STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

In the Matter of:	)	
PROPOSED AMENDMENT TO 20.6.2 NMAC (Copper Rule)	)	**No. WQCC 12-01(R)**

WRITTEN TESTIMONY OF THOMAS L. SHELLEY

I. INTRODUCTION

My name is Thomas L. Shelley. I am a registered civil engineer in New Mexico, license no. 12158. I am currently employed at the Tyrone and Chino Mines as the Reclamation Manager for New Mexico Operations and have held that position for 6 years. Prior to that, I was the Manager of the Environmental Services Department at the Tyrone Mine, a position I held from 1997 to 2002 and again from 2006 to 2007. My educational and employment history is shown in my resume attached as Exhibit Shelley-1.

As part of my duties as Environmental Engineer and Manager at the mines, I have been involved in the design and permitting of closure and reclamation work at New Mexico copper mines since the mid-1990s. This includes the development of closure-closeout plans designed to comply with the New Mexico Water Quality Act and New Mexico Mining Act requirements. My work was primarily for the Tyrone and Chino Mines, but I have also worked on the development and permitting of the closure-closeout plan for the Cobre Mine. As Reclamation Manager, I currently am responsible for the

permitting, engineering and implementation of reclamation work at the Chino and Tyrone Mines. My staff and I also review permitting and reclamation work for the Cobre Mine. My work involves ongoing permitting and obtaining agency approvals of closure and reclamation plans, the selection and oversight of consulting engineers and other scientists and the oversight of reclamation contractors. The contractors include Freeport-McMoRan's Reclamation Services Group, which conducts much of the reclamation construction, primarily earthwork consisting of regrading and covering closed mine facilities. Other contractors are responsible for seeding covered areas to facilitate revegetation. As part of my duties, I have been involved in the design, permitting and construction oversight of the closure and reclamation of approximately 6,200 acres of tailings impoundments at Tyrone and Chino, approximately 610 acres of leach stockpiles and waste rock stockpiles at Tyrone, and the former Tyrone concentrator and Chino Smelter sites consisting of approximately 50 acres together.

I also have experience in the design and permitting of copper mine expansion projects and ongoing copper mining operations. My experience includes geotechnical engineering of foundations, tailing and water resource dams (including slope stability) and environmental investigations (including ground water and surface water monitoring programs) as a consulting engineer. I managed the ground water discharge permits and oversaw the development of the first Mining Act permit applications at Chino as an employee of Chino Mines Company. I was responsible for obtaining environmental permits for the Tyrone Mine's ongoing operations during my tenure as Environmental Manager there, and for the design and permitting of leach stockpile, waste rock stockpile and open pit expansions, including the Little Rock Mine, which is integrated with the

Tyrone Mine operations. I have been directly involved with and responsible for the development and implementation of closure/closeout permits for the Chino and Tyrone Mines since their inception and directly oversaw the development of the first approved Cobre Closure/Closeout plan and closure cost estimate.

Before I go into the technical detail of this testimony, I would like to give the members of this Commission a visual perspective of completed reclamation projects. We have had much success in closure and reclamation of mining facilities at copper mines in New Mexico. Community members, political bodies and regulatory agencies have been very complimentary of the work that has been completed at these existing copper mines.

First, the following sequence of photographs show the sequential construction phases of reclamation of a major mine facility using the Tyrone Tailings Pond 2 as an example, which encompassed over 600 acres of the 6,200 acres cited above.

Tyrone Tailings Dam 2 – Pre-construction

Tyrone Tailings Dam 2 – Rough Grading Activities

Tyrone Tailings Dam 2 – Cover Material Placement

Tyrone Tailings Dam 2 – Finished Reclamation

Tyrone Tailings Dam 2 – Finished Reclamation

Tyrone Tailings Dam 2 – Top Surface Vegetation

Much of the 3,900 acres of tailings reclamation at Tyrone is shown in the photo below.

Tyrone Mangas Valley Tailings Dams – Reclaimed

Tyrone has completed significant stockpile reclamation incorporating a variety of design features and approaches to water management and channel armoring such as shown below in the 288 acre 1 Stockpile closure project.

Tyrone 1 Stockpile Reclamation

Tyrone 1 Stockpile Reclamation Side-slope Vegetation

Approximately 2,300 acres of tailings reclamation is nearing completion at the Chino South Mine Area as shown below.

Chino Reclaimed Tailings Dams B/C, 4 and 6

Chino Tailings Dam B/C Reclaimed – Mule Deer

My direct testimony focuses on the closure, closure implementation and post-closure provisions of the Proposed Rule, drawing on my experience and technical qualifications in the design, permitting and implementation of closure plans at copper mines, along with the relevant definitions. I also will address some of the design and operational requirements for certain types of copper mine facilities.

The current closure permit for the Tyrone Mine is Supplemental Discharge Permit for Closure, Discharge Permit DP-1341, which is attached as Exhibit Shelley-2. The current closure permit for the Chino Mine is Supplemental Discharge Permit for Closure, Discharge Permit DP-1340, which is attached as Exhibit Shelley-3. The current closure permit for the Cobre Mine is Supplemental Discharge Permit for Closure, DP-1403 which is attached as Exhibit Shelley-4. Tyrone, Chino and Cobre all have submitted applications to renew these permits, which are pending. The Tyrone Settlement Agreement is attached as Exhibit Shelley-5. Also attached to my Testimony are two technical exhibits: Exhibit Shelley-6. Excerpts from Engineering and Design Manual – Coal Refuse Disposal Facilities (MSHA 2009) and Exhibit Shelley-7 – Excerpts from Surface Mining Water Diversion Design Manual (OSM 1982).

My written testimony incorporates the language of the Proposed Rule from Attachment 1 to the New Mexico Environment Department's (Department) Petition in this matter, dated October 30, 2012. This language is incorporated into my testimony for ease of reference, and so that if any changes to the Proposed Rule are considered by the Water quality Control Commission (Commission), the record is clear regarding the exact language to which my testimony applies.

Freeport-McMoRan Tyrone Inc., Freeport-McMoRan Chino Mines Company and Freeport-McMoRan Cobre Mining Company (collectively, Freeport) have been in litigation with The Department for many years over the methods and scope of closure for copper mining facilities. Significant concessions by Freeport were made in order to reach a settlement of this litigation (Exhibit Shelley-5) and are reflected in the Proposed Rule that I will be testifying about below. We understand the magnitude of these operations and the significant impacts that the regulations have on our operations and closure of facilities. Copper mining is a valued industry in our state and the regulations must provide for environmental protections and strike a balance with ensuring that the industry can continue to operate responsibly.

Typical copper mining operations are large scale and environmental impacts are inevitable. Responsible closure activities, like I have shown above, show the industry's commitment to mitigate those impacts. Given the massive scale of copper mines, the regulations must encourage and allow the use of locally available construction materials for closure (typically the most significant being cover material and channel armoring material). The Freeport mines are integrating closure activities with active mining to the extent practical – such as segregating suitable materials to be used for closure cover. Freeport also believes that it is in the interest of the state to encourage maximum use of the areas within hydrologic containment for mining operations, which is an environmental benefit during the operating life of the mine as well as during the closure and post-closure periods.

Closure requirements are addressed in the existing discharge permit regulations in very summary fashion, as follows:

20.62.3107 MONITORING, REPORTING AND OTHER REQUIREMENTS:

> A. Each discharge plan shall provide for the following as the secretary may require:
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> . . . .
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> (11) A closure plan to prevent the exceedance of standards of Section 20.6.2.3103 NMAC or the presence of a toxic pollutant in ground water after the cessation of operation which includes: a description of closure measures, maintenance and monitoring plans, post-closure maintenance and monitoring plans, financial assurance, and other measures necessary to prevent and/or abate such contamination. The obligation to implement the closure plan as well as the requirements of the closure plan, if any is required, survives the termination or expiration of the permit. A closure plan for any underground injection control well must incorporate the applicable requirements of Sections 20.6.2.5005 and 20.6.2.5209 NMAC.

The closure requirements in the Proposed Rule address the specific closure measures required for copper mines, consistent with the requirements established in permit conditions imposed by the Department and closure measures successfully implemented at New Mexico copper mines, while adding additional details not currently found in permit conditions. The closure requirements for copper mines in the Proposed Rule are found in Section 20.6.7.33 NMAC, which begins as follows:

> **20.6.7.33 CLOSURE REQUIREMENTS FOR COPPER MINE FACILITIES:** An applicant or permittee shall submit a closure plan for all portions of a copper mine facility covered by a discharge permit that addresses the following requirements.

This language requires that closure plan be submitted as part of a permit application or permit for a copper mine. This approach is consistent with practice under the existing Commission regulations. Copper mines in New Mexico also are subject to the requirements of the New Mexico Mining Act and the Mining Act Rules, found at 19.10.1.1 to 19.10.13.1303 NMAC. The New Mexico Mining Act and the Mining Act Rules also require a permit for reclamation of New Mexico copper mines, and require a "closeout plan" for existing mining operations and a reclamation plan for new mining operations. The Mining Act Rules specify criteria for reclamation that include achieving an approved post-mining land use or a "self-sustaining ecosystem." Closeout and reclamation plans submitted under the Mining Act Rules require review and a written

determination by the the Department that "the permit applicant has demonstrated that the activities to be permitted or authorized will be expected to achieve compliance with all applicable air, water quality and other environmental standards if carried out as described in the permit application. This determination shall address applicable standards for air, surface water and ground water protection enforced by the Environment Department, or for which the Environment Department is otherwise responsible." 19.10.6.606.B(3) NMAC. Current practice is for the Department to base this determination with respect to water quality largely upon the issuance of a discharge permit for the activities to be permitted under the Mining Act. In other words, if the Department has issued or is prepared to issue a discharge permit under the Water Quality Act for the same activities to be permitted under the Mining Act, the Department will issue the determination required under the Mining Act.

