STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION
OF NEW MEXICO COPPER CORPORATION FOR
A GROUNDWATER DISCHARGE PERMIT FOR
THE COPPER FLAT MINE, DP-1840 No. GWB 18-06 (P)

ENVIRONMENT DEPARTMENT'S STATEMENT OF INTENT TO PRESENT TECHNICAL TESTIMONY

The Water Protection Division ("Division") of the New Mexico Environment Department ("NMED" or "Department") hereby submits this Statement of Intent to Present Technical Testimony in support of the above-referenced permit at the public hearing set to begin September 24, 2018.

1. The person filing this Statement of Intent – The Water Protection Division

2. Position – The Division recommends the approval of the draft permit.

3. The name and qualifications of each technical witness

A. Kurt Vollbrecht is the Manager of the Mining and Environmental Compliance Section of the Division. He oversaw development of the draft permit. He will testify concerning the basis for the draft permit, the regulatory framework, the history of the discharge permitting process, the administrative record, public participation, the surface water of the state determination, and financial assurance.

B. Bradley Reid is a permit writer for the Mining and Environmental Compliance Section of the Division. He was responsible for evaluating the application and drafting the permit. He will testify concerning the specific permit conditions and how the draft permit is consistent with the requirements of the copper rule, 20.6.7 NMAC.

C. Joseph Marcoline is a hydrogeologist for the Mining and Environmental Compliance Section of the Division. He provided technical review of various components of the aquifer evaluation conducted by NMCC. He will testify on aquifer characteristics and hydrogeologic controls on the movement of seepage from the waste rock stockpile and within groundwater, evaluation of liner leakage associated with the Tailing Storage Facility, adequacy of the monitoring well network, and evaluation of the modeling conducted relative the Area of Open Pit Hydrologic Containment.

Resumes and written testimony for all witnesses are attached as exhibits. The address for all witnesses is New Mexico Environment Department, P.O. Box 5469, Santa Fe, New Mexico, 87502-5469.

4. Estimated length of testimony for each witness.

The Division estimates that the direct testimony of each witness will require approximately 30 minutes.

5. A list and description of exhibits.

In addition to documents within the administrative record, the following exhibits are attached.

Exhibit List

1. Draft Permit DP-1840
2. Written Testimony of Kurt Vollbrecht
3. Written Testimony of Bradley Reid
4. Written Testimony of Joseph Marcoline
5. Resume of Kurt Vollbrecht
6. Resume of Bradley Reid
7. Resume of Joseph Marcoline

Respectfully submitted,

NEW MEXICO ENVIRONMENT DEPARTMENT

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GROUND WATER QUALITY BUREAU (GWQB)
DISCHARGE PERMIT
NEW COPPER MINE FACILITY
Issued under 20.6.2 and 20.6.7 NMAC

Return Receipt Requested
Certified Mail Receipt Number: 7005 1820 0001 5766 0796

Mine Facility Name:	Copper Flat Mine
GWQB Discharge Permit Number:	DP-1840
GWQB TEMPO AI Number:	1535
Permittee Name/Responsible Party:	New Mexico Copper Corporation
Mailing Address:	4253 Montgomery Blvd. NE, Suite 130 Albuquerque, NM 87109
Mine Facility Contact:	Jeff Smith; ~~(575) 912-5386~~(505) 382-5770
Mine Facility Location:	85 Copper Rock Road Hillsboro, NM 88042
County:	Sierra County
Permitting Action:	New
Effective Date:	XXXX XX, 2018
Expiration Date:	XXXX XX, 2018
NMED Permit Contact:	Brad Reid; (505) 827-2963
E-mail Address:	brad.reid@state.nm.us

Bruce Yurdin
Division Director
Water Protection Division

Date

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Part A GENERAL INFORMATION

A100 Introduction

A. The New Mexico Environment Department (NMED) issues this Ground Water Discharge Permit, DP-1840 (Discharge Permit) to the New Mexico Copper Corporation (permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978, §§ 74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 and 20.6.7 NMAC. NMED is issuing this Discharge Permit to control the discharge of water contaminants from the Copper Flat Mine facility for the protection of ground water and those segments of surface water gaining from ground water inflow, for present and potential future use as domestic and agricultural water supply and other uses, and to protect public health.

B. Pursuant to this Discharge Permit, the permittee is authorized to discharge a maximum of 25,264,000 gallons per day (gpd) of ~~mine~~ tailings slurry, which includes mine tailings, process water, impacted stormwater, and domestic wastewater to a lined tailing impoundment. In addition, this Discharge Permit regulates discharges from other mine units including waste rock stockpiles, ore stockpiles, mineral processing units, process water impoundments, an open pit, sumps, tanks, pipelines, and other areas within the permit area. The discharge may move directly or indirectly into ground water of the State of New Mexico which has an existing concentration of 10,000 milligrams per liter (mg/L) or less of total dissolved solids (TDS) within the meaning of Section 20.6.2.3104 and Subsection A of 20.6.2.3101 NMAC. The discharge may contain water contaminants or toxic pollutants elevated above the standards of Section 20.6.2.3103 NMAC.

Commented [BR1]: Clarifying edit made by NMED and in response to comments received from NMCC

C. The permittee is authorized to discharge water contaminants pursuant to this Discharge Permit which contains conditions authorized or specified by Part 20.6.7 NMAC (Copper Mine Rule) on condition that the permittee complies with the Copper Mine Rule and this Discharge Permit, which are enforceable by NMED.

A101 Applicable Regulations

A. The permittee is discharging from a facility that meets the definition of a "new copper mine facility" as defined in Paragraph (39) of Section 20.6.7.7.B NMAC. Sections 20.6.2.3000 through 20.6.2.3114 NMAC and Part 20.6.7 NMAC apply to discharges specific to copper mine facilities and their operations.

B. The discharges from the mine units regulated pursuant to this Discharge Permit are not subject to any of the exemptions of Section 20.6.2.3105 NMAC except as provided for in Subsection F of 20.6.2.3105 NMAC.

Commented [BR2]: Clarifying edit made in response to comment from NMCC

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C. Ground water quality as observed in monitoring wells required by C111.G and C114.C of this Discharge Permit is subject to the criteria of Sections 20.6.2.3101 and 20.6.2.3103 NMAC except as excluded pursuant to Subsection D of 20.6.7.24 NMAC.

A102 Permit Duration

A. Pursuant to the WQA 74-6-5(I) and Subsection H of 20.6.2.3109 NMAC, the term of this Discharge Permit is seven years from the effective date (effective DATE) or five years from the date the discharge commences, ~~whichever occurs first~~. In no event shall the term of DP-1840 exceed seven years from the effective date.

Commented [BR3]: Response to NMCC comment #6. The revised language clarifies the requirements set forth in WQA 74-6-5(I) and Subsection H of 20.6.2.3109 NMAC.

B. If the permittee submits an application for renewal in accordance with Subsection F of 20.6.2.3106 NMAC, then the existing discharge permit shall not expire until the application for renewal has been approved or disapproved.

A103 Terms of Permit Issuance

A. **Permit Fees** - The permittee shall remit an annual permit fee payment equal to the applicable permit fee, based on mine size as listed in Subsection A of 20.6.7.9 NMAC. The permit fee is due on August 1 of each year until termination of all discharge permits related to the Copper Flat Mine facility. [20.6.7.9.A NMAC]

B. **Transfer of Discharge Permit** - Prior to the transfer of any ownership, control, or possession of this permitted facility or any portion thereof, the permittee shall notify the proposed transferee in writing of the existence of this Discharge Permit and include a copy of this Discharge Permit with the notice. The permittee shall deliver or send by certified mail to NMED a copy of the notification and proof that such notification has been received by the proposed transferee. [20.6.7.38 NMAC and 20.6.2.3111 NMAC]

C. **Permit Renewal** - To renew this Discharge Permit, the permittee shall submit an application and associated fees for renewal at least 270 days prior to the expiration date of this Discharge Permit (by DATE) in accordance with Sections 20.6.7.9, 20.6.7.10, and 20.6.7.11 NMAC.

D. **Additional Conditions** - In addition to the requirements of 20.6.7 NMAC, the permittee shall comply with the following additional conditions as authorized by Subsection I of 20.6.7.10 NMAC pursuant to WQA 74-6-5: Condition C100.A, Condition C100.B, Condition C101.B, Condition C101.C, Condition C103.F, Condition C108.A, Condition C111.B, Condition C111.E, Condition C112.E, Condition C113.G, Condition C113.H, Condition C114.B, Condition C114.C, Condition C114.D, Condition D105.A, Condition D105.B, Condition D106.A, Condition D106.B, Condition D107.D.

Part B FACILITY SPECIFIC INFORMATION

B100 History and Facility Description

A. The Copper Flat Mine is an open pit copper mine facility owned by the New Mexico Copper Corporation situated within a mine permit area boundary of approximately 2,190 acres. The Copper Flat Mine will consist of an open pit, waste rock stockpiles, stormwater impoundments and collection systems, a Process Facility Area consisting of a concentrator and associated mineral processing units, a lined tailing impoundment, and associated infrastructure. The mine project will disturb approximately 1,290 acres of which approximately 910 acres were previously disturbed from historic mining operations at the site. The mine is regulated pursuant to this Discharge Permit and an abatement plan.

B. The historic Copper Flat Mine operation included several waste rock stockpiles, an open pit, a tailings storage facility, mineral processing facilities, impoundments, and associated infrastructure. The mine was operated for commercial production in 1982 for approximately three and a half months. Approximately three million tons of overburden (i.e., open pit pre-stripping) and 1.2 million tons of ore were mined resulting in an open pit encompassing eighty acres of disturbance including a five-acre water body. The bottom level of the pit currently sits at 5,400 feet above mean sea level (amsl). No mining has occurred at the ~~open pit~~site since 1982.

Commented [BR4]: Clarifying edit in response to NMCC comment

C. New Mexico Copper Corporation will construct and operate the Copper Flat Mine and concentrator using conventional copper and molybdenum sulfide flotation circuits and a gravity gold recovery circuit with a maximum throughput of 38,000 dry tons per day of ore, generating up to 25,264,000 gpd of tailings slurry. Over an estimated eleven-year operational period, the permittee intends to mine the copper-rich ore body and process approximately 125 million tons of ore at the Process Facility Area, and place 33 million tons of waste rock on three delineated waste rock stockpiles peripheral to the open pit.

D. Ore mined from the Copper Flat Open Pit will be crushed, milled, and concentrated using conventional milling and concentration processes. The copper and molybdenum concentrates produced at the Process Facility Area will be packaged for off-site transport and additional processing. The tailings, a by-product from the flotation process, will be conveyed via a tailing pipeline to a cyclone classification plant (Cyclone Plant) and then discharged at the Tailings Storage Facility (TSF).

E. A synthetically lined TSF will be constructed in the same location as the historic facility. Tailings slurry (i.e., process water and flotation tailings) containing, on average, approximately 29% solids ~~(by weight)~~ will be gravity conveyed from the Concentrator through a pipeline into the Cyclone Plant to separate the tailings into coarse and fine fractions. The coarse fraction tailings sand cyclone underflow will be deposited ~~at~~ to construct the tailing dam and the fine fraction tailings slime cyclone overflow will be discharged to the interior of the TSF. The TSF

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will extend approximately 1,000 feet to the east of the former starter dam (the tailings expansion area). A centerline construction method using the cyclone-processed tailings sand for tailings dam construction will be utilized. A starter dam will be constructed using borrow material to provide initial storage capacity and to provide a location for initial discharge of tailings. ~~The use of sand tailings for dam construction are such that the Cyclone Plant will be operated to produce the construction material.~~

Commented [BR5]: Clarifying edits in response to NMCC comments

F. Water collected inside the projected Open Pit Surface Drainage Area (OPSDA; as defined in Section 20.6.7.7 NMAC and displayed on Figure 2 attached to this Discharge Permit) at the open pit sump will be utilized for dust suppression during operations on haul roads, working areas, and waste rock stockpiles within the projected OPSDA. Water sources that do not exceed ground water quality standards set forth in Section 20.6.2.3103 NMAC will be used for dust suppression outside the projected OPSDA.

G. The pit area will be dewatered to facilitate mining below the water table. The existing diversion structure will be maintained during operations to convey non-impacted stormwater flows generated in Grayback Arroyo and its tributaries around the perimeter of the open pit. Pit water will primarily be used for dust suppression or re-used in the process water circuit.

H. After the cessation of mining, the pit will be rapidly re-filled with fresh water to the modeled static water table, forming a pit water body. Waste rock stockpiles, the TSF, and other impacted areas will be ~~covered with an engineered soil cover system~~reclaimed and revegetated in accordance with the approved Closure/Closeout Plan, including placement of an engineered soil cover system where required.

Commented [BR6]: Clarifying edit in response to NMCC comment

B101 Permitting History

A. The Discharge Plan for DP-1840 includes application materials submitted by the permittee to NMED dated December 11, 2015, Revision 1 of the Discharge Permit Application dated August 2017 ("Revised Application"), and materials contained in the DP-1840 administrative record prior to issuance of this Discharge Permit.

B102 Facility Location, Ground Water and Process Water Characteristics

A. Copper Flat Mine is located at 85 Copper Rock Road approximately 5 miles NE of Hillsboro, in Sections 30 and 31, T15S, R6W, Sections 25, 26, 35, and 36, T15S, R7W, and Section 6, T16S, R6W, Sierra County.

B. Ground water beneath the mine units regulated pursuant to DP-1840 is at a depth ranging from approximately 7 to 156 feet with a pre-discharge TDS concentration ranging from approximately 317 to 868 milligrams per liter.

C. The Copper Flat Open Pit walls, the waste rock stockpiles, the TSF and other disturbed areas at the mine facility may contain sulfide minerals which, when oxidized, generate acidic solutions.

These acidic solutions react with in situ minerals to produce acid rock drainage (ARD) that typically contains TDS, sulfate, and certain metals in concentrations that may exceed the water quality standards of Section 20.6.2.3103 NMAC.

Commented [BR7]: Clarifying edit in response to NMCC comment

D. Process water and impacted stormwater discharges regulated pursuant to DP-1840, including ARD, are typically outside the acceptable range for pH and contain TDS, sulfate, and certain metals in concentrations that exceed the water quality standards of Section 20.6.2.3103 NMAC.

B103 Authorized Mine Units

The permittee is authorized to manage the discharge of water contaminants through operation of the following mine units pursuant to this Discharge Permit. This Discharge Permit contains requirements associated with the following mine units as identified in the Revised Application and the administrative record as of the effective date of this Discharge Permit. Mine units listed below meet the definition of "new" mine units pursuant to the Copper Mine Rule, unless otherwise noted, and will meet applicable Copper Mine Rule design and construction requirements.

A. **Open Pit**

1. The permitted open pit operational area will encompass approximately 161 acres at full build out and will reach an approximate base elevation of 4,650 amsl. The diameter of the open pit will be approximately 2,800 feet, and the open pit depth will reach approximately 850 to 900 feet below the original pre-mining surface. The existing diversion of Grayback Arroyo will route stormwater around the open pit during operations and at closure. Approximately thirty-nine acre-feet per year (24 gallons per minute, gpm) of groundwater seepage and sixty-eight acre-feet per year (42 gpm) of stormwater entering the pit will be returned to the process water circuit or used for dust suppression using one or more pit dewatering sumps during operations.

Commented [BR8]: Clarifying edit in response to NMCC comment

B. **Waste Rock Stockpiles**

Commented [BR9]: Changes, as suggested by NMCC to bring projected size of mine units in alignment with Mine Operation Reclamation Plan (MORP)

1. Waste Rock Stockpile 1 (WRSP-1) - WRSP-1 will be located inside the projected OPSDA northeast of the open pit and will have an estimated footprint of approximately 40 acres upon build out. Approximately 3.16 million tons of material will be stockpiled within the permitted footprint during the operational phase of the mine. Berms and drain ditches will be constructed around the waste rock stockpile to prevent run-on and to control run-off.

2. Waste Rock Stockpile 2 (WRSP-2) - WRSP-2 will be located outside the projected OPSDA east of the open pit and Animas Peak and will have an estimated footprint of approximately 49 acres upon build out. Approximately 8.64 million tons of material will be stockpiled within the permitted footprint during the operational phase of the mine. Berms and drain ditches will be constructed around the waste rock stockpile to prevent run-on and to control run-off.

3. Waste Rock Stockpile 3 (WRSP-3) - WRSP-3 will be located outside the projected OPSDA east of the open pit and Animas Peak and will have an estimated footprint of approximately 122 acres upon build out. Approximately 32.89 million tons of material will be stockpiled within the permitted footprint during the operational phase of the mine. Berms and drain ditches will be constructed around the waste rock stockpile to prevent run-on and to control run-off. An open channel stormwater conveyance structure will be cut into the underlying bedrock at the toe of the stockpile to collect seepage and impacted stormwater generated from WRSP-3.

4. Existing Waste Rock Stockpile 1 (EWRSP-1) - EWRSP-1, located inside the projected OPSDA, is an historic waste rock stockpile located at the western edge of the mine facility boundary and contains approximately ~~512~~486,000 tons of waste rock. The current footprint of the stockpile is approximately 16 acres. This stockpile will be reclaimed during the mine start-up phase.

5. Existing Waste Rock Stockpile 2A (EWRSP-2A) - EWRSP-2A is an historic waste rock stockpile located at the north side of the open pit. A portion of EWRSP-2A is located outside the projected OPSDA. This portion will be relocated onto the portion of EWRSP-2A that is inside the projected OPSDA during the mine start-up phase and prior to construction of WRSP-1. EWSRP-2A will be sequentially covered during the operational phase of the mine from construction of WRSP-1 (i.e., EWRSP-2A will become part of WRSP-1).

6. Existing Waste Rock Stockpile 2B - EWRSP-2B, located inside the projected OPSDA, is an historic waste rock stockpile located at the north side of the open pit immediately west of the toe of EWRSP-2A. EWRSP-2B will be reclaimed during the mine start-up phase. The current combined footprint of EWRSP-2A and EWRSP-2B covers a footprint of 21 acres and contains approximately ~~913,000~~ 760,050 tons of waste rock.

7. Existing Waste Rock Stockpile 3 (EWRSP-3) - EWRSP-3, located outside the projected OPSDA, is an historic waste rock stockpile located north of the Concentrator in the ore processing area. It contains approximately ~~523,000~~333,300 tons of waste rock and ore. The current footprint of the stockpile is approximately 20 acres. Ore from this stockpile will be processed during the start-up phase of the concentrator. In addition, EWRSP-3 will be used during mine operations to temporarily store ore during upset conditions (i.e., when the Primary Crusher is not working).

8. Existing Waste Rock Stockpile 4 (EWRSP-4) - EWRSP-4, located inside the projected OPSDA, is an historic waste rock stockpile located southeast of the pit containing approximately 1,000,050~~.2 million~~ tons of waste rock. The current footprint of the stockpile is approximately 23 acres. The southern slopes of the stockpile facing Grayback Arroyo will be reclaimed during the mine start-up phase, and the top surface will be filled and graded to a 1% slope and used for an equipment laydown yard during operations.

Stormwater generated from the top surface will discharge to the open pit.

C. **Conditionally Exempt Facilities**

1. Growth Media Stockpiles - Three growth media stockpiles will be constructed at the mine facility to store reclamation cover material. Growth Media Stockpile 1 will be constructed southwest of the TSF and will have an estimated footprint of approximately 30 acres upon build out. Growth Media Stockpile 2 will be constructed northeast of the TSF and will have an estimated footprint of approximately 32 acres upon build out. Growth Media Stockpile 3 will be constructed southeast of WRSP-3 and will have an estimated footprint of approximately 14 acres upon build out. These stockpiles are authorized for storage of reclamation cover material only, and the conditionally exempt status is premised on ~~condition that~~ the permittee ~~adheres to the approved material characterization and handling plan~~ placesing material that does not generate water contaminants on the Growth Media Stockpile ~~to ensure the conditionally exempt status as stockpiles that do not generate water contaminants~~is maintained.

Commented [BR10]: Clarifying edits in response to NMCC comment

2. Mill Site Claims and Electrical Substation - Nine total existing and/or proposed mill site claims and one electrical substation located off-site will contribute to the project. Each mill site claim is five acres in size and the electrical substation will be located on a thirty-acre parcel of land. The mill site claims will be utilized for other water-related infrastructure uses such as staging and storage areas for booster tanks, pumps and electrical equipment, maintenance, and monitoring. The mill site claims and electrical substation are authorized for use on condition that the permittee adheres to the approved material characterization and handling plan to ensure the conditionally exempt status as areas that do not generate water contaminants.

D. **Copper Crushing, Milling, Concentrator, and Tailings Storage Facility**

1. Process Facility Area - The Process Facility Area, located outside the projected OPSDA southeast of the open pit, is where crushing and grinding, milling, flotation, concentrating, drying and packaging of ore will occur. In addition, administration, parking and other ancillary support facilities (e.g., Assay Laboratory) will be located here. Impacted stormwater generated in the Process Facility Area will be directed to open channel conveyances that convey to Impacted Stormwater Impoundment A.

   a. Primary Crusher - Ore from the open pit will be fed to the Primary Crusher for the first stage of crushing. Run-of-the-mine ore rock will be crushed to a size of eight-inch diameter and less. The gyratory crusher will be located below ground level on reinforced concrete with concrete sumps. The sumps will pump water for re-use in the ore processing circuit.

   b. Coarse Ore Stockpile - The Coarse Ore Stockpile will be located between the Primary Crusher and the Concentrator in the Process Facility area. Crushed ore rock from the

Primary Crusher will be temporarily stored at the Coarse Ore Stockpile until it is fed into the Reclaim Tunnel beneath the stockpile and onto a conveyor system which will transport ore to the Semi-Autogenous Grinding (SAG) Mill and grinding circuit. The Coarse Ore Stockpile will have a capacity of 75,000 tons and will have a footprint of approximately ~~2~~ 5 acres.

Commented [BR11]: Clarifying edit from NMCC to allow additional space for the crushed ore and associated equipment.

c. Concentrator - The Concentrator is designed to process up to~~1,600 tons of ore per hour, or~~ 38,000 tons per day. It will consist of several copper and molybdenum rougher/scavenger flotation cells, copper and molybdenum flotation and scavenger cells, concentrate tanks, thickeners, filters, a copper concentrate load-out area, a molybdenum packaging area, and associated infrastructure. The Concentrator is designed and will be constructed to prevent discharges from leaving the facility using concrete floors and numerous sumps, pumps, and concrete berms within the building.

