit
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EOY	End of Year
FONSI	Finding of No Significant Impact
ft	Feet
Golder	Golder Associates Inc.
gpm	Gallons Per Minute
Guidelines	Closeout Plan Guidelines

HDPE	High Density Polyethylene
kV	Kilovolt
LOM	Life of Mine
mg/L	Milligrams Per Liter
msl	Mean Sea Level
MMD	Mining and Minerals Division of the New Mexico Energy, Minerals and Natural Resources Department
MPO	Mine Plan of Operations
MSGP	Multi-Sector General Permit
NEPA	National Environmental Policy Act
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMMA	New Mexico Mining Act
NMOSE	New Mexico Office of the State Engineer
NMWQA	New Mexico Water Quality Act
NMWQCC	New Mexico Water Quality Control Commission
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	United States Department of Agriculture, Natural Resources Conservation Service
NSR	New Source Review
O&M	Operation and Maintenance
PDTI	Phelps Dodge Tyrone, Inc.
PMLU	Post-Mining Land Use
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
Rules	New Mexico Mining Rules
SCS	Soil Conservation Service
SPCC	Spill Prevention Control and Countermeasures
SX/EW	Solution Extraction-Electrowinning

SWPPP	Stormwater Pollution Prevention Plan
su	Standard Unit of Measure for pH
TDS	Total Dissolved Solids
Telesto	Telesto Solutions Incorporated
Tyrone	Freeport-McMoRan Tyrone Inc.
USFS	United States Department of Agriculture, Forest Service

1.0 INTRODUCTION

The Little Rock Mine is approximately 11 miles south of Silver City, New Mexico and 1 mile west of the Tyrone Mine (**Figure 1-1**). The site features at the Little Rock Mine are depicted on **Figure 1-2** and include an existing open pit copper mine, haul road, and associated facilities to support mining operations. The Little Rock Mine also includes lands that were disturbed by earlier operations (1970s) and have since been reclaimed.

The Little Rock Mine is currently permitted with the Mining and Minerals Division of the Energy, Minerals and Natural Resources Department of New Mexico (MMD) as an existing active mining operation (Rev. 14-1 to Permit No. GR007RE). The New Mexico Environment Department (NMED) Ground Water Quality Bureau issued Discharge Permit (DP) 1236 and both Departments approved the 2014 Closure/Closeout Plan (CCP) in 2016.

This CCP is an update of the 2014 Little Rock Mine and renewal application submitted to the NMED and the MMD, which was approved by the agencies in March 2016. In addition, in December 2013 the Water Quality Control Commission adopted the Copper Mine Rule, 20.6.7 New Mexico Administrative Code (NMAC).

Historic discharges at the Little Rock Mine, created by the former operator are subject to the Copper Mine Rule. The waste stockpiles constructed to date and proposed to be constructed are non-discharging units. The proposed road fill across Deadman Canyon will also be a non-discharging unit. These units are subject to the sections of the Copper Mine Rule that require the permittee to provide evidence that these features are and will be non-discharging units. This CCP reflects the applicable requirements of the Copper Rule and includes the current CCP for the Little Rock Mine.

1.1 Purpose of Plan

The purpose of this CCP is to present a reclamation plan (technical scope of work) consistent with all applicable federal and state regulatory requirements and permit conditions so that a financial assurance cost estimate can be calculated to meet the financial assurance requirements of Part 19.10.12 NMAC and DP-1236 once this scope of work is approved by the State and Federal Agencies. The Little Rock Mine CCP has been updated as required by: DP-1236, which was renewed and modified by the NMED on March 8, 2016 (NMED 2016); and Permit Revision 14-1 to Permit GR007RE (MMD 1998), which was issued by the Director of the MMD on March 8, 2016 (MMD 2016), and subsequently modified on February 5, 2018 (MMD 2018). DP-1236 addressed a number of issues regarding site-specific closure requirements at Little Rock, post-closure ground water monitoring and reporting requirements, and general financial assurance requirements. The MMD Permit details general obligations and conditions for mine closure, reclamation, and associated financial assurance requirements.

This CCP Update also incorporates the new requirements of the Copper Mine Rule. In addition, for those portions of the Little Rock Mine on federal public lands that are operated under a Mine Plan of Operations (MPO), the CCP addresses the requirements of the MPO and 43 C.F.R. Part 3809. The land that is planned to be disturbed by future mining is either managed by the Bureau of Land Management (BLM), United States Department of Agriculture Forest Service (USFS), or is owned by Freeport-McMoRan Tyrone Inc. (Tyrone).

1.2 Plan Organization

This section describes the purpose and scope of the CCP Update and its overall organization. The main body of the CCP consists of the following sections:

- **Section 1.0** provides an overview of the updated CCP for the Little Rock Mine;

- **Section 2.0** describes the existing and new facilities and current (2020) environmental setting at the Little Rock Mine including geology, fauna, flora, mine history, current (2020) disturbances, and permits associated with the mine;
- **Section 3.0** describes the proposed reclamation design criteria and performance objectives for surface reclamation and water management;
- **Section 4.0** provides details on the reclamation plans for the major facilities at the Little Rock Mine;
- **Section 5.0** describes the closure and post-closure monitoring plans for Little Rock along with contingency plans and reporting schedules;
- **Section 6.0** provides details of the proposed post-mining land uses and site-specific revegetation success guidelines for the Little Rock Mine;
- **Section 7.0** presents a summary of the material take-offs and factors that will be applied in the capital and operations and maintenance (O&M) cost estimates associated with the proposed reclamation and post-closure monitoring plans presented in Sections 4.0 and 5.0;
- **Section 8.0** presents the proposed reclamation schedule associated with this CCP;
- **Section 9.0** is the signature page for the CCP update; and
- **Section 10.0** lists the references used in preparation of this CCP.

The following appendices are also included in the updated CCP:

- **Appendix A** includes the reclamation design drawings that illustrate the updated CCP;
- **Appendix B** provides the updated facility characteristic forms;
- **Appendix C** includes the updated 2020 earthworks material take-offs; and
- **Appendix D** includes the 2020 Slope Stability Report.

1.3 Regulatory Authority

The New Mexico legislature enacted the New Mexico Mining Act (NMMA) in 1993 requiring that closeout plans be put in place for applicable mines within the State. Rules to implement the requirements of the NMMA were promulgated in 1994. This CCP was prepared to comply with applicable regulations and requirements stipulated in the NMMA and NMAC Title 19, Chapter 10, Part 5, New Mexico Water Quality Act (NMWQA), and the New Mexico Water Quality Control Commission (NMWQCC) Regulations (NMAC Title 20, Chapter 6, Parts 2 and 7).

The requirements of those laws are addressed in the conditions of Tyrone's permits GR007RE and DP-1236 for the Little Rock Mine. In 2013, NMED adopted new rules for the copper mining industry. Applicable conditions of these new rules, the Copper Mine Rule, have been addressed in this CCP. **Table 1-1** provides a summary of the closure and post-closure requirements in the Copper Mine Rule and the associated sections of this CCP Update for which they are addressed.

1.4 History of Closure/Closeout Plan Submittals

The original Little Rock Mine Closeout Plan for the Little Rock Mine was submitted to the MMD on August 29, 1997, and later revised in May 1998 at the request of MMD to reflect the approved Mine Plan of Operations (PDTI 1993). The original CCP was submitted to both agencies (NMED and MMD) on September 30, 1999 and approved by MMD on December 29, 2000 (MMD 2000) and the NMED on December 27, 2000 (NMED 2000). The following list provides a chronology of the more recent progress leading to this updated CCP:

- Tyrone submitted a reclamation cost estimate for the Copper Leach Stockpile, Precipitation Plant, and existing pit area (non-mining scenario) to the NMED and MMED in September 2009, and the non-mining reclamation cost estimate was approved by both agencies in October 2009;
- Tyrone requested that MMD revise the mine permit to return to an operating status in April 2010;
- An updated CCP for the Little Rock Mine was submitted to the agencies on July 21, 2010 (Tyrone et al. 2010) detailing the reclamation plan associated with updated mine development and operational plans;
- Revision 10-1 was approved on December 30, 2010 (MMD 2010), approving the change from standby to operating status, incorporating the 2010 Updated CCP which detailed the CCP under a mining scenario for the Little Rock Mine, and replacing Revision 97-1 to Permit No. GR007RE;
- An updated CCP for the Little Rock Mine was submitted to the agencies on June 19, 2014 (Golder 2014) detailing the reclamation plan associated with updated mine development and operational plans;
- MMD Permit Revision 14-1 and NMED DP-1236 renewal and modification were approved on March 8, 2016 (MMD 2016, NMED 2016), approving the expansion of the Little Rock Mine Permit Area, expansion of the Mining Area Design Limit, and updated 2014 CCP and reclamation cost estimate for the Little Rock Mine; and
- Tyrone requested a modification to Revision 14-1 to change permit condition 8.W from a closeout plan submittal date by June 30, 2018 to a submittal date by June 11, 2020. Modification 18-1 was approved in 2018.

Throughout the development of the CCPs, the naming of individual facilities has changed over time. A summary of the names previously used for individual facilities along with the current facility names used in this CCP Update is provided in **Table 1-2**.

1.5 Description of Updated Plan

The MMD and NMED require that existing mines prepare a CCP and the entity responsible for the mine must post financial assurance "*sufficient to assure the completion of the performance requirements of the permit, including closure and reclamation, if the work had to be performed by the director or a third party contractor.*"

This update to the CCP revises the CCP Update submitted in June 2014 (Golder 2014) with refined closure/closeout conceptual designs that account for changes in site-specific conditions, ongoing and completed reclamation projects, and the five year mine plans. Consistent with the previous Little Rock Mine CCPs, this updated plan is a "snapshot in time" that reflects the most expensive closure scenario within the 5-year period (years 2020 through 2024) covered by this CCP based on the Little Rock Mine plans and site conditions.

Details of facility changes that have occurred since the last CCP and those projected in the subsequent planning period are provided in this CCP. A recent evaluation of the five-year mining sequence (years 2020 through 2024) determined that 2024 is the highest reclamation cost year. The facility characteristics and reclamation designs presented in this CCP are referenced to conditions at Little Rock at the EOY 2024 as well as the projected status of ongoing and planned reclamation projects prior to the EOY 2024, unless otherwise noted. The proposed reclamation and post-closure monitoring plans for the principal mine facilities are described in Sections 4.0 and 5.0.

This updated CCP will support financial assurance cost estimates for closure/closeout based on the EOY 2024 mine plan. Use of the EOY 2024 mine plan is consistent with the snapshot in time philosophy that was adopted by Tyrone and the Agencies early in the closure planning process and represents the year with the greatest volume of regrading and cover placement required for the five year mine plan. If mining activities were to cease before EOY 2024, the highest reclamation cost scenario would be associated with the EOY 2024 conditions.

1.6 Proposed Modifications to Mine Permit Boundary and Open Pit Design Limit

As part of this updated CCP, Tyrone is proposing to modify both the existing Little Rock Mine Permit Boundary and the current Mining Area Design Limit to account for the current life of mine (LOM) plan. Tyrone is proposing to expand the existing Little Rock Mine Permit Boundary by approximately 348 acres to account for the projected expansion of the open pit and associated disturbance areas outside the current permit boundary limits (**Figure 1-3**). Tyrone is making these proposals to comply with NMMA 19.10.5.502 and 19.10.5.505.B. (1) that pertain to permit modifications and revisions.

Tyrone is also proposing to expand the current approved Little Rock Mine Mining Area Design Limit by approximately 558 acres (**Figure 1-3)**. Section 2.0 describes the associated mine facilities within the proposed Mining Area Design Limit. Under this plan, the proposed expanded Little Rock Mine Permit Boundary and the proposed expanded Little Rock Mine Mining Area Design Limit Boundary are consistent with one another. Further details of the proposed mine permit boundary and design limit changes are presented in Section 6.0.

2.0 EXISTING AND NEW FACILITIES AND CONDITIONS

The existing Little Rock Mine Permit Boundary occupies approximately 680 acres in parts of Sections 16, 17 and 20, Township 19 South, Range 15 West, New Mexico Principal Meridian and Baseline. The existing topography, site features, existing and proposed permit boundaries, and section lines are shown on (**Figure 1-2**), and the topography, site features, and permit boundaries that are planned to be in place by the EOY 2024 are shown on (**Figure 2-1**).

The following sections describe the existing and new Little Rock mining facilities and operations, ownership history, past and current (2020) land uses, environmental setting, and mine material characteristics. In addition, pertinent permits and the operational DP for the Little Rock Mine are summarized herein.

