STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED AMENDMENTS

TO 20.6.2 NMAC, THE COPPER MINE RULE

No. WQCC 12-01(R)

New Mexico Environment Department,

Petitioner.

TESTIMONY OF ADRIAN BROWN, P.E. IN REBUTTAL OF WITNESS OBJECTIONS TO COPPER MINE RULE

1. GROUNDWATER PROTECTION FOR TAILINGS IMPOUNDMENTS AND WASTE ROCK PILES SHOULD REQUIRE "BEST PRACTICES" OR THE "STATE OF THE ART"

1.1 Testimony

Witness Kuipers objects to the Rule's principal groundwater protection strategy (containment) not being "state-of-the-art", in contrast to a requirement to line these facilities, which was proposed as part of the Technical Committee process (Kuipers, p.8).

Witness Travers summarizes her testimony on the use of best practice by saying that "Best practice requires more protective pollution prevention measures and more stringent clean-up requirements [than the proposed Rule]" (Travers, p. 14). In particular, she points to the Rule's failure to mandate liners for large scale waste rock and tailings disposal systems as not representing "best industry practice" (Travers, p. 14).

1.2 Rebuttal

First, as Kuipers notes, the Water Quality Act (WQA) "prohibits pollution of groundwater above this Commission's water quality standards at places of withdrawal of water for present or reasonably foreseeable future use (place of withdrawal) unless a variance is obtained" (Kuipers, p. 4). The WQA is silent on the subject of how the groundwater protection that would prevent pollution will be achieved, and it does not require "state-of-the-art" method to be applied. If it did, it would be a "best practice" regulation (requiring best practices, but also allowing best practices even if they do not achieve the groundwater protection), rather than a "groundwater protection" regulation (which requires standards to be met at the place of withdrawal regardless of how that is achieved). Indeed, the Rule requires selection of a groundwater protection strategy that can be demonstrated to meet the standards at the place(s) of withdrawal regardless of whether it is the "state-of-the-art" or not (20.6.7.6 NMAC). The Rule does not require what is the best practice; rather protection of water quality is the end goal. In essence, while prescriptive the Rule starts with the end in mind.

Second, it is questionable that lining comprises the best practice in groundwater protection for tailings impoundments and waste rock piles:

1. Tailings Impoundments: With respect to tailings impoundments, lining is potentially problematic, for the following reasons:
    a. Liners leak, through seam failures, perforations, and directly through the liner material. Thus some tailings fluid is transported through the liner, the quantity depending on the area of the liner, the head over the liner, the frequency of defects, and the inherent permeability of the liner. The large area of typical copper mine tailings impoundments result in potentially significant leakage volumes.
    b. Lining reduces or eliminates the drainage of interstitial water from the tailings, thereby increasing the porewater pressure in the tailings which reduces the static stability of the pile and the ability of the pile to withstand earthquake loading without liquefying; failure has the potential to create widespread impact to the water resources of New Mexico, both surface water and groundwater. This problem can be overcome by installing a drainage system on top of the liner, but maintaining the long-term performance of these systems in tailings has been found to be problematic, particularly due to precipitation of dissolved constituents into perforations in deeply buried drainage pipes.
    c. The use of a liner results in collection of drainage fluid from the tailings, which will continue until such time as the tailings have significantly dewatered, or until the liner fails. The water collected from the tailings pile will generally require long term treatment before it can be discharged. In an unlined tailings system this water will pass into the groundwater system, with the volume decreasing over time following closure, eventually reaching a condition where standards will not be exceeded and the use of an interceptor system is no longer necessary.
2. Waste Rock Stockpiles: With respect to waste rock stockpiles, lining is potentially problematic, for the following reasons:
    a. Liners leak, through seam failures, perforations, and directly through the liner material. Thus some waste rock stockpile fluid is transported through the liner, the quantity depending on the area of the liner, the head over the liner, the frequency of defects, and the inherent permeability of the liner. The large area of typical copper mine waste rock stockpiles result in potentially significant leakage volumes.

b. Protection of the lining is difficult during placement of the waste rock, due to the impact of the large rocks that are dumped.
c. Placement of liner is difficult on steeply sloping areas that are often used for waste rock piles.
d. The use of a liner frequently creates a plane of weakness beneath the pile, particularly where the pile is located on sloping ground or bedrock. This causes reduced stability, which threatens the integrity of the liner due to mass movement of the pile, and by material from a slope failure impacting groundwater.

2. REMOVAL OF THE "AREA OF HYDROLOGIC CONTAINMENT" FROM THE RULE

2.1 Testimony

Witness Kuipers testifies that the Rule should not contain an Area of Hydrologic Containment ("AHC"), because it is a "highly temporal and transient feature" (Kuipers, p. 3, 4).

2.2 Rebuttal

The variability of the AHC is one of its strengths, not weaknesses. The Rule allows the permittee to adjust the size of the AHC by installation of pumping to ensure containment within the facility of any constituents released from units within the AHC. This is consistent with the containment requirements of the remainder of the Rule, particularly in 20.6.7.21 (Waste Rock Stockpiles) and 20.6.7.22 (Tailings Impoundments).