Commented [BR12]: NMED edit for clarity.

d. Mill - The Mill is located inside the Concentrator building and will consist of one SAG Mill, one ball mill, a pebble crusher, and associated conveyance systems and separators.

2. Tailings Storage Facility (TSF) - The lined TSF will be located outside the projected OPSDA and built progressively out in a five-phase process. It is designed to accommodate the volume of tailings generated during the life of the mine. The liner will consist of an 80-mil~~limeter (mil)~~ high-density polyethylene (HPDE) liner (or equivalent material) placed on a twelve-inch thick liner bedding fill sub base. In Phase 1, the liner bedding fill will consist of a minimum of 12 inches of historic tailings recovered from the north cell of the old starter dam. After Phase 1, liner bedding fill will consist of a twelve-inch layer of crushed and screened native material or selected local soil. TSF drainage will be collected using an underdrain collection system that incorporates two underdrains that will convey solutions to the TSF Underdrain Collection Pond. Drainage from the TSF impoundment interior will be collected in a continuous underdrain system (impoundment underdrain) constructed over the geomembrane liner. A separate blanket drain system will underlie the tailings dam (dam underdrain). The impoundment underdrain system will be equipped with a shutoff valve at its inlet during the initial years of operation to ensure two feet of freeboard is maintained in the Underdrain Collection Pond. When the valve is closed, the TSF supernatant pool will be used for storage until the TSF underdrain collection pond is pumped down. The TSF pool, located in the interior of the TSF, will be equipped with four floating-barge pumps with a maximum design capacity of 12,978 gpm. The pumps will convey TSF supernatant process water to the Process Water Reservoir through the 36-inch diameter HDPE water reclaim process water pipeline for re-use as process water. Tailing slurry, which is gravity conveyed from the Concentrator, will pass through the Cyclone Plant prior to discharge to the TSF. The Cyclone Plant will separate the tailing slurry into a coarse and fine fraction; the coarse fraction will be used to construct the tailing dam and the fine fraction will be conveyed into the TSF pool.

E. **Domestic Wastewater Treatment Facility**

1. A package treatment plant sized to treat up to 10,000 gallons of day of domestic wastewater will be constructed on a pre-existing slab located near the main gate and outside the projected OPSDA. The plant will be constructed and operated to treat wastewater to a secondary effluent quality. Treated effluent will be pumped via pipeline to the TSF facility for re-use as process water.

F. **Impoundments**

1. Process Water Reservoir (PWR) - The Process Water Reservoir will be located east of the Concentrator in the Process Facility Area and outside the projected OPSDA. It will have a footprint of approximately 2 acres and a storage capacity of 5,433,472 gallons while maintaining two feet of freeboard. It is sized to retain twelve hours of inflow at 7,200 gpm and a 100-year return interval storm event while maintaining two feet of freeboard. The pond will be double-synthetically lined (minimum 60-mil ~~each or equivalent)~~ ~~using~~ HDPE (or equivalent material) liners ~~and~~ equipped with a leak detection/collection system. It is designed to meet the requirements of Paragraphs (1), (2), (3), (6), and (7) of 20.6.7.17.D NMAC. The PWR will receive process water from the Underdrain Collection Pond at the TSF, impacted stormwater pumped from the three impacted stormwater impoundments, and freshwater from the off-site well field for use as process water in the Concentrator. The PWR will pump process water to the Process Water Tank for use in the Process Facility Area. Pumps will be sized to deliver 24,300,000 gpd (16,875 gpm) of process water to the Concentrator. In the event of upset conditions, the PWR overflow weir conveys solutions directly into the lined tailings trench/pipeline corridor which discharges to the TSF.

Commented [BR13]: Clarifying edits on liner material in response to comments received from the Sierra Club

2. TSF Underdrain Collection Pond (UCP) - The UCP will be located outside the projected OPSDA at the southeastern toe of the TSF. It will have a footprint of approximately 8 acres and storage capacity of 12,240,000 gallons while maintaining two feet of freeboard. It is sized to retain twenty-four hours of underdrain flow at a maximum flow rate, and runoff from the downstream face of the TSF during a 100-year return interval storm event. The pond will be double-synthetically lined (60-mil each or equivalent) using HDPE or equivalent material and equipped with a leak detection/collection system. It is designed to meet the requirements of Paragraphs (1), (2), (3), (6), and (7) of 20.6.7.17.D NMAC. The pond will receive approximately 448 gpm of tailing underflow, tailings dam face seepage, and impacted stormwater under standard operating conditions. Collected solutions will be returned to the process water re-use circuit via the 4,000 gpm pond reclaim pump system (one operating pump and one spare submersible turbine pump mounted in a concrete sump) and the underdrain collection process water pipeline. The underdrain collection process water pipeline will be placed along the upstream side (i.e., inside the TSF toe berm) of the toe berm and above the geomembrane liner during all buildout phases of the TSF. Perimeter collection trenches situated on the bermed upstream side of the TSF liner will capture and contain impacted stormwater from the face of the TSF and convey solutions to the Underdrain Collection Pond.

3. Surge Pond - The Surge Pond will be located outside the projected OPSDA at the northwest margin (i.e., upstream side) of the TSF and is associated with the Cyclone Plant. It will have a footprint of approximately 6.4 acres and storage capacity of 1,610,000 gallons while maintaining two feet of freeboard. The minimum 60-mil HDPE (or equivalent material) lined impoundment is designed to meet the requirements of Paragraphs (1), (2), (4), (6), and (7) of 20.6.7.17.D NMAC. The purpose of the Surge Pond is to contain discharges (tailings, process, and reclaim water) from various processing locations under upset conditions, due to a pipe failure, or shutdown of the Cyclone Plant. Upset flows from the Cyclone Plant will discharge by gravity to the Surge Pond within a secondary containment ditch lined with a minimum 60-mil HDPE geomembrane liner placed over 6 inches of liner bedding fill. Dedicated pumps will convey solutions from the Surge Pond to the TSF. The surge pond will be empty under normal operating conditions.

4. Impacted Stormwater Impoundments - Three stormwater impoundments will be utilized to capture precipitation and stormwater runoff from areas impacted by mining activities including mining, hauling, waste rock stockpiling, mineral processing, and shipping and receiving of goods and products. The minimum 60-mil HDPE (or equivalent material) lined impoundments are designed to meet the requirements of Paragraphs (1), (2), (4), (6), and (7) of 20.6.7.17.D NMAC. Each stormwater impoundment is designed to receive the volume of stormwater generated from a 100-year return interval storm event while maintaining two feet of freeboard. The stormwater impoundments will typically be empty and will be pumped as low as practicable within 30 days of storm events pursuant to Paragraph (4) of 20.6.7.17.D NMAC. Collected solutions from Impacted Stormwater Impoundment B (SW-B) and Impacted Stormwater Impoundment C (SW-C) will be pumped to Impacted Stormwater Impoundment A (SW-A) via the SW-C and SW-A pipelines, and solutions from Impacted Stormwater Impoundment A will be pumped to the PWR via the SW-A pipeline using temporary pumps. Sheet flow generated during storm events will be conveyed to the stormwater impoundments via open channel conveyances capable of handling a 100-year return interval storm event while maintaining six inches of freeboard.

   a. Impacted Stormwater Impoundment A (SW-A) - As shown in Figure 11J-3 of the Revised Application, SW-A will be located outside the projected OPSDA east of the Process Water Reservoir and at the southwest toe of WRSP-3. It will have a footprint of approximately 2 acres and storage capacity of 7,306,971 gallons while maintaining two feet of freeboard. Impacted Stormwater Impoundment A will capture and manage impacted stormwater from the approximately 91.06-acre catchment area in Watershed A which includes the Process Facility Area.

   b. Impacted Stormwater Impoundment B (SW-B) - As shown in Figure 11J-3 of the Revised Application, SW-B will be located inside the projected OPSDA at the southern toe of WRSP-1 and southwest corner of Watershed B. It will have a footprint of approximately 2 acres and storage capacity of 5,513,140 gallons while maintaining two

feet of freeboard. Stormwater Impoundment B will capture and manage impacted stormwater generated from the approximately 98.52-acre catchment area in Watershed B, which includes WRSP-1. Overflow from the impoundment will discharge under a haul road via a culvert and then flow into the open pit.

Impacted Stormwater Impoundment C (SW-C) - As shown in Figure 11J-3 of the Revised Application, SW-C will be located outside the projected OPSDA at the eastern toe of WRSP-3 and eastern edge of Watershed C. SW-C will have a footprint of approximately 7 acres and storage capacity of 10,513,140 gallons while maintaining two feet of freeboard. Stormwater Impoundment C will capture and manage impacted stormwater from the approximately ~~315.76~~198.66-acre catchment area in Watershed C which contains WRSP-2 and WRSP-3.

Commented [BR14]: Typographical error noticed by NMCC and corrected by NMED

G. **Sumps, Tanks, Pipelines and Other Containment Systems**

1. Tanks - Forty-eight above ground tanks will be used at the mine site; most will be located outside the projected OPSDA at the Process Facility Area. Appendix C of the Revised Application describes all tanks, sumps, and designed containments for each. Tanks are designed and will be constructed in accordance with Subsections A and B of 20.6.7.23 NMAC, unless otherwise noted.

   a. Concentrator Area - Thirty tanks will be located inside the Concentrator including (number of tanks in parenthesis): Grinding Area (1), Copper Floatation Area (1), Copper Regrind Area (1), Molybdenum Floatation Area (3), Copper-Molybdenum Thickening Area (4), Copper Thickening Area (6), Wheel Wash Area (1), Lime Reagent Area (2), Diesel Reagent Area (1), General Reagent Area (7), and Sodium Hydrosulfide Reagent Area (3).

   b. Truck Shop Tank Farm - Seven tanks will be located in the Truck Shop Tank Farm area to store various oil and fluid to support the vehicle fleet.

   c. Fuel Station Area - Five tanks will be located in the Fuel Station Area to be utilized for fueling needs.

   d. Miscellaneous Locations - Three tanks will be incorporated into the domestic wastewater treatment facility, one tank will be used at the Assay Lab for chemical waste, and one 170,000-gallon tank will be used for Process Water Storage and delivery. The Process Water Storage Tank will be situated in a bermed area that will be underlain by a HDPE synthetic liner.

2. Sumps and Containment Areas - Twenty-two sumps and/or containment areas will be constructed to capture and contain process water, impacted stormwater, and other solutions in the event there is a release from the primary containment structures in the Process Facility Area.

3. Copper Flat Open Pit dewatering system - The Copper Flat Open Pit dewatering system

will utilize one or more dewatering sumps and associated pipelines located in the pit to dewater the open pit. A portable booster tank(s) will be incorporated, as necessary, as the pit is deepened.

4. Pipelines - Pipelines serving the DP-1840 mine units consist of HDPE and range in size from 6 inches or less in diameter up to 36 inches in diameter. The pipelines are described in Table 11J-3, and Figures 11J-20A and 11J-20B of the Revised Application. All pipelines are designed and will be constructed in accordance with Subsections A and B of 20.6.7.23 NMAC. The Concentrator Whole Tailings Transport pipeline and UCP return pipeline will be placed within lined and bermed channels when located outside building areas.

H. **Truck and Equipment Washing Units**

1. A Truck and Equipment Washing Unit (Truck Wash) will be located outside the projected OPSDA along a haul road between the mine and the Truck Shop south of the Concentrator. It will consist of a concrete pad for vehicle and equipment washing. The pad will be sloped to drain into a 50,000-gallon concrete settling basin for separation of water, solids, oil and grease. Oil and grease will be skimmed and properly disposed of offsite. Solids removed from the bottom of the settling basin will disposed of at the TSF or stored on a concrete pad next to the wash unit for eventual disposal at the TSF. All wash water will be reused at the Truck Wash. The Truck Wash is designed in accordance with Section 20.6.7.26 NMAC.

2. A wheel wash tank and pump and associated concrete containment area will be located adjacent to the Concentrator. It will be used to remove and contain concentrate from truck wheels prior to the trucks travelling onto site roads. Solutions collected in the wheel wash sump will be returned to the Copper Thickener feed box via a dedicated pump equipped with automatic start/stop control.

I. **Dust Suppression** - Dust suppression trucks will utilize water from the open pit sump and/or stand pipes located inside the projected OPSDA for dust suppression within the projected OPSDA. Stand pipes used to deliver water to trucks for dust suppression outside the projected OPSDA will utilize water sources that meet ground water quality standards set forth in Section 20.6.2.3103 NMAC.

J. **Flow Measurement**

1. The permittee will utilize flow meters to measure regulated discharge volumes pursuant to this discharge permit and as required by the Copper Mine Rule. Flow meter locations utilized by DP-1840 are shown in Figures 11J-20A and 11J-20B of the Revised Application. In addition, Figure 3 located on Page 36 of this Discharge Permit, shows a schematic diagram of flow meter locations used for discharge volume reporting pursuant

to DP-1840.

K. **Meteorological Station**

1. The mine facility will utilize one Meteorological Station, located at the east central portion of the mine facility permit boundary, to measure meteorological data in accordance with the meteorological plan submitted with the Revised Application. The location is shown on Figure 11W-1 of the Revised Application.

B104 Authorized Discharges

The permittee is authorized to operate the following mine units in accordance with all applicable system design and operational constraints as described in this Discharge Permit, and the Discharge Plan. [20.6.2.3109 NMAC]

A. The permittee is authorized to discharge a maximum of 25,~~246~~264,000 gpd of tailing slurry from the Concentrator to the Cyclone Plant and then the TSF via gravity through the Concentrator Whole Tailings Transport pipeline.

B. The permittee is authorized to pump a maximum of 21,236,000 gpd of process water from the TSF Water Reclaim System, which includes combined flows from the UCP and TSF supernatant pool, to the PWR.

C. The permittee is authorized to discharge a maximum of 24,300,000 gpd of process water from the PWR to the Concentrator.

D. The permittee is authorized to place waste rock from the Copper Flat Open Pit within the permitted footprints of WRSP-1, WRSP-2, and WRSP-3 and discharge water contaminants originating from placed materials.

~~D.~~E. The permittee is authorized to dewater the Copper Flat Open Pit to accommodate mining of the Pit and to manage process water and impacted stormwater from the Copper Flat Open Pit.

Commented [BR15]: Edit added by NMED to ensure consistency with the Copper Mine Rule.

~~E.~~F. The permittee is authorized to store crushed ore at the ~~Crushed~~ Coarse Ore Stockpile.

~~F.~~G. During upset conditions, the permittee is authorized to temporarily stage ore within the permitted footprint of EWRSP-3, and discharge water contaminants originating from placed materials.

~~G.~~H. The permittee is authorized to operate SW-A, SW-B, and SW-C to collect impacted stormwater.

~~H.~~I. The permittee is authorized the operate all sumps, tanks, pipelines and other containment systems described in B103.G.

~~I.~~J. The permittee is authorized to operate the Truck and Equipment Wash units.

~~J.~~K. The permittee is authorized to discharge a maximum of 10,000 gpd of treated effluent from the domestic wastewater treatment and disposal facility to the TSF.

~~K.~~L. The permittee is authorized to discharge an annual average of approximately 96,000 gpd of process water from the Copper Flat Open Pit sump(s) and dewatering system for use as dust suppression water within the OPSDA or for reuse in the process water circuit.

~~L.~~M. This Discharge Permit authorizes only those discharges specified herein. Any unauthorized discharges such as spills or leaks must be reported to NMED and remediated as required by Section 20.6.2.1203 NMAC, and any additional requirements listed in this Discharge Permit.

N. The permittee shall provide written notice to NMED of the commencement, ~~or recommencement~~ of operations in accordance with Subsection C of 20.6.7.18 NMAC.

Commented [BR16]: Edit in response to NMCC comment.

~~M.~~O. If the Copper Flat Mine is on standby pursuant to the Mining Act, the permittee shall provide written notice to the department indicating the planned date of recommencement of operations. Written notification shall be submitted to the department a minimum of 30 days prior to the date mining is to recommence.

Commented [BR17]: New condition to ensure NMED is notified in the event the Copper Flat Mine has been on standby and intends to resume operations.

Part C FACILITY SPECIFIC REQUIREMENTS

The permittee shall conduct the requirements set forth below in accordance with the WQCC Regulations of Subsection C of 20.6.2.3106 NMAC and Section 20.6.2.3107 NMAC to ensure compliance with 20.6.2 NMAC, and in accordance with applicable requirements of Part 20.6.7 NMAC.

C100 Practice of Engineering

A. Within 120 days of completion of construction of any mine unit authorized for construction and discharge as listed in B103, the permittee shall submit complete as-built drawings and/or a construction certification report pursuant to Paragraph (2) of 20.6.7.18.B NMAC.

B. Design, construction and location of all mine units shall be in accordance with applicable Copper Mine Rule requirements and the Discharge Plan.

C101 Construction Schedule and Progress Reports

A. Pursuant to Subparagraph (a) of 20.6.7.18.C(1), the permittee shall provide NMED with written notice a minimum of 30 days before commencing construction of mine units covered by this

Discharge Permit. A summary of construction activities completed shall be submitted in accordance with Subsection B of 20.6.7.29 NMAC.

B. The permittee shall adhere to the sequencing schedule outlined in Table 2-1 of Revision 1 of the Updated Mine Operation Reclamation Plan (MORP) dated July 2017 and titled, "Copper Flat Development Sequence and Schedule," and as shown on Table 1 located on Page 31 of this Discharge Permit. NMED shall be notified prior to any deviations from the sequencing schedule.

C. All containment systems, seepage, and stormwater collection units shall be in place prior to operation of any discharging mine unit.

C102 Copper Flat Open Pit

A. The Copper Flat Open Pit shall be operated in accordance with the applicable requirements of Section 20.6.7.24 NMAC.

B. Pursuant to Subsection A of 20.6.7.24 NMAC, expansion of the Copper Flat Open Pit shall not exceed the area shown on Figure 1 located on Page 34 of this Discharge Permit. The permittee must obtain a permit modification or amendment prior to expanding the Copper Flat Open Pit beyond the area shown on Figure 1 of this Discharge Permit.

C. Fluids generated within the open pit shall be managed according to the applicable requirements of 20.6.7.24.C NMAC, and the Sitewide Water Management Plan required pursuant to Condition C107.A.

~~D. Pursuant to Subsection C of 20.6.7.24 NMAC, fluids generated within the open pit shall be managed according to the requirements of the Mine Operation Water Management Plan required in C111.I.~~

Commented [BR18]: Edits made by NMED to require that NMCC creates a single Sitewide Water Management Plan that combines three separate water management plans required by the Copper Mine Rule.

C103 Waste Rock Stockpiles

A. Waste rock shall be handled and characterized in accordance with applicable requirements of Subsection A of 20.6.7.21 NMAC, and the NMED-approved material characterization and handling plans summarized and referenced in the Revised Application.

B. Design, construction and location of the waste rock stockpiles shall be in accordance with the Discharge Plan, and applicable requirements of Subsections B and C of 20.6.7.21 NMAC.

C. The permittee shall comply with applicable operational requirements listed in Paragraphs (2) through (8) of 20.6.7.21.D NMAC including the requirement to place waste rock on waste rock stockpiles to plan for closure to the extent practicable and be in accordance with the operating plan required in C111.J (Sections 20.6.7.18, 20.6.7.21 and 20.6.7.33 NMAC).

D. Pursuant to Paragraph (1) of 20.6.7.21.D NMAC and Paragraph (1) of 20.6.7.21.B NMAC, the waste rock stockpiles described in B103.B shall not exceed the footprint, configuration, and location shown in Figure 1 of this Discharge Permit. The permittee may only expand the permitted footprint for the purpose of facility closure, or through an NMED-approved permit amendment or modification to DP-1840.

E. Pursuant to Paragraph (c) of 20.6.7.21.A(2) NMAC and as outlined in the material handling plan in the Revised Application, the permittee shall place a minimum of 10 feet of not potentially acid generating (NPAG) waste rock material above and below any areas where acid generating or potentially acid generating (PAG) waste rock will be placed.

F. As outlined in the Revised Application, the portion of EWRSP-2A located outside the projected OPSDA shall be relocated onto the portion of EWRSP-2A that is located inside the projected OPSDA, during the mine start-up phase and prior to construction of WRSP-1.

C104 Impoundments

A. Design, construction and location of all impoundments shall be in accordance with the Discharge Plan, and applicable requirements of Subsection D of 20.6.7.17 NMAC.

B. Operation of all impoundments shall be in accordance with the applicable requirements of Subsection F of 20.6.7.18 NMAC.

~~B.~~C. Pursuant to Subsection C of 20.6.7.17 NMAC, the permittee shall submit to NMED for approval a liner system construction quality assurance/construction quality control (CQA/CQC) plan a minimum of 90 days prior to construction of any impoundment that requires a liner system.

Commented [BR19]: Comment added by NMED in response to comments received from a member of the public regarding liner system CQA/CQC during installation.

~~C.~~D. Pursuant to Subsection B of 20.6.7.18 NMAC, the permittee shall submit a construction certification report within 120 days of construction completion of all impoundments that require a liner system.

~~D.~~E. In accordance with Subparagraph (c) of 20.6.7.17.D(2) NMAC, water levels in the PWR and UCP shall be maintained to provide capacity to convey maximum design process flow plus stormwater runoff from the reservoir catchment area while maintaining two-feet of freeboard.

~~E.~~F. In accordance with Subparagraph (e) of 20.6.7.17.D(2) NMAC, water levels in the SW-A, SW-B, and SW-C shall be maintained to provide capacity for a 100-year return interval storm event while preserving two-feet of freeboard under standard operating conditions and after storm events.

C105 Copper Crushing, Milling, Concentrator, and Tailings Storage Facility Units

A. Design, construction, and location of all crushing, milling, concentrating, and tailings storage facility units shall be in accordance with the Discharge Plan, and applicable requirements of Subsections A and B of 20.6.7.22 NMAC.

B. Operation of all crushing, milling, concentrating, and tailings storage facility units shall be in accordance with the Discharge Plan and applicable requirements of Subsection C of 20.6.7.22 NMAC.

C. Tailings Storage Facility

1. Deposition of tailings shall be in accordance with the operating plan required in C111.K.

2. Prior to initiation of construction of any portion of the TSF and associated dam, the permittee shall submit to NMED documentation of compliance with the Dam Safety Bureau of the Office of the State Engineer permitting requirements pursuant to Section 72-5-32 NMSA 1978, and rules promulgated under that authority, unless exempt by law from such requirements.

~~2.~~3. Prior to discharging to the TSF, the permittee shall ensure that berms and/or the dam structure of the TSF will have the capacity for such discharges while maintaining appropriate safety measures in accordance with the regulations of the Dam Safety Bureau of the Office of the State Engineer and Paragraph (d) of 20.6.7.17.C(1) NMAC.