2.1 Description of Mining Facilities

Section 2.1 describes the Little Rock mining features as of June 2020. The principal mining features at the site include the Little Rock Mine open pit, historical North and West Canyon waste rock stockpiles, North In-Pit Waste and West In-Pit Waste stockpiles, and the Reclaimed Copper Leach Stockpile (a.k.a. reclaimed leach stockpile) and P-Plant. The existing (June 2019) Little Rock Mine open pit encompasses approximately 196 acres, and the historical North and West Canyon waste rock stockpiles occupy approximately 9.6 acres. Approximately 31 acres are associated with the Reclaimed Copper Leach Stockpile and 1 acre is associated with the reclaimed P-Plant. The existing Little Rock Haul Road that provides access between the Little Rock and Tyrone mines covers an area of approximately 20 acres within the Little Rock Mine Permit Area. In addition to these primary features of the Little Rock Mine, the current permits allow for other operational facilities including a 46-kilovolt (kV) power distribution system, and temporary operations and maintenance facilities that are all projected to be in place by the EOY 2024. The current permits also allow for a secondary dewatering pipeline (dewatering pipeline alignment #2) that is not currently included in the EOY 2024 mine plan. The total existing and approved disturbance at the Little Rock Mine associated with the primary and ancillary facilities is approximately 322 acres.

Figure 2-1 depicts the primary elements of the Little Rock Mine that will be present at the EOY 2024, including the projected EOY 2024 configurations for the existing open pit, waste rock stockpiles, dewatering pipeline, seepage collection pipelines, and western haul road. In addition, **Figure 2-1** shows the EOY 2024 configurations of the planned East In-Pit Waste, CLW Waste, and NRW Waste stockpiles that will be present by the EOY 2024. The Reclaimed Copper Leach Stockpile will be removed and the material transported to a leach stockpile at the Tyrone Mine by the EOY 2020. The new CLW Waste stockpile will then be placed over the former footprint of the former Copper Leach stockpile. For FA purposes it is assumed that the Reclaimed P-Plant area will be disturbed.

2.1.1 Open Pit

The open pit at life of mine (LOM) is anticipated to encompass approximately 448 acres (represented as blue line on **Figure 2-1**), including approximately 275 acres of BLM managed lands and approximately 173 acres of private land. The open pit is currently being mined in 50-foot benches, creating a terraced/benched pit wall that will ultimately have one or more flat bottoms. The anticipated EOY 2024 pit configuration spans California Gulch and portions of Deadman Canyon.

During operation, storm water and ground water will be effectively managed as it is today under the current permit. Storm water from California Gulch and Deadman Canyon will be directed to the main sump at the bottom of the open pit. During operation, storm water, along with ground water inflow, will be pumped to the existing lined 1X1 Pond (lined with high density polyethylene [HDPE]) located near the Reclaimed 1X Tailing Impoundment at

Tyrone via the LR Sump – 1X1 dewatering pipeline (dewatering pipeline). The existing seepage collection pipeline from the Reclaimed Copper Leach Stockpile and P-Plant area also connects to the dewatering pipeline. From the lined 1X1 Pond, the collected water is conveyed through a booster pump station to the SX/EW raffinate tanks and then used in the Tyrone Mine process water management system.

At closure (EOY 2024), a pit lake is expected to begin to form within the Little Rock Mine open pit due to the cessation of dewatering activities. The pit lake is predicted to rise to an elevation of approximately 5,660 feet mean sea level (msl) at 30 years following closure, and then generally stabilizes at an elevation of approximately 5,669 feet msl at approximately 80 years after closure (see Section 3.2.1).

2.1.2 Waste Rock Stockpiles

The waste rock stockpiles consist of Pre-Cambrian Granite, a non-acid generating overburden material and are conditionally exempt from the engineering design, construction, and operational requirements of the Copper Mine Rule and the Water Quality Act during operations and at closure. Tyrone is currently monitoring Pre-Cambrian test plots that are expected to confirm that the material meets suitability criteria for reclamation cover.

There are currently four waste rock stockpiles located within the Little Rock Mine Permit Area, including the historical North and West Canyon waste rock stockpiles, and the North In-Pit Waste and West In-Pit Waste stockpiles. The historical North and West Canyon waste rock stockpiles are located around the perimeter of the open pit (**Figure 1-2**). The historical North waste rock stockpile is located on the northwest side of the existing open pit. The historical West Canyon waste rock stockpile is located approximately 200 feet southwest of the projected EOY 2024 open pit limit. These stockpiles have been colonized by native vegetation and no additional reclamation measures are proposed for the areas that will remain at the EOY 2024 (**Figure 2-1**). Although no additional reclamation measures are proposed for the North and West Canyon waste rock stockpiles, Operations and Maintenance (O&M) costs will be included until financial assurance is released.

Two stockpiles are currently under development within the Little Rock Mine open pit (**Figure 1-2**). The West In-Pit Waste stockpile is located in the western portion of the open pit and is projected to cover an area of approximately 42.9 acres at EOY 2024 prior to reclamation. The pit lake surface is not projected to cover any of the West In-Pit Waste stockpile after closure. The North In-Pit Waste stockpile is located in the north central portion of the open pit and is projected to cover an area of approximately 13.3 acres at EOY 2024 prior to reclamation. The North In-Pit Waste stockpile is projected to be completely covered by the stabilized pit lake surface at approximately 80 years after closure.

Three additional new waste rock stockpiles are included in the EOY 2024 mine plan (**Figure 2-1**). The CLW Waste stockpile will be located within the footprint of the Reclaimed Copper Leach stockpile and is projected to cover an area of approximately 31.2 acres by the EOY 2024 prior to reclamation. The NRW Waste stockpile will adjoin and be located immediately north and east of the historical North stockpile and is projected to cover an area of approximately 40.1 acres by the EOY 2024 prior to reclamation. The East In-Pit Waste stockpile will be located in the eastern portion of the open pit and is projected to cover an area of approximately 20.4 acres by the EOY 2024 prior to reclamation. The East In-Pit stockpile facility is projected to cover an area of approximately 9.8 acres above the stabilized pit lake surface after closure.

Topsoil will be salvaged during mining operations where feasible, and the salvaged material will be temporarily stored within the Little Rock Mining Area Design Limit or the 9A Waste and 9AX Waste stockpiles for future use as reclamation cover material.

2.1.3 Haul Roads

Two additional haul roads are required during mining and are included in the 5-year mine plan (EOY 2020 through EOY 2024), the Northern Haul Road and Southern Haul Road. The Northern Haul Road crosses Deadman Canyon and connects to the existing Little Rock Haul Road. The Southern Haul Road crosses Deadman Canyon at the approximate location of the existing spanning arch culvert on the south side of the pit.

2.1.4 Infrastructure and Other Miscellaneous Facilities

In addition to the major mine components identified above, there are a number of key ancillary facilities and infrastructure dispersed across the mine that support the operations at Little Rock. The ancillary facilities at the Little Rock Mine include: electrical power transmission lines and substations; storm water structures for drainage, diversion, and sediment control; and fencing.

2.1.4.1 Monitoring Wells and Exploration Drill Holes

All historical exploration holes were located and abandoned or mined out in first quarter 2010 (Tyrone 2011). All exploration holes drilled since the first quarter of 2010 were closed immediately. There are currently 9 monitoring wells at Little Rock. During the 5 year mine plan, it is projected that 5 monitoring wells with an average depth of 150 feet will be impacted and will need to be replaced.

2.1.4.2 Substation, Concrete Slabs, and Powerlines

Utilities serving structures to be removed and/or demolished and remaining concrete slabs include:

- 46 kilovolt powerline;
- Power poles;
- Substation;
- Pipelines; and
- Concrete slabs.

Power transmission lines, power poles, and substation will be removed once they are not needed for post-closure purposes.

2.1.4.3 Other Roads and Dewatering System and Conveyance Pipelines

As depicted in **Figure 1-2**, the Little Rock Haul Road provides access between the Little Rock and Tyrone mines, and crosses Deadman Canyon over an existing spanning arch culvert on the south side of the pit. By the EOY 2024, a substantial portion of the existing Little Rock Haul Road will be enveloped by the open pit (including part of the existing spanning arch culvert over Deadman Canyon). The Little Rock Haul Road will be reconfigured and the Northern Haul Road and Southern Haul Road will be constructed, within the proposed Mining Area Design Limit by the EOY 2024 as shown on **Figure 2-1** to provide access for mining operations. Ore from the Little Rock Mine will continue to be hauled to leach stockpiles at Tyrone.

A proposed new haul road, designated as the Western Haul Road, was approved in 2016 as part of Permit Revision 14-1 to Permit GR007RE. To date, this haul road has not been constructed, and the current EOY 2024 mine plan includes the construction of the NRW Waste stockpile over part of the area previously proposed for the haul road. Additionally, as with the ongoing mining operations, haul roads internal to the open pit will be extended

or constructed as pit excavation advances. The haul roads located at Little Rock Mine, that will be present at the EOY 2024, are shown in **Figure 2-1**.

The existing dewatering system at Little Rock pumps surface water and ground water that accumulates in a sump located at the bottom of the open pit during operations, which allows the mine to operate during normal activities within the open pit and during rain events. The dewatering system will continue to pump surface water and ground water that accumulates in a sump located at the bottom of the open pit during operations. A series of temporary dewatering sumps will be excavated as the pit is lowered, and water extracted from these sumps will be pumped to a temporary lined pond consisting of two sumps arranged in series that also serve as settling basins for sediments.

The temporary lined pond will continue to receive seepage from the CLDS and CLDS-1 collection trenches. Water from the temporary lined pond is then pumped via a diesel-powered pump through a 12-inch HDPE pipeline (referred to as the LR sump-1x1 pipeline) that extends to an existing 10-inch HDPE pipeline that runs to the existing lined 1X1 Pond (**Figure 2-1**). Post-closure water quality monitoring is addressed in Section 5.3 of this CCP.

2.1.5 Reclaimed and Removed Facilities

A substantial amount of reclamation work has been conducted at the Little Rock Mine since the issuance of DP-1236 and MMD Permit GR007RE. Facilities where reclamation is complete include: the abandoned Copper Leach Stockpile and P-Plant left by former operators (**Figure 1-2**); exploration roads; and all exploration holes located outside of the open pit boundary were plugged and abandoned in the first quarter of 2010 (Tyrone 2011a). Reclamation of the P-Plant and the Copper Leach Stockpile commenced in February 2010 and all work was completed in 2011.

2.2 Past and Current Land Uses

Lands in the vicinity of the mine have historically been used for mining, livestock grazing, timber and fuel wood harvesting, recreation, and wildlife habitat. Ponderosa pine was logged in the Big Burro Mountains south of the Little Rock Mine, and fuel wood has been cut from woodlands in this area for at least a century. Recreation in the area includes camping, picnicking, hunting, off-road vehicle use, hiking, horseback riding, and bicycling.

Current surrounding land uses include grazing, mining, and recreation. Grazing is the predominant land use surrounding the mine. Mining in the area of Little Rock dates back to the mid to late 1800s. During this period, mining and prospecting ranged from small shallow surface excavations to large scale underground workings. In the 1960s and early 1970s, operations at the Little Rock Mine were expanded. Mining during this period was intermittent but included the development of an open pit, leach stockpiles, and precipitation plant used to recover copper. The nearby Tyrone Mine went into large scale open pit production in the late 1960s. In the early 1990s, Tyrone began the process of obtaining the regulatory permits and land leases required to mine at the site.

2.3 Environmental Setting

The following sections present various aspects of the mine site, including its topography, geology, climate, hydrology, soils and vegetation, wildlife, and material characteristics.

2.3.1 Topography

The Little Rock Mine area is just west of the Continental Divide between the Big Burro and Little Burro Mountains. The mine is located on the northeastern slopes of the Big Burro Mountains, a northwest-southeast trending range

approximately 22 miles long and 4 to 12 miles wide. The Little Burro Mountains are situated northeast of the Big Burro Mountains and are separated from the Big Burro Mountains by the Tyrone mine and the Mangas Valley (**Figures 2-2 and 2-3**). The Mangas Valley and the Little Burro Mountains are located within a structurally controlled regional topographic feature that trends northwest to southeast.

The topography in the vicinity of the Little Rock Mine reflects the relatively gentle northeastern slopes of the Big Burro Mountains (**Figures 2-2 and 2-3**). Burro Peak, on the Continental Divide, rises to an elevation of 8,035 feet above msl. By contrast, the elevation of the Mangas Valley north of the mine is around 5,800 feet above msl. The Continental Divide traces immediately to the east of the Little Rock Mine; bisecting the Tyrone Mine. The Divide separates Mangas Wash, which drains westerly toward the Gila River, from the southeasterly-draining Brick Kiln Gulch and Oak Grove Wash. The Continental Divide crosses the Little Burro Mountains northwest of Tyrone Peak at a maximum elevation of 6,439 feet above msl.

2.3.2 Geology

The mineral deposits at the Little Rock Mine are hosted in granitic rocks that have been altered by hydrothermal and supergene processes. The ore deposit consists of a copper oxide enrichment zone surrounded by leached cap and underlain by a mineral zone that contains minor amounts of pyrite and lesser amounts of chalcopyrite and chalcocite. Copper oxide ore is mined and then transported to Tyrone for processing by solution extraction and electrowinning (SX/EW). Precambrian Granite is the primary source of waste material at the mine and is the material present in the waste rock stockpiles that surround the existing Little Rock Mine open pit. The majority of the waste rock at the Little Rock Mine is believed to be suitable as a reclamation cover material. Minor amounts of sulfide containing rocks produced during mining will be placed in accordance with the NMED approved material handling plan.