From the industry standpoint, it is critical that the requirements of the Mining Act and the Water Quality Act be coordinated and consistent, and avoid conflicts. A mine operator cannot have two separate and potentially conflicting plans for closure and reclamation of a copper mine. Consequently, the copper mines with which I am familiar have prepared one plan for closure and reclamation that is designed to meet the requirements of both the Water Quality Act and the Commission's regulations and the Mining Act and Mining Act Rules. We have called our combined plans "closure-closeout" plans. A key factor from Freeport's perspective is that the closure requirements in the Proposed Rule be consistent with the reclamation requirements of the Mining Act. I have reviewed the Proposed Rule in this regard and believe that it is generally

consistent with, and in any event compatible with, the corresponding Mining Act requirements.

Proposed Rule section 20.6.7.33.A NMAC, subsection A states:

> **A. Design storm event.** Permanent storm water conveyances, ditches, channels and diversions required for closure of a discharging facility at a copper mine facility shall be designed to convey the peak flow generated by the 100 year return interval storm event. The appropriate design storm duration shall be selected based on the maximum peak flow generated using generally accepted flood routing methods. Sediment traps or small basins intended as best management practices may be exempt from this requirement.

One of the key components of successful closure is storm water management. Our primary goal, if not one of the most important goals, is to ensure that once we have gone to the effort and expense of placing a cover on the various piles that an upset condition of a water control feature does not cause a breach in the cover. Maintenance of cover integrity is important for ground water protection because the cover design is intended to limit the amount of precipitation that can enter and potentially infiltrate through the underlying material and eventually reach ground water. Moreover, ditches, conveyances and spillways must be designed so that storm water flows do not pond excessively on the covers (unless the ponding is part of the intended design and special design considerations as referenced at 20.6.7.33 Subsection C are implemented) and can flow off of the cover without causing unwanted erosion. The Proposed Rule specifies the design storm event as a design to carry peak flow generated by the one hundred-year interval storm event, which is a generally accepted and reasonable design criterion. The 100-year design storm event is required by the Mining Act and is consistent with our existing discharge permits, closure-closeout plans and the closure and reclamation work we have performed to date. Adoption of this aspect of the Proposed Rule will reduce redundancy and potential conflict with the Mining Act requirements. This design criteria

is consistent with the Office of Surface Mining's and Mine Safety and Health Administration's guidance for permanent infrastructure and long-term closure of mine facilities (*see* Exhibit Shelley-6, pages 5-18, and Exhibit Shelley-7). The methods that were used at the Tyrone and Chino Mines were refined through collaboration with the Department, Mining and Mineral Division of the Energy, Minerals and Natural Resources Department (MMD), and Office of State Engineer (State Engineer) over a period of years. The lessons learned from those endeavors are included in the Proposed Rule and are summarized below. The Proposed Rule does not specify storm duration; instead it requires a design should assess conveyance of the "maximum peak flow". As a result an engineer must determine which duration, be it twenty-four hours or one hour will create the "maximum peak flow" based on the technical storm characteristics used in modeling the runoff and channel flows from the 100-year events and design the water conveyances, ditches, channels and diversions accordingly (*see* Exhibit Shelley-6, pages 5-18). 20.6.7.33.M NMAC states that these criteria will be superseded by the regulations of the State Engineer Dam Safety Bureau for facilities, like tailings dams, that the Dam Safety Bureau regulates. I have reviewed the proposed language above and believe that it is consistent with the objectives described above and protection of ground water quality.

Proposed Rule section 20.6.7.33.B NMAC states:

> **B. Slope stability.** At closure, tailing impoundment(s) not regulated by the office of the state engineer, leach stockpile(s) or waste rock stockpile(s) shall be constructed to promote the long-term stability of the structure. Closure of all critical structures at a copper mine facility shall be designed for a long-term static factor of safety of 1.5 or greater and non-critical structures shall be designed for a long-term static factor of safety of 1.3 or greater. The facilities being closed shall also be designed for a factor of safety of 1.1 or greater under pseudostatic analysis. A stability analysis shall be conducted for the facility that shall include evaluation for static and seismic induced liquefaction.

Slope stability requirements are imposed under several laws regulating copper mine facilities. Facilities that are under the jurisdiction of the State Engineer, such as tailings impoundments or large dams, are subject to stability criteria established in the State Engineer's regulations. The Mining Act Rules also require MMD to evaluate stability. The slope stability criteria in the Proposed Rule requires that closure of all critical structures at a copper mine facility must be designed to meet a long-term static factor of safety of 1.5 or greater. These critical structures are defined as structures that would cause an exceedance of applicable ground water standards on ground water if there were a significant unexpected slope movement. The generally accepted standard engineering practice would call for a static safety factor of 1.3 for rock stockpiles (which is cited as an example in the definition of a critical structure) and other typical embankments, however during the promulgation process, the Department was adamant about imposing a far more conservative criteria for "critical structures." A critical structure is defined in section 20.6.7.7.B(16) of the Proposed Rule as follows:

> (16) "Critical structure" means earthen or rock structures or embankments (such as an outslope of a rock stockpile), that are likely to cause an exceedance of applicable ground water standards or undue risk to property in the event of a significant unexpected slope movement.

This definition is tied to ground water protection and, in my opinion, that is a reasonable basis to determine what parts of a copper mine facility would constitute a "critical structure" subject to the more conservative stability requirement. In my view, the stability requirements of the Proposed Rule for "critical structures" are conservative and protective of ground water quality by ensuring that manmade structures will remain in place over time.

The Proposed Rule also requires non-critical structures to have a design safety factor of 1.3 or greater, which reflects the general industry standard and is consistent with

Mining Act Guidelines and Rules. Finally, the Proposed Rule also specifies a separate design factor of safety of 1.1 or greater under pseudostatic analysis, which is a method of evaluating slope stability under earthquake loading conditions. Pseudostatic analysis is a simplified and overly conservative way to evaluate slope stability under earthquake loading conditions. The factor of safety criteria of 1.1 for pseudostatic analysis is overly conservative for typical non-water holding embankments that may exist at closure. It is the standard the State Engineer Dam Safety Bureau uses for high hazard tailings dams and would be overly conservative if blindly applied to most other mine facilities at closure. In my opinion, these types of decisions should be left to licensed engineers who will look at all appropriate technical information. At a minimum, the pseudostatic factor of safety of 1.1 should only apply to true "critical structures" that really are an equivalent risk to a high hazard dam in the Dam Safety Bureau regulations. A pseudostatic factor of 1.0 is acceptable for most typical embankments because it is such a conservative approach to seismic stability evaluations. That is what the pseudostatic approach was designed for and it is often used as a screening tool because of its simplicity and conservatism. Requiring a liquefaction evaluation for all structures is reasonable only if by this language the department would accept a simple evaluation of obvious site conditions that would prevent liquefaction (such as bedrock foundations and other foundation properties, water table conditions, *etc.*)

The language in this section may be overly conservative and over-reaching since there are specific criteria, yet the application is vague and/or broad and does not allow the typical engineering judgment to make these most basic decisions. Rather than repeat the detailed technical citations here, I refer to the direct written testimony of James C. Scott

concerning the state of the practice for selecting appropriate factors of safety for various slope stability applications.

I recommend one change to Section 20.6.7.33.B NMAC of the Proposed Rule. This section should be struck and allowed to be addressed as it is now in New Mexico through 20.6.7.17.A. Alternatively, if the Department chooses to retain this section, the pseudostatic factor of safety should be 1.0 for non-critical structures and 1.1 for true "critical structures". Liquefaction evaluations may be required, but it should be clear that liquefaction evaluation may be a simple screen of obvious site conditions that would prevent the possibility of liquefaction with more detailed evaluation where site conditions warrant it. Again, this is to be determined by a professional engineer.

Proposed Rule section 20.6.7.33, subsection C states:

> **C. Surface re-grading:** During closure of any tailing impoundment, waste rock pile or leach stockpile at a copper mine facility, the surface shall be re-graded to a stable configuration that minimizes ponding and promotes the conveyance of surface water off the facility. The operator may propose for department approval a grading plan that allows ponding as an appropriate part of closure provided additional ground water protection measures, such as synthetic liner systems, are included as part of the design.
>
> (1) The top surfaces of all tailing impoundments at a copper mine facility shall be constructed to a minimum final grade of one-half of one percent (0.5%) after accounting for the estimated magnitude and location of large-scale settlement due to totaling consolidation or differential settlement. Prior to final re-grading activities, the permittee shall ensure that adequate drainage of the tailing impoundment has occurred to ensure that large-scale settlement following grading is minimized. The CQC and CQA plan shall provide the methods and procedures to ensure that the design and construction activities will be completed according to the approved final design and specifications, including design aspects related to potential future settlement.
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> (2) The top surfaces of all waste rock and leach stockpiles at a copper mine facility shall be constructed to a minimum final grade of one percent (1%).
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> (3) The outslopes of all tailing impoundments, waste rock and leach stockpiles at a copper mine facility shall be constructed to an interbench slope no steeper than three (3) horizontal to one (1) vertical (3H:1V). Alternative slope gradients may be allowed within an open pit surface drainage area, or if the permittee provides information showing that the cover performance objectives in Subsection F of this Section are met and the exception is approved by the department.
>
> (a) At existing copper mine facilities, where re-grading of individual outslopes would intersect a highway, cultural resource, physical infrastructure or a surface water of the state, outslopes may be re-graded no steeper than 2.5:1 or as otherwise approved by the department in Paragraph (3) of this Subsection.

(b) At existing copper mine facilities, the waste rock and leach stockpile outslopes within an open pit surface drainage area are not required to be graded and covered.

(4) For design purposes, allowable uninterrupted slope lengths shall be calculated using a generally accepted erosion estimation method and shall be based on the final slope angle and cover material characteristics representative of the cover materials proposed for use at the site. The maximum uninterrupted slope lengths shall be no greater than 300 feet for 4.0:1, 200 feet for 3:1 slopes and 175 feet for 2.5:1 slopes. Alternative slope lengths may be allowed if the permittee provides information showing that the cover performance objectives specified in Subsection F of this Section will be achieved and the exception is approved by the department.