~~3.~~4. Pursuant to Subparagraph (4) of 20.6.22.A NMAC and Subsection B of 20.6.7.18 NMAC, the permittee shall submit a construction certification report within 120 days of TSF liner system installation.

~~4.~~5. Pursuant to Subparagraph (a) of 20.6.7.22.C(1) NMAC, the TSF shall not exceed the footprint (564 acres) or location and configuration as shown in Drawing 12 in Appendix J of the document titled *Feasibility Level Design, 30,000 TPD Tailings Storage Facility and Tailings Distribution and Water Reclaim Systems Copper Flat Project Sierra County, New Mexico Golder Associates Inc., Revised, November 2016* (i.e., Appendix A the Revised Application) and as shown on Figure 1 of this Discharge Permit. The permittee may only expand the permitted footprint for the purpose of facility closure, or through an NMED-approved permit amendment or modification to DP-1840.

C106 Sumps, Tanks, Pipelines and Other Containment Systems

A. Design, construction and location of all pipelines, tanks, and sumps shall be in accordance with the Discharge Plan, and applicable requirements of Subsections A and B of 20.6.7.23 NMAC.

B. Operation of all pipelines, tanks, and sumps shall be in accordance with the applicable requirements of Subsection C of 20.6.7.23 NMAC.

Commented [BR20]: Requirement added in response to comments received from members of the public, and several organizations including the Elephant Butte Irrigation District; the New Mexico Environmental Law Center representing Turner Ranch Properties, owner of the Ladder Ranch which is located adjacent to the proposed Copper Flat Mine, and the Hillsboro Pitchfork Ranch; and non-governmental organizations including Amigos Bravos and Gila Resources Information Project.

C. Detailed and complete construction plans and specifications and supporting design calculations for any proposed or required tanks, pipelines, sumps, or other containment systems, including any replacements thereof, shall be submitted to NMED pursuant to Paragraph (2) of 20.6.7.17.C NMAC and Section 20.6.2.23 NMAC, and D107 of this Discharge Permit. This requirement does not apply to portable or temporary tanks, pipelines, sumps, or other containment systems that are subject to periodic relocation during mining operations.

D. Pursuant to Subsection J of 20.6.7.33 NMAC, upon discontinuing the operation of, or before moving tanks, pipelines, sumps, or other containment systems, all liquids shall be released to a location specifically authorized in the discharge permit, an alternate location subject to NMED approval, or otherwise properly contained, transferred, or disposed of in a manner that does not result in discharge to non-authorized areas.

C107 Stormwater Management

A. Stormwater shall be managed in accordance with the applicable requirements of Paragraph (4) of 20.6.7.17.C NMAC, and in accordance with the Stormwater Management Plan included in the Revised Application.

B. To ensure compliance with Subparagraphs (e) and (f) of 20.6.7.17.D(2) NMAC, the permittee shall inspect all stormwater impoundments, conveyance channels and collection ponds on a monthly basis and after precipitation events that exceed one inch for evidence of stormwater accumulations that exceed design capacities. To properly manage stormwater, the permittee shall ensure that the pumping capacity is adequate to maintain storage capacity in all stormwater impoundments.

C. Open channel conveyance structures, including those located at the base of WRSP-1, WRSP-2, and WRSP-3, shall be designed and operated to meet the requirements of Subparagraph (f) of 20.6.7.17.D(2).

C108 Sitewide Water Management Plan

Commented [BR21]: Edits made by NMED to require that NMCC create a single Sitewide Water Management Plan that combines three separate water management plans required by the Copper Mine Rule.

A. The Permittee shall submit to NMED for approval a Sitewide Water Management Plan no less than 60 days prior to discharge from the facility. The Sitewide Water Management Plan shall be a comprehensive plan that describes all water management systems at Copper Flat Mine and be designed, at a minimum, to meet the requirements of Paragraph (4) of 20.6.7.17.C NMAC (Stormwater Management Plan), Subsection C of 20.6.7.24 NMAC (Mine Operation Water Management Plan), and Subsection K of 20.6.7.30 NMAC (Interim Emergency Water Management Plan). Previously submitted documents in the Revised Application ~~to~~may be included as components of the Sitewide Water Management Plan includeing the Stormwater Management Plan and Mine Operation Management Plan. The Sitewide Water Management Plan shall be updated annually as specified in C113.

C109 Truck and Equipment Washing Units

A. The permittee shall operate the existing truck and heavy equipment washing unit in accordance with the applicable requirements of Subsection C of 20.6.7.26 NMAC.

~~A.~~B. Design, construction and location of truck and equipment washing units shall be in accordance with the Discharge Plan, and applicable requirements of Subsections A and B of 20.6.7.26 NMAC.

Commented [BR22]: Requirement added by NMED to be consistent with the Copper Mine Rule.

~~C108~~C110 Dust Suppression

A. Dust suppression on areas outside the OPSDA shall be conducted using water sources that do not exceed ground water quality standards set forth in Section 20.6.2.3103 NMAC.

B. If at some time in the future the permittee wishes to use an alternate source of dust suppression water or change the location in which discharges of water for dust suppression have been approved, the permittee shall notify NMED for approval in accordance with D107 prior to the proposed change.

~~C109~~C111 Domestic Wastewater Treatment Facility

A. The permittee shall utilize operators, certified by the State of New Mexico at the appropriate level, to operate the wastewater collection, treatment, and disposal system. The operations and maintenance of all or any part of the wastewater system shall be performed by, or under the direct supervision of, a certified operator. [Subsection C of 20.6.2.3109 NMAC, 20.7.4 NMAC]

~~C110~~C112 Flow Measurement

A. Pursuant to Paragraph (2) of 20.6.7.18.E NMAC, the permittee shall visually inspect all flow meters on a monthly basis for evidence of malfunction and repair or replace malfunctioning flow meters within 30 days of or as soon as practicable following discovery.

~~C111~~C113 Monitoring and Reporting

A. Pursuant to applicable requirements in Sections 20.6.7.28 and 20.6.7.29 NMAC, the permittee shall collect, preserve, transport, and analyze all ground water, process water, tailings slurry, impacted stormwater, seep, spring, and surface water samples from the facility in accordance with Table 2 located on Page 32 of this Discharge Permit, and any additional requirements listed in this Discharge Permit. Table 2 of this Discharge Permit provides a summary the monitoring and reporting requirements. Figures 2 and 3, located on Pages 35-36 of this Discharge Permit, designate sampling locations.

B. Samples of pit sump water, stormwater, PLS, seeps, and process water shall be analyzed for total concentrations for metal parameters (Suite C of Table 2) and dissolved concentrations for all parameters (including metal parameters) in accordance with Table 2 of this Discharge

Commented [BR23]: Clarifying edit made by NMED and in response to comment from NMCC

Permit. Samples of ground water and springs shall be analyzed for dissolved concentrations in accordance with Table 2 of this Discharge Permit.

C. The permittee shall submit monitoring reports to NMED on a semi-annual basis that contain all quarterly monitoring data and information collected pursuant to the requirements of this Discharge Permit, and applicable requirements of Section 20.6.7.29 NMAC. Semi-annual reports are due by February 28 and August 31 of each year. Data required to be submitted annually shall be submitted in the monitoring report due by February 28 of each year.

D. Pursuant to Subsection L of 20.6.7.28 NMAC, the permittee shall submit to NMED ground water elevation contour map(s) on a semi-annual basis and a map (or maps) showing the extent of the OPSDA and area of open pit hydrologic containment ("AOPHC") on an annual basis. The ground water elevation contour map(s) shall be of an appropriate scale to show ground water elevation contours for the Copper Flat Mine; the contour maps shall include land surface topographic contours with appropriate contour intervals, and shall include the monitoring wells that the ground water data is based on. The maps shall be submitted in the semi-annual monitoring reports in the format specified by Subsection C of 20.6.7.29 NMAC.

Commented [BR24]: Requirement added by NMED to be consistent with the Copper Mine Rule.

E. Implementation of all monitoring and reporting requirements listed in this Discharge Permit shall commence 180 days before emplacement of ore, waste rock, or discharge of tailings at an individual waste rock stockpile or tailings impoundment to allow for sampling and reporting prior to discharge, except as required under abatement pursuant to C114.C and C114.D.

~~E.~~F. The Permittee shall submit annually an updated Sitewide Water Management Plan that meets at a minimum the requirements of Paragraph (4) of 20.6.7.17.C NMAC (Stormwater Management Plan), Subsection C of 20.6.7.24 NMAC (Mine Operation Water Management Plan), and Subsection K of 20.6.7.30 NMAC (Interim Emergency Water Management Plan). The update shall be submitted to NMED as an attachment to the monitoring report due on February 28 of each year.

Commented [BR25]: Requirement added by NMED to ensure that the Sitewide Water Management Plan reflects current operations and water management.

~~F.~~G. Requests to change monitoring and reporting requirements may require an amendment or modification to this Discharge Permit as required by the secretary. [20.6.2.7 NMAC]

~~G.~~H. **Ground Water**

1. Pursuant to Subsection B of 20.6.7.28 NMAC the permittee "shall monitor ground water quality as close as practicable around the perimeter and downgradient of each open pit, waste rock stockpile, tailings impoundment, process water impoundment, and impacted stormwater impoundment."
2. Pursuant to Paragraph (1) of 20.6.7.28.B NMAC, the existing monitoring wells listed in Table 2 of this Discharge Permit, except GWQ-1 and GWQ-8 as discussed in C111.G.4 below, have been deemed appropriate by NMED for continued use as ground water monitoring wells under this Discharge Permit. These ground water monitoring wells,

installed prior to the effective date of the Copper Mine Rule, have been identified to be constructed in accordance with the Copper Mine Rule.

3. Pursuant to Subsection G of 20.6.7.28 NMAC, the permittee shall sample and analyze ground water quarterly from all monitoring wells in accordance with Table 2 of this Discharge Permit, and applicable requirements of Subsection F of 20.6.7.28 NMAC. Analytical results shall be submitted in the semi-annual monitoring reports in the format specified by Subsection C of 20.6.7.29 NMAC.
4. Monitoring Wells GWQ-1 and GWQ-8 are not constructed in accordance with Section 20.6.7.28 NMAC; however, these wells are authorized for incorporation into the monitoring network to provide contextual ground water information for this Discharge Permit.
5. Pursuant to Paragraph (a) of 20.6.7.28(2) NMAC, the permittee shall install all proposed monitoring wells at least 180 days before emplacement of ore, waste rock, or discharge of tailings or other contaminants at an individual waste rock stockpile or tailings impoundment to allow sampling prior to discharge, except as required under abatement pursuant to C114.C and C114.D.
    a. The permittee shall provide NMED with a definitive installation schedule as project approval dates become more certain.
    b. All proposed monitoring wells shall be installed in accordance with Subsections B, C, D and E of 20.6.7.28 NMAC. Within 15 days of completion of each new monitoring well the permittee shall provide NMED with depth-to-water measurements and water quality field parameter data. Pending ground water conditions in the newly installed monitoring wells, additional requirements may be necessary. The permittee shall notify NMED in writing a minimum of one week prior to the start of installation of the monitoring wells. Upon completion of the installation of the monitoring wells, the permittee shall submit to NMED a monitoring well completion report for all newly-installed monitoring wells in accordance with the applicable requirements of Subsection K of 20.6.7.28 NMAC.
6. The permittee is authorized to plug and abandon Monitoring Wells GWQ-11, GWQ94-13, GWQ94-16, GWQ94-17, GWQ94-18, GWQ94-19, GWQ94-20, IW-1, IW-2, IW-3, NP-2, NP-3, NP-5, GWQ11-25A and GWQ11-25B, which will be buried during construction of the TSF and enlargement of the open pit (GWQ11-25A, and GWQ11-25B).
    a. Monitoring wells shall be plugged and abandoned in accordance with the attachment titled, *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions*, Revision 1.1, March 2011, and all applicable local, state, and federal regulations, including 19.27.4 NMAC.
    b. The permittee shall submit documentation describing the well abandonment procedures in accordance with the attachment titled, *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions*, Revision 1.1, March 2011. The well

abandonment documentation shall be submitted to NMED with the next semi-annual monitoring report for this Discharge Permit upon completion of abandonment procedures.

c. Pursuant to Subsection B of 20.6.7.30 NMAC, NMED may require replacement monitoring wells.

7. The permittee shall include Monitoring Wells NP-1, NP-4, GWQ-10, GWQ94-21A, GWQ94-21B, GWQ94-14, GWQ94-15, GWQ11-25A, and GWQ11-25B in the monitoring plan until expansion of the TSF requires plugging and abandonment of these wells.

8. The permittee shall submit a request in accordance with D105 prior to plugging and abandonment of any monitoring well.

I. **Additional Monitoring Wells**

Commented [BR26]: Added by NMED and in response to concerns raised by the New Mexico Environmental Law Center representing Turner Ranch Properties, owner of the Ladder Ranch which is located adjacent to the proposed Copper Flat Mine, and the Hillsboro Pitchfork Ranch

1. The permittee shall install two additional monitoring well (PWQ-23, PGW-24). PGQ-23 shall be located along the southwest toe of the TSF between GWQ-6 and GWQ-12, and the PGQ-24 shall be located along the northeast toe of the WRSP-3 between PGWQ-3 and PGWQ-4.

2. Pursuant to Subsection A of 20.6.7.28 NMAC, the permittee shall submit a map identifying the proposed locations and provide construction details for the monitoring wells for NMED approval a minimum of 30 days prior to installation.

3. Installation of the monitoring wells shall be in accordance with Subsections B, C, D and E of 20.6.7.28 NMAC.

~~H.~~J. The permittee shall notify NMED in writing a minimum of one week prior to the start of installation of the monitoring well required in C114.C.3. Upon completion of the installation of the monitoring well, the permittee shall submit to NMED monitoring well completion report for the newly-installed monitoring well in accordance with the applicable requirements of Subsection K of 20.6.7.28 NMAC.

~~I.~~K. **Surface Water**

1. The permittee shall analyze surface water collected from five surface water auto-sampling ports (SWQ-1 through SWQ-5) located in Grayback Arroyo in accordance with the applicable requirements of the Revised Application and Subsection N of 20.6.7.28 NMAC. The surface water collection ports shall be checked after each precipitation event of 0.5 inch or greater at the Copper Flat Mine. If sufficient water is present, a sample shall be collected and analyzed. The permittee shall attempt to collect samples from the collection ports as soon as practicable after the precipitation event. No more than one surface water sample per port may be collected in a 24-hour period, and no more than two surface water samples per port are required to be collected per quarter. Samples shall be analyzed for total and dissolved concentrations of the analytes listed on Table 2 of this Discharge Permit.

Analytical results shall be submitted in the semi-annual monitoring reports in the format specified by Subsection C of 20.6.7.29 NMAC.

2. The permittee shall sample and analyze surface water collected quarterly from any seeps or springs, if encountered, outside the OPSDA in accordance with the schedule listed in Table 2 of this Discharge Permit, and applicable requirements of Subsection N of 20.6.7.28 NMAC. Analytical results shall be submitted in the semi-annual monitoring reports in the format specified by Subsection C of 20.6.7.29 NMAC.

~~J.~~L. **Copper Flat Open Pit**

Commented [BR27]: Edits made by NMED to require that NMCC create a single Sitewide Water Management Plan that combines three separate water management plans required by the Copper Mine Rule.

1. Pursuant to Subsection C of 20.6.7.24 NMAC, the permittee shall submit on an ~~semi-~~annual basis a mine operation water management report summarizing the pit dewatering activities for the Copper Flat Open Pit for the previous year, including reporting on volumes of water pumped to dewater the pit and location of pumping. ~~a mine operation water management report summarizing pit dewatering activities and management of water generated and collected from within the perimeter of the open pit~~. The report shall also discuss changes and planned activities for dewatering the Copper Flat Open Pit for the coming year. The planned future dewatering activities shall be incorporated into the annual Sitewide Water Management Plan update required pursuant to C113.F. ~~The report shall also include an updated mine operation water management plan discussing changes to water management in the open pit for the upcoming six months. The report shall be submitted in the semi-annual monitoring reports.~~

~~K.~~M. **Waste Rock Stockpiles**

1. Pursuant to Paragraph (7) of 20.6.7.21.D NMAC, the permittee shall submit on an annual basis an operating plan that describes the sequencing of waste rock deposition on the waste rock stockpiles, including the volume and location of NPAG waste rock material placed in the past year and a proposal for material placement for the next year, and describes the operation of any applicable systems utilized to contain or transport process water or impacted stormwater from the waste rock stockpiles. The operating plan shall be submitted with the monitoring report due by February 28 of each year.

Commented [BR28]: Edit by NMED to ensure placement of NPAG is in appropriate location to ensure protection of water quality.

~~L.~~N. **Copper Crushing, Milling, Concentrator, and Tailings Storage Facility Units**

1. Pursuant to Subparagraph (j) of 20.6.7.22.C(1) NMAC, the permittee shall submit on an annual basis an operating plan that describes the sequencing of tailings deposition on the TSF and describes the operation of any applicable systems utilized to contain or transport process water and measures taken to manage the surface impoundment area to maintain adequate freeboard.

~~M.~~O. **Discharge Volumes**

1. The permittee shall measure and report discharge volumes for process water, liner solution

collection systems, tailings and impacted stormwater discharges in accordance with Subsections B, E, and F of 20.6.7.29 NMAC and the flow metering plan submitted with the Revised Application. Flow meter locations used for monitoring and reporting are schematically displayed on Figure 3 of this Discharge Permit. Discharge volume reporting shall be submitted in the semi-annual monitoring reports in the format specified by Subsection C of 20.6.7.29 NMAC. In addition to applicable discharge volume reporting required by Subsections B, E, and F of 20.6.7.29 NMAC, additional discharge volume reporting for the following shall be measured and reported:

a. The daily volume and source of water used for dust suppression.

~~N.~~P. **Flow Measurement Report**

1. Pursuant to Subparagraph (a) of 20.6.7.18.E.2 NMAC, the permittee shall submit a report of repaired or replaced flow meters in the semi-annual monitoring reports that include a description of any flow meter malfunctions with a statement verifying the repair and description of calibration of the flow meter pursuant to Paragraph (3) of 20.6.7.18.E NMAC.

~~O.~~Q. **Impoundment Leak Detection/Collection System Report**

1. Pursuant to Subparagraph (b) of 20.6.7.18.F.2 NMAC, the permittee shall submit a report of repaired or replaced leak detection/collection system components in the semi-annual monitoring reports.

~~P.~~R. **Meteorological Data**

1. Meteorological data shall be measured and reported as stipulated in the Meteorological Plan submitted with the Revised Application. Pursuant to Subsection G of 20.6.7.29 NMAC, tabulated data shall be submitted to NMED in the monitoring report due by February 28 of each year.

~~C112~~C114 **Contingency Plan**

A. The permittee shall comply with all applicable contingency requirements and submit to NMED all applicable information or documentation specified in Subsections A through J of 20.6.7.30 NMAC.

B. Pursuant to Subsection G of 20.6.7.30 NMAC, discharges of process water, impacted stormwater, or seepage that exceed the standards of Section 20.6.2.3103 NMAC to unauthorized areas must be reported under Section 20.6.2.1203 NMAC.

C. Pursuant to Subsection K of 20.6.7.30 NMAC, the permittee shall submit to NMED for approval an Interim Emergency Water Management Plan ~~within 180 days of the effective date of this~~

~~Discharge Permit (by~~ ~~DATE~~no less than 60 days prior to discharge at the mine facility~~)~~. The Interim Emergency Water Management shall be a component of the Sitewide Water Management Plan required in C108.A.

Commented [BR29]: Edit by NMED in response to comments from NMCC and to address that Copper Flat Mine is considered a "New Copper Mine Facility" pursuant to 20.6.7.7.B(39)

D. Pursuant to Subsection I of 20.6.7.30 NMAC, the permittee shall notify NMED of any significant erosion or condition that may compromise conveyance structures utilized in DP-1840.

E. If NMED or the permittee identifies any other failures of the discharge plan or system not specifically noted in this permit, NMED may require the permittee to develop and submit contingency plans and schedules for NMED approval to address such failures. [20.6.2.3107.A.10 NMAC]

~~C113~~C115 Closure Plan

A. Closure of all mine units associated with this Discharge Permit shall be performed in accordance with the requirements of Sections 20.6.7.33 and 20.6.7.34 NMAC, the Closure/Closeout Plan contained in the Revised Application, this Discharge Permit as applicable, and the final Closure/Closeout Plan approved by the New Mexico Mining and Minerals Division pursuant to the New Mexico Mining Act.

B. Pursuant to Paragraph (4) of 20.6.7.33.F NMAC and Subsection F of 20.6.7.34 NMAC, the permittee shall submit for NMED approval at least sixty days prior to construction, a Construction Quality Assurance/Construction Quality Control (CQA/CQC) plan for any mine units regulated pursuant to DP-1840 where cover is applied under an approved Closure/Closeout Plan.

C. For each mine unit closed, the closure period shall cease, and the post-closure period shall commence following NMED approval of a final CQA/CQC report that is in accordance with Subsection G of 20.6.7.34 NMAC.

D. The permittee shall provide a workplan and an implementation schedule, as a component of the Test Plot Program, for NMED approval within 90 days of the effective date of this permit (by DATE) to perform soil water characteristic curve laboratory analysis on the proposed reclamation cover material (RCM). The workplan shall be designed to verify Copper Mine Rule water holding capacity requirements pursuant to Subsection F of 20.6.7.33 NMAC. Based on the results of developed soil water characteristic curves, the permittee will be required to implement an appropriate material handling plan at closure to ensure the emplaced cover material textural characteristics achieves the water holding capacity required pursuant to Section 20.6.7.33 NMAC. Final RCM approval is subject to a demonstration that Copper Mine Rule requirements will be met, and concurrence from the New Mexico Mining and Minerals Division that requirements of the Mining Act will be met.

E. To demonstrate that the proposed RCM material will be capable of sustaining plant growth without continuous augmentation and have erosion resistant capabilities as required pursuant to Subsection F of 20.6.7.33 NMAC, the permittee shall conduct a RCM Test Plot Program. The RCM Test Plot Program shall be conducted in accordance with all approved work plans, and applicable New Mexico Mining and Minerals Division requirements.

F. In accordance with Subsection H of 20.6.7.33 NMAC, the permittee shall manage all process water at closure pursuant to the water management plan described in the Revised Application.