The Big Burro Mountains are primarily composed of Precambrian Burro Mountain Granite. This granite is part of a batholith that was intruded by the Tyrone laccolith nearly 56 million years ago (Kolessar 1982). Both Precambrian Burro Mountain Granite and Tertiary intrusive rocks are exposed in the vicinity of the Little Rock Mine. The surface geology at the Little Rock Mine is predominately Precambrian Burro Mountain Granite, while Tertiary intrusive rocks are present throughout much of the area immediately south of the site (Trauger 1972). Younger geologic units, such as Quaternary-Tertiary Gila Conglomerate and Quaternary alluvium occupy the Mangas Valley north of the Little Rock Mine. Gila Conglomerate was deposited as bolson fill and fan deposits derived from Late Tertiary and older tectonic uplifts. More recent alluvium was deposited unconformably on Gila Conglomerate north of the Little Rock Mine and is also present as valley fill along many present-day drainages including California Gulch and Deadman Canyon.

Several faults have been mapped in the area of the Little Rock and Tyrone mines in association with early geologic mapping (Trauger 1972, Hedlund 1978) and through mining and mineral exploration activities. The predominant geologic structures in the region are sets of northeast- and northwest-trending faults. Some of these faults exhibit hundreds of feet of offset and juxtapose different geologic units. The Austin-Amazon fault is a major northeast-striking fault approximately 0.4 miles northwest of the existing Little Rock Mine open pit. Two east-west trending faults are also located near or within the permit boundary. These include the Southern Star fault located along the northern perimeter of the permit boundary and an unnamed fault that runs through the permit boundary and is located approximately 0.3 miles north of the existing open pit (**Figure 2-4**). A generalized geologic map showing the exposed geology associated with the projected EOY 2024 open pit configuration is presented on **Figure 2-5**, and associated geologic cross sections through the projected EOY 2024 open pit are presented on **Figure 2-6**.

2.3.3 Climate

The Little Rock Mine is located in a semi-arid region in southwestern New Mexico, with elevations ranging from approximately 5,800 to 6,300 feet above msl (**Figure 2-3**). The climate is warm and dry, with mean annual precipitation of approximately 16 inches (400 millimeters [mm]) and a mean annual temperature near 50°F (10°C). Precipitation falls mainly as rain, but snow may occur from November to March. Most of the precipitation in the area falls during July through October in the form of rain during short, intense, thunderstorms. Approximately 60 percent of the precipitation falls during the summer months. Precipitation is characterized mostly by small magnitude events ranging from less than 0.1 to 0.25 inches (2.5 to 6.4 mm) per day. Larger magnitude rainfall events (greater than 1 inch) also occur in the summer months, but at a much lower frequency. Monthly precipitation is generally less than an inch per month from November through June, peaks in July, August, and September with between 2 and 3 inches per month, and generally falls to approximately 1 inch in October. Evaporative demand in this region is high and annual evaporation far exceeds annual precipitation.

Eight weather stations are located in the vicinity of the Little Rock Mine each with varying periods of record. Of those stations, the Tyrone Mine General Office station has the longest period of record (i.e., 1954 to the present). The Little Rock Mine station has a relatively short period of record, with records starting in 2001. Longer term records (more than 40 years) are available from five weather stations located near the mine. The five stations with the longest periods of record are:

- The Tyrone Mine General Office station, located at the Tyrone Mine at an elevation of 5,960 feet above msl;
- The White Signal station, located approximately 7 miles south at an elevation of 6,066 feet above msl;
- The Hurley station, located approximately 15 miles east at an elevation of 5,700 feet above msl;
- The Santa Rita station, located approximately 20 miles east-northeast at an elevation of 6,312 feet above msl; and
- The Fort Bayard station, located approximately 20 miles northeast at an elevation of 6,149 feet above msl.

These stations are considered fairly representative of the range of climate conditions at Little Rock. Long-term climatic records (spanning more than 100 years) are available for Fort Bayard.

2.3.4 Hydrology

The Continental Divide is located approximately 3 miles south of the Little Rock Mine and runs along the peaks of the Big Burro Mountains. The Continental Divide separates surface water drainages that are tributary to the Gila River from drainages that are tributary to the Mimbres River. The New Mexico Office of the State Engineer (NMOSE) has declared two underground water basins in the region, the Mimbres and Gila-San Francisco. Ground water beneath the Little Rock Mine is in the Gila-San Francisco underground water basin. The following sections further describe surface water and ground water resources in the vicinity of the Little Rock Mine.

2.3.4.1 Surface water

Surface water features in the area of the Little Rock Mine consists of ephemeral washes in California Gulch and Deadman Canyon (**Figure 1-2**). These ephemeral washes flow only in direct response to precipitation events and have channels that are above the regional bedrock aquifer. The washes do not support self-sustaining populations of fish or other aquatic species.

Deadman Canyon and California Gulch flow from south to north and converge at the north end of the site before discharging to a constructed diversion channel, and ultimately to the Mangas Wash. Whitewater Canyon also contributes flows to the constructed diversion channel. Mangas Wash is a tributary to the Gila River, and the drainage is ephemeral in the vicinity of the Little Rock Mine. Both California Gulch and Deadman Canyon cross through the Little Rock Mine Permit Area. Storm water in California Gulch, upgradient of the Little Rock Mine flows to the Little Rock open pit. In response to runoff events, surface water converges with ground water in the open pit bottom. As previously described, water from the open pit is currently pumped to the lined 1X1 Pond via the LR sump-1x1 pipeline.

At the EOY 2024, the open pit is expected to intersect the ephemeral Deadman Canyon drainage, requiring the management of storm water flows. A diversion channel will be constructed during closure to convey surface water flows from Deadman Canyon along the eastern portion of the open pit. The Deadman diversion will be constructed on non-acid generating rocks, including an approximate 704-foot long section adjacent to the East In-Pit Waste stockpile. The Deadman Canyon Diversion will be designed to control erosion and to safely convey storm water for discharge in accordance with 20.6.7.33.A NMAC.

Two ephemeral springs occur outside the Little Rock Mine Permit Area. Sugar Loaf Spring occurs west of the Little Rock Mine Permit Area, and McCain Spring is located to the east of the Little Rock Mine Permit Area (**Figure 2-7**). Flows at these springs are sporadic, and primarily occur in response to precipitation events. The ephemeral nature of these springs and their location compared to the topography suggest that they are fed by infiltration on the upgradient slopes immediately adjacent to the springs and are not discharge points for regional ground water that would be hydraulically connected to the aquifer beneath the Little Rock Mine.

Surface water flow and water quality monitoring data are collected at several locations and the results are reported in accordance with DP-1236 (**Figure 2-7**). These monitoring locations include: seepage collection points CLDS and CLDS-1; flow samplers in California Gulch (LRFS-1 through LRFS-3); the open pit sump; and nearby Sugar Loaf and McCain springs. The three flow samplers are located near mine facilities and collect samples of ephemeral surface water within California Gulch during storm events. At closure (EOY 2024), a pit lake is expected to begin to form within the Little Rock Mine open pit due to the cessation of dewatering activities. Details of the predicted pit lake stage and water quality following closure are provided in Section 3.2.1.

2.3.4.2 Ground Water

Regional ground water exists within intrusive igneous rocks at the Little Rock Mine. These rocks include Precambrian Granite, Tertiary Granodiorite, and Tertiary Quartz-Monzonite (**Figure 2-4**). Precambrian Granite is the most abundant rock type and is intruded by the Tertiary Granodiorite in the area of the southwest portion of the projected EOY 2017 open pit. Several large Tertiary Quartz-Monzonite dikes trend southwest to northeast along the entire south side of the open pit. Ground water occurrence and flow within the igneous rocks is governed by secondary permeability (i.e., joints, fractures, and faults); the direction of ground water flow is predominantly toward the east/northeast and in the direction of the Main Pit at Tyrone (**Figure 2-8**).

During mining operations, ground water flow patterns will continue to change in the vicinity of the Little Rock Mine open pit due to dewatering activities, as the open pit is advanced below the regional water table. In July 2013, ground water began infiltrating into the open pit and dewatering efforts commenced. The extraction rate from the Little Rock Mine open pit was approximately 2.7 gallons per minute (gpm) in July of 2013, and increased to approximately 178 gpm in August 2013 due to increased surface water and ground water inflows, and the advancement of mining within the pit (Tyrone 2013b). Regional water quality generally meets all Section

20.6.2.3103 NMAC standards, but occasionally the standards for fluoride or manganese are exceeded due to natural background conditions.

Several geologic structures also affect ground water flow in the area of the Little Rock Mine. These structures include the Austin-Amazon and Southern Star faults and Tertiary Quartz-Monzonite dikes. The two faults are regionally extensive faults and act as low-permeability barriers to ground water flow (DBS&A 2014). The Austin-Amazon and Southern Star faults are located to the northwest and north of the Little Rock Mine open pit, respectively.

The Tertiary Quartz-Monzonite dikes act as low-permeability features, limiting ground water flow from the south side of the dikes to the north. Mining at the Little Rock Mine will excavate portions of the dikes below the regional water table, allowing ground water from the south to flow more readily to the Little Rock Mine open pit. Due to the presence of these low-permeability features (faults and dikes), the majority of the ground water in the Little Rock Mine area flows toward the Tyrone Main Pit rather than northerly toward the Mangas Valley. At closure (EOY 2024), a pit lake is expected to begin to form within the Little Rock Mine open pit due to the cessation of dewatering activities. Details of the predicted pit lake stage and water quality following closure are provided in Section 3.2.1.

Perched ground water is present in shallow alluvium beneath the California Gulch and Deadman Canyon drainages near the site. These shallow ground water systems are restricted to the alluvial sediments that overlie bedrock in the drainage channels. Saturation within these systems is intermittent, existing primarily during spring and summer runoff.

2.3.5 Soils and Vegetation

Two soil-vegetation associations have been identified within the mine permit area. Vegetation at the Little Rock Mine is characterized by mixed evergreen woodland dominated by pinyon pine (*Pinus edulis*), One-seed juniper (*Juniperus monosperma*), Emory oak (*Quercus emoryi*), and shrubs and scattered warm season grasses. The soils in the mountain slope mixed evergreen woodland association are mostly loamy skeletal Haplustolls. These soils are shallow, noncalcareous, and medium- to coarse textured with moderate to high amounts of coarse fragments. These soils formed in residuum and colluvium from competent igneous rocks composed of quartz monzonite and granite.

Minor areas of bedrock are exposed at the surface. This association occupies the very steep back slopes and ridges of the Big Burro Mountains. Vegetation within the mountain slope mixed evergreen woodland association represents the lower elevation ranges of this community regionally. Ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*) are locally important subordinates in this community that may dominate minor sheltered topographic positions. A riparian corridor is associated with portions of the upper reaches of Deadman and Whitewater canyons and California Gulch. Fremont cottonwood (*Populus fremontii*) may occur as an incidental species in the riparian areas.

2.3.6 Wildlife

Wildlife species in the vicinity of the Little Rock Mine are representative of those communities that are found in southwestern New Mexico pinyon-juniper-oak woodlands. Surveys conducted in the area of the Tyrone Mine indicate that there is a healthy diversity and abundance of vertebrate species using the habitat around the mine. At least 18 mammals, 79 bird species, and 5 reptiles have been documented in the vicinity of the Tyrone Mine (DBS&A 1997, Metric Corporation 1993 and 1996, and Dames & Moore 1994).

Surveys to identify Federal and State threatened, endangered, and special status wildlife species, were conducted by Metric Corporation (1993 and 1996) and Tierra Environmental Consultants (2010) in the Little Rock Mine project area.

Existing wildlife habitats associated with the Little Rock Mine are largely upland, terrestrial habitats. No fisheries exist within the immediate vicinity of the proposed mine. The drainages which traverse the site are ephemeral and flow only in response to storm events or spring snowmelt.

2.3.7 Material Characteristics

Tyrone has developed a classification of the mineralization types that occur in the rocks at the Little Rock Mine area. This classification system was developed to characterize the deposit from an ore processing perspective. Mineral type information is routinely used for detailed mine planning and for copper production forecasting. The basic theme of the mineral type designation is to identify the type of copper mineralization and acid neutralizing potential associated with the ore body. This ore body contains a high concentration for calcite veins, which reduce copper leach recovery. The mineral information is used to evaluate the application concentration of leach solution for economic copper recovery.

These sample results also have an environmental application. Acid-base accounting (ABA) and total metals analyses were conducted on an initial group of 90 samples in order to evaluate the metal mobility/reactivity of the rocks for each of the mineral types defined for the area. A supplemental group of 34 samples were submitted for ABA determinations in August 1998. The collective results of the 124 samples from the two sampling campaigns indicate that the mineral types at the Little Rock Mine have very little to no potential to generate acid. There are three primary mineral types found within the Little Rock Mine Permit area in addition to reclamation borrow material. These mineral types are described below.

Precambrian Granite

The distinguishing minerals in Precambrian Granite consist predominantly of goethite and hematite. No sulfide minerals are known to occur in the leach cap; the degree of oxidation is complete. Other accessory minerals identified within leach cap include calcite, montmorillonite, kaolinite, and specularite.