As has been stated previously, copper mines are typically large scale operations with facilities covering many square miles. The above language establishes requirements for regrading copper mine facility components to facilitate cover placement and to facilitate drainage clean runoff to natural water courses and to reduce ponding of water on closed facilities. To achieve this objective at this large scale, closure plans necessarily require movement of massive amounts of mined materials (rock and tailings). The primary purpose is to grade the surface, particularly relatively flat top surfaces, in a manner that allows water to flow off the surface and not accumulate significantly unless the approved design allows, and makes provisions for, ponding to occur. The primary purpose of surface regrading for relatively steep side slopes is to create a configuration that that will allow application and maintenance of a cover.

The surface regrading requirement in the proposed rule mandates that stockpiles be regraded to a stable configuration minimizing ponding and promoting water conveyance. The proposed rule also provides some flexibility allowing the operator to propose grading plans that allow ponding as part of the design, but only if approved by the Environment Department. The reason for this flexibility is that our experience has shown that in reclamation of large scale copper mines, the need for this allowance will most certainly come up (typically on a limited basis). There have been instances at both Chino and Tyrone reclamation sites where a flat synthetically-lined channel of about 1 or

2 acres in size total can replace massive cuts and fills over hundreds of acres that would otherwise be above and beyond the massive regarding volumes already required to achieve basic drainage. Allowing for ponds also could facilitate post-mining land uses for wildlife habitat. There have been instances where small, insignificant sized pond areas will be required as part of the water conveyance design for closure also (such as stilling basins). By requiring Department approval for such a closure approach, the Department can ensure that appropriate measures, such as liners, can be utilized to reduce potential seepage of ponded water into mined materials underlying the reclaimed surface.

The top surface regrading requirements set forth in the proposed rule sets a minimum final grade of one half of one percent for tailings impoundments after accounting for settlement. This is consistent with industry practice and existing permits issued by the Department and has been implemented successfully on tailings impoundments at New Mexico copper mines, including those where I have supervised closure and reclamation work. In my experience, such a design will allow adequate surface water drainage and have required only relatively minor corrections of grade on the post-reclamation facilities.

Settlement can be an issue for closure water conveyances that are on top of tailings dams. Because tailings impoundments are mainly composed of fine grain solids, which means the particles are much smaller than sand (silts primarily). These materials are prone to hold water and over time the water slowly squeezes out under the weight of the layers of deposited tailings. As the water squeezes out, the volume decreases and settlement of the material occurs. As a result, we employ geotechnical engineers who perform settlement analysis or consolidation analysis of the tailing dam. They predict

from that analysis where the largest settlements will occur and how much has already occurred. It is usually preferable to conduct regrading and install covers a few years after a tailing impoundment has last received tailings so that settlement occurs before closure and reclamation is performed. Estimates regarding future consolidation/settlement are considered in the closure design to accommodate the settlement so that the overall surface drainage is not compromised. For example, we typically try to design and position our channels so they would generally get steeper as settlement occurs thus maintaining the function of the channel.

The slope requirements for leach and waste rock stockpiles require a minimum grade of one percent. Although Freeport believes it is acceptable to close a stockpile top surface using the half percent grade, we believe we can comply with the more conservative gradient requirement that was preferred by the department. At closure, these top surfaces are typically not as large as tailing dam surfaces and do not have as many issues with deep channel excavations that may allow achievement of a minimum 1% grade (affecting stability) as a tailings dam typically would. Settlement generally occurs more quickly in stockpile materials.

The proposed rule specifies that slopes, after regrading, can be no steeper than three-to-one (3 horizontal to 1 vertical) which is consistent with most of the closure and reclamation work I have supervised, with permits previously issued and designs approved by the Department for copper mines in New Mexico, and has been operationally successful. The proposed rule also allows, in some instances, slopes that are two and a half-to-one (2 ½ horizontal to 1 vertical). This is a pragmatic allowance in cases where impediments exist near the stockpile like a highway or water course that would not

accommodate the flatter slope. It should be noted that we have slope test plots at Chino and Tyrone that are graded at the two and a half-to-one gradient and they are performing adequately. The proposed rule also specifies some limits on the maximum uninterrupted slope lengths depending on the steepness of the slope and this is important because the engineering design criteria specifying the slope length will indicate what effect erosion will have on the slope. Slope lengths that are too long for a particular cover material and a particular slope steepness may produce unacceptable erosion occurrences. This depends on the erosion resistant characteristics of the material available to be used for cover. Typically, as slope lengths increase the risk of erosion increases; and generally, as the slope steepens the shorter slope lengths are required to manage erosion. However, there are numerous examples of steep reclaimed slopes at the Freeport copper mines that experience little erosion because of the coarse texture of the slope material. In reclamation, the need for exceptions usually arise to some degree and the rule allows variations to be proposed with approval by the department. All of the forgoing regrading criteria are generally consistent with Exhibit Shelley-2, conditions 3, 4, 6, 9 and 10, except that the criteria for stockpile top surfaces is more stringent in the copper rule. The proposed rule is similarly consistent with Exhibits Shelley-3 and 4.

The proposed rule specifies an exception for regrading and covering outslopes within an open pit surface drainage area. This area is defined in the Proposed Rule, section 20.6.7.7.B(42) as follows:

> (42) "Open pit surface drainage area" means the area in which storm water drains into an open pit and cannot feasibly be diverted by gravity outside the pit perimeter, and the underlying ground water is hydrologically contained by pumping or evaporation of water from the pit bottom.

The current closure-closeout plan and permits for the Chino Mine allow such an exception over a broader area that may include some areas where surface water does not drain to the open pit. The settlement agreement for the Tyrone Mine (Exhibit Shelley-5) allows for this exception only in the area where both surface water and underlying ground water both flow to an open pit, consistent with the definition of "open pit surface drainage area" in the Proposed Rule. The reason for this exception is that slopes immediately adjacent to an open pit naturally drain into the open pit and little or no environmental benefit is achieved from reclaiming those slopes. There is also a safety risk when operating in these areas near the open pit and environmental risks as well. For example, If there were a requirement to reclaim those slopes abutting the open pit and manage the water on the reclaimed slope as in normal reclamation, then there would be construction of storm-water conveyances right on the edge of the open pit, which is a precarious site to be managing water and could lead to washouts and potential water-induced pit wall instability. The Mining and Minerals Division (with concurrence of the department) has agreed with this approach and has issued "waivers" of reclamation requirements as allowed by the Mining Act and Mining Act Rules for the Tyrone and Chino Mines within these open pit areas.

I have reviewed the proposed language above concerning surface regrading and the exception of slopes within open pit surface drainage areas and believe that it is consistent with the requirements of the permit conditions for regrading currently established through permit conditions, as modified per the terms of the Tyrone Settlement, as shown by Exhibits Shelley 2, 3, 4 and 5 and the objectives described above and protection of ground water quality.

Proposed Rule section 20.6.7.33, subsection D states:

> **D. Open pits.** The applicant or permittee shall provide detailed information and a closure plan for open pits that demonstrates how the following criteria will be addressed through water management and/or other activities at these facilities to minimize the potential to cause an exceedance of applicable water quality standards:
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> (1) Open pits in which the evaporation from the surface of an open pit water body is predicted to exceed the water inflow shall be considered to be a hydrologic evaporative sink. If an open pit is determined to be a hydrologic evaporative sink, the standards of 20.6.2.3103 NMAC do not apply within the area of hydrologic containment.
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> (2) After closure, if water within an open pit is predicted to flow from the open pit into ground water and the discharge from an open pit may cause an exceedance of applicable standards at a designated monitoring well location, then the open pit shall be considered a flow-through pit and the open pit water quality must meet ground water standards of 20.6.2.3103 NMAC or be managed to mitigate exceedances of applicable standards outside the area of hydrologic containment.

Open pits at copper mines are typically large scale operations covering hundreds or thousands of acres. Open pits are constructed by blasting rock and removing the blasted material. The slopes of an open pit are designed to be as steep as possible, consistent with maintaining stable slopes for safety, to minimize the amount of material that must be removed to access the ore. This approach keeps the size of an open pit to a minimum consistent with mine economics and also minimizes the volume of material that must be hauled and placed in stockpiles. Most copper ore bodies are cone shaped and elliptical in plan view, as opposed to the relatively horizontal seams of coal and some other minerals resources. Consequently, to access the ore body safely as the mine gets deeper the top of the mine must be wider than the bottom part. For this reason, it typically is not feasible for open pits at copper mines to be closed and reclaimed by backfilling concurrent with mining operations, although we sometimes utilize mined-out portions of open pits for placement of waste rock or leach stockpiles. Freeport-McMoRan has evaluated the closure of the large open pits at the Chino, Tyrone and Cobre Mines and has concluded that closure and reclamation by full or partial backfilling is not feasible and could have adverse environmental consequences. Both the Environment Department

and the Mining and Minerals Division have agreed and the permits issued under both the Water Quality Act and the Mining Act do not require surface closure or reclamation of most open pits; however, safety provisions and water management provisions are required.

Depending upon the geology and mineralization of the mined rock, in most instances precipitation runoff from open pit walls and ground water inflow that contacts pit walls will not meet the numerical ground water quality standards of section 20.6.2.3103 NMAC. There is no known technology to prevent this from occurring.

Once mined deeply enough, open pits result in hydrologic capture of ground water from all directions. Neil Blandford, a hydrologist, will testify regarding this phenomenon. If the open pit is large enough, relative to ground water inflow and precipitation, such that annual evaporation of water accumulating in the open pit (if that is allowed to happen) would exceed annual inflow of ground water and precipitation, then the open pit is considered to be a "hydrologic evaporative sink" that will never discharge water contained in the open pit to surrounding ground water. In that event, paragraph (1) of the Proposed Rule subsection quoted above will apply, and because the open pit will never discharge to surrounding ground water, the Proposed Rule exempts the water contained in the open pit from compliance with the standards of section 20.6.2.3103. The open pit at the Chino Mine is an example of such an open pit.