~~F.~~G. Surface water quality standards will not apply to the pit lake water body that will exist at closure so long as the pit lake remains a hydrologic evaporative sink and the pit lake water body remains wholly on private land (20.6.4.7(S)(5) NMAC).

~~G.~~H. Closure of EWRSP-1 and EWRSP-2B shall be completed during ~~the mine start-up phase~~ the preproduction period of its mining operation in accordance with the requirements of Sections 20.6.7.33 and 20.6.7.34 NMAC, the Revised Application and this Discharge Permit, as applicable. Closure of EWRSP-1 and EWRSP-2B shall be completed no later than three years from the effective date of this Discharge Permit.

~~H.~~I. The southern slopes of EWRSP-4 facing Grayback Arroyo shall be reclaimed during the preproduction period of its mining operation~~the mine start-up phase~~, and the top surface shall be filled and graded to a 1% slope in accordance with the requirements of Sections 20.6.7.33 and 20.6.7.34 NMAC, the Revised Application and this Discharge Permit, as applicable.

~~I.~~J. **Post-Closure Conditions**

1. Post-closure requirements shall be performed in accordance with the applicable requirements of Section 20.6.7.35 NMAC, and in accordance with the Closure/Closeout Plan and associated materials submitted as part of this Discharge Permit. Pursuant to Subsection D of 20.6.7.35 NMAC, the permittee shall submit to NMED semi-annual reports pursuant to the schedule in Subsection A of 20.6.7.29 NMAC that include, but are not limited to, a description and the results of post-closure monitoring, any work completed during the preceding semi-annual period, any maintenance and repair work conducted for any closure unit, status of post-closure activities, and semi-annual potentiometric maps.
2. Pursuant to Subsection E of 20.6.7.35 NMAC, the contingency requirements of Section 20.6.7.30 NMAC apply to any deficiencies discovered during post-closure monitoring and inspections, including, but not limited to, the requirements for possible corrective action plans, abatement plans, monitoring well replacement, reporting and correction of unauthorized discharges, and significant erosion of, or ponding of water on, a cover system.

Commented [BR30]: Added by NMED and in response to concerns raised by the New Mexico Environmental Law Center representing Turner Ranch Properties and the Hillsboro Pitchfork Ranch

Commented [BR31]: Schedule clarification comment from NMCC

Commented [BR32]: Added by NMED to ensure reclamation of these rock piles occurs in a timely manner.

~~C114~~C116 Abatement Plan

A. The permittee has been required to submit to NMED for approval a proposed abatement plan for the Copper Flat Mine. All abatement plans and activities shall be performed in accordance with Sections 20.6.2.4000 through 4115 NMAC and Paragraphs (3) and (4) of 20.6.7.30.A NMAC.

B. Within 180 days of the date of this Discharge Permit (by DATE), the permittee shall submit a workplan to evaluate any potential ongoing sources of surface or ground water impacts to Grayback Arroyo and connected aquifers. The workplan shall include a schedule and any corrective action measures, if necessary, to address any currently known source areas of impacts to Grayback Arroyo and connected aquifers pursuant to Sections 20.6.2.4000 NMAC through 4115 NMAC.

C. **Additional Monitoring Wells**

1. In addition to the monitoring wells already proposed in the Revised Application, the permittee shall install two additional monitoring wells to evaluate current ground water conditions proximal to the open pit and historic waste rock stockpiles. One monitoring well shall be located to the northeast side of the open pit at the intersection of ground water contour interval 5450 feet and the OPSDA (PGWQ-21) as shown on Figure 2 of this Discharge Permit, and a second monitoring well shall be located southwest of the open pit near the intersection of ground water contour interval 5480 feet and the OPSDA between GWQ-11-24B and GWQ11-26 (PGWQ-22).
2. Pursuant to Subsection A of 20.6.7.28 NMAC, the permittee shall submit a map identifying the proposed locations and provide construction details for the monitoring wells for NMED approval a minimum of 30 days prior to installation. The proposal shall consider the necessity of a nested pair monitoring well(s) to evaluate ground water conditions in different water bearing units or to account for ground water decline due to pit dewatering.
3. Within 180 days of the date of this Discharge Permit (by DATE), the permittee shall install monitoring wells PGWQ-1, PGWQ-5, PGWQ-13, PGWQ-20, PGWQ-21, and PGWQ-22 to provide additional information regarding the horizontal and vertical extent and magnitude of ground water contamination as required pursuant to Sections 20.6.2.4000 NMAC through 20.6.2.4115 NMAC.
4. Installation of the monitoring wells shall be in accordance with Subsections B, C, D and E of 20.6.7.28 NMAC.
5. The permittee shall notify NMED in writing a minimum of one week prior to the start of installation of the monitoring wells required in C114.C.3. Upon completion of the installation of the monitoring wells, the permittee shall submit to NMED monitoring well completion reports for the newly-installed monitoring wells in accordance with the

applicable requirements of Subsection K of 20.6.7.28 NMAC.

D. **Additional Stage 1 Abatement Plan Ground and Surface Water Quality Information**

1. The permittee shall collect an additional four quarters of ground and surface water data from the monitoring wells required in C114.C.3, and the previously approved Stage 1 Abatement Plan sampling locations shown in Table 2 of the document entitled, "Results from First Year of Stage 1 Abatement Investigation at the Copper Flat Mine Site Near Hillsboro, New Mexico," dated May 2014.
2. The initial abatement sampling event shall commence following completion of installation of monitoring wells required in C114.C.3. Analytical results shall be submitted semi-annually in the format specified by Subsection C of 20.6.7.29 NMAC.

~~C115~~C117 Financial Assurance

A. The permittee shall maintain joint financial assurance with NMED and the Mining and Minerals Division of the New Mexico Energy, Minerals and Natural Resources Department to cover costs associated with closure and post-closure activities approved under this Discharge Permit. [20.6.2.3107 NMAC]

Part D GENERAL CONDITIONS

NMED has reviewed the Discharge Plan for the proposed discharge permit and has determined that the provisions of the Copper Mine Rule and applicable ground water quality standards will be met in accordance with this Discharge Permit. General conditions pursuant to 20.6.2 NMAC and 20.6.7 NMAC are listed below.

D100 Enforcement

A. Any violation of the requirements and conditions of this Discharge Permit, including any failure to allow NMED staff to enter and inspect records or facilities, or any refusal or failure to provide NMED with records or information, may subject the permittee to a civil enforcement action pursuant to the NMSA 1978, Section 74-6-10(A) and (B). Such action may include a compliance order requiring compliance immediately or in a specified time, assessing a civil penalty, modifying or terminating the discharge permit, or any combination of the foregoing; or an action in district court seeking injunctive relief, civil penalties, or both. Pursuant to the NMSA 1978, Section 74-6-10(C) and 74-6-10.1, civil penalties of up to $15,000 per day of noncompliance may be assessed for each violation of the NMSA 1978, Section 74-6-5, the WQCC Regulations, or this Discharge Permit, and civil penalties of up to $10,000 per day of noncompliance may be assessed for each violation of any other provision of the WQA, or any regulation, standard, or order adopted pursuant to such other provision. In any action to enforce this Discharge Permit, the permittee waives any objection to the admissibility as evidence of

any data generated pursuant to this Discharge Permit. The permittee does not waive any argument as to the weight such evidence should be given. [74-6-10 WQA, 74-6-10.1 WQA]

B. Pursuant to the NMSA 1978, Section 74-6-10.2(A-F), criminal penalties may be assessed for any person who knowingly violates or knowingly causes or allows another person to:

1. Make any false material statement, representation, certification or omission of material fact in an application, record, report, plan or other document filed, submitted or required to be maintained under the WQA;
2. Falsify, tamper with or render inaccurate any monitoring device, method or record required to be maintained under the WQA; or
3. Fail to monitor, sample or report as required by a permit issued pursuant to a state or federal law or regulation.

D101 General Inspection and Entry Requirements

A. Nothing in this Discharge Permit shall be construed as limiting in any way the inspection and entry authority of NMED under the WQA, the WQCC Regulations, or any other applicable law or regulation. [20.6.2.3107 NMAC, 74-6-9(B) & (E) WQA]

B. The permittee shall allow the Secretary or an authorized representative, upon the presentation of credentials, to [20.6.2.3107.D NMAC, 74-6-9(B) & (E) WQA]:

1. Enter at regular business hours or at other reasonable times upon the permittee's premises or other location where records must be kept under the conditions of this Discharge Permit, or under any federal or WQCC regulation.
2. Inspect and copy, during regular business hours or at other reasonable times, any records required to be kept under the conditions of this Discharge Permit, or under any federal or WQCC regulation.
3. Inspect, at regular business hours or at other reasonable times, any facility, equipment (including monitoring and control equipment or treatment works), practices or operations regulated or required under this Discharge Permit, or under any federal or WQCC regulation.
4. Sample or monitor, at reasonable times for the purpose of assuring compliance with this Discharge Permit or as otherwise authorized by the WQA, any effluent, water contaminant, or receiving water at any location before or after discharge.

D102 General Engineering, Operational and Setback Requirements

A. Mine units shall be designed in accordance with the applicable requirements of Section 20.6.7.17 NMAC.

B. Mine units shall be operated in accordance with the applicable requirements of Section 20.6.7.18 NMAC.

C. The permittee shall meet all applicable setback requirements pursuant to Section 20.6.7.19 NMAC.

D103 General Record Keeping and Reporting Requirements

A. The permittee shall retain written records at the copper mine facility as required pursuant to Section 20.6.7.37 NMAC.

B. The permittee shall furnish to NMED, within a reasonable time, any documents or other information which it may request to determine whether cause exists for modifying, terminating and/or renewing this Discharge Permit or to determine compliance with this Discharge Permit. The permittee shall also furnish to NMED, upon request, copies of documents required to be kept by this Discharge Permit. [20.6.2.3107.D NMAC, 74-6-9 (B) & (E) WQA]

D104 General Sampling and Analytical Methods

A. Unless otherwise approved in writing by NMED, the permittee shall conduct sampling and analysis in accordance with the most recent edition of the following documents [Subsection B of 20.6.2.3107 NMAC]:

1. American Public Health Association, Standard Methods for the Examination of Water and Wastewater (18^{th}, 19^{th}, or current)
2. U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste
3. U.S. Geological Survey, Techniques for Water Resources Investigations of the U.S. Geological Survey
4. American Society for Testing and Materials, Annual Book of ASTM Standards, Part 31. Water
5. U.S. Geological Survey, et al., National Handbook of Recommended Methods for Water Data Acquisition
6. Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations
7. Methods of Soil Analysis: Part 1. Physical and Mineralogical Methods; Part 2. Microbiological and Biochemical Properties; Part 3. Chemical Methods, American Society of Agronomy

D105 Monitoring Well Abandonment

A. The permittee shall submit a written request for NMED approval to amend or modify this Discharge Permit at least 30 days prior to the anticipated destruction or removal of any monitoring wells required under this Discharge Permit. Monitoring well plugging and abandonment shall be completed in accordance with the *Ground Water Discharge Permit Monitoring Well Construction and Abandonment Conditions,* Revision 1.1, March 2011, or according to regulations issued by the Office of the State Engineer in 19.27.7 NMAC, unless an alternate method is approved by NMED. [20.6.2.3107 NMAC]

B. The request required in D105.A shall include the following information:

1. A scaled map showing the location of the monitoring well(s) and the mine units it is intended to monitor;
2. The purpose for plugging and abandoning the monitoring well(s);
3. Details, if available, on the monitoring well(s) including depth-to-water elevation, top-of-casing elevation, construction and lithologic logs;
4. ~~Recent g~~Ground water analytical results from a minimum of the most recent eight sampling events from the monitoring well(s);
5. Proposed replacement well(s), if applicable, and;
6. Same details, as applicable, as provided in D105.B.1, D105.B.3, and D105.B.4 are required for the proposed replacement monitoring well(s). New replacement wells require monitoring well completion reports pursuant to Subsection K of 20.6.7.28 NMAC.

D106 Reporting Requirements for Unauthorized Discharges

A. In the event of a spill or release that is not authorized under this Discharge Permit, the permittee shall initiate the notifications and corrective actions as required in 20.6.2.1203 NMAC. The permittee shall take immediate corrective action to contain and remove or mitigate any damage caused by the discharge. Within 24 hours after discovery of the discharge, the permittee shall verbally notify NMED and provide the information required by Paragraph (1) of 20.6.2.1203.A NMAC, and to determine applicable monitoring and reporting requirements pursuant to Paragraphs (2) and (3) of 20.6.7.29.B NMAC. Within 7 days of discovering of a discharge reportable under 20.6.2.1203 NMAC, the permittee shall submit a written report to NMED verifying the oral notification and providing any additional information or changes. The permittee shall submit a corrective action report within 15 days after discovery of the discharge. [20.6.2.1203 NMAC]

B. As part of the 24-hour spill notification requirements, the permittee shall submit a figure to NMED that clearly displays the location (or locations) of the spill and identifies nearby mine units and/or location information in latitude/longitude coordinates in decimal degrees

(XX.XXXXXX and –XXX.XXXXXX, respectively), using a specified datum of WGS 84. Submittal of location information in Universal Transverse Mercator (UTM) format is also acceptable.

D107 Modifications and Amendments

A. In the event the permittee proposes a change to the facility or the facility's discharge that would result in a change in the volume discharged; the location of the discharge; or the amount or character of water contaminants received, treated, or discharged by the facility, the permittee shall notify and obtain approval from NMED prior to implementing such changes. Such changes may require modification or amendment of this Discharge Permit, including payment of applicable fees as specified in Section 20.6.7.9 NMAC. [20.6.2.3107.C NMAC, 20.6.2.3109.E NMAC, 20.6.7.7.B(19) NMAC, 20.6.7.14 NMAC]

B. For any proposed change that would meet the definition of a discharge permit modification as specified in Paragraph P of 20.6.2.7 NMAC, the permittee shall submit for NMED approval an application for modification of this Discharge Permit pursuant to Sections 20.6.7.10 and 20.6.7.11 NMAC. Plans and specifications shall be included in the application, as applicable, pursuant to Section 20.6.7.17 NMAC.

C. For any proposed change that meets the definition of a discharge permit amendment as specified in Paragraph 19 of 20.6.7.7.B NMAC, the permittee shall submit to NMED a request for an amendment to this Discharge Permit pursuant to Section 20.6.7.14 NMAC. Plans and specifications shall be included in the request, as applicable, pursuant to Section 20.6.7.17 NMAC.

D. Pursuant to Section 20.6.2.3109 NMAC, NMED reserves the right to require a discharge permit modification in the event NMED determines that the requirements of 20.6.2 NMAC are being or may be violated, or the standards of Section 20.6.2.3103 NMAC are being or may be violated. This may include a determination that structural controls and/or management practices approved under this Discharge Permit are not protective of groundwater quality, and that more stringent requirements are needed to protect groundwater quality. The permittee may be required to abate water pollution.

D108 Compliance with Other Laws

A. Nothing in this Discharge Permit shall be construed in any way as relieving the permittee of the obligation to comply with all applicable federal, state, and local laws, regulations, permits or orders. [20.6.2 NMAC, 20.6.7.8(D) NMAC]

Table 1 – Copper Flat Development Sequence and Schedule

Project Build Out Sequence					Project Reclamation Sequence	
		Disturbed Acres				
Year	Project Activity	Facility	Cumulative	19.10.1602.D(15)(c) Reference	Year	Reclamation Activity
1	Mobilize Construction	0.00	0.00	Other Facility or Structures (c)xiii	1	
	Plant Site Grading	84.41	84.41	Other Facility or Structures (c)xiii		
	TSF Phase 1	451.50	535.91	Tailings Storage Facility (c)vii		
	Top Dressing Stockpile 1	29.33	565.24	Topsoil & Topdressing Stockpiles (c)xi		
	Construct Mill	8.51	573.75	Mills (c)viii		
	Construct Ancillary Facilities	8.89	582.64	Other Facility or Structures (c)xiii		
	Storage Areas	3.22	585.86	Storage Areas (c)x		
	EWRSP 1	15.34	601.20	Waste Rock Stockpiles (c)xii		
	EWRSP 2A	8.33	609.53	Waste Rock Stockpiles (c)xii		
	EWRSP 2B	12.73	622.26	Waste Rock Stockpiles (c)xii		
	EWRSP 3	19.54	641.80	Waste Rock Stockpiles (c)xii		
	EWRSP 4	18.10	659.90	Waste Rock Stockpiles (c)xii		
	Mine Haul Roads	5.97	665.87	Waste Rock Stockpiles (c)xii		
	Impoundments : TSF; Proc; SW A	12.92	678.79	Impoundments (c)ii		
	Collection Ditches: SW A	1.38	680.17	Impoundments (c)ii		
2	Top Dressing Stockpile 2	31.55	711.72	Topsoil & Topdressing Stockpiles (c)xi	2	Reclaim EWRSP 1
	Top Dressing Stockpile 3	3.53	715.25	Topsoil & Topdressing Stockpiles (c)xi		Reclaim EWRSP 2A
	Construct Ancillary Facilities	21.10	736.35	Other Facility or Structures (c)xiii		Reclaim EWRSP 2B
	Open Pit	82.66	819.01	Open Pit (c)vi		
	WRSP 1	3.97	822.98	Waste Rock Stockpiles (c)xii		
	WRSP 2	2.44	825.42	Waste Rock Stockpiles (c)xii		
	WRSP 3	6.07	831.49	Waste Rock Stockpiles (c)xii		
	Mine Haul Roads	11.03	842.52	Waste Rock Stockpiles (c)xii		
	EWRSP 4	4.52	847.04	Waste Rock Stockpiles (c)xii		
	Ore Stockpile	2.07	849.11	Ore Stockpiles (c)i		
	Impoundments : Surge; SW B; SW C	8.99	858.10	Impoundments (c)ii		
	Collection Ditches: SW B; SW C	4.42	862.52	Impoundments (c)ii		
3	Top Dressing Stockpile 3	10.58	873.10	Topsoil & Topdressing Stockpiles (c)xi	3	
	Open Pit	66.13	939.23	Open Pit (c)vi		
	WRSP 1	27.80	967.03	Waste Rock Stockpiles (c)xii		
	WRSP 2	4.88	971.91	Waste Rock Stockpiles (c)xii		
	WRSP 3	18.20	990.11	Waste Rock Stockpiles (c)xii		
	TSF Phase 2	28.22	1,018.33	Tailings Storage Facility (c)vii		
4	WRSP 1	7.94	1,026.27	Waste Rock Stockpiles (c)xii	4	
	WRSP 2	19.51	1,045.78	Waste Rock Stockpiles (c)xii		
	WRSP 3	18.20	1,063.98	Waste Rock Stockpiles (c)xii		
	TSF Phase 3	28.22	1,092.20	Tailings Storage Facility (c)vii		
5	Open Pit	8.27	1,100.47	Open Pit (c)vi	5	
	WRSP 2	14.63	1,115.10	Waste Rock Stockpiles (c)xii		
	WRSP 3	18.20	1,133.30	Waste Rock Stockpiles (c)xii		
	TSF Phase 4	28.22	1,161.52	Tailings Storage Facility (c)vii		
6	Open Pit (buildout complete)	8.27	1,169.79	Open Pit (c)vi	6	
	WRSP 1	0.00	1,169.79	Waste Rock Stockpiles (c)xii		
	WRSP 2	4.88	1,174.67	Waste Rock Stockpiles (c)xii		
	WRSP 3	18.20	1,192.87	Waste Rock Stockpiles (c)xii		
7	WRSP 2, 3	2.44	1,195.31	Waste Rock Stockpiles (c)xii	7	
	WRSP 3	18.20	1,213.51	Waste Rock Stockpiles (c)xii		
	TSF Phase 5 (buildout complete)	28.22	1,241.73	Tailings Storage Facility (c)vii		
8	WRSP 3	18.20	1,259.93	Waste Rock Stockpiles (c)xii	8	
9 - 11	WRSP 3 (buildout complete)	6.07	1,266.00	Waste Rock Stockpiles (c)xii	10 - 11	WRSP 3 Contour
12					12	WRSP 3 Contour, TSF Draindown - Active Evaporation
13					13	Pit Rapid Fill, WRSP 2-Upper Lift Contour, WRSP 1-Contour, TSF Draindown - Active Evaporation
14	Mining and Processing Ends				14	Rapid Fill, WRSP-2 Upper Lift Contour, WRSP 1 - Contour, Fill & Contour, WRSP 3, 2, 1, EWRSP 4 Cover & Seed, TSF Draindown - Active Evaporation
15					15	Process Area Demo, Fill & Contour, WRSP 3, 2, 1, EWRSP 3 & 4 Contour, Cover & Seed, Pit Area Contour, TSF Contour, Draindown - Active Evaporation
16					16	Process Area Fill & Contour, WRSP 3, , 2, 1, EWRSP 3 & 4 Contour, Cover, Seed, TSF Contour, Draindown - Active Evaporation
17					17	TSF Contour, Draindown - Active Evaporation
18	Evaporation Pond Construction (Project Buildout Complete)	24.05	1,290.05	Impoundments (c)ii	18	TSF Contour & Cover, Draindown - Active Evaporation, Passive Evaporation
19					19	TSF Contour, Cover, Draindown - Passive Evaporation
20 - 21					20 - 21	TSF Contour, Cover, Seed, Draindown - Passive Evaporation
22 - 38					22 - 38	TSF Draindown - Passive Evaporation
39					39	TSF Evaporation Pond Fill, Cover & Seed

Table 2 – Monitoring and Reporting Summary for DP-1840

Monitoring Report Schedule of Submittal (Subsection A of 20.6.7.29 NMAC)	
1	January 1 - June 30 (Q1 and Q2 sampling quarters) – Semi-annual report due by August 31 of each year
2	July 1 - December 31 (Q3 and Q4 sampling quarters) – Semi-annual report due by February 28 of each year
3	Annual reports due by February 28 of each year

Reporting Summary

Annual Reporting Frequency	Number of Sites	Description
2	Not Applicable	Monitoring reports – All applicable requirements of Subsections A through H of 20.6.7.29 NMAC, and C113.-
2	Not Applicable	Additional Discharge Volume reporting listed in C111.L
2	1	Mine facility ground water elevation contour map
1	1	OPSDA and AOPHC Map(s)

Monitoring Schedule

Area	Identification Number	Sampling type	Q1	Q2	Q3	Q4	Notes
Open Pit	GWQ96-22A	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ96-22B	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ11-26	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ96-23A	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ96-23B	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ11-24A	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ11-24A	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-1	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-2	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-21	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-22	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
TSF	GWQ-1	mw & p	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ-8	mw & p	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ-10	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ-12	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	NP-1	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	NP-4	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ94-14	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ94-15	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ94-21A	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ94-21B	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	GWQ13-28	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-14	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-15	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-16	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-18	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-19	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-23	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
TSF/UCP	PGWQ-17	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
TSF/WRSP-2 &-3	PGWQ-13	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
Surge Pond	GWQ-5R	mw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-9	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
WRSP-2 &-3	PGWQ-3	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-4	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-5	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	

Commented [BR33]: Changed to Suites A-D for Quarters 2-4 by NMED and in response to comments received by NMCC

EXHIBIT 1

	PGWQ-8	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-20	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-24	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
SW-C/ WRSP-2 & WRSP-3	PGWQ-6	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
	PGWQ-7	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
SW-A	PGWQ-10	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
PWR	PGWQ-11	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
SW-A/PWR	PGWQ-12	Pmw	A-F,W	A-D,W	A-D,W	A-D,W	
Grayback Arroyo^	SWQ-1	sw	A-F,W	A-D,W	A-D,W	A-D,W	~~Tot. +~~ ~~Diss.~~ Suite C Tot.
	SWQ-2	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	SWQ-3	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	SWQ-4	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	SWQ-5	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
Impoundments	SW-A(M/S-9)	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	SW-B (M/S-10)	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	SW-C (M/S-11)	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	PWR (M/S-8)	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	Surge Pond (M/S-14)	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	UCP (M/S-6)	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
	TSF (M/S-4)	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
Mine Pit Water	Dewatering Sump	sw	A-F,W	A-D,W	A-D,W	A-D,W	Suite C Tot.
Seeps/Springs	Outside OPSDA only	spg/ sp	A-F,W	A-D,W	A-D,W	A-D,W	If encountered
Flow Meters/Discharge Volume Reporting	M/S-1 through M/S-17		C.111.L &M	C.111.L &M	C.111.L &M	C.111.L &M	See Figure 3

Sampling Analytical Suites (dissolved concentrations in mg/L, unless otherwise noted ~~otherwise~~):

A = Field Parameters: Temperature (°C), pH, specific conductance (µS/cm),

B = General Chemistry and Inorganic Parameters: alkalinity-bicarbonate (alk-HCO_3), alkalinity-carbonate (alk-CO_3), alkalinity-total (alk-Tot), calcium (Ca), chloride (Cl), cyanide (CN), fluoride (F), magnesium (Mg), potassium (K), sodium (Na), sulfate (SO_4), and total dissolved solids (TDS)

C = Metal Parameters: aluminum (Al), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmiun (Cd), chromiun (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), manganese (Mn), molybdenum (Mo), nickel (Ni), selenium (Se), silver (Ag), total mercury (Hg), uranium (U), and zinc (Zn).