The Precambrian Granite is composed primarily of the minerals quartz, orthoclase, plagioclase and biotite that occur as coarse-grained crystals. The degree of fracturing within leach cap is related to its proximity to oxide copper mineralization. The fractures are more abundant adjacent the oxide zone and diminish outward. Goethite and hematite are present as secondary minerals, which are weathering products of oxidation of the pre-existing pyrite and chalcopyrite grains. Other secondary minerals mentioned above occur in association with the rock forming minerals such as feldspars altered to clay, specularite in veinlets, and calcite that is associated with iron oxides, feldspars, and also as discrete crystals. The ABA data for Precambrian Granite strongly suggest that it will not generate acid and has a moderate potential to neutralize acid. The Precambrian Granite comprises the bulk of the overburden rock mined from the open pit.

Copper Oxide

The distinguishing mineral in copper oxide is chrysocolla, which is the major ore component at the Little Rock Mine. Like leach cap, no sulfide minerals are known to occur in the oxide copper zone and the degree of oxidation is complete. Other accessory minerals include goethite, hematite, calcite, montmorillonite, kaolinite, white mica (sericite), malachite, and azurite.

Masses that contain varying amounts of manganese, iron, and copper in an oxide form are also present in volumetrically minor amounts. The oxide copper mass is entirely hosted by Precambrian Granite. The oxide copper zone is the most fractured of all the rock types at the Little Rock Mine. The ABA data strongly suggest that the oxide copper will not generate acid and has a moderate to strong potential to neutralize acid. The oxide copper rock is the ore being mined at the Little Rock Mine and hauled to Tyrone.

Chalcopyrite-Pyrite

Chalcopyrite and pyrite are the distinguishing minerals for this mineral type. Accessory minerals identified include chalcocite, covellite, montmorillonite, kaolinite, white mica (sericite), specularite, bornite, and calcite. The copper- and iron-bearing minerals are principally in a sulfide form (not including the rock-forming minerals). This sulfide zone does not contain any appreciable amounts of secondary oxide minerals suggesting limited oxidation within this zone.

Precambrian Granite is the host rock to this mineral type. Fractures are present within this zone, but at a lower density than is observed in the oxide copper zone. The presence of veinlets containing chalcopyrite, pyrite, quartz, and calcite is a distinctive feature of this mineral type. The collective ABA data show that the sulfides have a very low potential to generate acid, with sufficient neutralizing capacity to neutralize all of the acid that may potentially be produced. The sulfide zone rocks therefore also can be classified as having a moderate to high potential to neutralize acid. This mineral type is generally considered to be non-ore rock and constitutes a very small amount of the material being mined.

2.3.8 Overburden Materials

Traditional cover/topsoil resources are scarce in the vicinity of the Little Rock Mine. The native soils are thin and contain moderate volumes of rock fragments. In addition, the slopes are steep and limit the practicality of operating equipment for topsoil salvage. However, it is Tyrone's opinion that the Precambrian Granite has few apparent limitations as a plant growth media when compared to the native soils. This is being proven with Pre-Cambrian Granite Test Plots located at the Reclaimed USNR site. The Pre-Cambrian Granite is composed primarily of the minerals quartz, orthoclase, plagioclase, and biotite that occur as coarse-grained crystals.

Over the past several years, Tyrone has strategically placed Precambrian Granite mined from the Little Rock Mine at several locations around the mine site, including the 9A Waste and 9AX Waste stockpiles in preparation for reclamation activities at the Tyrone Mine. Overall, the Precambrian Granite overburden materials from the Little Rock Mine are net-neutralizing and non-acid generating. Laboratory analyses indicate that the overburden from the Little Rock areas is relatively uniform and has few apparent limitations as a plant growth media when compared to the surrounding native soils. There are no apparent chemical limitations with respect to salinity in either the overburden or the native soils and the pH and extractable nitrate concentrations occur at similar levels in both materials. The overburden is moderately coarse textured and contains moderate volumes of rock fragments. The native soils exhibited similar characteristics and are moderately coarse textured with moderate amounts of rock fragments (PDTI 2000 and 2005a, Golder 2020b). The suitability of Precambrian Granite as reclamation cover material is further supported by observations of the establishment of perennial native vegetation within the pit area and on the historical North Waste and West Canyon waste rock stockpiles.

A test plot study at the United States Natural Resources (USNR) site is also currently evaluating the suitability of Precambrian Granite from the Little Rock Mine as reclamation cover material for the Tyrone Mine. As detailed in the USNR test plot as-built report (Golder 2017), the two-acre test plot includes four treatments, which are approximately a half-acre each, including: 1) a control plot (conventional seed mix and mulching); 2) mulch prior

to seeding with conventional seed mix plot; 3) conventional mulch with alternative seed mix plot; and 4) mulch prior to seeding with alternative seed mix plot. Preliminary results indicate that the USNR test plots are on the right trajectory relative to vegetation success and erosional stability. Tyrone believes that the test plot studies will show that the Precambrian Granite from the Little Rock Mine will perform very well as reclamation cover material.

The Little Rock Mine topsoil salvaging plan also calls for the salvaging of identified topsoil resources of greater than 300 cubic yards in volume with a minimum thickness of two feet. These areas will be identified during the clearing and grubbing of undisturbed areas in preparation for mining.

2.4 Permits and Discharge Plans

Tyrone holds the state and federal permits and authorizations necessary to produce copper from the existing facilities at the Little Rock Mine. Current permits include a NMMA permit from the MMD as an existing mining operation (Mining Act Permit No. GR007RE). The Little Rock Mine is also subject to Discharge Permit 1236 (DP-1236), issued by the NMED. Because a portion of the lands at the Little Rock Mine are managed by the BLM, the mine also maintains a Mine Plan of Operations in conformance with the BLM Surface Management Regulations (43 CFR 3809). **Table 2-1** lists the permits under which the Little Rock Mine currently operates. Tyrone maintains a Storm Water Pollution Prevention Plan (SWPPP) that is inclusive of the Little Rock Mine.

The EPA issued the current MSGP on June 4, 2015; Tyrone operates under permit authorization number NMR053073, confirmed by the most recent NOI acknowledgement issued by the EPA on September 27, 2015. The SWPPP identifies pollution prevention procedures for areas of the site that could potentially discharge storm water associated with mining activities and implements best management practices (BMPs) for the management and control of storm water (Tyrone 2018). The SWPPP will be updated to reflect the planned expansion of the Little Rock Mine.

3.0 RECLAMATION PERFORMANCE OBJECTIVES AND DESIGN CRITERIA

This section presents the performance objectives and design criteria for closure/closeout of the Little Rock Mine facilities. The performance objectives presented herein for closure closeout of the facilities were developed based upon the current requirements of Permit GR007RE, DP-1236, and the Copper Mine Rule, with the intent of meeting rules and requirements associated with the NMWQA, NMWQCC Regulations, Copper Mine Rule, NMMA, and, for the mine areas located on federal public lands, applicable elements of 40 CFR Part 3809. This plan ensures that stormwater and sediment are managed appropriately during and following reclamation in accordance with 20.6.7.33.E NMAC. The primary performance objectives for closure closeout of the Tyrone Mine include: reestablishment of a self-sustaining ecosystem, stabilize the reclaimed areas, and to control discharges of process waters.

Descriptions of the facilities covered by the reclamation designs and their design criteria are included in Section 3.1. The performance objectives and reclamation designs for closure/closeout of the facilities are included in Section 3.2. The existing and planned closure/closeout activities for Little Rock Mine are presented in Section 4.0.

3.1 Facility Characteristics and Classification

To standardize the development of the financial assurance cost estimate associated with this CCP, facilities with common characteristics and mine function have been grouped together in this section. Thus, the stockpiles, open pit, haul roads, conveyance pipelines, and infrastructure and other miscellaneous facilities are identified as the primary reclamation facility groups. Sections 3.1 through 3.5 provide general descriptions, estimated areas of disturbance, and reclamation performance standards associated with each of these facility groups.

The reclamation plans for each of the facility groups are presented in Section 4.0. The characteristics and reclaimed acreages of individual stockpiles, open pit, haul roads, conveyance pipelines, and infrastructure and other miscellaneous facilities are summarized on facility characteristics forms (**Appendix B**). The general areas of disturbance and associated major facilities to be reclaimed at Little Rock are summarized in the following sections.

3.1.1 Stockpiles

A total of approximately 149 acres of stockpile surfaces are targeted for reclamation under this (EOY 2024) plan. No additional earthwork reclamation measures are proposed for the North and West Canyon waste rock stockpiles and operations and maintenance costs will be included in the CCP until financial assurance is released. The conditionally exempt North In-Pit Waste and West In-Pit Waste stockpiles are currently under development within the Little Rock Mine open pit (**Figure 1-2**).

As previously described, the Reclaimed Copper Leach Stockpile will be removed and the material transported to leach stockpiles at the Tyrone Mine by the EOY 2020, and the area will be replaced with the CLW Waste stockpile. For this CCP, it is assumed that the associated Reclaimed P-Plant will be disturbed while removing the Reclaimed Copper Leach Stockpile and the construction of the CLW Waste stockpile.

Three new waste stockpiles (East In-Pit Waste, NRW Waste, and CLW Waste) will be constructed by the EOY 2024 and will be composed of Precambrian Granite a non-acid generating material and are projected to be conditionally exempt of the engineering design, construction, and operational requirements of the Copper Mine

Rule and the Water Quality Act during operations and at closure (**Figure 1-3**). The reclamation plan for the stockpiles is described in Section 4.1.

3.1.2 Open Pit

Open pit mining is projected to continue at the Little Rock Mine for an additional 10 years, through 2030. The conceptual end of mine life pit configuration, presented in **Figure 1-3**, will enable mining of additional leachable ore, which will be transferred to the adjacent Tyrone facility for copper extraction. Additional waste rock overburden will be mined to access the leachable ores. The pit configuration at the EOY 2024 will encompass approximately 260 acres within the proposed Mining Area Design Limit, with a total of approximately 8.95 acres of accessible flat areas targeted for reclamation (**Figure 2-1**).

Predictive ground water flow and geochemical modeling was completed by Daniel B. Stephens & Associates (DBS&A) for the Little Rock Mine area in 2014 to evaluate the rate of rise of the pit lake following cessation of dewatering and the associated estimated water quality of the pit lake water following closure. The reclamation plan for the Little Rock Mine open pit is described in Section 4.2.

3.1.2.1 Updated Ground Water Flow and Geochemical Modeling

Predictive ground water flow and geochemical modeling was conducted in 2014 to evaluate ground water and pit lake conditions at closure and to satisfy requirements of DP-1236 (DBS&A 2014). The groundwater flow model was also recently updated to evaluate the rate of rise of the pit lake following cessation of dewatering with the EOY 2024 mine plan configuration. Sources of water inflow to the open pit considered in the modeling included the following:

- Ground water inflow;
- Direct precipitation on to the lake surface;
- Runoff within the perimeter of the pit; and
- California Gulch storm water.

Water outflow from the pit lake included evaporation from the lake surface and flow from the pit lake to adjacent ground water in some areas.

3.1.2.2 Ground Water Flow Modeling Results

The ground water flow model was originally developed by DBS&A by extending the existing calibrated model used for the Tyrone Mine Stage II Abatement Plan Proposal (Stage II APP, [DBS&A 2012]), which is a three dimensional MODFLOW-NWT (Niswonger et al. 2011) model. Modifications to the model presented in the Stage II APP include: (1) expansion of the model domain to the west and southwest; (2) addition of 5 model layers to better represent ground water conditions in the vicinity of the Little Rock Mine open pit; (3) extension of the Southern Star Fault (a low-permeability feature) to the west; (4) addition of the Austin-Amazon and Tertiary quartz-monzonite dikes as horizontal flow barriers; and (5) detailed simulation of transient, site-specific recharge for the Little Rock Mine area and upgradient watersheds (i.e. Deadman Canyon and California Gulch) using local climate and soils data. Once these changes were made, the model calibration was updated with an emphasis placed on the Little Rock Mine area.

The expanded ground water flow model was then used to predict the following:

- Drawdown at the end of mining caused by pit dewatering;
- Pit lake area and ground water elevation at closure;
- Ground water levels and ground water flow directions at closure; and
- A water budget for the pit lake, including ground water inflow and outflow rates and losses due to evaporation.

Based on the predictive simulations, drawdown at the open pit at the end of mining (EOY 2024) is estimated to be approximately 112 feet under the EOY 2024 mine plan. Once mining is complete and dewatering is stopped, the pit will begin to fill with water, due primarily to ground water inflow. The ground water inflow rate is estimated at approximately 133 gpm at the end of mining (EOY 2024) and decreases as the lake level rises. The ground water inflow rate is predicted to be approximately 78 gpm once the pit lake water level begins to stabilize at an elevation of 5,669 feet msl. The pit lake is predicted to rise to an elevation of approximately 5,660 feet msl at 30 years following closure, and then generally stabilizes at an elevation of approximately 5,669 feet msl at approximately 80 years after closure. At the 5,669-foot level, the lake will cover approximately 35 acres.