Some open pits are not large enough, relative to ground water inflow and precipitation, such that evaporation of water allowed to accumulate in the open pit would be less than that required to prevent a discharge to surrounding ground water. Some of the open pits at the Tyrone Mine are examples of such open pits, which are sometimes

referred to as “flow through” pits. However, I should clarify that even though the Tyrone Main Pit would be a flow-through pit if the water were left to rise in the pit without pumping for decades, ground water is not now discharging from the pit because it is a hydrologic sink induced by pumping. In fact Exhibit Shelley-2 and the operational DP that regulates the open pit require that the water in the open pit be pumped to maintain this very effective hydrologic sink as an environmental control.

Paragraph (2) of the subsection quoted above applies to “flow-through” open pits such as Tyrone. If such an open pit would contain water that does not meet ground water quality standards (similar to Tyrone), such that a discharge would be predicted to or cause an exceedance of ground water quality standards at a monitoring well, then the permittee would be required to develop mitigation measures to prevent an exceedance of ground water quality standards. At the Tyrone Mine, the closure-closeout plan requires water collected in the open pit following closure to be pumped out and treated to meet applicable standards, after which the treated water can be discharged to the environment or delivered for a beneficial use.

There could be other scenarios in the development of an open pit copper mine that require water management similar to Tyrone’s or ground water pumping systems designed to control the discharge of ground water at closure so that any potential impacts are contained and managed to meet the same ground water protection objectives within a reasonable distance from the pit within the mine operation.

The Proposed Rule language is consistent with the physical, hydrologic and geochemical characteristics of open pit copper mines and the approved closure-closeout plans and permit requirements imposed under the Water Quality Act for the Chino,

Tyrone and Cobre Mines. In my experience, the Environment Department has never required water collected in open pits to meet the standards of section 20.6.2.3103 NMAC, and the approved plans and permits issued for our mines allow for collection and treatment of this water following closure. It is a reality that the existing copper mines and all typical copper mines are large scale and contain geologic conditions that will cause water collected in the pits to exceed the standards referenced above. The copper rule must account for these practical realities. I have reviewed the proposed language above and believe that it is generally consistent with Exhibits Shelley-2 (Condition 22), 3 (Conditions 20), and 4 (Condition 23) and the objectives described above and protection of ground water quality.

Proposed Rule section 20.6.7.33, subsection E states:

> **E. Surface water management:** The permittee of a copper mine facility shall maintain and implement a plan for the management of all stormwater and sediment generated from the facility during reclamation and following closure.

The Proposed Rule specifically requires that an operator must maintain and implement a management plan for storm-water and sediment generated from the facility during reclamation and following closure. The closure-closeout plans and permits issued for closure of the Chino, Tyrone and Cobre Mines contain such plans. Generally, they require that stormwater that does not meet applicable ground water quality standards be collected and contained within the mine following closure. A closure plan might provide that impacted storm water would be placed in an impoundment and used for purposes such as dust control, evaporated, or sent to a water treatment plant. I have reviewed the proposed language above and believe that it is consistent with Exhibits 2, 3, 4 and the objectives described above and protection of ground water quality.

Proposed Rule section 20.6.7.33, subsection F states:

F. Cover system: At closure, a permittee shall install a cover system on waste rock piles, leach stockpiles, tailing impoundments and other facilities that have the potential to generate leachate and cause an exceedance of applicable standards at a designated monitoring well location using the following criteria, as appropriate. Any soil cover systems installed before the effective date of the copper mine rule are not subject to the requirements of the copper mine rule unless the department determines that an exceedance of applicable standards has occurred or is likely to occur as a result of the existing installed cover system, and that modification of the cover will prevent further impacts to ground water. Any cover system installed at an existing copper mine facility after the effective date of the copper mine rule shall be a store and release earthen cover system with a thickness of 36 inches and shall be constructed in accordance with the applicable requirements of Paragraphs 1 through 3 of this Subsection. For leach and waste rock stockpiles inside the open pit surface drainage area of an existing copper mine facility a 36-inch cover is only required on the top surfaces.

(1) The cover system shall be constructed of 36 inches of earthen materials that are capable of sustaining plant growth without continuous augmentation and have erosion resistant characteristics. Erosion rates shall be equal to or less than stable slopes in the surrounding environment after the vegetation has reached near-equilibrium cover levels. Erosion will be estimated using generally acceptable methods.

(2) Soil cover systems shall be designed to limit net-percolation by having the capacity to store within the fine fraction at least 95 percent of the long-term average winter (December, January and February) precipitation or at least 35 percent of the long-term average summer (June, July and August) precipitation, whichever is greater. The water holding capacity of the cover system will be determined by multiplying the thickness of the cover times the incremental water holding capacity of the approved cover materials. Appropriate field or laboratory test results or published estimates of available water capacity shall be provided by the permittee to show that the proposed cover material meets this performance standard.

(3) Cover thickness or other design criteria may be reduced or modified if:

(a) the cover system is installed over a lined facility and the design and function of the liner system will complement the cover system, or the permittee proposes a composite, layered or an alternate cover system with an equal or greater level of ground water protection described in Paragraphs (1) and (2) of this Section, or

(b) a demonstration is made that an alternate proposed cover system will ensure that an exceedance of applicable standards will not occur in ground water. Such a demonstration shall include:

(i) a comprehensive modeling study to estimate the quantity of net-percolation through a cover system that will not result in an exceedance of applicable standards in ground water;

(ii) a plan for performance monitoring of the cover system, including ground water monitoring; and

(iii) an agreement by the permittee to pay for the cost of a third party review of the modeling study and performance monitoring plan.

(4) A CQA/CQC plan shall be submitted for department review as part of the final cover design. The plan shall identify a licensed New Mexico professional engineer as the designated CQA officer and include his or her supervision of the CQA plan and shall identify the methods proposed to ensure that the closure construction will be completed in accordance with the design and specifications. Following the completion of the work, the CQA officer shall prepare a final CQA report. The final CQA report shall provide a detailed description of the installation methods and procedures and document that the work was conducted as designed.

The Proposed Rule contains requirements for the design and placement of a cover system, the purpose of which is to sustain vegetation, protect the wastes from erosion and store precipitation within the cover until it is removed by evapotranspiration to minimize drainage into the underlying mined materials that could result in leaching of contaminants that eventually could reach ground water. Mr. Lewis Munk will provide expert testimony on the technical basis for the Proposed Rule.

Copper mines are large scale facilities typically covering several square miles. The facilities that will require cover are also large scale. At the Chino and Tyrone facilties, the amount of cover material required for closure is on the order of 10 to 20 million cubic yards. The requirements at the Cobre Mine would be less, but still likely on the order of several million cubic yards. For this magnitude and scale of closure, it is essential that the facilities locate suitable cover materials from locally available sources and preferably from overburden material excavated in the mining process. This is really the only practical thing to do, and, fortunately this offers environmental benefits as well. Completed reclamation as well as test plot programs at the mines indicate suitable materials are likely locally available. The Proposed Rule should encourage these practices and integration of closure (such as segregating suitable cover and riprap materials) with mine operations to the extent practical.

The Proposed Rule requirements for covers are consistent with the requirements of the closure permits (Exhibits Shelley-2, 3, and 4) for the Chino, Tyrone and Cobre Mines. In general, this language will require a cover composed of three-feet of suitable cover material, meaning material that is capable of sustaining vegetation. The closure and reclamation covers for which I have participated in the design and permitting and

have supervised installation at the Tyrone and Chino Mines have consisted of between two and three feet of material. We installed two foot thick covers on some tailing impoundments at Tyrone, subject to verification that they are performing properly to protect ground water. While our technical evaluations, as described by Mr. Munk, indicate that three-foot covers are conservatively thick, most of the covers we have installed, as approved by the Department and MMD, are designed for a minimum thickness of three feet.

Facilities that are not a potential source for exceedances of applicable ground water standards are exempt from the cover requirements for closure purposes. Also, Freeport understands that some mine materials, such as the Cobre tailings and some of the Cobre waste rock piles, have equivalent properties to suitable cover materials and could constitute part of the required thickness of cover material subject to the technical demonstrations provided for in Exhibit Shelley-4, page 15, Condition 16 and I believe that the language of the Proposed Rule would accommodate such an approach.

The tailing, leach stockpiles and waste rock stockpiles on which we have installed, or are required to install, covers are unlined. Paragraph (3) of the subsection quoted above allows for some variation on the cover requirements for lined facilities, subject to appropriate technical demonstrations. The reason for this variation is that liners will provide separate protection against migration into ground water of the typically small volumes of leachate from a closed and covered facility. Also, for the very large copper mines operated by Freeport (which are typical of operating open pit copper mines), covers using locally available material, such as overburden from the mine, are the only feasible means of constructing covers due to the huge volumes of material required.

For some smaller facilities, however, covers using alternative engineered cover systems (including geomembranes or alternative cover thicknesses using available earthen cover materials) may be feasible. Paragraph (3) above also allows for an alternative design using such materials as long as it provides equal or better protection of ground water.

The Proposed Rule requires that cover installation be performed pursuant to a written CQA/CQC plan. Based on my experience with the detailed design and supervising the installation of covers, this is an important requirement. It is standard engineering and construction industry practice to provide construction quality control based on a written plan/procedure during construction and to verify that plans and specifications were adhered to through construction quality assurance practices. CQA/CQC plan documents the procedures for quality practices on the project and it is approved by the agencies prior to the start of construction. The CQA/CQC report summarizes the evidence collected through the CQA/CQC plan and documents that the construction complied with the design intent and the specifications and explains significant deviations from the plan.

I have reviewed the proposed language above and believe that it is consistent with Exhibits Shelley 2, 3, 4 and the objectives described above and protection of ground water quality.