D = Nutrients: Total Kjeldahl nitrogen (TKN), and Nitrate-Nitrogen (NO_3-N)

E = Radioactivity: Combined Radium-226 and Radium-228 (pCi/L)

F = Organic Parameters: Total Petroleum Hydrocarbons (TPH), benzene, polychlorinated biphenyls (PCBs), toluene, carbon tetrachloride, 1,2-dichloroethane (EDC), 1,1-dichloroethlyene (1,1-DCE), 1,1,2,2-tetrachloroethylene (PCE), 1,1,2-trichloroethylene (TCE), ethylbenzene, total xylenes , methylene chloride, chloroform, 1,1-dichloroethane, ethylene dibromide (EDB), 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, vinyl chloride, PAHs: total naphthalene plus monomethylnaphthalenes, benzo-a-pyrene

Measurements

W = Depth-to-water measurement to the nearest 0.01 foot

^ = See C111.H

Commented [BR34]: Totals for suite C only.

Explanation to Abbreviations and Symbols		
mw = monitoring well	WRP = Waste Rock Stockpile	Sampling Quarter:
Pmw = proposed monitoring well	PWR = Process Water Reservoir	Q1 = Jan-Mar
sw = surface water	UCP = Underdrain Collection Pond	Q2 = Apr-Jun
p = production well	SW = Impacted Stormwater Impoundment	Q3 = Jul-Sep
spg = spring	Suite C Tot. = Total Concentrations for Suite C	Q4 = Oct-Dec
sp = seep	M/S-# = Measuring/Sampling Point	
Tnk = tank	OPSDA = Open Pit Surface Drainage Area	
	AOPHC-= Area of Open Pit Hydrologic Containment	

Figure 1 – Authorized Mine Unit Footprints

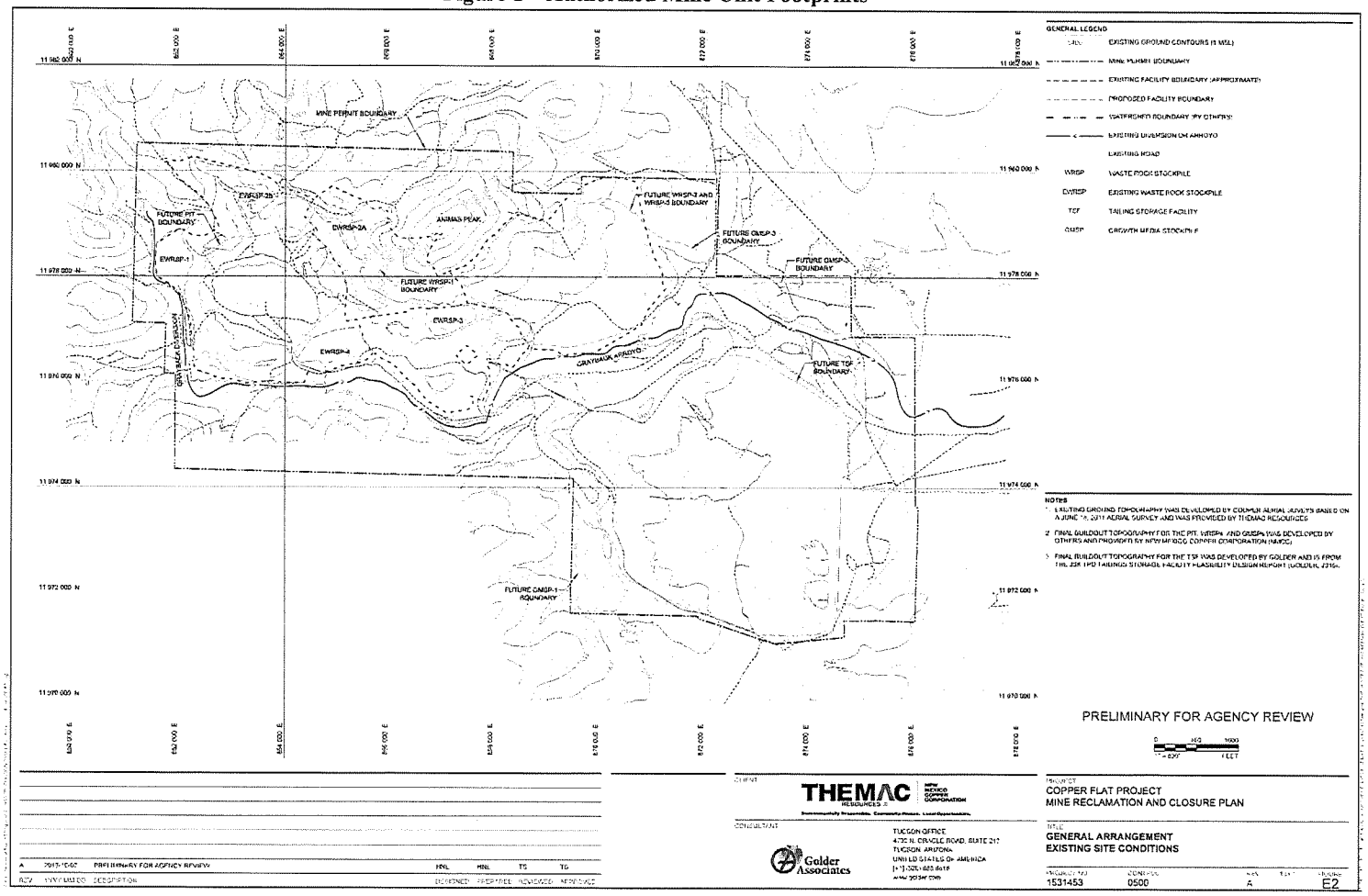

EXHIBIT 1

Figure 2 – Ground and Surface Water Sampling Locations

Commented [BR35]: Figure 2 has been updated to provide more clarity on the ground and surface water sampling locations.

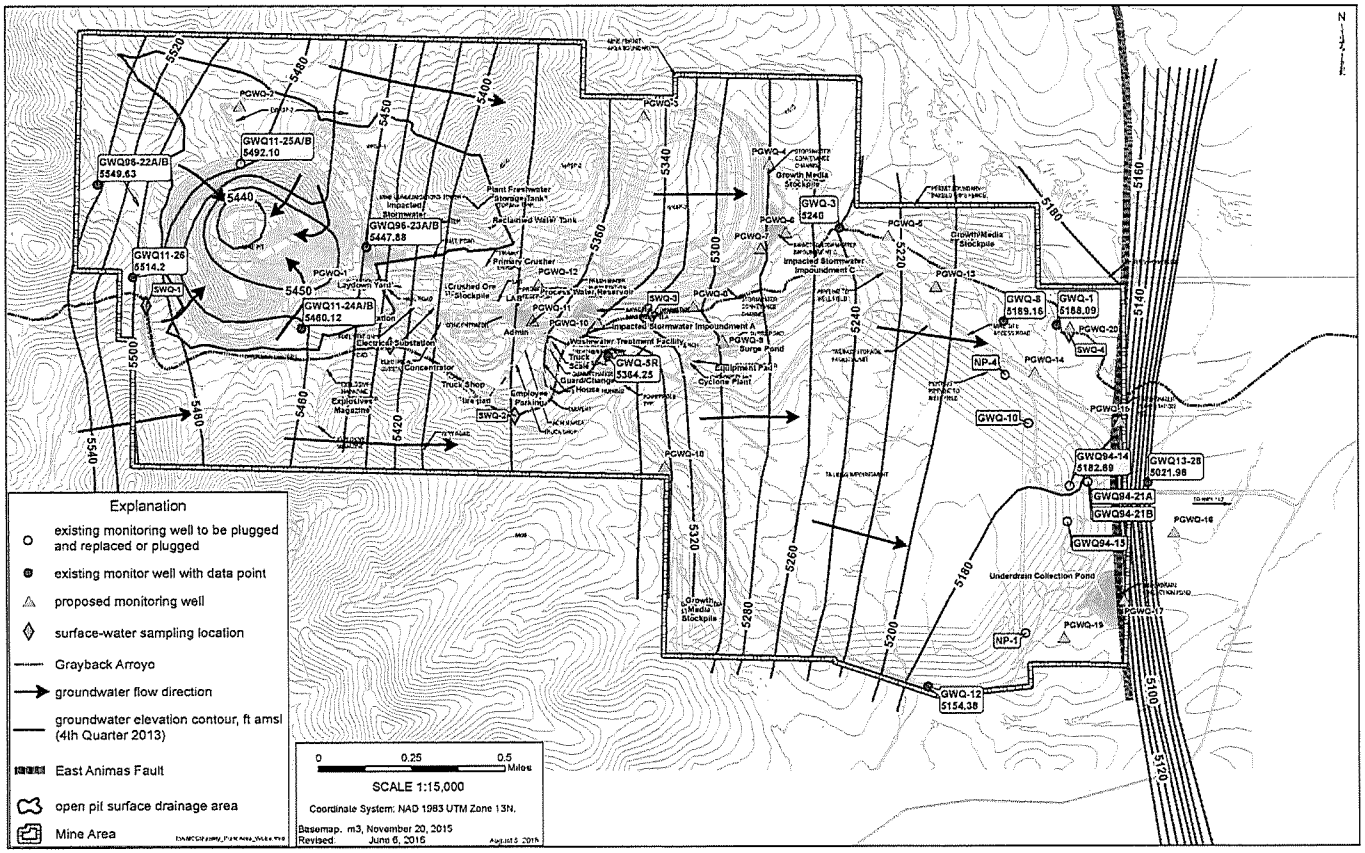

EXHIBIT 1

Figure 3 – Flow Meter and Process Water Sampling Locations

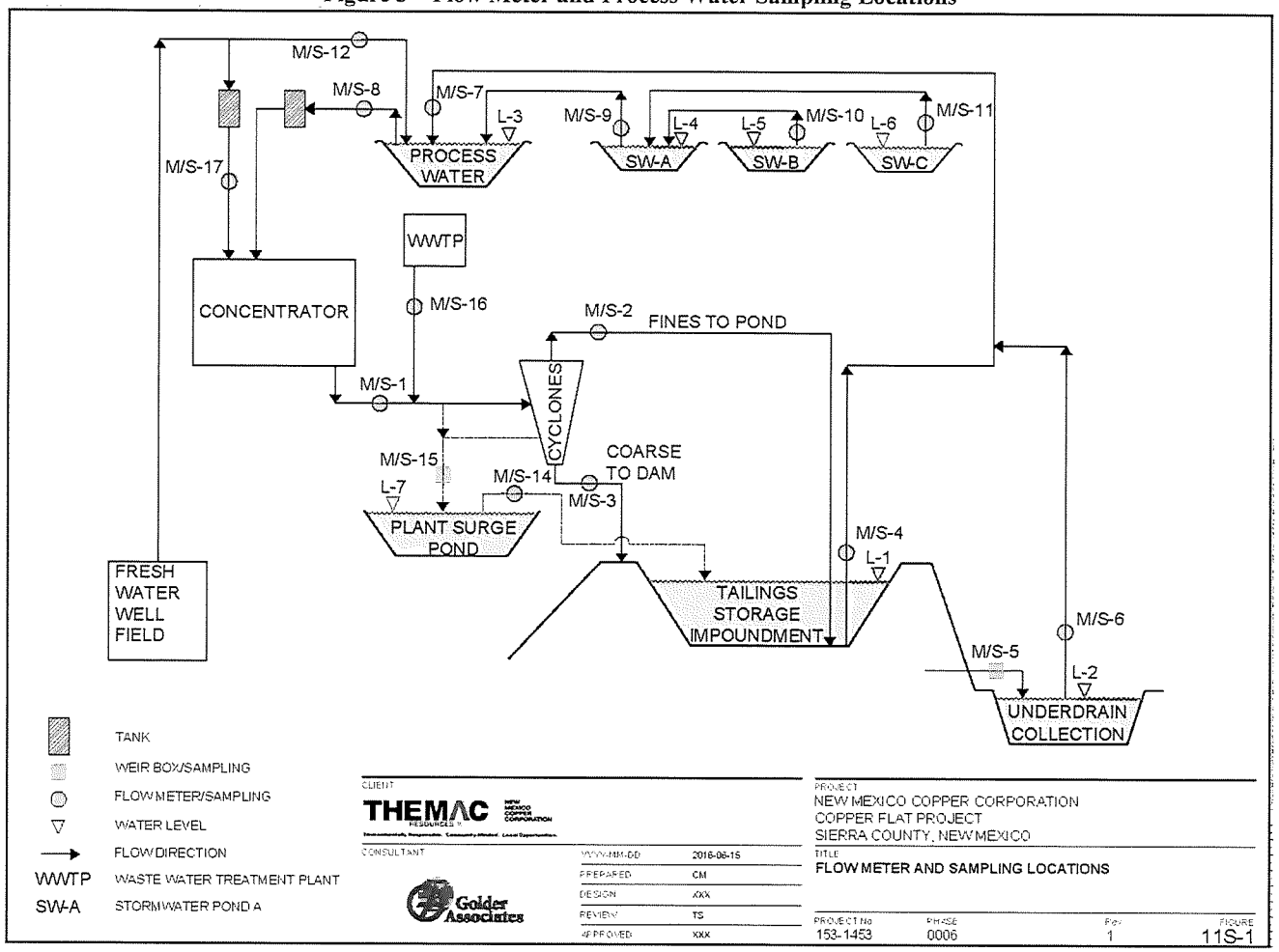

EXHIBIT 1

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUNDWATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840 **NO. GWB 18-06 (P)**

WRITTEN TESTIMONY OF KURT VOLLBRECHT

My name is Kurt Vollbrecht, and I am the Program Manager of the Mining Environmental Compliance Section ("MECS") with the New Mexico Environment Department ("Department" or "NMED") Water Protection Division's Ground Water Quality Bureau ("GWQB"). I am presenting this testimony in this hearing concerning the draft Discharge Permit number 1840 ("DP-1840") for the proposed Copper Flat Mine in Sierra County, New Mexico. The latest draft of the Discharge Permit for the Copper Flat Mine ("DP-1840" or "Permit") is marked as NMED Exhibit 1.

I. QUALIFICATIONS

I hold a Bachelor of Science degree in Geology from California State University, Hayward and a Master of Science degree in Geology from the New Mexico Institute of Mining and Technology. I have held the position of Program Manager for nearly six years and I oversee 12 supervisory and technical staff. In total, I have worked for NMED for nearly 20 years, holding a variety of technical and supervisory positions in NMED's Water Protection Division (and its predecessor divisions), including the last 13 years with MECS. MECS is responsible for all permitting, spill response, abatement, and public participation activities associated with mining facilities in New Mexico in accordance with the New Mexico Water Quality Act, NMSA 1978, §§ 74-6-1 to -17, and the Ground and Surface Water Protection Regulations, 20.6.2 NMAC and 20.6.7 NMAC.

EXHIBIT 2

A copy of my resume is marked as NMED Exhibit 5. It is accurate and current.

II. BASIS FOR DISCHARGE PERMIT

A discharge permit is required for the proposed Copper Flat Mine because; 1) the Copper Flat Mine will discharge effluent in a manner such that the effluent may move directly or indirectly into groundwater within the meaning of 20.6.2.3104 NMAC; 2) the discharge is such that effluent may move into groundwater of the State of New Mexico which has an existing total dissolved solids (TDS) concentration of less than 10,000 mg/L within the meaning of 20.6.2.3101.A NMAC; and 3) the discharge has the potential to affect a place of withdrawal of groundwater for present or reasonably foreseeable future use within the meaning of the Water Quality Act (WQA). NMSA 1978, § 74-6-5.E.3 and 20.6.2.3103 NMAC. Pursuant to 20.6.2.3104 NMAC, no person shall cause or allow effluent to discharge so that it may move directly or indirectly into groundwater unless discharging pursuant to a discharge permit issued by the NMED Secretary.

III. REGULATORY FRAMEWORK

The Department issues groundwater discharge permits pursuant to the WQA, NMSA 1978, §§ 74-6-1 through 74-6-17, and the New Mexico Ground and Surface Water Protection Regulations, Title 20, Chapter 6, Part 2 of the New Mexico Administrative Code (NMAC), issued by the New Mexico Water Quality Control Commission (WQCC). 20.6.2 NMAC provides for ground and surface water protection under the Water Quality Act. In addition to the requirements of 20.6.2 NMAC, the proposed Copper Flat Mine as defined as a "new copper mine facility" is required to meet the requirements of the Ground Water Protection – Supplemental Permitting Requirements for Copper Mine Facilities, Title 20, Chapter 6, Part 7 NMAC.

Part 20.6.7 NMAC provides for prescriptive engineering design, operational, monitoring, contingency, and closure requirements at copper mine facilities to ensure ground and surface water

protection under the Water Quality Act. The Department's GWQB MECS implements the provisions of these rules as applied to mine-related discharges with the potential to adversely impact groundwater. Groundwater discharge permits are intended to establish the terms and conditions under which a permittee may discharge contaminants in a manner that is protective of groundwater.

In addition to the New Mexico Ground and Surface Water Protection Regulations and Supplemental Permitting Requirements for Copper Mine Facilities, the Copper Flat Mine is subject to a variety of other state and federal regulatory requirements. These include but are not limited to the requirements of the federal National Environmental Policy Act ("NEPA"), the New Mexico Mining Act requirements under the authority of the New Mexico Mining and Minerals Division ("MMD"), and the requirements for dam safety and water rights under the authority of the Office of the State Engineer.

NMED was an active participant in the NEPA process and development of an Environmental Impact Statement ("EIS") by the United States Bureau of Land Management ("BLM") as a cooperating agency pursuant to a Memorandum of Understanding ("MOU") specific to the development of the Copper Flat Mine EIS signed by NMED on September 9, 2011 (Bates 2166-2172). In addition to the MOU with BLM regarding the Copper Flat Mine EIS development, NMED has entered into an MOU with BLM signed by NMED on March 11, 2016 that establishes procedures for implementing financial assurance requirements. The purpose of the financial assurance MOU with BLM is to set forth a framework that minimizes duplication of financial assurance requirements by allowing for joint financial assurance to be held by NMED and BLM at sites that are subject to the financial assurance requirements of both agencies. MMD has a similar MOU in place with BLM.

NMED has in place a Joint Powers Agreement ("JPA") with the New Mexico Energy, Minerals and Natural Resources Department ("EMNRD") that establishes procedures for implementing financial assurance requirements. The purpose of the financial assurance JPA with EMNRD is to set forth a framework that minimizes duplication of financial assurance requirements by allowing for joint financial assurance to be held by NMED and EMNRD at sites that are subject to the financial assurance requirements of both agencies.

IV. HISTORY OF DISCHARGE PERMITTING PROCESS

NMCC initiated the permitting process with NMED for the Copper Flat Mine in March of 2011 through submittal of an application to modify Discharge Permit number 1 ("DP-1"), the discharge permit for a previous mine at the same site. The application included a Stage 1 Sitewide Abatement plan proposal. Within this time frame NMCC also initiated the NEPA process with BLM, as well as began discussion with MMD regarding the permitting process pursuant to the New Mexico Mining Act. NMED never acted upon that application, as it became apparent that significant changes to the mine plan were likely as a result of the NEPA process that had just begun. In a letter dated November 26, 2014 (Bates 10497-10499) NMED provided a status update to NMCC that included a discussion indicating that, due to significant changes to the proposed mine plan, a revised discharge permit application was required and that it would be processed in accordance with the Copper Mine Rule as promulgated in December of 2013. In December of 2015, NMCC submitted a revised discharge permit application as required to meet Copper Mine Rule requirements and to reflect the revised plan of operations. In a letter dated September 19, 2016 NMED informed NMCC that the revised permit application was considered a new permitting action and assigned the proposed new copper mine facility a new discharge permit number to the Copper Flat Mine (DP-1840), thereby retiring, DP-1.

V. ADMINISTRATIVE RECORD

NMED prepared an administrative record and index in this matter and posted it initially on the Department website on July 11, 2018. NMED provided various interested parties with notice of the posting and provided the administrative record to those parties in DVD format as well. NMED filed the index with the hearing office on July 10, 2018. I have reviewed the overall content and I am generally familiar with it. To the best of my knowledge it is accurate and complete.