The final simulated pit lake level is 131 feet below the lowest potential surface water outflow point of the Little Rock Mine open pit of 5,800 feet msl. As the lake surface area increases, evaporation is expected to account for a greater proportion of the outflow than ground water outflow. Water is predicted to flow through the lake and into ground water along the northeast portion of the open pit. Ground water derived from the pit lake is expected to flow toward the Tyrone Main Pit, which unlike the Little Rock Mine open pit, will continue to be dewatered during the post-closure period. Further details of the predictive ground water flow and geochemical modeling project completed by DBS&A in 2014 are presented in the Groundwater Flow and Geochemical Modeling Report for the Little Rock Mine (DBS&A 2014). The updated 2020 groundwater flow modeling results are summarized in a technical memorandum by DBS&A (2020).

3.1.2.3 Geochemical Modeling Results

An update to the geochemical model will be completed by DBS&A and the results will be submitted separately to NMED in July 2020. The geochemical modeling platform PHREEQC Interactive (version 3.0) (Parkhurst and Appelo 1999) was used by DBS&A to perform mixing and equilibrium calculations to estimate post-closure Little Rock Mine pit lake water quality in 2014 (DBS&A 2014). The geochemical model has not been updated with the EOY 2024 mine plan configuration, but the predicted pit lake water quality for the EOY 2024 mine plan configuration is not expected to fundamentally change the overall results of the 2014 model simulation results presented herein.

The mixing and equilibrium calculations were performed using relative quantities of water with differing water quality for the individual sources to the Little Rock Mine pit lake. The individual water flow and chemistry inputs in the model included the following:

- Ground water inflow was represented by simulated inflow rates at 30 years and 100 years after closure calculated by the ground water flow model, while ground water quality was characterized by sampling at upgradient monitor wells LRW-4 and LRW-5. The water quality of LRW-5 was represented by averaging the chemistries of samples collected from 2006 to 2014. The quality of the water represented by well LRW-4 sampling results was determined by averaging the data over the period 2006 through 2010. Based on results of the ground water flow model, 98 percent of the water quality input was assigned the water quality consistent with LRW-5, and the remainder was assigned water quality consistent with LRW-4.

- Direct precipitation on to the lake surface was calculated using the simulated pit lake areas at 30 years and 100 years following closure and a mean annual precipitation of 16 inches based on the observed climate history at National Climatic Data Center (NCDC) Fort Bayard weather station (NCDC Coop 293265). The chemistry of this precipitation was represented by an average of monthly data collected at the Gila Cliff Dwellings National Monument meteorological station between 1985 and 2012.
- Pit wall runoff was estimated by applying the Soil Conservation Service (SCS) curve number (CN) method (NRCS 2004) and using daily precipitation values based on the observed climate history at Fort Bayard. CNs of 80 and 90 were used for the in-pit stockpile areas and exposed pit wall surfaces, respectively. The areas and relative proportions of the exposed materials were determined from the post-mining mineralization map presented in the Amendment to Mine Plan of Operations (Tyrone 2013). Water quality of the pit wall runoff for these geologic materials was determined from the data presented in URS (2009).
- California Gulch storm water, upgradient of the open pit, will continue to be diverted to the Little Rock Mine pit lake. Average annual runoff from this watershed was estimated using HEC-HMS modeling performed by Telesto (2014). Surface water quality in California Gulch upgradient of the Little Rock Mine is monitored at location LRFS-1. Average water quality at this monitor location for the 5-year period between August 2008 and July 2013 was used to represent the chemistry of California Gulch storm water.
- Evaporation is an important contributor to the water balance of the pit lake, and the geochemical modeling includes the effects of evapo-concentration on pit lake water chemistry.

Results of the geochemical modeling are reported in **Table 3-1** for 30 years and 100 years following closure and indicate that applicable surface water and ground water standards are expected to be met with the exception of fluoride. Fluoride and manganese concentrations are naturally elevated in some ground water in the Little Rock and Tyrone areas (DBS&A 2012), and the fluoride concentration is predicted to be above the Section 3103 standard of 1.6 milligrams per liter (mg/L). Predicted fluoride concentrations at 30 and 100 years after closure are 2.23 and 3.01 mg/L, respectively.

The predicted manganese concentration at both 30 and 100 years after closure is 0.11 mg/L; the Section 3103 standard for manganese is 0.2 mg/L. Predicted sulfate and total dissolved solids (TDS) concentrations are relatively low (**Table 3-1**), and the expected pH is slightly alkaline at approximately 7.9 standard units (su). These results are consistent with the geology of the Little Rock Mine deposit and general lack of sulfide bearing rocks expected to be exposed at the end of mining.

3.1.3 Haul Roads

A total of approximately 26.2 acres of haul road surfaces are targeted for reclamation under this (EOY 2024) plan. The Northern Haul Road, Southern Haul Road and Little Rock Haul Road will be the only haul roads present at the EOY 2024. Additional access ramps will also be present at the EOY 2024.

3.1.4 Conveyance Pipelines

Impacted waters (generally flowing between 0 and 5 gpm) from the Reclaimed Copper Leach Stockpile are intercepted in the CLDS and CLDS-1 seepage collection systems. Impacted waters will continue to be collected from these two collection systems after the Reclaimed Copper Leach Stockpile is removed (as long as seepage flows continue) and will continue to be routed through the existing seepage collection pipeline and to the LR sump-1x1 pipeline throughout the post-closure period.

3.1.5 Infrastructure and Other Miscellaneous Facilities

A miscellaneous group of ancillary facilities and infrastructure are present at the Little Rock Mine including: operational and exploration roads; dewatering systems (including booster pump stations, pit dewatering sumps, HDPE pipelines, and power supply); electrical power distribution system and components; storm water structures for drainage, diversion, and sediment control; equipment storage areas; and fencing. The total estimated disturbance area associated with the ancillary facilities and infrastructure is approximately 108.9 acres. Also, an additional 10 acres of area will be included in the reclamation cost estimate for allowance for additional disturbed areas within the Mine Permit area. The additional disturbed areas may include exploration drilling and well pads, small staging areas, utility corridors, haul roads, pull-offs, or other miscellaneous unforeseen changes for operations.

3.2 Performance Objectives and Design Criteria

This section presents the reclamation design criteria in accordance with the rules and requirements. The closure or reclamation designs are depicted in the drawing set provided in **Appendix A**. The designs were developed to provide enough information to calculate the financial assurance cost estimate. The following sections present the performance objectives and reclamation design criteria for the major facilities at the mine. A summary of the key design criteria for the facilities to be closed is presented in **Table 3-2**.

The reclamation practices proposed within this CCP are intended to meet the objectives described below and provide protection of air and water resources consistent with state and federal laws. As previously described in Section 1.5, the conceptual reclamation designs are based on the EOY 2024 mine plan. Final designs, technical specifications, and construction quality assurance plans for each facility will be prepared when mining ceases.

3.2.1 Stockpiles

The performance objectives for closure/closeout of the stockpile facilities include: re-establishment of a self-sustaining ecosystem; stabilize the reclaimed areas to stable landforms; containment of seeps and sediment transport; and control of run on and runoff.

A summary of the key design criteria for the stockpile facilities to be closed is presented in **Table 3-2**. All of the stockpiles to be closed will be composed of non-acid generating material and are projected to be conditionally exempt from the engineering design, construction, and operational requirements of the Copper Mine Rule and the NMWQA during operations and at closure. The reclamation plan for the Little Rock Mine open pit is described in Section 4.2.

Structural Stability

The existing stockpiles at Little Rock are composed of blasted rock placed on 30-to-50-foot high lifts through end-dumping at angle of repose that results in benches with overall slopes less than angle of repose with catch benches on each lift. The portions of the stockpiles to be regraded and covered will be reclaimed in a manner that ensures that the slope stability requirements listed in Section 20.6.7.33.B NMAC (though they are non-discharging units and therefore, not subject to this section) and Permit GR007RE are met. Tyrone recently completed a stockpile stability analysis associated with the current reclamation plan (Golder 2020b) and the report is included in **Appendix D**. The results of this analysis indicate that the stockpiles are stable for long term conditions reflecting the post-closure stockpile configurations and strength conditions (**Table 3-3**).

Stockpile Erosion and Drainage Control

Storm water will be controlled using conventional terrace channels integrated to downdrains for facilities to be reclaimed. Runoff drainage and erosion control for the stockpiles will be achieved by storm water conveyance channels, stable outslopes, suitable cover and stockpile material, and revegetation. Channels, perimeter berms, and hydraulic structures will be designed to control erosion on the outslopes of all stockpiles and safely convey storm water for discharge.

Stockpile Cover and Revegetation

Finish grading of the stockpile subgrade will be performed based on pre-construction surveys. Areas where the seedbed has limited fines and are rocky will receive four (4) inches of additional fine-grained cover material (obtained locally) to improve seedbed conditions. Revegetation of the stockpile top surfaces, and stockpile outslopes will be achieved by seeding with a variety of native and adapted grasses, shrubs, and forbs.

Stockpile Surface Water and Sediment Containment

The existing surface impoundment, berms, sumps, collector pipes, and seepage collection systems will be integrated into a new overall system to manage surface water and seepage flows, and contain sediment deposition within the Mine Permit Area.

3.2.2 Open Pit

The performance objectives for closure/closeout of the Little Rock open pit includes establishment of a self-sustaining ecosystem; containment of sediment; and control of run on where feasible. The pit configuration at the EOY 2024 will encompass approximately 260 acres. Accessible pit flat areas and benches not covered by the ultimate pit lake, will be ripped to a depth of 18 to 24 inches and vegetated by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with MMD Permit GR007RE and associated Permit revisions. Temporary erosion control measures will be provided during the construction and early vegetation establishment periods.

This CCP includes the cessation of pit dewatering activities upon closure. The existing pumps, pipelines, aboveground electrical systems, and infrastructure will be removed from the pit upon closure. Site access to the open pit will be controlled by a combination of fences and earthen berms installed around the perimeter of the pit. Signs will be posted on the fencing at 500-foot intervals and at all access points, and warnings of potential hazards present. Pit walls are sufficiently stable that a specific conceptual design is not needed. Any materials eroded from these slopes will be contained within the pit.

3.2.3 Haul Roads

Haul roads and access roads not needed for closure and post-closure access will be reclaimed. The road material will be loosened by ripping to a depth of between 18 and 24 inches and revegetated by seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with MMD Permit GR007RE and associated Permit revisions. If acid-generating material is encountered, the roads will be ripped, covered with 36 inches of the suitable cover material and revegetated in accordance with MMD Permit GR007RE. All culverts will be removed unless they serve a post-closure purpose. Reclaimed haul roads and access roads will be revegetated by seeding with a variety of native and adapted grasses, shrubs, and forbs.

3.2.4 Conveyance Pipelines

As previously noted, open pit dewatering will be discontinued following cessation of open pit mining at the Little Rock Mine. As such, the sections of the LR sump-1x1 dewatering pipeline located within the open pit will not be

required for post-closure conveyance of water from the open pit. These sections of pipeline will be buried or removed and disposed of in an approved manner.

The pipeline corridors will be inspected and characterized for evidence of past spills that could potentially cause exceedances of water quality standards of Section 20.6.1 NMAC and Section 20.6.2.3103 NMAC. If they are shown to constitute a source of contamination (defined as exceedances of applicable standards), the impacted material will be covered with 36 inches of suitable cover material. Disturbed areas along the pipeline corridors will be revegetated by seeding with a variety of native and adapted grasses, shrubs, and forbs.

3.2.5 Infrastructure and Other Miscellaneous Facilities

Reclamation of the disturbed areas associated with the ancillary facilities and infrastructure will be accomplished by removing or burying utility and structure foundations, pipelines, power lines, power poles, and temporary buildings and providing erosion and drainage control and revegetation. The power line and access road will be reclaimed by ripping and/or covering the disturbed areas and seeding with a variety of native and adapted grasses, shrubs, and forbs in accordance with MMD Permit GR007RE and applicable modifications.

Temporary erosion and drainage control practices may include but are not be limited to rough grading and installation of water bars, minor diversions, sediment containment structures, mulching, straw bales, and silt fences. The need for these practices will be evaluated on a site-specific basis at closure. The seed mix to be used is presented in Section 6.0.

4.0 RECLAMATION PLAN

The CCP that is proposed for the Little Rock Mine is intended to reclaim existing and the newly disturbed areas and achieve compliance with applicable state and federal regulations on mine reclamation and water quality protection. The CCP supplies sufficient detail to estimate financial assurance activities including estimate capital and operating costs in the unlikely scenario that the mine will close under a forfeiture scenario. The reclamation plan and associated design criteria conform to the closure requirements described in DP-1236 (NMED 2000 and 2016) and the Copper Mine Rules, closeout requirements described in MMD Permit GR007RE (MMD 2000, 2010, and 2016), and applicable mine reclamation regulations set forth by the BLM (3809.401(b)(3) and 3809.420(b)(3)). The reclamation will provide for the establishment of a self-sustaining ecosystem consistent with the designated post-mining land uses and life zone of the surrounding area, which for the Little Rock Mine, is wildlife habitat.