Proposed Rule Section 20.6.7.33.G NMAC states:

> **G. Process solution reduction plans:** The closure plan shall include a process solution reduction plan for the copper mine facility. The process solution reduction plan is a conceptual engineering document that describes the processes and methods that are expected to be used at a copper mine facility to reduce the quantities of process water in storage and circulation inventory at the end of copper production in preparation for long-term water management and/or treatment. The plan shall describe and list the current or proposed process water management facilities and inventories of process water. The plan shall describe the modifications to the process water management system required to create an efficient process water reduction system and the operation and maintenance requirements for the system with material take-offs of

> sufficient detail to prepare an engineering-level cost estimate equivalent to the cost estimate to be provided with the closure plan. The plan shall provide an estimate of the required water reduction period based on the water reduction calculations provided in the plan to be used for planning and operation and maintenance cost calculations.

The Proposed Rule requires process solution reduction plans to deal with the inevitable large inventories of impacted water that exists when typical copper leaching operations and other mine facilities that utilize significant amounts of water, such as tailings ponds, reach the end of their economic life. Copper mining involves significant amounts of water to process ore. When mining concludes, the water inventory is likely to be impacted and generally has a low pH. It is necessary to eliminate some of that water prior to sending it to a water treatment plant to avoid the need to design and construct a larger capacity water treatment plant than is needed for most of the duration of post-closure water treatment. Thus as the economic life of such facilities comes to an end the operation will begin to reduce that impacted water in inventory over a reasonable amount of time (typically five to ten years). Typically, these plans will include evaporation processes whereby impacted water is circulated over a leach facility where it can be evaporated using existing surfaces that are ideal for this activity. The process solution elimination plan provides the roadmap to facilitate impacted water inventory reduction. The plan must describe and list current proposed water management facilities and inventories of processed water, detail modifications to the system and set forth operation and maintenance requirements. The Proposed Rule language quoted above would require process solution reduction in a manner consistent with approved closure plans and permits approved by the Department for New Mexico copper mines. I have reviewed the proposed language above and believe that it is consistent with Exhibits Shelley-

2(Condition 88), 3(Condition 88) and 4 (Condition 86) and the objectives described above and protection of ground water quality.

Proposed Rule Section 20.6.7.33.H NMAC states:

> **H. Closure water management and treatment plan:** The applicant or permittee shall submit a closure water management and treatment plan. The closure water management and treatment plan shall consist of a conceptual engineering document that describes the processes and methods that are expected to be used at a copper mine facility for long-term management and/or treatment of process water. The plan shall describe the long-term water management and treatment facilities with sufficient detail (including locations of key components) to prepare an engineering-level cost estimate equivalent to the cost estimate to be provided with the closure plan (providing material take-offs, capital and operation and maintenance costs). The plans will provide sufficient detail to estimate capital and operating costs to provide the basis for financial assurance pursuant to 20.6.8 NMAC for these activities.

The Proposed Rule contains a requirement to plan for the long-term treatment of impacted water. This is a conceptual engineering document that describes the processes and methods that will be employed after mine closure to collect impacted water, treat and discharge it safely. The plans are detailed enough to provide an engineer-level cost estimate. This plan is important to generating the estimates necessary to comply with the financial assurance components of closure. The Proposed Rule language quoted above would require developing of water treatment plans in a manner consistent with approved closure plans and permits approved by the Department for New Mexico copper mines. I have reviewed the proposed language above and believe that it is consistent with Exhibits Shelley-2, 3 and 4 and the objectives described above and protection of ground water quality.

Proposed Rule Section 20.6.7.33.I NMAC states:

> **I. Impoundments:** The permittee shall close all reservoirs and impoundments in a manner that ensures that the requirements of the Water Quality Act, commission rules and the discharge permit are met. Closure activities shall meet the following requirements:
>
> (1) Fluids from reservoirs and impoundments shall be drained and appropriately disposed of.
>
> (2) Sediments in the reservoir or impoundment shall be characterized and abated or appropriately disposed of in a manner that will not cause an exceedance of applicable standards.

(3) Materials underlying the reservoir or impoundment shall be characterized to determine if releases of water contaminants have occurred.

(4) Where characterization results show materials remaining within or beneath any reservoir or other impoundment that are not naturally occurring to be a source or potential source of ground water contamination outside the open pit surface drainage area, the reservoir or impoundment, shall be covered and re-vegetated pursuant to this Section.

(5) Based on the characterization conducted pursuant to Paragraph (4) of this Subsection, further characterization of ground water beneath and adjacent to the reservoir or impoundment may be required to determine if abatement is necessary.

(6) Reservoirs and impoundments located outside the open pit surface drainage area shall be closed in a manner that creates positive drainage away from the impoundments, unless needed during closure and post closure for storm water retention or seepage interception, post-closure water management and treatment, or unless otherwise approved by the department. Post-closure reservoirs or impoundments to be used for the collection of non-impacted storm water and located over areas where residual wastes, vadose zone contamination or ground water contamination remains shall be synthetically lined pursuant to the design and construction criteria of Paragraph (4) of Subsection D of 20.6.7.17 NMAC. Large reservoirs located in the open pit surface drainage area of an existing copper mine facility are exempt from the requirement to establish positive drainage.

(7) The department may approve alternative plans for closure of impoundments based on site-specific conditions when the alternative closure method will provide the same level of ground water protection as the methods specified in Paragraphs (1) through (6) of this Subsection.

The Proposed Rule necessarily has to deal with water impoundments, simply because such a large quantity of water is necessary for copper production, this part of the regulation is mainly aimed at process water and storm-water impoundments that in post-closure no longer remain necessary. Absent a necessary function, these impoundments must be managed in a manner consistent with all copper mine facilities. If there is a potential that they could discharge contaminants then they must be managed in a manner that eliminates or minimizes their impact to the environment and ensures that the requirements of the Water Quality Act, Commission rules and regulations and the discharge permit are met. The closure requirements provide a host of environmental safeguards; fluids from reservoir and impoundments must be drained and appropriately disposed of, sediments in the reservoir or impoundment must be characterized and abated or appropriately disposed of to guard against exceedances, materials underlying the reservoir or impoundment must be characterized to determine if contaminants have been

released. Furthermore, if characterization results identify materials that are not naturally occurring and pose a contamination threat outside the open pit drainage area they must be covered and re-vegetated and if impacts are present an abatement evaluation would be completed to determine if abatement is necessary. Reservoir and impoundments located outside the open pit drainage area must be closed in a manner that creates positive drainage away from the impoundments unless they are critical to post closure processes. In the case of non-impacted water in impoundments and reservoirs that can be used for storm-water collection, located over residual waste areas, they must be synthetically lined. The Department has the ability to approve alternative closure measures in cases where a different measure will provide the same level of protection. The Proposed Rule language quoted above would require closure of impoundments in a manner consistent with approved closure plans and permits approved by the Department for New Mexico copper mines. I have reviewed the proposed language above and believe that it is consistent with Exhibits Shelley-2, 3 and 4 and the objectives described above and protection of ground water quality.

Proposed Rule Section 20.6.7.33.J NMAC states:

> **J. Pipelines, tanks and sumps:** The permittee shall remove and/or properly dispose of the tailing, process water, or other materials contained in pipelines, tanks or sumps as soon as they are no longer needed for site operations, water treatment, or other post-closure water management. Any residual tailing, process water, sediments or contaminated water shall be removed from the pipelines, tanks or sumps prior to closure and dispose of the material in a department approved manner. Pipelines may be removed for appropriate disposal or cleaned and buried in place. Sumps may be removed for disposal or cleaned and broken up and buried in place. During pipeline, tank or sump closure, the permittee shall inspect the entire pipeline, tank or sump area for evidence of past spills and characterize the impacts and potential impacts of such spills. The permittee shall document all areas where there is evidence of spills and propose to the department appropriate corrective actions pursuant to 20.6.2.1203 NMAC. Following pipeline, tank or sump removal, the permittee shall remove for disposal or reclaim in place all acid generating pipeline, tank or sump bedding material that has the potential to impact water quality in excess of the applicable standards.

The Proposed Rule requires pipelines, tanks and sumps that may contain residual contaminants to be removed or closed in a manner approved by the Department provided they are no longer needed for site operations. Pipelines, tanks and sumps that can be removed and cleaned can be disposed of on site in an appropriate and approved manner. These areas and components must be inspected and evaluated for evidence of past spills and are subject to appropriate agency corrective action. All materials that remain and have the potential to create an environmental impact are subject to removal and disposition. The Proposed Rule language quoted above would require closure of pipelines, tanks and sumps in a manner consistent with approved closure plans and permits approved by the Department for New Mexico copper mines. I have reviewed the proposed language above and believe that it is consistent with Exhibits 2,3 and 4 and the objectives described above and protection of ground water quality.

Proposed Rule Section 20.6.7.33.K NMAC states:

> **K. Crushing, milling, concentrating and smelting:** The permittee shall close all crushing, milling, concentrating or smelting areas in a manner that ensures that the requirements of the Water Quality Act, commission rules and the discharge permit are met. Any remaining materials containing water contaminants that may cause an exceedance of the applicable standards shall be removed or disposed of in a department approved manner or covered pursuant to this Section. The permittee shall characterize the crushing, milling, concentrating or smelting area for the presence of any remaining potential water contaminants. If water contaminants are present that may with reasonable probability move directly or indirectly into ground water and cause an exceedance of the applicable standards, the area shall be covered pursuant to this Section.

The Proposed Rule deals with crushing, milling and smelting areas similarly to other facilities. If they have a potential for discharge or contain water contaminants that may cause an exceedance the materials with these characteristics must be removed or disposed of as per the Department requirements. If water contaminants are present that may move directly or indirectly into ground water the materials must be covered in accordance with the Proposed Rule requirements for cover systems. The Commission

should be aware that closure, in some instances, may not result in the decommissioning of structures that may remain in place and be used for some other purpose. For example, the Mining Act contemplates industrial post-mining land uses. The Proposed Rule language quoted above would require closure of impoundments in a manner consistent with approved closure plans and permits approved by the Department for New Mexico copper mines. I have reviewed the proposed language above and believe that it is consistent with the objectives described above and protection of ground water quality.