VI. PUBLIC PARTICIPATION

NMCC submitted the application for Discharge Permit Modification to NMED on March 31, 2011 (Bates 299-302, 307-1709). NMED determined the application administratively complete on May 3, 2011 and NMCC provided an affidavit of public notice one ("PN-1") completion dated June 28, 2011 (Bates 2143-2156) to NMED. A revised application to reflect the revised mine operation plan and meet Copper Mine Rule requirements submitted on December 11, 2015 (Bates 11377-11378, 12354-13547). Public notice of the revised application was issued on January 15, 2016 (Bates 13567-13569). Following technical review of the application, NMED created a draft Discharge Permit, DP-1840. The Department published notices of the draft DP-1840 for a 90-day comment period from February 2, 2018 until May 5, 2018. The public notice was initially established for the required minimum 30-day time frame, and then extended an additional 60 days in response to requests for additional time by members of the public. In response to the public notice, the Department received comments and requests for a public hearing from three non-government organizations, two governmental organizations, the Applicant, and 46 individuals.

Upon the Department's determination that a hearing was to occur, the Department notified the public of the hearing determination by posting the Hearing Notice on the Department's website,

publishing the Hearing Notice in the Albuquerque Journal (August 8, 2018) and the Truth or Consequences Herald (August 15, 2018), mailing the Hearing Notice to persons on the facility-specific mailing list, and mailing a Notice to affected public agencies and tribal entities on or about August 8, 2018. In addition, the 46 persons who had submitted comment and requests for hearing via email were provided email notification of the hearing on two occasions. NMED also posted the Hearing Notice at various locations in the affected communities including the Elephant Butte Municipal Building, Truth or Consequence Clerk's Office, Sierra County Clerk's Office, Truth or Consequences Post Office, Williamsburg Municipal Office, and a notice posted in the Hillsboro Post Office indicating the Public Notice and Fact Sheet are located in the Hillsboro Public Library. The Hearing Notice included all information required at 20.6.2.3108.L NMAC including the time and place of the hearing and a brief description of the hearing process. The Hearing Notice included a fact sheet about the proposed Discharge Permit and the Copper Flat Mine. The Department provided both English and Spanish versions of the Hearing Notice and fact sheet.

VII. SURFACE WATER OF THE STATE DETERMINATION

Pursuant to 20.6.4.7(S)(5) NMAC "*Surface water(s) of the state* means all surface waters situated wholly or partly within or bordering upon the state, including... any "waters of the United States" as defined under the Clean Water Act...Surface waters of the state does not include private waters that do not combine with other surface or subsurface water or any water under tribal regulatory jurisdiction pursuant to Section 518 of the Clean Water Act..." Therefore, to be exempt from the definition of a "Surface water(s) of the state", a water body; (1) must not combine with other surface or subsurface waters, (2) must not be a water of the United States, and (3) must be located entirely on private lands.

NMCC has conducted groundwater modeling that demonstrates that the open pit water body will constitute a hydrologic sink at closure (Bates 09097-09511), and therefore will not combine with subsurface water. Creation of an area of open pit hydrologic containment is a key component of the Copper Rule to ensure containment of any groundwater contamination that may occur as a result of open pit mining. Evaporation from the open pit water body acts as the "pump" to maintain capture of groundwater. In addition, Grayback Arroyo, which originally flowed through the location of the existing open pit water body was diverted around the open pit area years ago prior to historic mining. The diversion of Grayback Arroyo will be maintained throughout mining and following closure of the Copper Flat Mine. Therefore, the open pit water body also will not combine with other surface waters.

The United States Army Corp of Engineers issued a determination that the open pit water body was not a water of the United States (Action No. SPA-2014-00364-LCO) (Bates 10438-10448). The NMED Surface Water Quality Bureau provided a letter dated October 21, 2016 to NMCC indicating that a demonstration that the open pit water body will not combine with other surface or subsurface water at closure had been made (Bates 13891-13892). The letter further requested that NMCC work with the Bureau of Land Management to verify that the open pit water body would remain entirely on private land following closure. In a letter from NMCC to the SWQB dated January 25, 2018 additional information was provided demonstrating that the future pit lake water body would remain wholly on private land (Bates 15848-15853).

Based on documents contained within the Administrative Record as referenced above, the NMED has determined that the open pit water body that will be present at the Copper Flat Mine at closure will not be a Surface Water of the State and is not subject to surface water quality standards found at 20.6.4 NMAC.

VIII. FINANCIAL ASSURANCE

NMCC submitted a proposed financial assurance cost estimate to MMD by letter dated August 9, 2018. On August 15, 2018 NMED received from MMD a request for review and comment on the financial assurance cost estimate within 60 days. The financial assurance cost estimate must meet the requirements of the New Mexico Mining Act Financial Assurance Requirements set forth in 19.10.12 NMAC, as enforced by MMD. Although NMED does not have specific regulations governing financial assurance, NMED review is required to ensure the closure cost estimate meets the requirements of the WQCC Regulations including 20.6.2.and 20.6.7 NMAC. In the August 9, 2018 cover letter NMCC acknowledges that financial assurance is required by MMD, BLM, and NMED for the Copper Flat Mine. Further, NMCC requests that all three agencies engage with NMCC to determine the final financial assurance cost estimate that is required. NMCC requested that the final approved financial assurance be held jointly by the three agencies. As stated above, the existence of MOU's between BLM and the State, and a JPA between NMED and MMD facilitate the three agencies holding joint financial assurance for one site.

I have reviewed the draft permit and found it to be consistent with the requirements of both the Copper Rule 20.6.7 NMAC and the Ground and Surface Water Protection Rules 20.6.2 NMAC.

This concludes my testimony.

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUND WATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840 **NO. GWB 18-06 (P)**

WRITTEN TESTIMONY OF BRADLEY REID

I. INTRODUCTION

My name is Bradley Hamilton Reid, and I am employed by the Mining Environmental Compliance Section ("MECS") of the New Mexico Environment Department ("Department" or "NMED") Water Protection Division's Ground Water Quality Bureau ("GWQB"). I present this written testimony on behalf of NMED in this proceeding. The focus of this proceeding is the draft Discharge Permit associated with an application submitted by the New Mexico Copper Corporation ("NMCC" or "Applicant") for the proposed Copper Flat Mine located approximately five miles northeast of Hillsboro, Sierra County. The latest draft of Discharge Permit 1840 ("DP-1840" or "Discharge Permit") is marked as NMED Exhibit 1. References to the draft Discharge Permit in my testimony refer to that version of the proposed Discharge Permit. This written testimony focuses primarily on the individual Discharge Permit requirements, their regulatory basis, and how those permit requirements ensure protection of ground water.

II. QUALIFICATIONS

I am a permit lead with MECS, with a primary focus on copper mine facilities. I have held my current position at MECS since December 2012. My duties in MECS include drafting discharge permits and ensuring their compliance, spill response, public participation, and oversight of mining facilities that are abating groundwater in accordance with the New Mexico

Water Quality Act, NMSA 1978, §§ 74-6-1 to -17, and the Ground and Surface Water Protection Regulations, 20.6.2 NMAC and the Ground Water Protection – Supplemental Permitting Requirements for Copper Mine Facilities, 20.6.7 NMAC. In total, I have worked for NMED for nearly 15 years. Prior to my time at MECS, I was employed in the Pollution Prevention Section within the GWQB for approximately nine years.

I hold a Bachelor of Science degree in Geological Sciences with Special Honors from the University of Texas at Austin, and a Master of Science degree in Geological Sciences, also from the University of Texas at Austin.

A copy of my resume is marked as NMED Exhibit 6. It is accurate and current.

III. DESCRIPTION OF FACILITY

The Copper Flat Mine as proposed will consist of an open pit; waste rock stockpiles; stormwater impoundments and associated collection and conveyance systems; a Process Facility Area consisting of a Concentrator and associated mineral processing units; the synthetically lined Tailing Storage Facility ("TSF"); and associated mine infrastructure. The mine project is proposed to disturb approximately 1,290 acres of which approximately 910 acres were previously disturbed from historic mining operations at the site.

The Applicant is proposing to construct and operate the Copper Flat Mine and Concentrator using conventional copper and molybdenum sulfide flotation circuits and a gravity gold recovery circuit with a maximum throughput of 38,000 tons per day of ore, generating up to 25,264,000 gallons per day ("gpd") of tailings slurry. The copper and molybdenum concentrates produced at the Process Facility Area will be packaged for off-site transport and additional processing. Over an estimated eleven-year operational period, the Applicant intends to mine approximately 125 million tons of ore from the copper-rich ore deposit for processing at the Process Facility Area,

and place 33 million tons of waste rock on three delineated waste rock stockpiles located peripheral to the open pit ("WRSP-1"), and on the east flank of Animas Peak ("WRSP-2," "WRSP-3").

The synthetically lined TSF is proposed to be constructed due east of the Process Facility Area. Tailings slurry (i.e., process water and flotation tailings) containing approximately 29% solids by weight will be gravity conveyed from the Concentrator through a Cyclone Plant to separate the tailings into coarse and fine fractions. The coarse fraction tailings sand cyclone underflow will be deposited at the tailing dam and the fine fraction tailings slime cyclone overflow will be discharged to the interior of the TSF.

After the cessation of mining, the pit is proposed to be rapidly re-filled with fresh water to the modeled static water table, forming a pit water body. Waste rock stockpiles, the TSF, and other impacted areas will be reclaimed and revegetated in accordance with Copper Rule requirements and DP-1840 as applicable; and the final Closure/Closeout Plan approved by NMED and the New Mexico Mining and Minerals Division pursuant to the New Mexico Mining Act.

Groundwater beneath the mine units regulated pursuant to DP-1840 is at a depth ranging from approximately 7 to 156 feet with a pre-discharge total dissolved solids ("TDS") concentration ranging from approximately 317 to 868 milligrams per liter. The geology of the site consists of a quartz monzonite stock that hosts the ore body situated within volcanic crystalline andesite with low permeability surrounding the quartz monzonite and beneath the mineral processing and waste rock storage units. Santa Fe Group basin fill is present beneath the synthetically lined TSF, and consists of interbedded layers of poorly consolidated sand, silt, clay, and conglomerate.

IV. DESCRIPTION OF DRAFT DISCHARGE PERMIT DP-1840

A Discharge Permit is conditioned through requirements developed pursuant to the New Mexico Water Quality Act, NMSA 1978, § 74-5-1 through -17, the New Mexico Ground and

Surface Water Protection Regulations (Part 20.6.2 New Mexico Administrative Code ("NMAC")) and the Supplemental Permitting Requirements for Copper Mine Facilities ("Copper Mine Rule" or "Copper Rule" Part 20.6.7 NMAC).

The draft Discharge Permit is based on the Discharge Plan. The Discharge Plan for DP-1840 includes application materials submitted by the permittee to NMED dated December 11, 2015, Revision 1 of the Discharge Permit Application dated August 2017 ("Revised Application"), and materials contained in the DP-1840 administrative record prior to issuance of the draft Discharge Permit.

DP-1840 was drafted using a standardized permitting template developed for permitting copper mine facilities and other mine facilities throughout the State. The permit template is divided into four parts: Part A - General Information, Part B - Facility Specific Information, Part C - Facility Specific Requirements, and Part D - General Conditions. Part A provides a statement of purpose, a brief outline of the discharge authorizations, and defines applicable regulations, permit duration, and terms of issuance. The last section of Part A (A103.D) lists additional requirements added to the Discharge Permit as authorized by Subsection I of 20.6.7.10 NMAC for requirements that the Department imposes on a discharge permit in accordance with Section 74-6-5 NMSA that are not included in the Copper Rule. As required by Subsection I of 20.6.7.10 NMAC, NMED provided written explanations of the reasons for the additional permit requirements in the cover letter accompanying the draft Discharge Permit dated February 2, 2018.

The first three sections of Part B (B100-B102) provide the history of the site; a facility description and overview of site operations; a summary of the permitting history; information related to location, and groundwater and process water characteristics. The next two sections (B103 and B104) define the mine units authorized for the discharge and management of water

contaminants; and authorize discharges and discharge volume limits pursuant to system design and operational requirements set forth in DP-1840, and the Discharge Plan.

Part C contains facility specific design, construction, location, sitewide water management, monitoring, contingency, closure, post-closure, abatement, and financial assurance requirements for Copper Flat Mine set forth in accordance with Subsection C of 20.6.2.3106 NMAC and Section 20.6.2.3107 NMAC to ensure compliance with Part 20.6.2 NMAC, and in accordance with applicable requirements of Part 20.6.7 NMAC.

Part D contains general requirements pursuant to Part 20.6.2 NMAC and Part 20.6.7 NMAC. These requirements are not specific to Copper Flat Mine and are general permit requirements.

V. CHANGES TO DRAFT DISCHARGE PERMIT IN RESPONSE TO COMMENTS

NMED issued public notice of the availability of the initial draft of DP-1840 on February 2, 2018. The 30-day public comment period was extended an additional 60 days, allowing a total of 90 days for the public to provide comment on the draft discharge permit. The comment period ended on May 5, 2018. In response to the public notice, NMED received comments on the initial draft of DP-1840 and requests for a public hearing from three non-government organizations, two governmental organizations, the Applicant, and 46 individuals. As a result of careful consideration of comments received, NMED is proposing changes to be incorporated into the final version of DP-1840. NMED provided a subsequent draft DP-1840 in redline strikeout to New Mexico Environmental Law Center ("NMELC"), Elephant Butte Irrigation District ("EBID"), and the Applicant on August 10, 2018 to ensure the parties were informed of these proposed changes in advance of submittal of direct testimony. The edits are shown in DP-1840, marked as NMED

Exhibit 1, as redline/strikeout, and explanation for the changes are provided in the comment fields located along the right-hand side of the document.

For the most part, these changes fall into four categories:

1. Typographical corrections and clarifying edits to language, as noted either by NMED in preparing the testimony or suggested by other parties.
2. Changes made to ensure greater consistency between the permit and the requirements of the Copper Rule.
3. Requirements added in response to comments received from NMELC, EBID, the Applicant, or in one case, a member of the public.
4. Requirements added to specify that the Applicant develop a Sitewide Water Management Plan.

Overall, these proposed edits strengthen and clarify DP-1840, and impose some additional requirements on the Applicant. The edits also represent a commitment by NMED for continuous improvement in the permitting process. NMED refines each Copper Rule discharge permit developed to ensure each permit is clear, concise, and in alignment with the Copper Rule. The following is a summary highlighting some of the improvements made to DP-1840.

Recommencement of Operations – In response to comments received from the Applicant, NMED added Requirement B104.O to clarify that the Permittee must comply with recommencement notification should Copper Flat Mine go on standby pursuant to the Mining Act. The reason for this Requirement is that the Copper Flat Mine falls under the definition of a "new copper mine facility" as set forth in Section 20.6.7.7 NMAC. Although Copper Flat Mine will never meet the definition of an "existing copper mine facility", it should still be subject to the notification requirements set forth in Subsection C of 20.6.2.18 NMAC in the event the mine

returns from standby to active status or constructs new mine units added during the life of the mine and not already authorized for discharge. As such, B104.O clarifies notice of mining operations and discharge requirements of Subsection C of 20.6.2.18 NMAC.

Construction Quality Assurance/Construction Quality Control Plan - In response to a concern raised by a member of the public, NMED has added Requirement C104.C to require that the Applicant submit a construction quality assurance/construction quality control (CQA/CQC) plan a minimum of 90 days prior to construction of any impoundment that requires a liner system at Copper Flat Mine. A CQA/CQC plan as set forth by Subsection C of 20.6.7.16 NMAC ensures that construction of liner systems meet all design criteria, plans and specifications. NMED believes existing Requirements C100 and D102.A in DP-1840 address this issue but agrees that the addition of C104.C adds clarity to DP-1840.

TSF Dam Permit - Upon consideration of comments received on the draft DP-1840, NMED added Requirement C105.C.2 to ensure that the Applicant submit to NMED documentation of compliance with the Dam Safety Bureau of the Office of the State Engineer permitting requirements prior to initiation of construction of any portion of the TSF and associated dam. Addition of this requirement strengthens the requirements listed in Section C105 of DP-1840. NMED has been in communication with the Dam Safety Bureau of the Office of the State Engineer and understands that NMCC is currently in compliance with Office of the State Engineer regulations for the existing tailing storage facility.

Sitewide Water Management Plan - NMED added Requirement C108.A, and related Requirements C102.C, C113.F, C113.L, C114.C to require that the Applicant combine three separate water management plans required by the Copper Rule into one comprehensive sitewide plan ("Sitewide Water Management Plan") that meets the requirements of Paragraph (4) of

20.6.7.17.C NMAC (Stormwater Management Plan), Subsection C of 20.6.7.24 NMAC (Mine Operation Water Management Plan), and Subsection K of 20.6.7.30 NMAC (Interim Emergency Water Management Plan).

This water management plan approach was originally developed by NMED as a result of discussions with Freeport-McMoRan Chino Mines Company and the Gila Resources Information Project during the Continental Mine Discharge Permit ("DP-181") process, to which Freeport-McMoRan Chino Mines Company is the responsible party. The parties reached concurrence that a unified sitewide water management plan, with annual updates, provides more clarity and reduces potential redundancy which may occur with three separate plans. Because this new requirement for a sitewide water management plan developed for DP-181 occurred after the initial draft DP-1840 was noticed on February 2, 2018, NMED has added these requirements to DP-1840 to reflect this refined permitting approach. Accordingly, a Sitewide Water Management Plan will be required for all copper mine facilities in the future.

Additional Monitoring Wells – Upon further examination of the monitoring well network proposed by the Applicant, and in consideration of comments received on draft DP-1840, NMED has added Requirement C113.I to require that the Applicant install two more monitoring wells at Copper Flat Mine in addition to those already required to be installed under draft DP-1840. These two wells will provide additional groundwater information for two mine units and strengthen the DP-1840 groundwater monitoring plan. One of these monitoring wells is proposed to be located on the south side and cross gradient from the TSF, and the second additional monitoring well is required north of and cross gradient to WRSP-2 and WRSP-3.

NMED received comments from the Applicant requesting elimination of two additional monitoring NMED is requiring to be located around the open pit wells as specified in Requirement

C116.C. These wells are necessary to fulfill the requirements of Subparagraph (4) of 20.6.7.28.B NMAC which states, "a permittee shall install a sufficient number of monitoring wells around the perimeter of an open pit to monitor ground water quality and the hydrologic gradient around the pit." In addition, both these wells will provide critical groundwater information for abatement purposes.

Edits made to draft DP-1840 since issuance on August 10, 2018 - NMED has made a few minor edits and typographical corrections since providing the draft of DP-1840 in redline strikeout to NMELC, EBID, and NMCC on August 10, 2018. The edits are as follows:

1. In Section C109, the word "existing" has been removed from C109.A; and the order of C109.A and C109.B have been reversed.
2. In Requirement C113.H, a quotation mark was added in front of the word "shall".
3. In Requirement B103.D.2, a typographical error listing the TSF liner thickness as "80-millimeter (mil)" was corrected to read "80-mil".
4. In Requirement B103.F.4, Stormwater Impoundments A - C were all defined in parenthesis as "(SW-A)", "(SW-B)", and "(SW-C)".
5. In Requirement B104.A, a typographical error of the discharge volume was corrected to change the discharge volume from "25,246,000" to "25,264,000".

VI. ADHERENCE TO COPPER RULE

In this part of my testimony I will discuss how the draft DP-1840 and its authorized mine units meet the requirements of the Copper Rule.

Copper Flat Open Pit – Section C102 of DP-1840 addresses the facility specific requirements of the Copper Flat Open Pit. The Copper Flat Open Pit is expected to remain a hydrologic evaporative sink throughout operations and after post mining rapid-fill operations are

completed (Bates 15726-15760; Bates 11304-11306). The area of open pit hydrologic containment ("AOPHC") is expected to enlarge significantly during the operational period as the pit is dewatered and deepened to accommodate mining (Bates 17590-17600). Pursuant to Subsection D of 20.6.2.7.24 NMAC and Paragraph (2) of 20.6.7.33.D NMAC, the standards of Section 20.6.2.3103 NMAC will not apply inside the AOPHC during operations and after closure of Copper Flat Mine, so long as the open pit remains a hydrologic evaporative sink.

In accordance with Subsection B of 20.6.2.24 NMAC, DP-1840 specifies that the existing diversion structure in Grayback Arroyo be maintained during operations to convey non-impacted stormwater flows generated in Grayback Arroyo and its tributaries around the perimeter of the open pit.

In summary, operation of the Copper Flat Open Pit as proposed by the Applicant and authorized in DP-1840 meet applicable requirements of Section 20.6.7.24 NMAC.

Waste Rock Stockpiles - Section C103 of DP-1840 addresses the facility specific requirements of the waste rock stockpiles at the Copper Flat Mine. The Applicant is proposing to construct three waste rock stockpiles ("WRSP-1", "WRSP-2", and "WRSP-3") for placement of approximately 33 million tons of waste rock over the estimated eleven-year operational period of the mine. DP-1840 dictates that the proposed waste rock stockpiles be designed and constructed to meet the requirements of Subsection A of 20.6.7.18 NMAC (i.e., planning for closure), which will facilitate reclamation and fulfillment of the requirements in Paragraph (3) of Section 20.6.7.33.C NMAC at the end of mine life. To this end, each lift within the stockpile will be a maximum of approximately 75 feet high and placed at angle of repose with 120-foot setbacks between lifts to maintain a 3 to 1 overall angle for the stockpile outslopes to facilitate closure.

All waste rock stockpiles, including existing waste rock stockpiles, will be reclaimed at the end of mine life with 36 inches of approved reclamation cover material in accordance with the approved Closure/Closeout Plan and applicable Copper Rule requirements.

In accordance with Section 20.6.7.21 NMAC, DP-1840 specifies that berms and open-channel conveyance structures be constructed around waste rock stockpiles to prevent surface water run-on and to control run-off and/or flowing seeps from the proposed stockpiles. Channels must be constructed in a manner to maximize positive flow while minimizing the potential for ponding and erosion. Collected solutions will be conveyed to the Impacted Stormwater Impoundments discussed below. Any alluvial materials encountered along stockpile toes will be removed and open-channel conveyance channels will be constructed into the underlying low permeability bedrock to maximize collection of seepage and impacted stormwater generated from the stockpiles (Bates 15932).