The reclamation plan was developed with consideration of the site-specific conditions that will exist at the Little Rock Mine at the EOY 2024. The general setting of the Little Rock Mine area is shown on **Figure 1-2** (existing features) and **Figure 2-1** (EOY 2024 features), and the closure or reclamation designs are depicted in the drawing set provided in **Appendix A**. The reclamation proposed for each of the major facilities is discussed in Sections 4.1 through 4.5. The plans and methods developed herein represent designs for reclamation of the facilities based on an anticipated configuration. More specific plans will be developed and submitted prior to mine closure in accordance with Permit GR007RE. A final construction quality assurance (CQA) plan for reclamation and closure will be prepared by Tyrone for submittal to and approval by the State of New Mexico with joint review by the BLM at least 180 days prior to commencement of reclamation. The CQA plan will provide a detailed description of the work proposed to be performed to close the site. Monitoring and maintenance activities will follow primary reclamation and will continue for approximately thirty years as described in Section 5.0.

As previously described in Section 2.1.5, several facilities have been reclaimed and additional facilities are projected to be removed by the EOY 2024. Erosion and vegetation establishment monitoring will continue at these facilities in accordance with Permit GR007RE and NMED requirements. The following sections describe the specific facilities that will still have components to be closed at the EOY 2024, components that will be retained for further use during the closure/post-closure period, and the design criteria for the facilities to be reclaimed. A summary of the key design criteria for the facilities to be closed is presented in **Table 3-2**.

4.1 Stockpiles

A total of 7 stockpiles will be present at Little Rock at the EOY 2024, including the East In-Pit Waste, North In-Pit Waste, West In-Pit Waste, CLW Waste, NRW Waste, and historical North and West Canyon waste rock stockpiles. All of these stockpiles will (or are) composed of non-acid generating material overburden waste rock. Storm water from the in-pit stockpile areas will be routed to a downdrain and down to the pit sump. The NRW Waste and West Canyon waste stockpiles will require run on controls to direct storm water flows around the perimeters of the facilities. The CLW Waste and historical North stockpiles are constructed above the surrounding terrain therefore run on controls are not required for these facilities. The following sections describe the specific stockpile facilities that will still have components to be closed at the EOY 2024, and the components that will be retained for further use during the closure/post-closure period.

4.1.1 Existing Components That Will Be Used for Post-Closure Purposes

The existing closure components and related engineering controls associated with the Little Rock Mine stockpiles and stockpile areas that will be used for post-closure purposes include:

- Volunteer native vegetation growing on the historical stockpiles (historical North and West Canyon waste stockpiles);
- O&M of existing seepage collection systems CLDS and CLDS-1 at the removed reclaimed Copper Leach Stockpile, and associated pumps, tanks, and the LR sump-1x1 dewatering pipeline extending to the lined 1X1 Pond;
- O&M of existing surface water collection points LRFS-1 in California Gulch, Deadman Flow Sampler North, Deadman Flow Sampler South, and Little Rock Flow Sampler 4;
- O&M of nine existing ground water monitoring wells (LRW-4, LRW-5, 1236-2012-01, and 1236-2016-01 through 1236-2016-06);
- O&M of stormwater and surface water diversion structures constructed to route upland flows around the removed Copper Leach Stockpile and P-Plant reclaimed areas and surrounding impacted areas; and
- O&M of Deadman Canyon surface water diversion structure constructed to route upland flows around the Little Rock Mine open pit (note Deadman Canyon surface water diversion structure will be constructed and operational at closure).

4.1.2 Planned Closure/Closeout Activities

The construction design criteria for the stockpiles and monitoring wells are summarized in **Table 3-2** and the planned approaches for closure of these facilities are described below. Reclamation design drawings for the facilities are presented in **Appendix A**. The planned approaches for closure of the stockpiles include:

- Grading of the in-pit stockpile outslope surfaces in a manner that orients surface water drainage toward the pit bottom and routes storm water to a downdrain;
- Grading of the of the stockpiles outslopes located around the perimeter of the open pit in a manner that orients surface water drainage toward the exterior of the mine;
- Grading of the stockpile outslopes down to interbench slopes of 3.0H:1V;
- Construction of 32-foot wide terrace benches on the outslopes at maximum slope lengths of 200 feet;
- Placement of 4 inches of additional fine-grained cover material (obtained locally) over 10% of the surface areas of the stockpiles to enhance the seedbed, targeting areas with high amounts of rock at the surface;
- Ripping of stockpile top surfaces and outslopes to a depth of 18 to 24 inches;
- Seeding of ripped surfaces of in-pit stockpile to reestablish vegetation in accordance with MMD Permit GR007RE and associated Permit revisions; and
- Plugging and abandonment of exploration drill holes and ground water monitor wells.

4.2 Open Pit

The Little Rock Mine open pit configuration at the EOY 2024 is shown on **Figure 2-1** and reclamation designs are depicted in the drawing set provided in **Appendix A**. The existing closure components and the planned closure activities for the Little Rock Mine open pit are described below.

4.2.1 Components to be used for Post-Closure Purposes

The closure components and related engineering controls associated with the Little Rock Mine open pit that will be used for post-closure purposes include:

- Maintenance of existing pit perimeter fencing and berms;
- Maintenance, sampling and reporting of monitoring wells;
- Monitoring of the open pit lake water quality; and
- Construction and maintenance of haul roads and access ramps within open pit for post-closure reclamation monitoring.

4.2.2 Planned Closure/Closeout Activities

The design criteria for the Little Rock Mine open pit are summarized in **Table 3-2** and the planned approaches for closure are described below. Reclamation design drawings for the Little Rock Mine open pit are presented in **Appendix A**. The planned approaches for closure of the Little Rock Mine open pit include:

- Ripping of accessible open pit flat areas, not covered by the ultimate pit lake that will form after dewatering stops, and accessible benches in the open pit to a depth of 18 to 24 inches. For the purposes of this CCP, accessible pit flat areas are defined as pit haul road driving surfaces and flat areas 50-feet or greater from a highwall;
- Seeding of ripped surfaces to reestablish vegetation in accordance with MMD Permit GR007RE and associated Permit revisions;

- Construction and maintenance of 6-foot chain link fencing and earthen berms approximately 40 feet from the open pit highwalls to limit public access;
- Installation and maintenance of signs on fencing at 500-foot intervals and at access points, warning of potential hazards present;
- Seeding of approximate 25-foot-wide disturbance area used to construct the chain link fencing, and approximate 100-foot-wide disturbance area used to construct the berm to reestablish vegetation in accordance with MMD Permit GR007RE and associated Permit revisions; and
- Removal of aboveground electrical systems and infrastructure within the open pit, including pumps, lighting, and transmission lines not necessary for post-closure site operations and maintenance.

4.3 Haul Roads and Access Roads

The haul roads and access roads that will be present at the EOY 2024 is shown on **Figure 2-1** and reclamation designs are depicted in the drawing set provided in **Appendix A**. The existing closure components and the planned closure activities for the haul roads and access roads are described below.

4.3.1 Existing Components to be used for Post-Closure Purposes

The existing closure components and related engineering controls associated with the haul roads and access roads that will be used for post-closure purposes include:

- O&M on a 30-foot width of the Southern Haul Road within the pit for post-closure access to the pit bottom for pit lake and reclamation monitoring;
- O&M of access roads to reclaimed facilities and post-closure monitoring stations (wells, flow samplers, meteorological station, outfalls, etc.); and
- O&M of storm water control structures located along post-closure haul roads and access roads.

4.3.2 Planned Closure/Closeout Activities

The design criteria for the haul roads and access roads to be closed are summarized in **Table 3-2** and the planned approaches for closure include:

- Removal of portions of the Northern Haul Road to be used as part of the Deadman Canyon Diversion at closure;
- Ripping of roads to a depth of 18 to 24 inches;
- Seeding of ripped and covered areas to reestablish vegetation in accordance with MMD Permit GR007RE and associated Permit revisions; and
- Removal of culverts not needed for post-closure storm water management and disposal of them in an approved manner.

4.4 Pipelines

The pipelines that will be present at the EOY 2024 is shown on **Figure 2-1** and reclamation designs are depicted in the drawing set provided in **Appendix A**. The existing closure components and the planned closure activities for the pipelines are described below.

4.4.1 Existing Components to be used for Post-Closure Purposes

The existing closure components and related engineering controls associated with the pipelines that will be used for post-closure purposes include:

- O&M of the LR sump-1x1 pipeline to convey seepage water to the lined 1X1 Pond; and
- O&M of seepage collection systems.

4.4.2 Planned Closure/Closeout Activities

The design criteria for the pipelines are summarized in **Table 3-2** and the planned approaches for closure include:

- Covering impacted areas with 36 inches of suitable reclamation cover material;
- Flushing of sections of the LR sump-1x1 dewatering pipeline located within the open pit that will not be required for post-closure conveyance of water from the open pit to remove residual solutions. These sections of pipeline will be buried or removed and disposed of in an approved manner;
- Removal of residual sediments and fluids from other miscellaneous pipelines and disposal of materials at an approved location on-site;
- Burial or removal and disposed of miscellaneous pipe in an approved manner; and
- Seeding of disturbed and covered areas to reestablish vegetation in accordance with MMD Permit GR007RE and associated Permit revisions.

4.5 Infrastructure and Other Miscellaneous Facilities

Reclamation of the disturbed areas associated with the ancillary facilities and infrastructure will be accomplished by removing or burying utility and structure foundations, pipelines, power lines, power poles, and temporary buildings and providing erosion and drainage control and revegetation. The existing closure components and the planned closure activities for the ancillary facilities and structures are described below.

4.5.1 Existing Components to be used for Post-Closure Purposes

- There are no ancillary facilities and/or infrastructure that will be used for post-closure purposes.

4.5.2 Planned Closure/Closeout Activities

The design criteria for the ancillary facilities and structures are summarized in **Table 3-2** and the planned approaches for closure include:

- Covering impacted areas with 36 inches of suitable reclamation cover material;
- Ripping of non-impacted disturbed areas to a depth of 18 to 24 inches;
- Seeding of ripped and covered areas to reestablish vegetation in accordance with MMD Permit GR007RE and associated Permit revisions;
- Removal of electrical distribution system, including the substation, transmission lines, and power poles; and
- Removal of any temporary, portable operations and maintenance facilities used to support mining and not needed for post-closure purposes.

5.0 CLOSURE & POST-CLOSURE MONITORING, REPORTING AND CONTINGENCY PLANS

Closure and post-closure monitoring will be conducted at the Little Rock Mine to ensure that the closed facilities are performing as designed, are protective of water quality, and will allow for the establishment of a self-sustaining ecosystem or approve post-mining land use. Closure and post-closure monitoring, reporting, and contingency planning will be conducted in accordance with the Copper Mine Rule (where applicable), Section 20.6.7.35 NMAC, DP-1236 and the MMD Permit GR007RE. Costs associated with the closure and post-closure monitoring will be included in the CCP financial assurance cost estimate using an assumed third party to complete all the monitoring listed in Sections 5.0 through 6.0.

All the closure and post-closure ground water, surface water, seep, spring, and piezometer monitoring data will be reported in accordance with 20.6.7.35 NMAC and DP-1236. The MMD guidelines require monitoring of revegetation during the bonding period to evaluate revegetation success, and NMWQCC Regulation 3107.A.11 requires the development of post-closure monitoring and contingency plans that are consistent with the terms and conditions of the applicable DP. Additional monitoring and reporting requirements associated with public health and safety, wildlife, meteorology, erosion, and CQA/construction quality control (CQC) plans are specified in MMD Permit GR007RE. The following sections summarize the general approach that will used to meet all of these requirements.

5.1 Erosion and Drainage Control Structures

All closure components requiring a cover system will be visually inspected for signs of excessive erosion and significant erosion features that may compromise the functional integrity of the cover system or drainage channels in accordance with 20.6.7.35 NMAC and Section 8 (14-1).R of the MMD Permit. In accordance with Section 20.6.7.35.C NMAC, a contractor will conduct inspections and submit reports of the reclaimed facilities monthly for the first year following submission of the final CQA/CQC for the unit, and quarterly thereafter until the end of post-closure monitoring, provided the department may approve a schedule allowing less-frequent monitoring.Additional erosion inspections will also be conducted after a one inch or more precipitation event within a 24-hour period.

Evidence of excessive erosion and/or structural failures will be reported to the appropriate agencies (MMD and NMED) in a timely manner. A written report detailing the nature and extent of the problem and a corrective action plan will be developed after the problem is identified in accordance with Section 20.6.7.30.J NMAC.

As specified in 20.6.7.35.C NMAC and Section 8 (14-1).R.1 of the MMD Permit, a contractor will routinely inspect and maintain all drainage channels, diversion structures, retention impoundments, and auxiliary erosion control features in accordance with professionally recognized standards, such as the Natural Resources Conservation Service.