Proposed Rule Section 20.6.7.33.L NMAC states:

> **L. Closure monitoring and maintenance:** During closure the permittee shall continue monitoring pursuant to 20.6.7.28 NMAC and 20.6.7.29 NMAC. The permittee may propose and the department may approve modifications to the required monitoring to reflect changes in conditions during closure, including abandonment of monitoring wells.

The Proposed Rule requires vigilant monitoring utilizing the best techniques available including but not limited to monitoring wells. The monitoring process requires the permittees to monitor the site and evaluate constantly. The permittees may seek modifications based on changing conditions during closure but only with agency approval. The Proposed Rule language quoted above would require closure monitoring and maintenance in a manner consistent with approved closure plans and permits approved by the Department for New Mexico copper mines. I have reviewed the proposed language above and believe that it is consistent with the objectives described above and protection of ground water quality.

Proposed Rule Section 20.6.7.33.M, NMAC states:

> **M. Exceptions to design criteria:** The closure design criteria of this Section may be modified if approved by the department. Design criteria required by the office of the state engineer dam safety bureau for regulated facilities, such as jurisdictional impoundments (including tailing impoundments), shall supersede the criteria in this Section.

The Proposed Rule does allow some flexibility with regard to design criteria modifications and exceptions because the process is dynamic and ever-changing. However, modifications are allowed only in instances where the Environment Department approves of the modification. This requirement is similar to conditions in existing discharge permits for closure, which allow for approved changes to design criteria, particularly as detailed designs are prepared as closure is implemented. To avoid conflict with applicable requirements of the State Engineer, in the event of a conflict between the Proposed Rule closure requirements and the State Engineer requirements, the State Engineer Dam Safety Bureau for regulated facilities will take priority.

The next section of the Proposed Rule covered by my testimony is Section 20.6.7.34, which addresses implementation of closure. The preceding section regarding closure design requirements will be used to develop closure plans that must be prepared and updated during mine operations. Once a decision is made to proceed with closure of a mine, the closure plan must be implemented. At that point, detailed engineering plans and documentation must be prepared and reviewed for construction and implementation of closure. The following Proposed Rule language addresses these issues.

20.6.7.34 IMPLEMENTATION OF CLOSURE

A. Notification of intent to close. A permittee shall notify the department in writing of its intent to implement the closure plan for a copper mine facility or a unit of a facility. Notification shall be given at least 30 days prior to implementation of closure construction activities.

The Proposed Rule requires an operator create a closure plan and submit it to the Department. Before an operator can begin closure they must notify the Department, in writing, thirty days before commencement. The purpose of this notice is to give the Department an opportunity to inspect and prepare for review of detailed closure

implementation documents. Such a notification requirement is contained in the conditions of current discharge permits for closure of copper mines (Exhibits 2, 3 and 4).

> **B. Initiation of closure.** Upon notice of intent to implement a closure plan, a permittee shall commence closure in accordance with the approved closure plan. Implementation of closure includes preparation and submittal of a final design and CQA/CQC plan. The permittee shall submit the final design and CQA/CQC plan to the department for approval within 180 days of submission of a notice of intent to implement the closure plan. The permittee shall commence final closure construction of the facility within 180 days of receipt of written approval of the final design and CQA/CQC plan. These timelines may be modified by the department upon request by the permittee for good cause shown, including allowance for time for procurement and mobilization of construction services and materials prior to actual closure construction.

Once the closure notification has been given, the proposed copper rule requires submission of a CQA/CQC report summarizing inspections, testing and various types of data collection and analysis. This submission must be given within one hundred and eighty (180) days of the closure notification and final closure can begin within one hundred and eighty (180) days of agency approval of the CQA/CQC. These timelines can be modified with good cause and agency approval. This requirement is consistent with current discharge permit closure requirements and practices.

> **C. Notification of change in operational status.** Whenever operation of a copper mine facility subject to closure requirements under the copper mine rule is suspended or resumed, the permittee shall provide the department written notification within thirty days of the date operation is suspended or resumed. Each subsequent semi-annual report submitted during suspension of operation of a copper mine facility shall state whether the permittee intends to resume operations and the anticipated date of resumption of operations or the conditions under which operations will resume.

There are periods in an active mine where operations cease for various reasons, this does not necessarily mean that the closure process must or even should commence. For example, in the history of the Tyrone and Chino Mines, large areas of the mine have remained inactive for years then recommence based on a variety of factors. Copper mines are huge and can cover five to ten thousand acres. It would be extremely inefficient to begin closure of a mine merely because it isn't currently active.

To alert the Department of periods of inactivity and changes in status, the Proposed Rule requires notification of a change in status. For instance, if a mine facility suspends or resumes operations they must inform the Department within thirty (30) days of that action. The operator must also file an annual report during suspension of operations that states whether they intend to resume operations and provides an anticipated resumption date or conditions or the conditions under which operations will resume.

> **D. Department notice regarding suspended operations and enforcement action.** If leaching operations or milling operations at a copper mine facility are suspended for more than one year, the department may issue a written notice to the permittee requesting that the permittee provide evidence that the permittee is capable of and intends to resume operation of the facility. If the permittee does not respond within 30 days of postal notice of the department's written notice, or if the permittee does not provide evidence that the copper mine facility is capable of resuming operation, that the permittee intends to resume operation of the copper mine facility, and that the copper mine facility does not pose a threat to public health or cause undue damage to property, the department may determine that the permittee is in violation of the copper mine rule for failure to implement closure of the copper mine facility in a timely manner and may take appropriate enforcement action pursuant to Section 74-6-10 NMSA 1978, including requiring implementation of closure in accordance with 20.6.7.33 NMAC and this Section.

As discussed above regarding subsection C of this section, the Proposed Rule allows for flexibility to consider that copper mines may have periods of inactivity. However, the Proposed Rules also is intended to ensure that there is a legitimate intent to resume operations and not to simply avoid implementing closure. This subsection specifically addresses leaching and milling operations that are suspended for more than a year. During suspension of leaching or milling operations the Department can issue a written notice requiring the operator to provide evidence that they are capable of resuming operations and intend to do so. Furthermore, the operator must show that the copper facility does not pose a threat to the public health and will not unduly damage the

property. Copper mines in New Mexico are subject to separate requirements under the Mining Act to obtain a standby permit for an extended period of inactivity.

> **E. Deferral of closure**. A permittee may request deferral of closure of a unit at a copper mine facility that has reached the end of its useful life with no intent by the permittee to resume operations if the proximity of active operations at the copper mine facility could result in ongoing contamination of the unit, closure would require relocation or replacement of infrastructure that supports ongoing operations, or for other good cause shown. The department may approve a deferral of closure if the permittee demonstrates that adequate water management measures are being implemented to protect ground water quality during the period of deferral.

The Proposed Rule does allow for a deferral of closure when an area of a copper mine is not in use and the operator has no intention of resuming operations, but only if active mine operations are in close proximity to the inactive unit and those operations could result in ongoing contamination of the inactive unit, or closure would require costly removal of infrastructure or for good cause. However, the operator must demonstrate that they can adequately protect ground water during the deferral.

> **F. Final design.** The permittee shall submit a final design and CQA/CQC plan to the department for approval at least 60 days prior to construction, including commencement of surface shaping activities, of any area subject to a closure plan pursuant to the copper mine rule including, but not limited to, tailing impoundments, waste rock piles, leach stockpiles, and any other area where cover is required under the approved closure plan. The CQA/CQC plan must include detailed engineering designs for storm water management structures and associated conveyance systems, cover design specifications, a cover material suitability assessment, a borrow source location, a rip rap suitability assessment, a rip rap source location, a post reclamation storm water management plan, and a schedule for completion. In addition, the final design and CQA/CQC plan shall include best management practices that will be employed during reclamation to address erosion and storm water management in a manner that meets the requirements of the Water Quality Act and commission regulations. The final design and CQA/CQC plan shall bear the signature and seal of a licensed professional engineer in accordance with Subsection A of 20.6.7.17 NMAC.

As discussed above, final designs and CQA/CQC are important to ensure that closure measures are installed properly and in accordance with regulatory requirements. To ensure an orderly review and approval process, the Proposed Rule requires operators to submit a final design plan and CQA/CQC sixty (60) days prior to commencement of construction during closure and this includes surface reshaping for tailing impoundments,

waste rock piles, leach stockpiles and any other area that requires cover. The CQA/CQC plans must include engineering designs for water management structures and conveyance systems, cover design specifications and a material suitability assessment. It must identify a borrow source location, a rip rap suitability assessment, a rip rap source location, a post reclamation storm water management plan that meet the requirements of the Water Quality Act and a timeline for completion. These requirements are consistent with current discharge permit requirements and practices.

> **G. CQA/CQC report**. Within 180 days after project completion, the permittee shall submit a final CQA/CQC report to the department. The CQA/CQC report shall include, at a minimum, as-built drawings of the entire reclaimed area including test pit locations and cover thickness data, a final survey report and topographic map following cover placement, a summary of work conducted, construction photographs, the location of reclaimed borrow areas, soil testing results, and laboratory analytical reports. The contour intervals on topographic maps shall be no greater than two feet for the top surfaces and no greater than ten feet for the outslopes for closure of tailing impoundments, leach stockpiles or waste rock stockpiles. The CQA/CQC report shall provide summaries of the quality assurance data, documenting that the project was completed according to the approved final design and CQA/CQC plan with significant exceptions explained. The CQA/CQC report shall bear the signature and seal of a licensed professional engineer in accordance with Subsection A of 20.6.7.17 NMAC.

The final step in the implementation of closure is documentation that the closure measures have been implemented in accordance with regulatory requirements. The Proposed Rule requires an operator to file a CQA/CQC report during the implementation of closure phase within one hundred and eighty (180) days after completion. The CQA/CQC includes drawings of the proposed reclamation area, surveys, data, testing results, topographical maps, construction photos and a summary of work. This report documents that the project was completed according to the approved plans and specifications and must provide an explanation for significant deviations. The Proposed Rule requirements are consistent with current permit requirements (Exhibits Shelley-2, 3 and 4) and accepted engineering practices.