Pursuant to Subparagraph (c) of 20.6.7.21.A(2) NMAC, DP-1840 requires that the Applicant implement a material handling plan requiring placement of a minimum of 10 feet of "not potentially acid generating" waste rock material above and below any areas where "acid generating", or "potentially acid generating" waste rock will be placed. Adherence to this requirement will limit acid generation potential by providing buffering potential for any acid rock drainage that might develop.

WRSP-1 will be constructed inside the projected Open Pit Surface Drainage Area ("OPSDA"; as defined in Section 20.6.7.7 NMAC) on low-permeability andesite and quartz monzonite. Waste rock with a higher potential to develop acid rock drainage ("ARD") will be placed within the authorized footprint of this waste rock stockpile (Bates 15918).

WRSP-2 and WRSP-3 will be constructed outside the OPSDA on low-permeability andesite (Bates 09608, Bates 15993). Due to implementation of the material handling plan discussed above, placement of the stockpiles on low permeability bedrock, demonstrated geochemistry of the waste rock (Bates 05649-05651), integrated solution capture systems, and implementation of the monitoring plan including well installation, monitoring, and reporting, NMED does not anticipate that contaminants generated from WRSP-2 and WRSP-3 will impact groundwater above the standards set forth in Section 20.6.2.3103 NMAC.

In summary, the design criteria, location, and operation of the waste rock stockpiles as proposed by the Applicant and authorized in DP-1840 meet applicable requirements of Section 20.6.7.21 NMAC.

Impoundments – C104 of DP-1840 specifies requirements for the design criteria, location, purpose, and operation of the impoundments proposed for use at Copper Flat Mine and are in accordance with the Copper Rule. Impoundment design is dictated by location of the impoundment and the designated purpose the impoundment will serve. Impoundments that store process water or leach solutions for long-term storage require additional engineering controls compared to impoundments intended to store solutions for less than 30 days.

Impacted Stormwater Impoundments A - C ("SW-A", SW-B", SW-C") are designed to receive surface drainage that may come in contact with water contaminants at Copper Flat Mine. Because these impacted stormwater impoundments are designed to store impacted stormwater for less than 30 days, DP-1840 specifies that they be designed with an engineered single-lined 60-mil high-density polyethylene ("HDPE;" or equivalent material) liner system to meet the requirements of Paragraphs (1), (2), (4), (6), and (7) of 20.6.7.17.D NMAC.

The Process Water Reservoir is designed to receive reclaimed process water from a variety of sources including the TSF, impacted stormwater impoundments, and freshwater supply system conveyed by pipelines. The reservoir also receives direct precipitation to the pond surface and embankment crest area. Because this impoundment is intended for long-term storage of process water, DP-1840 specifies that the Process Water Reservoir be designed with an engineered double-lined 60-mil HDPE (or equivalent material) liner system, leak collection system, and subgrade bedding that meets the requirements of Paragraphs (1), (2), (3), (6), and (7) of 20.6.7.17.D NMAC. A critical component of the design, which offers additional protection measures in the event of upset conditions, is an overflow weir that conveys solutions directly into the HDPE lined tailings trench/pipeline corridor which discharges to the TSF.

The Underdrain Collection Pond (UCP) is sized to retain twenty-four hours of underdrain flow at a maximum flow rate, and runoff from the downstream face of the TSF during a 100-year return interval storm event. Because the pond will contain solutions during normal operating conditions (i.e., long-term storage), DP-1840 specifies that it be designed with an engineered double-lined 60-mil HDPE (or equivalent material) liner system, leak collection system, and subgrade bedding that meets the requirements of Paragraphs (1), (2), (3), (6), and (7) of 20.6.7.17.D NMAC.

The purpose of the Surge Pond is to contain discharges (tailing, process, and reclaim water) from various processing locations under upset conditions, such as a pipe failure, or shutdown of the Cyclone Plant. Because the Surge Pond will be empty under normal operating conditions, DP-1840 specifies that it be designed with an engineered minimum 60-mil HDPE (or equivalent material) lined impoundment that meets the requirements of Paragraphs (1), (2), (4), (6), and (7) of 20.6.7.17.D NMAC.

In summary, the design criteria, location, purpose, and operation of the impoundments as proposed by the Applicant (Bates 16750-16777) and authorized in DP-1840 meet applicable requirements of Section 20.6.7.17 NMAC.

Copper Crushing, Milling, Concentrator, and Tailings Storage Facility Units - Section C105 of DP-1840 specifies the facility specific requirements for Copper Crushing, Milling, Concentrator, and Tailings Storage Facility Units at Copper Flat Mine. The Process Facility Area and associated mineral processing units will be constructed on low permeability andesite bedrock (Bates 15837-15843) which meets the requirements of Subsection A of 20.6.7.22 NMAC. Impacted stormwater generated in the Process Facility Area will be directed to open channel conveyances that convey solutions to SW-A which meets the requirements of Subsection A of 20.6.7.22 NMAC. Other containment features are discussed below.

Section C105.C addresses the TSF at Copper Flat Mine. It is a lined facility designed to accommodate the volume of tailings generated during the life of the mine. The liner will consist of a minimum 80-mil HPDE liner (or equivalent material) placed on a twelve-inch thick liner bedding fill sub base. TSF drainage will be collected using an underdrain collection system that incorporates two underdrains that will convey solutions to the TSF UCP. All impacted stormwater generated from the TSF dam face will be captured and contained on HDPE-lined and bermed channels which are integrated into the TSF liner system.

In summary, the design criteria, location, purpose, and operation of the copper crushing, milling, concentrator, and the TSF as proposed by the Applicant and authorized in DP-1840 meet applicable requirements of Section 20.6.7.22 NMAC.

Sumps, Tanks, Pipelines and Other Containment Systems - Section C106 of DP-1840 addresses the facility specific requirements of the sumps, tanks, pipelines and other containment

systems at Copper Flat Mine. Twenty-two sumps and/or containment areas will be constructed to capture and contain process water, impacted stormwater, and other solutions in the event there is a release from the primary containment structures in the Process Facility Area. Any leakage, spillage, or wash water within a containment area at the Process Facility Area is designed to be directed by sloped concrete floors to a watertight drainage sump (Bates 16784). Forty-eight above ground tanks are proposed for use, most of which will be located at the Process Facility Area. The tanks are designed to meet the requirements of Subsection A of 20.6.7.23.A NMAC (Bates 16784).

TSF supernatant process water will be returned to the Process Water Reservoir for re-use through the 36-inch diameter HDPE water reclaim process water pipeline situated within the lined tailings trench corridor (Bates 16022-16023). The UCP return process water pipeline will be placed along the upstream side (i.e., inside the TSF toe berm) of the toe berm and above the geomembrane liner during all buildout phases of the TSF (Bates 16729-16733). The Concentrator Whole Tailings Transport pipeline will be placed within the lined tailings trench corridor when located outside building areas until discharge at the TSF (Bates 16009; Bates 16022-16023).

In summary, design, location, construction, and operation of tanks, pipelines and other containment systems as proposed by the Applicant and authorized in DP-1840 meet applicable requirements of Section 20.6.7.23 NMAC.

Stormwater Management – Section C107 specifies requirements to manage stormwater at Copper Flat Mine. There are a variety of storm water conveyance channels at Copper Flat Mine. These systems consist of a network of diversions designed to convey peak flows to stormwater impoundments from a 100-year return interval storm event while maintaining at least 6 inches of freeboard in accordance with Subparagraph (f) of 20.6.7.17.D(2) NMAC. C107.B of DP-1840 specifies that inspections be conducted of stormwater management facilities on a monthly basis

and after precipitation events exceeding one inch to ensure compliance with Subparagraphs (e) and (f) of 20.6.7.17.D(2) NMAC.

In summary, stormwater management as specified in DP-1840 meets the applicable requirements of Section 20.6.7.17 NMAC.

Other Facility Specific Requirements - DP-1840 contains facility specific requirements regarding Truck and Equipment Washing Units (C109), Dust Suppression (C110), the Onsite Domestic Wastewater Treatment Facility (C111), and Flow Measurement (C112). Design, location, construction, and operation of mine units pursuant to these sections as proposed by the Applicant and authorized in DP-1840 meet the applicable requirements pursuant to Part 20.6.2 NMAC and Part 20.6.7 NMAC.

Monitoring and Reporting – The Applicant prepared a water quality monitoring plan that identified certain existing monitoring wells at the site in combination with proposed new monitoring wells, as well as surface water and process water sampling points to comprise a monitoring plan to monitor water quality at Copper Flat Mine (Bates 17049-17076). This plan was augmented by NMED and as conditioned in DP-1840 in Section C113.

DP-1840 requires that the permittee monitor and report water quality information from 56 compliance sampling locations at Copper Flat Mine. Nineteen existing monitoring wells have been incorporated into the proposed DP-1840 monitoring network in accordance with Paragraph (1) of 20.6.7.28.B NMAC, and the Applicant will be required to install an additional 24 monitoring wells for groundwater compliance sampling to fulfill additional location requirements referenced in Subsection B of 20.6.7.28 NMAC. In addition, DP-1840 designates five surface water sampling points along Grayback Arroyo, and eight process water sampling points throughout Copper Flat

Mine. The monitoring plan set forth in DP-1840 adequately fulfills the requirements of Subsection R of 20.6.7.11 NMAC and Section 20.6.7.28 NMAC.

Mine-Unit Specific Groundwater Monitoring - There are nineteen monitoring wells proposed to monitor groundwater around the perimeter of the TSF which satisfies the requirements of Paragraph (2) of 20.6.7.28.B NMAC. Up to six monitor wells have been approved to be plugged and abandoned as the TSF builds progressively outward. NMED will evaluate groundwater conditions as these wells are plugged and abandoned and may require replacement monitoring wells pursuant to Subsection B of 20.6.7.30 NMAC.

DP-1840 requires nine monitoring wells be used to evaluate groundwater conditions around the perimeter of WRSP-2 and WRSP-3. This subset of wells will be adequate to monitor potential groundwater impacts from the waste rock stockpiles and satisfies the requirements of Paragraph (2) of 20.6.7.28.B NMAC.

Paragraph (3) of 20.6.7.28.B NMAC requires a minimum of one monitoring well be located within 75 feet or as close as practicable of each process water or impacted stormwater impoundment at Copper Flat Mine. This requirement is met or exceeded for each proposed impoundment at Copper Flat Mine, and consequently, DP-1840 satisfies the requirements of Paragraph (3) of 20.6.7.28.B NMAC.

DP-1840 requires eleven monitoring wells be utilized to evaluate groundwater conditions around the open pit. Groundwater information from these wells will be utilized, in part, to define the hydrologic gradient around the pit and the AOPHC. These monitoring wells satisfy the requirements of Paragraph (4) of 20.6.7.28.B NMAC.

Paragraph (5) of 20.6.7.28.B NMAC requires a minimum of one monitoring well be located upgradient of Copper Flat Mine and each new waste rock stockpile, TSF, process water and

impacted stormwater impoundment. This requirement is met or exceeded for Copper Flat Mine and each proposed new mine unit (Bates 17069-17070), and therefore DP-1840 satisfies the requirements of Paragraph (5) of 20.6.7.28.B NMAC.

Closure – Section C115 specifies requirements for closure at Copper Flat Mine. The Applicant prepared a Closure/Closeout Plan, referenced in DP-1840, to address closure requirements pursuant to applicable sections of the Copper Rule including Section 20.6.7.33 NMAC and Section 20.6.7.34 NMAC, and the New Mexico Mining and Minerals Division pursuant to the New Mexico Mining Act. The closure plan as conditioned through DP-1840 meet applicable requirements of Section 20.6.7.33 NMAC and Section 20.6.7.34 NMAC.

The Applicant has committed to reclaiming Existing Waste Rock Stockpile 1, Existing Waste Rock Stockpile 2-B, and the outslopes facing Grayback Arroyo of Existing Waste Rock Stockpile 4 during the preproduction period of its mining operation. Condition C115.H requires reclamation of Existing Waste Rock Stockpile 1, Existing Waste Rock Stockpile 2-B no later than three years from the effective date of DP-1840. Reclamation of these existing mine units that are not components of future operations will result in enhanced environmental protection and provide abatement-related source control at the Copper Flat Mine regardless of any timeline for operation of Copper Flat Mine.

Abatement – Section C116 of DP-1840 addresses the Abatement Plan for Copper Flat Mine. DP-1840, as proposed, specifies additional abatement activities required for implementation upon issuance of DP-1840 including installation of additional monitoring wells, submittal of a workplan to address any ongoing impacts to Grayback arroyo and connected aquifers, and collection of additional Stage 1 Abatement Plan ground and surface water quality data. Implementation of abatement activities as conditioned through DP-1840 and approved Stage

1 Abatement workplans ensures abatement occurs in a timely fashion. regardless of any timeline for operation of Copper Flat Mine.

This concludes my testimony.

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE APPLICATION OF NEW MEXICO COPPER CORPORATION FOR A GROUNDWATER DISCHARGE PERMIT FOR THE COPPER FLAT MINE, DP-1840 **NO. GWB 18-06 (P)**

WRITTEN TESTIMONY OF JOSEPH MARCOLINE

My name is Joseph Marcoline, and I am a hydrogeologist providing technical support for the Mining Environmental Compliance Section ("MECS") with the Water Protection Division of the New Mexico Environment Department ("NMED"). I am presenting technical testimony for the hearing on the proposed Copper Flat Mine Draft Discharge Permit.

I. QUALIFICATIONS

I have been employed with NMED for just under 16 years. My work during fifteen of the nearly sixteen years focused exclusively on permitting and reclamation of New Mexico mine sites. I have had regulatory involvement with every large-scale hard rock mine in New Mexico during my tenure with NMED. I have also worked as a contract reclamation specialist at a hard rock mine in Canada, and designed instrumentation and monitoring programs and reviewed closure plans for mines in Colorado, New Mexico, Peru, and the Northwest Territories.

I earned a Bachelor of Arts degree in geology and mathematics from Hamilton College in 1994. In 1996, I completed a Master of Science degree in geology and geochemistry at the New Mexico Institute of Mining and Technology. Following my master's studies, I accepted a position with the Groundwater Quality Bureau of NMED and was instrumental in the initial establishment of a mine operations and reclamation section within the bureau, now called MECS. I was the permit lead for the Chino Mine, a large-scale copper mine in in Silver City and was the NMED reclamation lead for the minimal impact and exploration mines in NM. During this time with NMED I developed a strong interest in several of the less understood aspects of waste rock management, associated groundwater contamination, and unsaturated

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flow hydrogeology within waste rock. I left NMED in 2002 to study these processes, and subsequently, I earned my Doctor of Philosophy ("Ph.D.") in unsaturated flow hydrogeology from the University of British Columbia. My research and coursework were within the Hydrology and the Mine Engineering Departments and were supervised by several world-renowned researchers in unsaturated flow, evaporative flux modeling, and mine reclamation. My dissertation involved a rigorous hydrologic, civil engineering, and soil science approach to investigate the mechanisms of water flow and chemical transport within heterogeneous mine waste rock. My dissertation led to a greater understanding of contaminant loading from waste rock and evaluation of the resultant effect on the water balance of various engineered soil cover systems over mine waste rock.

A brief accurate and current Curriculum Vitae is marked as NMED Exhibit 7.

II. BASIS FOR TESTIMONY

As Mr. Vollbrecht and Mr. Reid have noted in their testimony, the proposed Copper Flat Mine is required to meet the Supplemental Permitting Requirements for Copper Mine Facilities ("Copper Rule"). Part 20.6.7.21 NMAC of the Copper Rule requires an aquifer evaluation to determine the potential nature and extent of impacts to groundwater from waste rock stockpiles. The aquifer evaluation requirements include a description of aquifer characteristics and hydrogeologic controls on the movement of leachate from the waste rock stockpile and within groundwater impacted by the waste rock stockpile based on on-site data.

I reviewed the technical basis for the water balance component of the aquifer evaluation performed by the New Mexico Copper Corporation ("NMCC") as it relates to both the Tailing Storage Facility ("TSF") and the proposed waste rock stockpiles. I reviewed site geologic and weather conditions, as well as the waste material characterization performed by NMCC. I evaluated the NMCC water balance modeling and the evaluation of the potential for the percolation of water through the waste rock stock piles. I also evaluated the modeling performed by NMCC of leakage of tailing porewater through the synthetic liner at the base of the TSF. For the waste rock stockpile and the TSF, I reviewed the NMCC evaluation of the potential for percolation through the waste rock and the leakage through the TSF liner to percolate

through the unsaturated materials beneath the facilities, and this information was subsequently used by other NMED experts to evaluate the potential for concentrations of contaminants in groundwater to exceed the standards of Section 20.6.2.3103 NMAC.

I was also asked to review public comments that were technical in nature and related to the 1) water balance as it pertains to the aquifer evaluation that NMCC performed to determine the potential nature and extent of impacts to groundwater from waste rock stockpiles, 2) leakage of water through the synthetic liner underlying the TSF, 3) adequacy of the monitoring well network, 4) long-term open pit groundwater capture, and 5) use of the andesite as a liner under the waste rock. The following portion of my direct testimony summarizes my review and interpretation of the public comments that pertain to the four topics listed above.

1) **Water Balance in Waste Rock:** The water balance simulations submitted by NMCC to evaluate transport of water through the waste rock stockpile during the operational period used the numeric unsaturated flow model MACRO 5.2 developed by Larsbo et al. (2005). MACRO 5.2 is a dual-porosity model that solves the Richard's based unsaturated flow equations and in addition allows for computation of a preferential flow component using a version of the kinematic wave theory. The modeling used precipitation and evaporation from Hillsboro from a 67-year period of record, assumed no transpiration and minimal run-off.

My review of the model included an evaluation of all input parameters and numerous independent runs of the simulation. My review also included an independent analysis of parameter sensitivity on model output. I have concluded that the choice of the numeric model and the climate inputs were appropriate. The boundary, solver, set-up and property inputs were reasonable. I also have concluded that while laboratory measured soil water characteristic curves or model derived hydraulic conductivity curves have not yet been developed for the waste rock at the Copper Flat Mine, the waste rock properties used in the modeling, including the particle size distribution and the values used to express of the water content and hydraulic conductivity relationship were well within the range observed at other hard rock mine sites in New Mexico.

As predicted by the NMCC model, my independent modeling, and as observed at other mine waste rock piles in New Mexico, water is expected to infiltrate into the waste rock and a small portion has the potential to continue to percolate to the base of the pile.

2) **Liner Leakage:** In Appendix B of a report titled "NMCC Probable Hydrologic Consequences of the Copper Flat Mine" dated May 22, 2018 (Bates 18302-18628), NMCC presented the methodology and results from a numeric evaluation of liner seepage based on a peer-reviewed set of equations and case study field data. The evaluation assumed a 2.5 cm^2 punctures in every hectare of the synesthetic liner. The modeled results using a modified version of the Giruoud et al. (1997) equations and are consistent with peer reviewed literature leakage values per area. At this rate, leakage from the 536-acre lined tailing storage facility is estimated to be approximately 720 gallons per day or 0.5 gallons per minute. The estimated leakage rates were used by NMCC as an input into a numeric model to evaluate the potential to impact groundwater beneath the facilities. NMCC as well as several of the public commenters provided references to multiple studies that conclude that the leakage rates will be significantly reduced with increased quality control during construction and with post construction testing. My conclusion is that NMCC's evaluation of liner leakage is physically based, consistent with literature and case study values and therefore reasonable.

3) **Monitoring Well Network:** I evaluated the network of existing and the required wells around the proposed open pit for adequacy of monitoring of groundwater levels. Water levels in these wells combined with the pit lake water level are appropriately spaced to provide verification of the water table gradient surrounding the pit. The gradient of the water table, regardless of fracturing or of conductivity will control the direction of groundwater flow. I also looked at the completion diagrams and location of monitoring wells around the footprint of the TSF and waste rock stockpiles at final build-out as well as the location of wells required by NMED. These wells provide an appropriate initial basis for monitoring of the proposed facilities. Additional wells or

characterization methods can be installed or employed if future information suggests that is necessary.

4) **Area of Open Pit Hydrologic Containment:** I reviewed the groundwater conditions around and west of the existing pit, the precipitation and evaporation data for the region, final surface area and the depth to water in the final pit and concur with the conclusion that the post-mining open pit will result in an evaporatively driven cone of depression in groundwater surrounding the open pit. As a safeguard, NMED will condition the discharge permit to require monitoring of water levels in the pit and in wells surrounding the open pit during and following mining to ensure that the predictions are correct.

5) **Andesite as a Natural "Liner":** Highlighted in several of the public comments was a concern that NMCC was relying on the andesite bedrock as an impermeable liner. From my review while NMCC acknowledges that while the andesite has a low permeability, I was unable to identify an instance of NMCC indicating that the andesite is impermeable. NMCC uses an estimate of 10^{-6} centimeters per second (cm/s) as the hydraulic conductivity for the andesite. One of the specific comments disagrees with the NMCC estimate and refers to Table 5.2 from the report titled "Model of Groundwater Flow in the Animas Uplift and Palomas Basin (referred to by the commenter as Jones et al. (2014))" (Bates 09969-10385). The comment indicates that all the estimates in Jones et al. (2014), Table 5.2 exceed 10^{-5} cm/s. The commenter is in error in that the wells in Table 5.2 that exceed 10^{-5} cm/s are not completed in the andesite bedrock, rather in the quartz monzonite. The well labeled as GW Q5-R was completed in the andesite and tested at 0 cm/s, a much lower saturated hydraulic conductivity than 10^{-6} cm/s. In addition, Table 6.1 show the andesite hydraulic conductivity as 0.002 ft/day which is equivalent to between 3 to 7 x 10^{-7} cm/s. Well testing data presented in the Stage I Abatement Plan (Bates 09579-09915) indicate that the two wells in the andesite, GW Q96-22 and GW Q96-23, tested at $6x10^{-9}$ cm/s and $9.5x10^{-7}$ cm/s respectively. Based on existing well test data and field observation of the andesite outcrops it is reasonable to assume that the bulk hydraulic conductivity is between the measured 10^{-7} and 10^{-}

^{11} cm/s. While this range in hydraulic conductivity of the andesite while is very low, it is not impermeable, and it stands to reason that a small portion of this water may continue to percolate through the unsaturated andesite and into groundwater.

This concludes my technical testimony.

Kurt M. Vollbrecht

Education

M. S. in Geology, August, 1997, **New Mexico Institute of Mining and Technology**, Socorro, NM

B. S. in Geology, June, 1994, **California State University, Hayward (CSUH)**

Professional Experience

Program Manager, NMED Mining Environmental Compliance Section, NMED GWQB, 3/12-12/12 and 7/13-present: Manager of the Mining Environmental Compliance Section, including developing regulations, policies, and guidelines for mine related discharges; review and approval of discharge permits; assigning, directing, and tracking the work of current MECS technical staff and Team Leaders on permit development and enforcement actions; coordination with the United States Environmental Protection Agency regarding National Priorities List sites; conducting meetings with permittees, public members, and senior management.