5.2 Ground Water and Surface Water Control Facilities

Tyrone maintains several state and federal permits to protect surface water and ground water and to ensure adherence to applicable water quality standards as mandated by the NMWQA and the NMWQCC regulations (NMAC 20.6), Sections 401 and 404 of the Clean Water Act, and the U.S. Environmental Protection Agency’s (EPA’s) National Pollutant Discharge Elimination System (NPDES) MSGP. DP-1236 has been issued by NMED to address operational, closure and post-closure water quality issues at the Little Rock Mine. In addition, Tyrone maintains a SWPPP and a Spill Prevention, Control, and Countermeasure (SPCC) plan that are inclusive of the Little Rock Mine and serve to protect water quality.

DP-1236 includes an operational plan, corrective action plan, contingency plan, and closure plan. Collectively, these plans provide the mechanisms for the regulatory agencies to collect ongoing and real-time data related to mine operations; continuously monitor, model, and prevent potential impacts to the environment; document compliance; and mitigate these potential impacts where conditions warrant.

In accordance with DP-1236 and 20.6.7.35.A NMAC, a contractor will perform quarterly inspections and annual evaluations of all groundwater abatement systems, including the seepage interceptor systems, and perform maintenance as necessary to ensure that all water contaminants are managed in a manner that is protective of groundwater quality. Monitoring of site water quality will be accomplished through sampling and analysis of potentially impacted water at site locations.

Contingency Plans and Emergency Response Plans have been prepared that present details for addressing potential failures of individual components of the Little Rock Mine closure plan, including an increase in the extent or magnitude of ground water and/or surface water contamination, potential failures associated with collection systems and impoundments, and potential failures of various components of closed lands. The emergency response plan outlines operational parameters and contingencies to address operation failures at the Little Rock Mine associated with pumping water from the open pit, sumps, and other impoundments that may contain affected water. Accordingly, a contractor will verify any potential discharges not approved in DP-1236. If an unapproved discharge is identified, a contractor will perform appropriate corrective actions in accordance with 20.6.7.30 NMAC.

5.3 Post-Closure Monitoring of Seepage, Ground Water, and Surface Water

In accordance with Condition 41 of DP-1236 (NMED 2000), post-closure monitoring of seepage, ground water, and surface water will continue for a minimum of 30 years after completion of final closure construction activities. The monitoring will be conducted in accordance with monitoring and reporting requirements specified in Section C107.C of DP-1236 (NMED 2016).

In addition to surface water monitoring and analyses required in DP-1236, the SWPPP and SPCC Plan serves to protect water quality. Monitoring will be conducted in accordance with 20.6.2.3107 NMAC. Tyrone may request a reduction in monitoring frequency, change in location, and change in analytical parameters for NMED approval after two years of quarterly monitoring. The proposed post-closure monitoring and reporting schedule for the Little Rock Mine includes quarterly monitoring and reporting for the first 2 years after reclamation, semi-annual for the next 8 years, and yearly for the remaining 20 years. Each monitoring report will contain monitoring well laboratory analyses, surface water analyses, water level data, potentiometric surface maps, seepage water analyses, spring and seep discharge rates, and summaries of daily weather data. The monitoring reports will be submitted to NMED in accordance with the approved discharge permit.

5.3.1 Ground Water Monitoring Network:

Groundwater quality will be monitored throughout the post-closure period within the nine existing ground water monitoring wells at the site (LRW-4, LRW-5, 1236-2012-01, and 1236-2016-01 through 1236-2016-06), and in any new monitoring wells installed after closure for compliance monitoring purposes. For FA purposes, it is assumed sample collection will be done under contract by an environmental contractor. The intent of the groundwater monitoring is to evaluate the effectiveness of the closure plan and demonstrate compliance with applicable regulations and standards. The monitoring will be conducted in accordance with monitoring and reporting

requirements specified in Section C107.C of DP-1236 (NMED 2016). The analytical results will be reported to the NMED as specified in DP-1236 and 20.6.7.35.B NMAC.

5.3.2 Surface Water and Seep Monitoring Network:

Post-closure surface water monitoring locations within and around the Little Rock Mine include the following points:

- Depth and water quality of the open pit lake;
- Water quality at two surface water collection points in California Gulch (LRFS-1 and LRFS-4 located downgradient of projected LOM pit rim);
- Water quality at two surface water collection points in Deadman Canyon (Deadman Flow Sampler North, Deadman Flow Sampler South;
- Estimated volume of storm water from California Gulch that reports to the open pit;
- Flows and water quality from seepage collection systems CLDS and CLDS-1 at the former reclaimed Copper Leach Stockpile area; and
- Flows at McCain Spring and Sugarloaf Spring.

Surface water monitoring and sampling activities will be performed quarterly at each spring and surface water collection point. In accordance with Section C107.C of DP-1236, the Little Rock Mine open pit water body will be sampled on a semi-annual basis. The surface water collection ports in California Gulch and Deadman Canyon will be checked after each precipitation event of 1.0 inch or greater at the Little Rock Mine site; if a sample is present it will be collected and analyzed. No more than one surface water sample per port will be collected in a 24-hour period, and no more than six surface water samples per port will be collected per quarter. Sample collection will be done by an environmental contractor. Samples will be shipped to an analytical laboratory for analysis. A report will be prepared to document the sampling and analysis in accordance with DP-1236 for review by regulatory authorities.

5.4 Revegetation Success Monitoring

Vegetation establishment monitoring of reseeded areas will be conducted in accordance with 20.6.7.35.C NMAC and Appendix A of Revision 14-1 of the MMD Permit (MMD 2016). Vegetation establishment monitoring will be conducted during the third year after seeding, with the objective of determining the adequacy of reseeding efforts. The vegetation establishment monitoring (Year 3) will be semi-quantitative and the results will be provided to MMD. Quantitative revegetation monitoring will be performed at the 6th year after planting, and for at least 2 years of the last 4 years, starting after the 8th year of the 12-year monitoring period.

Revegetation monitoring will include, at a minimum, canopy cover, plant diversity, and woody stem density. The revegetation monitoring will be conducted to meet statistical adequacy for the monitoring conducted during two of the last four years prior to financial assurance release. The canopy cover and woody stem density surveys will be conducted using vegetation monitoring techniques approved by MMD for the Tyrone Mine. The vegetation monitoring plan is quantitative, using the same techniques for the reclamation area and the reference area for each monitoring event and from year to year during the monitoring period. Any changes to the approved vegetation monitoring plan will be submitted to the MMD for approval at least 90 days prior to a monitoring event. Areas where vegetation has not been successfully established will be reseeded or inter-seeded.

5.5 Wildlife Monitoring

A contractor will document wildlife use of reclaimed areas beginning six years after reseeding is completed in accordance with Sections 8.R.2 of Revision 14-1 of the MMD Permit (MMD 2016). The wildlife monitoring program will include annual deer pellet group counts and bi-annual bird diversity surveys in year 6, and in 2 years of the last 4 years prior to release of financial assurance. Results of the surveys will be evaluated to determine wildlife-use trends during reestablishment of a self-sustaining ecosystem. A contractor will review the 2001 Little Rock Mine wildlife monitoring plan (Tetra Tech EMI 2001), conditionally approved by MMD on September 27, 2001, and submit to MMD for approval, an updated wildlife monitoring plan at least 45 days prior to implementation of the wildlife monitoring surveys. Due to use of the area by wildlife species, particularly birds, the pit lake could be attractive to migratory waterfowl.

5.6 Public Health and Safety

Pursuant to Sections 8.G.2 of Revision 14-1 of the MMD Permit (MMD 2016), a contractor will submit written details and maps showing the locations of berms and fences that will be placed around the pits to restrict access by unauthorized personnel and provide for public safety within 180 days of cessation of operations.

5.7 Construction Quality Assurance Plan

Pursuant to Section 8.F of Revision 14-1 of the MMD Permit, a contractor will submit a Construction Quality Assurance Plan (CQAP) to MMD for approval no less than 180 days prior to proposed commencement of reclamation and will implement the plan after MMD approval. The CQAP will be supplemented with a Final Design (formerly known as a Construction Quality Assurance Report) to be submitted to the MMD within 180 days after completion of construction.

6.0 POST-MINING LAND USE DESIGNATION AND SITE-SPECIFIC REVEGETATION SUCCESS GUIDELINES

This section provides a description of the PMLU for the permit area and the associated site-specific revegetation guidelines based upon the requirements of the MMD Permit, NMMA Section 69-36-11.6, and Subparts 507.A, 507.B, and 508 of the NMMA Rules (MMD 1996). The proposed wildlife habitat PMLU area is shown on **Figure 6-1**.

6.1 Post-Mining Land Use Designation

The wildlife habitat PMLU is specified in Section 3.J of Revision 14-1 of the MMD Permit. The selection of the wildlife habitat PMLU for purposes of the NMMA does not preclude multiple beneficial uses (e.g., grazing, recreation, and watershed) in the post-closure period by the surface landowners (e.g., BLM and USFS). Reclamation of the Little Rock Mine will improve the character of the mined area to achieve the wildlife habitat post-mining land use.

Successful implementation of the proposed reclamation plan will result in the development of an early-stage grass/shrub community within a larger plant community that is dominated by a mixed-evergreen woodland community. The areas of cliffs and talus associated with the pit walls will provide features that are consistent with the local topography in the canyons. The reclaimed area will provide a locally important increase in community level diversity that will benefit the broad range of wildlife adapted to the area. The pit's topographic relief is expected to present desirable nesting and perching sites for birds.

Native vegetation will be established on the reclaimed areas at the Little Rock Mine resulting in increased erosion protection and direct habitat improvement, and reduced percolation of water into the underlying materials relative to current conditions. Proposed reclamation seed mixes and seeding rates for the Little Rock Mine are presented in **Table 6-1**. These species have broad ecological amplitudes and provide structural diversity. **Table 6-2** lists some of the major functional attributes of the primary vegetation selected for use at the Little Rock Mine.

The seed mix was selected to provide early establishment of ground cover, erosion control, and diversity in growth forms. The species selected for the Little Rock Mine have been successfully used in mine reclamation and range improvement projects in many parts of New Mexico, including both the Little Rock and Tyrone mines. The vegetation will provide forage, seeds, and cover for reptiles, small mammals, and birds. The reptiles, small mammals, and birds common to the mine area will benefit from the increased insect populations that are likely to accompany revegetation of the site. The shrubs, grasses, and forbs selected for use at the Little Rock Mine will provide nutritious forage and browse for large mammals (e.g., deer). In addition, the seed mix includes a number of valuable forage grasses that are absent or occur at a low frequency outside the permit area, thus, improving the range condition locally.

The pit lake that is anticipated to form after reclamation is expected to benefit the local wildlife. Access to the pit lake by wildlife will be promoted by low slope gradients in the shoreline area (adjacent to the toe of the in-pit stockpiles), and the development of brush and/or rock piles to provide sheltering cover. Shoreline vegetation may ultimately develop once the pit lake levels stabilize. Specific details of the wildlife features will be presented in the CQAP for this facility.

6.2 Site Specific Revegetation Success Guidelines

As previously noted, Tyrone is proposing to modify both the existing Little Rock Mine Permit Boundary and the current Mining Area Design Limit to account for the change in the mine plan (Section 1.5). The proposed Mining Area Design Limit combines the estimated extent of disturbed areas and the projected LOM open pit configuration as shown on **Figure 2-1**.

New disturbances located outside the current Mining Area Design Limit, and new disturbances identified in Permit Revision 14-1 to MMD Permit GR007RE that are to be backfilled, covered with topdressing, and revegetated will meet the reclamation standards set forth in 19.10.5.507 NMAC and will also comply with the new unit standards set forth in 19.10.5.508.E NMAC. Disturbances located within the current Mining Area Design Limit (excluding new disturbances identified in Permit Revision 14-1 to MMD Permit GR007RE) are considered existing mine units and will meet the reclamation standards set forth in 19.10.5.507 NMAC. The proposed Mining Area Design Limit, proposed changes to the Little Rock mine permit boundary, projected LOM open pit configuration, and associated new unit and existing unit disturbance areas are presented in **Figure 6-2**. Site-specific revegetation success guidelines for each of these areas are described below.

The MMD recognizes that replication of the pre-mining plant communities after mining is not practical (MMD 1996). The intent of the reference area characterization is to provide a site-specific, quantitative basis for determining revegetation success. More importantly, the reference area provides an “ecological barometer” that integrates normal climatic variations to aid in the evaluation of temporal changes or trends in the reclaimed ecosystem. Thus, the reference areas do not represent model plant communities that will be replicated in detail, but rather local indications of the ecological potential of the reclaimed plant communities.

The reclamation success guidelines required by the MMD vary depending on the PMLU and whether the area to be reclaimed is an existing disturbance or an existing mine new unit disturbance. Canopy cover, shrub density, and vegetation diversity are the revegetation success guidelines that are typically used to judge revegetation success on lands designated as wildlife habitat. The vegetation success guidelines include numerical standards to address the canopy cover and shrub density requirements of the NMMA.

The plant diversity guidelines are addressed through a technical standard and are complemented by a qualitative assessment of plant colonization and regeneration to corroborate the establishment of a self-sustaining ecosystem. A detailed description of the vegetation success guidelines for reclaimed existing disturbance areas is included in DBS&A (1999). The guidelines for revegetation success that apply to the Little Rock Mine are discussed in Sections 6.2.1 through 6.2.3.