After closure measures have been implemented and the final report has been submitted and approved by the department, the closed area is ready to move to post-closure. Post-closure includes monitoring the performance of the closure measures to ensure they are performing as intended and to identify any necessary maintenance. For facilities used to collect and treat impacted water, the post-closure period involves active operations. The Proposed Rule specifies the following general requirements.

> **20.6.7.35 POST-CLOSURE REQUIREMENTS:** For each unit closed at a copper mine facility, the closure period shall cease, and the post-closure period shall commence, following the permittee's submission and department approval of a final CQA/CQC report that includes as-built drawings and a closure report documenting completion of regrading, covering, seeding, and construction of any other elements required for closure of a unit. The post-closure period for a copper mine facility shall begin when the final CQA report is approved and only monitoring, inspections, maintenance, and/or operation of a closure water treatment and management plan remain to be conducted. During the post-closure period, a permittee shall conduct post-closure monitoring, inspection, reporting, maintenance, and implementation of contingency actions as specified by this Section. The post-closure period shall end for a unit of a copper mine facility upon the completion of post-closure monitoring, inspection and maintenance for the unit as required by this Section. The post-closure period shall cease when all monitoring, inspections, maintenance, and operation of the water management and treatment plan required under this Section may cease. For units of a copper mine facility subject to an abatement plan, monitoring, inspection, reporting, and operation of abatement systems shall be conducted in accordance with the approved abatement plan rather than this Section.

This Proposed Rule language is consistent with current permit requirements under the Water Quality Act and current practices. The above language addresses the cessation of the post-closure period. Under current permit requirements, the post-closure period generally may end when applicable standards have been demonstrated to have been achieved, including vegetation standards and water quality standards.

> **A. Seepage interceptor system inspections.** A permittee shall perform quarterly inspections and annual evaluations of all seepage interceptor systems and perform maintenance as necessary to ensure that the systems are performing as designed and are functioning in a manner that is protective of ground water quality. The inspection results and any maintenance performed by the permittee on seepage interception systems shall be reported pursuant to Subsection D of this Section.

The Proposed Rule requires vigilant inspections and annual evaluations of any interceptor systems in order to ensure that the ground water protection techniques and

systems are working properly. To the extent the systems need to be repaired or modified, the operator must notify the Environment Department. The Proposed Rule is consistent with current permit requirements and practices.

> **B. Water quality monitoring and reporting.** A permittee shall perform water quality monitoring and reporting during the post-closure period pursuant to 20.6.7.28 NMAC and 20.6.7.29 NMAC, as applicable and modified by this Section. Ground water elevation contour maps required pursuant to Subsection L of 20.6.27 NMAC shall be submitted annually during the post-closure period. A permittee may request to reduce the frequency of or cease sampling a water quality monitoring location if the water contaminants in a monitoring well have been below the standards of 20.6.2.3103 NMAC for eight consecutive quarters. If sampling of a monitoring well may cease in accordance with this Subsection, the monitoring well shall be abandoned in accordance with applicable requirements unless the permittee requests and the department approves the monitoring well to remain in place for an alternative use or future monitoring.

The Proposed Rule requires post closure monitoring with regard to water quality. Operators must submit ground water elevation contour maps annually, but can request less frequent submissions and possibly cease operating a monitoring well if it is below standards for eight consecutive quarters. In this situation the well can be abandoned in accordance with regulations. An operator may seek permission from the Environment Department to potentially leave the well. *See* Proposed Rule section 20.6.7.35.B. Freeport supports this provision and asserts that it is protective of human health and the environment.

> **C. Reclamation monitoring, maintenance, and inspections.**
>
> (1) **Vegetation.** To ensure that vegetated covers required by the copper mine rule or the approved discharge permit are protective of water quality, a permittee shall perform post-closure monitoring of vegetation pursuant to schedules and monitoring requirements approved by the mining and minerals division. Any proposed changes to the closure or post-closure vegetation monitoring plan to meet Mining Act requirements shall be submitted to the department to ensure monitoring is protective of water quality. The permittee shall provide the department with a copy of monitoring results for vegetated covers, including photographic documentation as required by the mining and minerals division. At such time as the mining and minerals division vegetation success requirements under the Mining Act have been met, the permittee shall provide a final report to the department and vegetation monitoring may cease.
>
> (2) **Erosion, subsidence, slope instability, ponding, and other features.** The permittee shall visually inspect closed discharge permit areas where a cover was installed for signs of excessive erosion, subsidence features, slope instability, ponding, development of fissures, or any other feature that may compromise the functional

integrity of the cover system or drainage channels. Drainage channels, diversion structures, retention ponds, and auxiliary erosion control features shall be inspected in accordance with professionally recognized standards (e.g., U.S. department of agriculture natural resources conservation service standards). The inspections shall be conducted monthly for the first year following submission of the final CQA/CQC report for the unit, and quarterly thereafter until the end of post-closure monitoring, provided the department may approve a schedule allowing less-frequent monitoring. Discharge permit areas where covers were installed shall also be inspected for evidence of excessive erosion within 24 hours, or the next business day, following storm events of one inch or greater as measured at the nearest rain gauge on the copper mine facility. The permittee shall report and take corrective action pursuant to 20.6.2.7.30 NMAC regarding signs of excessive erosion, subsidence features, slope instability, ponding, development of fissures, or any other feature that may compromise the functional integrity of the cover system or drainage channels. Monitoring and inspection results shall be reported as required by Subsection D of this Section.

(3) **Entry.** A permittee shall inspect and maintain the fencing or other management systems required by the discharge permit to prevent access by wildlife and unauthorized members of the public to an open pit, reservoir, impoundment or any sump that contains water that may present a hazard to public health or wildlife.

(4) **Cover maintenance.** A permittee shall perform maintenance on all areas where a cover system was installed as required by the copper mine rule, including associated drainage channels and diversion structures if their performance may affect cover system function. Based on monitoring of vegetation and erosion required by Paragraphs (1) and (2) of this Subsection, a permittee shall provide recommendations for maintenance work in semiannual monitoring reports described in Subsection D of this Section, including a schedule for completion of work.

(5) **Other inspection and maintenance**. A permittee shall routinely inspect and maintain all structures, facilities, and equipment the failure of which may impact ground water quality. Water collected that exceeds the ground water quality standards in Section 20.6.2.3103 NMAC shall be stored, conveyed, treated and discharged in a manner that is consistent with the closure water treatment and management plan any other applicable regulatory requirements. The inspection results shall be reported as required in Subsection D of this Section. Inspections and maintenance shall include but are not limited to:

i) storm water retention reservoir(s);
ii) water treatment plant(s);
iii) pumps and pipelines to deliver water to water treatment plant(s); and
iv) seepage collection ponds.

(6) **Implementation of water management and treatment plan**. The permittee shall continue to implement the water management and treatment plan required by Subsection H of 20.6.7.33 NMAC during the post-closure period. The water management and treatment plan may be modified in accordance with its terms or by approval of the department to reflect changes in site conditions.

The Proposed Rule requires more than simply monitoring water. An operator must monitor the vegetation in accordance with the Mining Act and any changes must be submitted to the Department for approval to ensure they remain protective of ground water. An operator must submit copies of their monitoring results and only when the requirements of the Mining Act are met can they cease monitoring. The copper rule

similarly requires monitoring of erosion, subsidence, slope stability, ponding and many other features to ensure the functional integrity of the cover systems and drainage channels. The inspections are conducted monthly for the first year and must meet applicable standards and then are required quarterly thereafter. Following storm events of one inch or greater the cover areas must be inspected within twenty-four (24) hours to check for sign of excessive erosion, subsidence or any feature that may compromise the functional integrity of the cover systems and the drainage channels. Any fencing must be inspected to protect surrounding wildlife and unauthorized members of the public. In general, the Proposed Rule requires vigilant maintenance and inspection of structures, facilities equipment that could potentially impact ground water. The Proposed Rule language is consistent with conditions imposed in current permits and with current practices.

> **D. Reporting.** A permittee shall submit to department semi-annual reports pursuant to the schedule in Subsection A of 20.6.7.29 NMAC until the post-closure period ends for the copper mine facility. The reports shall contain:
>
> (1) a description and the results of all post-closure monitoring conducted pursuant to this section.
>
> (2) a description of any work completed during the preceding semi-annual period including but not limited to:
>
> (i) the status of post-closure activities for the copper mine facility; and
>
> (ii) any maintenance and repair work conducted for any closure unit.
>
> (3) semi-annual potentiometric maps including data from all monitoring wells, extraction wells, piezometers, seeps and springs appropriate to the water table being mapped.

The Proposed Rule requires semi-annual reporting until the post closure period terminates. Once the post closure period is over, the operator must submit reports containing the results of all monitoring conducted, descriptions of work completed, status reports for post-closure activities and any maintenance or repair work completed. The Proposed Rule language is consistent with conditions imposed in current permits and with current practices.

> **E.** The contingency requirements of 20.6.7.30 NMAC apply to any deficiencies in the implemented closure systems discovered during the post-closure monitoring and inspections required pursuant to this section.

The contingency requirements of the Proposed Rule apply to circumstances such as detection of exceedances of standards in monitoring wells and lack of capacity in impoundments. These circumstances could occur during the post-closure period, so the Proposed Rule references the contingency requirements as applicable during the post-closure period to govern corrective actions.

I will next address some of the contingency requirements of the Proposed Rule, particularly Subsections D, J, K and L of section 20.6.7.30. Some of these provisions apply during mine operations, as well as closure, so I will address these provisions generally. First, Subsection D reads as follows:

> **D**. **Exceedance of permitted maximum daily discharge volume.** If the maximum daily discharge volume authorized by the discharge permit at a particular permitted location is exceeded by more than ten percent for any three average daily discharge volumes within any one year period, the permittee shall submit within 60 days of the third exceedance a corrective action plan for reducing the discharge volume or an application for a modified or renewed and modified discharge permit pursuant to 20.6.7.10 NMAC. Within 30 days of postal notice of department approval, the permittee shall initiate implementation of the corrective action plan.