NMED Mining Environmental Compliance Section Operational and Closure Team Leader, NMED GWQB 12/12-3/14: Responsible for evaluating, drafting and ensuring consistency and compliance with Ground Water Discharge Permits, specific to hard rock mine sites in New Mexico for protection of groundwater pursuant to the NM Water Quality Act and WQCC Regulations. Supervision of several NMED technical staff including Tyrone Mine, Chino Mine and Continental Mine permit leads, AOC, and uranium mine permit lead.

Mining Act Team Leader, NMED GWQB, 9/05-3/12: Responsible for coordination with the Mining and Minerals Division (MMD) in implementation of the NM Mining Act and providing comments and environmental determinations to MMD pursuant to the NM Mining Act. Evaluate and ensure compliance with Ground Water Discharge Permits specific to hard rock mine sites in New Mexico for protection of ground water pursuant to the NM Water Quality Act and WQCC Regulations. Evaluate reclamation practices and water quality issues at hard rock mine sites pursuant to the NM Mining Act. Supervise 3 technical staff.

Industrial Waste Team Leader, NMED GWQB, 7/04-9/05: Lead facility-type team by identifying, prioritizing, and implementing ways to improve program effectiveness in regulating facilities including development of policies, guidelines, templates and regulations. Provide technical and regulatory guidance to staff to ensure compliance with domestic, agricultural, and industrial Ground Water Discharge Permits for protection of groundwater pursuant to the NM Water Quality Act and WQCC Regulations. Supervise 3 technical staff.

Geoscientist A, NMED GWQB, 7/00-7/04: Evaluate and ensure compliance with domestic, agricultural, and industrial Ground Water Discharge Permits for protection of groundwater pursuant to the NM Water Quality Act and WQCC Regulations. Supervise 3 technical staff as above. Assistant to Domestic Waste Team Leader for oversight of 600+ domestic waste discharge permits.

Water Resource Specialist, NMED GWQB, 10/98 – 7/00: Technical staff member responsible for review of a large, diverse caseload including domestic, agricultural, mining, and industrial Ground Water Discharge Permits. Duties include technical review of existing Ground Water Discharge Permits, review of new, renewal, and modification applications for Ground Water Discharge Permits, and evaluation of technical submittals to ensure compliance with NM Water Quality Act and WQCC Regulations.

***Exploration Field Geologist*:** Havilah Mining, Houston, Texas. 9/97 - 6/98, Mapping of potential ore body in southwest Texas, on-sight supervision of drilling program, core logging, splitting, and sample

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preparation for assay. On-site supervision of an exploratory placer operation in Sonora, Mexico. Duties included field mapping of veins and placer deposits, selection of sample locations to properly characterize potential deposit, overseeing operation of sluice and mineral separation equipment. *Supervisor:* Al Wadsworth, Consulting Geologist.

***Masters Research*:** New Mexico Tech, Socorro, NM. 9/94 - 9/97, In-depth study of Precambrian rocks including: detailed field mapping, structural analysis, petrographic study, microprobe analysis, and $^{40}Ar/^{39}Ar$ and U/Pb dating of igneous and metamorphic rocks. *Supervisor:* Dr. Laurel Goodwin.

***Assistant Manager*:** 6/85 – 6/93, Buss Automotive Parts, Oakland, CA.

Teaching Experience

Teaching Assistant, Geologic Field Courses:
New Mexico Tech, assisted students in detailed mapping of structurally complex Precambrian rocks in northern New Mexico. *Supervisors:* Drs. Steve Ralser and Maureen Wilks. Summer, 1996 and 1997.

CSUH advanced field course with emphasis on field mapping and study of Cascade Range volcanoes and associated deposits. *Supervisor:* Dr. Elwood R. Brooks. Summer, 1995.

CSUH summer field course including mapping of Devonian-Pennsylvanian miogeoclinal rocks in eastern Nevada, Mesozoic sedimentary rocks of the northern Colorado Plateau, and folded Mesozoic strata in the Gros Ventre River Valley, Wyoming, structural analysis of mesoscopic features, Grand Teton Range, Wyoming, and tape and compass mapping of a Paleozoic dike complex, northern Sierra Nevada. *Supervisor:* Dr. Elwood R. Brooks. Summer, 1994.

Lab Instructor, Igneous and Metamorphic Petrology, Structural Geology, New Mexico Tech. *Supervisor:* Dr. Laurel Goodwin. 9/94 - 5/97.

Teaching Assistant, Igneous and Metamorphic Petrology, CSUH. *Supervisor:* Dr. Nancy Fegan. 1/94 - 3/94.

BRADLEY H. REID

EDUCATION

1999-2002 University of Texas at Austin Austin, TX

- **Master of Science in Geological Sciences**

MS Thesis: *Sedimentology and Depositional History of the Late Cenozoic Gila Group in the Central Duncan Basin, Greenlee County, southeast Arizona*

1993-1998 University of Texas at Austin Austin, TX

- **Bachelor of Science in Geological Sciences**

Special Honors in Geological Sciences

BS Honors Thesis: *Structural Analysis of the Transverse Zone, part of the San Julian Uplift, northern Zacatecas, Mexico*

1986-1993 Albuquerque Academy Albuquerque, NM

- **High School Diploma**

PROFESSIONAL EXPERIENCE

New Mexico Environment Department, Ground Water Quality Bureau Santa Fe, NM

Environmental Scientist & Specialist - Advanced Dec 2012 - Present

- As a senior technical staff member within the Mining Environmental Compliance Section, provide regulatory oversight in environmental remediation, mine operation and reclamation at three hard rock mining facilities in NM including the largest copper mine in the state. Manage technically complex discharge permit caseload pursuant to the NM Water Quality Act and Water Quality Control Commission (WQCC) Regulations including the Copper Mine Rule; NM Mining Act; and other state and federal statutes, standards and regulations. Coordinate with federal and state agencies on mine permitting procedures; develop, conduct and report on scientific geohydrologic site investigations; review and approve ground water pollution prevention plans, abatement plans, and corrective action plans; draft discharge permits; review and comment on Mining Act applications; and conduct site inspections.
- Other duties: sample ground water, mine process water, and soil; assist staff with in-house data management systems (TEMPO); provide review and comment on facility-specific plans and specifications; work with NMED legal staff; assist in generating permit-related templates and documents.

New Mexico Environment Department, Ground Water Quality Bureau Santa Fe, NM

Environmental Scientist & Specialist - Operational April 2005 - Dec 2012

Environmental Scientist - Basic Jan 2003 - April 2005

- As a Compliance and Enforcement (C&E) staff member within the Pollution Prevention Section, seek voluntary compliance and regulate facilities that have or may require Ground Water Discharge Permits pursuant to the NM Water Quality Act and WQCC Regulations.
- Write Notice of Non-Compliance, Notice of Violation, Site Inspection Follow-up, Corrective Action Required, and other enforcement letters to encourage voluntary compliance and ensure protection of ground water quality for present and foreseeable use. Write Administrative Compliance Orders when efforts to achieve voluntary compliance fail.
- Other duties: conduct site inspections of facilities and prepare site inspection reports; sample ground water, wastewater, and soil; train staff and develop C&E strategies; write Ground Water Discharge Permits for facilities including municipal wastewater treatment plants,

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mobile home parks, gas fired power plants; evaluate responses to C&E letters; encourage voluntary compliance through phone calls and meetings; evaluate and characterize site-specific conditions and potential threats to ground water; assist staff in WQCC hearing preparation; and coordinate C&E efforts with other bureaus within the Environment Department.

Texas Department of Transportation, Soils and Aggregate Laboratory Austin, TX

Geologist Research Assistant October 1999 - August 2001

- Petrographic analysis of concrete and aggregate to determine strength, durability, and failure criteria. Determine chemical reactivity of concrete and its water/cement ratio using epifloresent techniques, polarizing microscope, and SEM. Conduct ASTM and other quality control tests on concrete and aggregate.
- Participate in a research project using semi-automated techniques to predict water/cement ratios in concrete.

Burlington Resources Oil and Gas, Basin Opportunities Team Farmington, NM

Geology Intern June 1998 - September 1998; October 1998 - March 1999

- Identify, interpret, and research fracture trends within the Mancos Shale, San Juan Basin.
- Analyze and manipulate 2-D seismic lines to determine the relationship between fractured shales and interval velocities.
- Create, load, quality control, and analyze geological and geophysical data systematically collected by the project team. Create derivative maps, well-control base maps and cross sections using Mincom Geolog and Landmark Z-map.
- Present findings in numerous technical presentations.

U.S. Geological Survey, Western Earth Surface Processes Team Menlo Park, CA

Field Geologist September 1998 - October 1998

- Assist USGS geologist in the geologic mapping of parts of the Vancouver (100k) quadrangle in southern Washington State. Map on land and in boat, collect rock samples.
- Prepare rock samples for thin section analysis and isotopic age dating.
- Internship resulted from receiving the National Association of Geoscience Teachers student award for being the top student in the summer 1997 UT at Austin Geology Field camp.

University of Texas at Austin, Department of Geological Sciences Austin, TX

Undergraduate Research Assistant Spring 1997; Spring 1998

- January – June 1998: Empirical analysis of quartz micro-fractures via interpretation of SEM-CL photo mosaics to facilitate structural geology research under Dr. Randall Marrett.
- January – June 1997: Input and interpret computer data and prepare rock samples for laboratory analysis to facilitate sedimentology research under Dr. Earle McBride.

University of Texas at Austin, Department of Geological Sciences Austin, TX

Laboratory Research Assistant II September 1997 - January 1998

- Geologic mapping and data collection for senior honors thesis project under supervision by Dr. Randall Marrett. Conduct two months of solo mapping in the minimally studied San Julian Uplift, part of the Sierra Madre Oriental, northern Zacatecas, Mexico.

Sandia National Laboratories, Geoscience and Environment Group Albuquerque, NM

Geohydrology Intern June 1996 - September 1996

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- Stratigraphic and rock properties modeling of the Paintbrush Tuff hydrogeologic unit at Yucca Mountain, Nevada.

Los Alamos National Laboratory, Los Alamos Neutron Science Center Los Alamos, NM

Undergraduate Student Technician June 1994 - September 1994

- Aid in the assembly of an x-ray diffractometer and other pieces of measuring equipment to facilitate research in a physics laboratory.

PUBLICATIONS/ABSTRACTS

- Reid, B.H., and Buffler, R.T., 2004, A Summary of the Depositional Elements and Setting of the Late Cenozoic Gila Group, central Duncan Basin, southeast Arizona, *in* Quaternary Stratigraphy and tectonics, and late prehistoric agriculture of the Safford Basin (Gila and San Simon River Valleys), Graham County, Arizona, Friends of the Pleistocene, Rocky Mountain Cell 46th field conference and Arizona Geological Society fall field trip, 2002, October 11-13, 2002: U.S. Geological Survey Open-File Report 2004-1062, 26 p.

- Reid, B.H., and Marrett, R.A., 2002, Structural analysis of the Tranverse Zone, part of the San Julian Uplift, Sierra Madre Oriental, northern Zacatecas, Mexico: Abstracts with Programs-Geological Society of America, GSA Annual Meeting, Denver.

- Reid, B.H., Buffler, R.T., and Enders, M.S., 2001, Sedimentation and Tectonics of the Gila Group Conglomerate in the Duncan basin, Greenlee County, SE Arizona: Abstracts with Programs-Geological Society of America, GSA Annual Meeting, Boston.

HONORS & RECOGNITIONS

- UT at Austin Geology Foundation Penzoil and Pogo academic fellowship, spring of 2001 and 2002
- Ewing-Worzel UT at Austin Institute for Geophysics academic fellowship, fall 2001
- Graduated with Special Honors in Geological Sciences, UT at Austin, May 1998
- National Association of Geologic Teachers Award, spring 1998
- 1998 Outstanding Field Geologist Hammer Award (awarded annually to top student at UT at Austin Field Geology course)
- Associated Western Universities (AWU) student fellowship, summer 1996
- UT at Austin Honors: fall 1994, spring 1995
- 10 semester-long academic scholarships awarded by UT Geology Department, 1993-1998
- Mission Volunteer Scholarship, fall 1995

CERTIFICATIONS

- National Association of Wastewater Transporters, Inc.
- OSHA 40 Hour Hazwoper

INTERESTS AND ACTIVITIES

- Vice-President of the Santa Fe Geological Society, 2005 – 2008

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JOSEPH R. MARCOLINE

Highly specialized in instrumentation, monitoring and modeling of water and gas flow, and contaminant transport in complex, unsaturated systems. Experienced in leading the investigation, design and implementation of complex field-scale reclamation and remediation projects.

FORMAL EDUCATION:

2007

Ph.D., Hydrogeology, University of British Columbia, Vancouver, B.C., Canada, January 2007

Advisor:	Dr. Leslie Smith
Dissertation Title:	*Investigations of water and tracer movement in covered and uncovered unsaturated waste rock.*

Dissertation Summary: Conducted a five-year civil engineering and hydrogeologic project. Project included a multi-tracer, flow and transport experiment in a heavily instrumented, mine waste rock pile at the Cluff Lake Mine. Planned, engineered, constructed and modeled a remedial style test cover system. Monitored, sampled and tested seepage water quality and mine waste rock and cover materials.

1997

M.S., Geology, New Mexico Institute of Mining and Technology, Socorro, NM.

Advisor:	Dr. Laurel Goodwin
Thesis Title:	*Field, petrographic and $^{40}Ar/^{39}Ar$ constraints on the tectonic history of the central Manzano Mountains, central New Mexico*

1994

B.A., Geology, minor in Mathematics, Hamilton College, Clinton, NY.

Advisor:	Dr. Barbara Tewksbury
Thesis Title:	*Structural and kinematic analysis of the Canton-Hyde School Gneiss*

ON-THE-JOB TRAINING AND EXPERIENCE

Mining Environmental Section, New Mexico Environment Department, Santa Fe, NM.
Hydrogeologist, 2011 - Current

- Oversight manager for the large scale 850,000,000 dollar remediation project under the NM Water Quality Act and EPA CERCLA.

- Oversee construction of remedial actions at the Questa Mine Site including sonic, becker, rotary and direct push drilling, large scale steep slope reclamation, liner installations, seepage extraction systems, and waste isolation and removal.
- Hired and managed geotechnical experts from CDM Smith and Shannon-Wilson for project support.
- Assisted the USEPA with several multi-million dollar waste removal actions at the Chevron Mines Inc., Questa Mine Site.
- Participated as a technical expert and advisor during the development of the New Mexico Copper Rule.

Mining Environmental Section, New Mexico Environment Department, Santa Fe, NM.
Hydrogeologist, 2007 - 2011

- Evaluate cover designs, in-situ instrumentation plans, modeling reports and performance monitoring at the Phelps Dodge and Chevron mine sites pursuant to the state groundwater permits.
- Oversaw actions related to and development of the Superfund remedial actions for the Questa Mine Site, formally known as the Molycorp Mine Site.
- Assisted the USEPA in the technical development, negotiations and drafting of the 1000+ page Remedial Investigation and Feasibility Study for Chevron Mines Inc., Questa Mine Site.
- Worked closely with multiple State and Federal Agencies, public interest groups and local communities to ensure all needs are considered and issues addressed during the clean-up of the Questa Mine Site.
- Assisted the New Mexico Game and Fish, the Bureau of Land Management and the New Mexico Bureau of Geology with the characterization of surface and groundwater in the areas surrounding the Chevron Mines Tailing Facility in Questa, New Mexico.
- Drafted permits for groundwater protection pursuant to the New Mexico Water Quality Act and the Water Quality Control Commission Regulations for several large mine sites in New Mexico including the Chevron Mines Inc., Questa Mine Site.
- Review and comment on operational, monitoring, construction, closure and all other permitted actions at the Chevron Mines Inc., Questa Mine Site and the Freeport-McMoRan Mine sites.
- Assist Groundwater Quality Bureau (GWQB) and Mining Environmental Compliance Section (MECS) staff with hydrologic, geochemical, modeling and other engineering problems relative to mine operations and closure in the State of New Mexico.
- Coordinate with the US EPA and NM Mining and Minerals Department on mine closure issues.

Northern New Mexico College, Espanola, NM.
Assistant Professor, 2009-2012

- Taught college level classes in the Environmental Science Department including Hydrology, Watershed Management, Soil Science, Soil Fertility, Instrumentation, Monitoring, Sampling and Analysis.
- Advised 20+ students on their academic progress and career planning.
- Oversaw multiple, detailed research projects in which students were actively working in the field on real-life environmental problems.

- Participated in curriculum and program development, and other academic research and administrative tasks.
- Steering Committee member for the NMED/NMCF/LANL/NNMC RACER environmental database program.

Northern New Mexico College, Espanola, NM.
Adjunct Professor, 2009

- Taught College Hydrology and Natural Resource classes within the Environmental Science Department.

J.R.Marcoline Consulting (LLC), Vancouver, BC.
Civil Engineer/ Hydrologist/ Owner, 2004-2007

- Contract: Drafted *Guidelines for Operation and Closure of Mine Sites in New Mexico*, 2004 - 2007.
- Contract: Built automated electrical conductivity, large scale flow meters and TDR probes for the Diavik mine in the North West Territories and the Antamina Mine in Peru based on Ph.D. designs.
- Contract: Developed sampling protocols and conduct field hydrologic and geotechnical tests for Dr. Ward Wilson and the Molycorp Mine, 2004 - 2005.
- Contract: Developed the Acid Rock Drainage Literature Database for Souder Miller Inc. and the New Mexico Environment Department, 2004.
- Contract: Conducted field density testing and permeability testing of waste rock and cover material for closure on the Claude waste rock pile at the Cluff Lake Mine, Saskatchewan, Canada. Cogema Resources, 2002.
- Contract: Assisted O'Kane Consultants and mine personal with the civil engineering and technical aspects of the installation of a top surface, and outslope lysimeter system at the Cluff Lake Mine, Saskatchewan, Canada. Cogema Resources, 2003.
- Installed two monitoring systems with numerous moisture sensing instruments and water quality sampling devises, all which were computer animated and datalogged. The system, cutting edge at the time, was a modification of my Ph.D. monitoring design that was permitted by the Canadian Government to monitor moisture flux into, and out of, an engineered cover system for closure of existing acid generating waste rock piles at the Cluff Lake Mine, Saskatchewan, Canada. Cogema Resources, 2003.

Mining Environmental Section, New Mexico Environment Department, Santa Fe, NM.
Geologist Supervisor, 1999 - 2002

- Coordinated mine closure work between private, public and multi-agency government groups.
- Developed reclamation plans for 108 full-scale, minimal impact and exploration mines in NM.
- Reviewed and commented on Phelps Dodge mine closure plans.
- Issued and maintained groundwater discharge permits for the Chino Mines Company, NM.
- Supervised staff hydrologists within the Ground Water Quality Bureau.

Pollution Prevention Section, New Mexico Environment Department, Santa Fe, NM.
Water Resource Specialist III, 1998 - 1999

- Performed compliance inspections at industrial, remedial and domestic waste sites.
- Sampled monitoring wells, wastewater lagoons and waste effluent for chemical analysis.
- Issued and monitored 64 groundwater discharge permits in the state of New Mexico.
- Informed the public of state policies and regulations at public meetings and hearings.

Lujan Drillers, Santa Fe, NM.
Drill Technician, 1998

- Analyzed and logged drill cuttings for groundwater well and disposal well installations.

Arroyo Seco, Ranchos de Taos and **Taos Pueblo** school systems,
Teacher, 1997 – 1998

- Introduced children to the geology of the Rio Grande Rift, the Sangre de Cristo Mts.
- Introduced environmental awareness and our relationship to the Rio Grande watershed.

Private Contractor, Santa Fe, NM.
Field Geologist and Instructor, 1995 – 1997

- Instructed the NM and CO portions of the Hamilton College Geologic Field Class
- Assistant Teacher for the New Mexico Tech Geologic Field Class
- Geologic mapping of rock fractures in Santa Fe County to locate groundwater wells.
- Geologic mapping for the New Mexico Bureau of Mines and Mineral Resources.

REFERRED PUBLICATIONS:

Marcoline, J.R., Smith, L, Beckie, R.D., 2006, Water Migration in Covered Waste Rock, Investigations Using. Deuterium as a Tracer. Proceedings of the 7th International Conference on Acid Rock Drainage, R.I. Barnhisel (ed.). The American Society of Mining and Reclamation, pp. 1142-1156.

Marcoline, J.R., Beckie, R.D., Smith, L., and Nichol, C.F., 2003, Mine Waste Rock Hydrogeology: The Effect of Surface Configuration on Internal Water Flow. The Australasian Institute of Mining and Metallurgy, Sixth International Conference Acid Rock Drainage.

Marcoline, J. R., Ralser, S., Goodwin, L.B., 2000, Field and microstructural observations from the Capilla Peak area in the Manzano Mountains, central New Mexico: New Mexico Geology, v. 22, p.57-63.

Marcoline, J. R., Heizler, M. T., Goodwin, L. B., Ralser, S., Clarke, J., 1999, Thermal, Structural and Petrological evidence for 1400-Ma metamorphism and deformation in central New Mexico. Rocky Mt. Geol., v. 34, p. 93-119.

ABSTRACTS:

Marcoline, J. R, Beckie, R.D, and L. Smith, 2003, Water Flow Within A Waste Rock Pile With A Compacted Cover, Joint Annual Meeting of the Geological Association of Canada, the Mineralogical Association of Canada and the Society of Economic Geologists, May 25-28 2003.

Bauer, Paul, Ralser, S., Ilg, B., Kelly, S., **Marcoline, J. R.**, 1997, 100 KM - Scale, long-lived fault systems in the Sangre de Cristo Mountains, New Mexico: Geological Society of America, Abstracts with Program, v. 29, no.6, p. 276.

Marcoline, J. R., Heizler, M., Ralser, S., Goodwin, L. B., 1996, Thermochronologic constraints on Proterozoic deformation and metamorphism in the Manzano Mountains, New Mexico: New Mexico Geology, v.18, p. 34.

Marcoline, J. R., Ralser, S., Heizler, M. T., Goodwin, L. B., 1995, Middle Proterozoic regional deformation: Evidence from the Monte Largo Shear Zone, Manzano Mountains, Central New Mexico: Geological Society of America, Abstracts with Program, v. 27, no.6, p. 162.

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