6.2.1 Canopy Cover

Because of its broad implications for erosion control and ecologically based PMLUs, canopy cover is one of the primary criteria for determining reclamation success. The Little Rock Mine has a proportional success guideline for total canopy cover equal to 70 percent of the measured reference area value for existing unit disturbance areas (**Figure 6-2**). The proportional standard was determined based on the interpretation of the community structure and ecological conditions in the reference area. The proportional standard reflects the view that the typical 12-year bond release period does not allow enough time for full maturation of the reclaimed plant community relative to the native sites. The numerical standard derived from the proportional standard will vary over time to account for temporal differences in canopy cover associated with climatic variations. Thus, the numerical standard may increase or decrease based on reference area measurements, but the proportional standard will remain fixed.

For the new unit disturbance areas (**Figure 6-2**), the proportional success guideline for total canopy cover will be equal to 90 percent of the measured reference area value in accordance with 19.10.5.508E NMAC. The ground cover of living perennial plants shall be adequate in both the existing and new unit disturbance areas to control erosion.

6.2.2 Shrub Density

Shrubs are important components of many reclaimed landscapes. A proportional success guideline of 60 percent (of the reference area) has been accepted by the MMD for shrub density in the reclaimed areas associated with the existing disturbance areas. For the new unit disturbance areas, the proportional success guideline for shrub density will be equal to 90 percent of the measured reference area value in accordance with 19.10.5.508E NMAC. As with canopy cover, the shrub density standards are determined based on the interpretation of the ecological conditions of the reference areas.

6.2.3 Plant Diversity

Species diversity is commonly thought to increase the stability of plant communities. The perceived enhancement of ecological stability is related to the buffering effect that species with different ecological amplitudes provide in response to environmental stresses. A technical, rather than proportional, standard is proposed for plant diversity.

The plant diversity guidelines for the Little Rock Mine are based on the assumption that site stability is improved by establishing plants with different ecological amplitudes to buffer seasonal and annual fluctuations in climate. Tyrone understands that creating a monoculture on the reclaimed lands is not desirable, while at the same time, recognizing that the benefits of increased diversity diminish beyond subjective threshold levels that are defined by the reclamation objectives. Thus, the diversity guideline for the Little Rock Mine was developed from a functional perspective, whereby site stability, erosion control, and establishment of vegetation that is supportive of wildlife habitat are primary performance objectives. In addition, these guidelines were developed in recognition of the limitations associated with the sampling and statistical evaluation of plant communities whereby minor components are often not represented in the monitoring data.

The numerical diversity guidelines for the Little Rock Mine are listed in **Table 6-3**. To summarize, the diversity guideline would be met if the reclaimed area contains at least three warm season grasses and two shrubs, with individual cover levels of at least 1 percent. In addition, one non-weedy forb species should occur at a minimum cover level of at least 0.1 percent to meet the proposed diversity guideline. The forb guideline is unqualified with respect to seasonality and could include a perennial, biannual, or annual species.

Based on the results of numerous vegetation monitoring and test plot studies at both Chino and Tyrone, cool-season grasses are generally not found within the reference area and in reclaimed areas despite seeding efforts to introduce these species. As shown on **Table 6-3**, Tyrone proposes to change the numerical standard of perennial cool season grasses from 2 to 0 (eliminating the cool-season grass standard). The elimination of the cool-season grass component is consistent with the surrounding ecosystem and will not negatively affect the PMLU.

Species diversity on the reclaimed areas is expected to increase with time; however, this process is likely to be slow. Successful colonization depends on the convergence of a seed source and the proper weather conditions; however, even with such an ideal convergence, inter-specific competition, predation, and dispersion mechanisms may limit the establishment of new plants on the reclaimed area. Because of the strong climatic influence on seed

production and plant establishment, the rate of colonization is expected to be erratic and potentially slow for many species, with the highest rates of colonization expected to be concentrated in the reclaimed/undisturbed ecotone.

Evidence of colonization will complement the numerical diversity guidelines listed in **Table 6-3**. No numerical guideline is proposed for colonization, which would be demonstrated by increases in the number of species recognized in the reclaimed area. Information on colonization will be collected and reported to provide evidence of the ability of the reclaimed landscape to support native plants from the surrounding communities. Secondarily, observations of colonization provide evidence of regeneration and thus help demonstrate the establishment of a self-sustaining ecosystem required in the NMMA.

The intent of the colonization standard is to provide evidence of the ability of the reclaimed landscape to support plants from the surrounding communities. In addition, observations of colonization provide evidence of regeneration and thus demonstrate the establishment of a self-sustaining ecosystem. Colonization will be demonstrated by increases in the number of species recognized in the reclaimed area. This information will be obtained from the relative cover data or documented observations of volunteer plant species particularly along the margins of the reclaimed areas during periodic inspections and vegetation monitoring events.

7.0 BASIS FOR CAPITAL AND OPERATION AND MAINTENANCE COST ESTIMATES

This section provides a brief description of the of the material take-offs and factors that will be applied in the capital and O&M cost estimates associated with the Little Rock reclamation plan. The cost estimates will be submitted once the Scope of Work is approved and will be budgetary and for the purpose of determining the value of the financial assurance performance bond.

7.1 Basis for Capital Cost Estimates

The material takeoffs for reclamation of the Tyrone Mine were prepared in accordance with standard engineering practice and are included in **Appendix C**. The material takeoffs for the major reclamation earthwork components are summarized in the table below.

Earthwork Material Take-Off Summary		
Item	**Quantity**	**Units**
Earthwork		
Total Reclamation Area • Stockpile Reclamation Area • Open Pit Reclamation Area • Haul Road Reclamation Area • Disturbed Area Reclamation[1]	303 149 8.95 26.2 118.9	acres acres acres acres acres
Stockpile Grading	2.8	million cubic yards
Stockpile Bench Grading	25,798	feet
Stockpile Cover Material	8,014	cubic yards
Stockpile Surface Water Conveyance Channels and Downdrains	29,368	feet
Open Pit Grading	NA	million cubic yards
Open Pit Cover Material	NA	cubic yards
Building Demolition	1,614	square feet

Notes:

[1] – Includes additional 10 acres of area that is included in the reclamation cost estimate for allowance for additional disturbed areas within the Mine Permit area.

NA – Not applicable

It is assumed that indirect costs, for capital, is 30% of the estimated direct capital cost based on the 2018 FA Work Group meetings and agreement and the associated approval letter issued by the State of New Mexico in January 2019.

7.2 Basis for Operation and Maintenance Cost Estimates

The operations and maintenance (O&M) cost basis details and supporting documentation are provided in **Appendix C**. A summary of these details are provided below. O&M costs are assumed to diminish with time and will be allocated as follows:

Erosion Control and Monitoring:

Annual cost estimates after closure will be based on an erosion control crew engaged for 10 days per year for the first year and then 4 days per year for 11 additional years.

Road Maintenance:

Access road and haul road maintenance for post-reclamation years 3 through 30 will be included in the erosion control and monitoring costs. The road maintenance cost for post-reclamation years 3 through 30 will be included for access to all post-closure monitoring points and the power line access road. These consist of access roads for erosion monitoring and open pit slope stability monitoring, and access to all water quality and flow monitoring points (California Gulch flow samplers, seepage collections CLDS and CLDS-1, McCain Spring, Sugarloaf Spring, open pit lake, and the nine compliance monitoring wells). Road maintenance consists of a motor grader engaged for 12 hours prior to each sampling event annually.

Water Quality Monitoring and Reporting:

In accordance with Condition 41 of DP-1236 (NMED 2000), post-closure monitoring of seepage, ground water, and surface water will continue for a minimum of 30 years after completion of final closure construction activities. The monitoring will be conducted in accordance with monitoring and reporting requirements specified in DP-1236. The water quality monitoring and sampling program will include: water quality and water levels at nine ground water monitoring wells; open pit water quality and elevation; CLDS and CLDS-1 seep collection water quality and flow rates; California Gulch surface water quality and flow rates; Deadman Canyon surface water quality and flow rates; flows at McCain Spring and Sugarloaf Spring; and meteorological monitoring from the Little Rock Mine weather station.

For cost estimating purposes, it will be assumed that post-closure monitoring and sampling will be conducted quarterly for the first 2 years after reclamation, semi-annually for the next 8 years, and yearly for the remaining 20 years. Estimated sampling frequencies for California Gulch and Deadman Canyon surface water, and seepage collection water is based on sampling conducted in 2019. The seep collections are assumed to be dry two quarters a year and sampled the other two quarters. The surface water collection ports in California Gulch and Deadman Canyon will be checked after each precipitation event of 1.0 inch or greater at the Little Rock Mine site, and it is assumed that water will be present once a year.

It is assumed that indirect O&M costs in total are 17.5% of the estimated direct O&M cost based on the 2018 FA work group meetings and agreement and the associated approval letter issued by the State of New Mexico in January 2019. **Appendix C** provides the full supporting documentation for the O&M cost estimate.

8.0 RECLAMATION SCHEDULE

An update to the reclamation schedule is required pursuant to the MMD Permit and 19.1 0.5.506.B.1 NMAC. The proposed reclamation schedule is an integral component for the development of the financial assurance cost estimate based on a total site-wide mine default scenario. The schedule assumes a walk away scenario and all mining operations are terminated at the EOY 2024. The EOY 2024 was chosen for the development of the CCP in that it represents the most conservative earthwork takeoff volumes and thus the highest reclamation cost estimate for the five-year period under evaluation.

Table 8-1 presents the anticipated schedule for implementation of closure activities based on best available information and mine planning forecasts. The proposed schedule summarizes Tyrone's understanding of the existing near-term mine operation and longer-term mine plan projections. More specifically, the schedule is based on the following considerations:

- Practical phasing of the reclamation projects to account for the anticipated labor, equipment and other resources that would be necessary to complete these projects based on current conditions;
- Sequential closure of facilities in a phased cost efficient manner; and
- Total annual acreages that would be reclaimed over this period.

The anticipated durations for reclamation presented in **Table 8-1** include earthwork and reseeding, but do not include vegetation success/O&M/monitoring that will be conducted throughout the 30-year post-closure monitoring period as described in Section 5. Reclamation of the stockpiles, accessible flat areas within the open pit, haul roads and access roads, pipelines, and ancillary facilities and infrastructure would begin per the approved CCP schedule. All primary reclamation activities as described herein should be essentially completed within approximately seven years (1 year pre-construction work, 5 years for earthwork, and 1 year post-construction work), not including the required post-reclamation monitoring.

For clarity, the financial assurance cost estimate and the proposed reclamation schedule are explicitly linked. Tyrone expects that the planned closure of the facilities represented by the proposed schedule will be conducted in a more cost efficient manner than that reflected in the financial assurance cost estimate, which is predicated on the unlikely condition of forfeiture. As indicated earlier, implementation of the mine-for-closure concepts are expected to result in more efficient reclamation than might be considered in a forfeiture scenario.

9.0 USE OF THIS REPORT

Golder has compiled this CCP Update to present Little Rock Mine's 5-year update of the CCP to the NMED and the MMD of the New Mexico Energy, Minerals and Natural Resources Department. In the compilation of this plan, Golder collaborated with Telesto Solutions, Inc., who designed the closure/closeout configuration of the mine facilities and prepared the cost basis document. The Little Rock Mine CCP has been updated to fulfill the requirements of the following:

- Discharge Permit DP-1236, Little Rock Mine, (DP-1236), issued by the NMED on December 27, 2000 (NMED 2000) and renewed on March 8, 2016 (NMED 2016), and associated amendments;
- Permit GR007RE, Little Rock Mine Existing Mining Operation (MMD Permit), issued by the MMD of the New Mexico Energy, Minerals and Natural Resources Department on December 21, 1998 (MMD 1998) and associated Permit revisions;
- Copper Mine Rule, 20.6.7 NMAC adopted by the New Mexico Water Quality Control Commission on December 1, 2013 (NMWQCC 2013); and
- 43 CFR Subpart 3809, applicable mine reclamation regulations set forth by the U.S. BLM.

Tyrone has completed numerous other studies required by DP-1236 and Mining Act Permit GR007RE. Information from these various studies has also been considered in preparing this CCP Update.

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Signature Page

Please contact the undersigned with any questions or comments on the information contained in this report.

Respectfully submitted,

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https://golderassociates.sharepoint.com/sites/121812/project files/6 deliverables/001-little rock ccp update/rev4/final revisions and submttal on feb 11 2021/20136957-001-rev1a-little_rock_ccp_update_20210111_clean.docx

Tables

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APPENDIX A

RECLAMATION DESIGN DRAWINGS

APPENDIX B

FACILITY CHARACTERISTICS FORMS

APPENDIX C

RECLAMATION COST BASIS SUMMARY REPORT

APPENDIX D

LITTLE ROCK STOCKPILE STABILITY ANALYSIS FOR THE 2020 CLOSURE CLOSE-OUT PLAN UPDATE

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