Subsection D addresses the circumstance where the permitted maximum daily discharge volume is exceeded. Discharge Permits for facilities at copper mines typically have maximum discharges specified and a requirement that changes to the operation (such as increasing a discharge rate within the facility) are discussed and approved in advance or that unplanned exceedances are documented and explained. This contingency is reasonable as it requires documentation and evaluation to ensure that designs and capacities for facilities remain adequate and that the discharges are known, understood and remain permitted. Subsection D has language requiring action only if the average daily discharge volume is exceeded by ten percent three times in a year. I expect that the

average daily discharge volume would be calculated depending upon the frequency of required meter readings. This provision would not require action due to isolated, non-recurring events. The subsection specifies a reasonable range of actions that could include actions to reduce the discharge volume or an application to modify a permit, which would require evaluation of system capacity and other factors and potentially improvements to facilities as needed to accommodate an increase in the authorized discharge volume. The process calls for submission of a corrective action plan and Department review and response to the plan, similar to the process specified in Section 20.6.2.1203 NMAC of the Commission's existing rules, which are currently specified in discharge permit conditions for contingency actions in general. This same process is utilized in the language of the remaining contingency subsections discussed below.

Subsections J and K read as follows:

> **J. Erosion of cover system or compromised stormwater conveyance structure, ponding of stormwater, or other conditions.** Within 24 hours of discovery, a permittee shall report to the department any evidence of significant erosion of a cover system required by 20.6.7.33 NMAC or compromise of a stormwater conveyance structure; any significant ponding of stormwater on the cover system; or any other condition that may significantly compromise the cover system or stormwater conveyance structure. Within 15 days of the reported discovery, the permittee shall submit to the department a corrective action plan describing any actions taken or proposed to be taken to repair the damage or condition. Within 30 days of receipt, the department shall respond to the proposed corrective action plan. Repairs to the cover system or stormwater conveyance structure shall be completed consistent with the applicable requirements of 20.6.7.33 NMAC. The corrective action plan shall include a schedule for implementation. The schedule shall propose completion within one year from the submittal date of the initial corrective action plan. Within 30 days of the date of postal notice of the department's approval of the corrective action plan, the permittee shall initiate implementation of the plan.
>
> **K. Water management and water treatment system failure.** Within 24 hours of discovery, a permittee shall report to the department any significant failure of a water management or water treatment system constructed and operated pursuant to 20.6.7.33 NMAC or any condition that may cause a significant failure of the water treatment system. Within 15 days of the reported discovery, the permittee shall submit to the department a corrective action plan describing any actions taken or proposed to be taken to repair the damage or condition. Within 30 days of receipt, the department shall respond to the proposed corrective action plan. Repairs to the water treatment system shall be completed consistent with the applicable requirements of 20.6.7.33 NMAC. The corrective action plan shall include a schedule for implementation. The schedule shall propose completion within one year from the submittal date of the initial corrective

> action plan. Within 30 days of the date of postal notice of the department's approval of the corrective action plan, the permittee shall initiate implementation of the plan.

Generally, Subsection J is consistent with the requirements of the existing closure permits, Exhibits Shelley-2, 3, and 4. I have experience with this process for reporting significant erosion and other observed conditions that could compromise the effectiveness of closure systems, and the requirements of Subsection J are reasonable, except for the last two sentences of Subsection J. Based on experience, I have a concern with the last two sentences of 20.6.7.30.J NMAC. While these two criteria are appropriate for most corrective actions, they are not appropriate, or even possible, for some corrective actions and may conflict with the approved schedule that is required for every corrective action plan. An appropriate schedule must be submitted with each corrective action plan. This schedule should be sufficient. The last two sentences seem to supersede and/or could potentially conflict with the approved schedule. Sometimes weather conditions prevent initiation of a corrective action plan and so these corrective actions should be negotiated and approved rather than stating that every action be started within a set time period. On rare occasions a corrective action plan could easily take longer than one year to finish, particularly if longer term monitoring is required to determine when to initiate the plan. With regard to the last sentence, corrective actions typically are implemented before a written corrective action plan is even submitted. Freeport has experienced all of these scenarios and has resolved them to both the Department's and the MMD's satisfaction. Good maintenance of reclaimed surfaces can tolerate and accommodate these scenarios. There needs to be some flexibility to accommodate these circumstances and the department will have approval authority if they do not like the schedule proposed. Approval of the schedule is all the Department

and the operator should need. Consequently, I recommend that the last two sentences of Subsection J be deleted.

Subsection K addresses failures of water management and water treatment systems required as part of closure. I understand that "water management" as used here likely would refer to systems used to collect impacted water to be delivered to the water treatment plant, such as impoundments, pipelines and pumping systems. While we have not yet implemented water treatment systems because the mines currently are utilizing impacted water for mine processes, this process specified in Subsection K is consistent with the contingency process with which I am familiar, and appears to be reasonable, except for the second to last sentence regarding a one year time limit, which is subject to the same comment I made regarding Subsection J.

Finally, subsection L addresses interim emergency water management, and reads as follows:

> **L. Interim Emergency Water Management:** An applicant or permittee shall develop and submit to the department an interim emergency fluid management plan. The purpose of the interim emergency water management plan is to provide information to the department on how process water systems, interceptor wells, seepage collection systems and storm water management systems are operated and maintained to prevent discharges in the event the department assumes management of the copper mine facility. An applicant or permittee shall include in the plan process water flow charts showing electrical system requirements, pump operations, seepage collection and interceptor well operations and applicable operation and maintenance requirements. The interim process water management plan shall be updated as major process water system changes occur that would affect the interim emergency water management plan. The interim emergency water management plan shall be maintained on site and be available for department review. The plan shall be submitted within180 days of discharge permit renewal for an existing copper mine facility and no less than 60 days prior to discharge at a new copper mine facility.

The type of requirements specified in this provision are not required under existing discharge permit conditions, but was added based on recommendations of other technical and advisory committee participants. It requires preparation and submission of a plan that will provide information to the Department regarding the operation of

systems, such as pumping systems for recirculation of process fluids and collection of impacted water, that might have to continue in operation following an unplanned event, such as a bankruptcy and/or abandonment of a copper mine, resulting in the Department's assumption of those operations. These circumstances are highly unlikely. The plans may be very complex and challenging to complete within the 180 day period specified in the Proposed Rule.

The final provision addressed in this testimony is from the General Engineering and Surveying Requirements, Section 20.6.7.17.C (3). I am addressing this provision because applies to water treatment systems that typically are included only in closure plans.

> (3) **Process water or impacted stormwater treatment system plans and specifications.** An applicant or permittee proposing or required to construct a treatment system for process water or impacted stormwater to be treated prior to discharge or for water collected and treated during closure or post-closure activities shall submit detailed and complete construction plans and specifications and supporting design calculations developed pursuant to this section and 20.6.7.18 NMAC.

With regard to paragraph (3), it would first note that it applies for process water or storm to be treated prior to discharge or for water collected and treated during closure and post-closure activities. It is very rare to have planned discharges of process water or impacted stormwater at a copper mine in the arid southwestern U.S., other than discharges associated with recirculated, recycled and reused water. Indeed, regulations under the federal Clean Water Act, 40 C.F.R. Part 440, prohibit most discharges of process water from copper mines except during periods of abnormal precipitation. Process water and impacted stormwater are nearly always recirculated within a particular process or used for makeup water in the mining processes. Rarely, if ever, does this water require treatment before reintroduction into the copper mining process.

The circumstances change, however, during closure and post-closure if there is no longer any active mining process that can utilize remaining process water or impacted storm water. In many mining states, this water typically is dealt with by evaporation. If evaporation is not feasible or allowed, a water treatment system may be needed so that excess water can be discharged either to surface waters or for a different use.

Section 20.6.7.17.C (3) requires submission of "detailed and complete plans and specifications and design calculations" describing such a water treatment system. Plans and specifications for water treatment systems that are included in permit applications may be required decades before closure is implemented and a water treatment system may be constructed. It is not reasonable to require plans and specifications at this point in time that contain anywhere close to the detail of final construction plans and specifications. These plans and specifications may be based on existing or commercial systems scaled for the anticipated volume and quality of water anticipated to require treatment. In some instances, including development of plans currently accepted by the Department for closure water treatment systems at the Tyrone and Chino Mines, they may be based on data obtained from bench-scale testing. These plans and specifications are needed as part of a permit application for a new or existing copper mine primarily as a basis to estimate water treatment costs at closure to calculate financial assurance amounts. I expect that the Department intends that "detailed and complete construction plans and specifications and supporting design calculations" as used in paragraph (3) are consistent with the level of plans and specifications previously accepted by the Department as part of closure plans and permits for copper mines. Based on the foregoing, I suggest that the phrase "detailed construction plans and specifications and

supporting design calculations" be replaced with "plans and specifications and supporting design calculations sufficient to provide a reasonable estimate of the costs to design, construct and operate the treatment system."

At closure, the final design for water treatment is developed well in advance to detail the project to a level that it can be constructed. These final plans and specifications would be covered by this provision also and would be reviewed and approved by the department.

II. CONCLUSION

The provisions of the Proposed Rule discussed in my preceding written direct testimony are generally consistent with the corresponding requirements imposed by the Department under the existing discharge permits for copper mines for compliance with the Water Quality Act. They are more specific in several respects than the existing permit conditions, and in some instances, the Proposed Rule adds new requirements not found in the existing permits. The specific engineering design criteria and procedures for closure are consistent with the closure and reclamation plans, including detailed construction designs, for which I have supervised implementation at existing copper mines under the Water Quality Act and the Mining Act. Other than the changes suggested above, I can support the Commission's adoption of these provisions of the Proposed Rules. This concludes my direct written testimony.

Thomas L. Shelley