3. DEFINITION OF "PLACE OF WITHDRAWAL"

3.1 Testimony

Witness Shields, representing Amigos Bravos, testifies that: "All water, everywhere, should be regarded as a 'place of withdrawal of water for present and reasonably foreseeable future use'. NMSA 1978, §74-6-5.E(3). Once we accept the reality that all water, everywhere, is a place of withdrawal for the foreseeable future, it must become a matter of public policy that all state agencies have an obligation, to the extent that their role and decisions have an impact on water in the state, to ensure that all water, everywhere, is protected" (Shields, p. 6, 7).

3.2 Rebuttal

There is no requirement under the WQA for "all water, everywhere" to be regarded as a place of withdrawal of water for present and reasonably foreseeable future use. If there were, the Act would not have needed to limit protection to those places of withdrawal. Further, prohibition of pollution of "all water, everywhere" would be a de-facto prohibition of mining, and indeed most other industrial or agricultural activity in New Mexico, because, as Witness Kuipers acknowledges in his testimony, "... pollution of groundwater above standards at some sites may be unavoidable ..." (Kuipers, p. 3). Such prohibition of mining would defeat the objective of the rule, which clearly contemplates copper mining as a legitimate activity in New Mexico (20.6.7.6 NMAC).

In addition, such an unconditional requirement would constitute a futile call. There are many locations on active copper mine sites where access to groundwater is not available, including under all lined units (due to having to breach the lining to gain access), under waste rock dumps (due to dumping activity, general infeasibility of installation and operation of wells, and low permeability of the bedrock that generally underlies waste rock stockpiles limiting or preventing water extraction in usable quantities), and under tailings impoundments (due to tailings disposition activities, and the general infeasibility of installation and operation of wells). So these locations in general cannot be "place[s] of withdrawal" of water, regardless of the desire of Amigos Bravos to make them so. They can, however, again <u>become</u> places of withdrawal after mine closure (albeit with difficulty where there is waste rock or tailings located over those places to considerable depth), and the Rule is crafted in such a way as to require the water accessible at those places of withdrawal to be of a quality that allows reasonably foreseeable future use for "domestic or agricultural" purposes.

The timing and size of the operation of the mining activity in each unit supports a use by use approach to the place of withdrawal. For example, the existing Water Quality Control Commission Regulations exempt from discharge permit requirements "[n]atural ground water seeping or flowing into conventional mine workings which re-enters the ground by natural gravity flow prior to pumping or transporting out of the mine and without being used in any mining process; this exemption does not apply to solution mining" (20.6.2.2.3105.K NMAC). The fact that this regulation exists suggests that mining is a New Mexico reality, and that some groundwater at some times is exempt from the discharge permit requirements. Like the Rule, the exemption above identifies the location of the groundwater and the point of use of the groundwater. The Rule establishes a groundwater protection system that takes into account the fact that groundwater immediately under waste rock and leaching piles is not protected as domestic or agricultural use because it is presently in use for mining activities. During operations, groundwater outside of the waste rock and tailings impoundments is protected by means of the interceptor system. Upon closure all groundwater is protected as domestic or agricultural use as the present and reasonably foreseeable future use.

Similarly, the nature and size of the operation of mining activity determines the ability to institute controls to protect groundwater in its present use. The Rule's unit by unit approach protects groundwater as it becomes accessible for use. The present use of mining is temporal, considering the long-term monitoring and abatement of groundwater for its future use of domestic and agricultural use. While smaller mining operations, other than copper, may provide for smaller facilities and feasible means to drill in the center of operations and reverse flow, copper mining is inherently large in scale, generally using open pit mining to achieve the required economies of scale. The Rule sets out with definition how large open pit mines inherently use water and what is feasible for groundwater protection post-use. The Rule does not alter the on-the-ground reality that the place of withdrawal of groundwater at copper mines is not immediately below waste rock piles and tailing impoundments during mining. Rather than exempt large scale open pit copper mines from the requirement of obtaining discharge permits, the Rule seeks to closely manage by regulation the impacts on groundwater and require its protection for the long term.

4. ESTABLISHMENT OF A POINT OF COMPLIANCE SYSTEM

4.1 Testimony

Witness Travers testifies that "... the Proposed Rule establishes a point of compliance system. Under the Proposed Rule, ground water quality standards must be met at designated monitoring wells" (Travers, p. 10).

Witness Olson testifies that "As proposed by the Department, the Copper Mine Rule adopts a point of compliance concept that allows a permittee to create new cases of extensive pollution of ground water by rule" (Olson, p. 4).

4.2 Rebuttal

The Rule does not directly establish a point of compliance system in and of itself. It establishes a groundwater protection system at each unit of the facility. The effectiveness of that system is demonstrated by monitoring wells around the perimeter, downgradient and as close as practicable to each unit. These monitor wells are not points of compliance; they are sentinels to ensure that the protections that are built in to each unit of the copper mine facility are effective, and if they are not, then to signal the need for implementation of contingency and abatement actions as needed to restore the protections required.

If the monitor wells were points of compliance, then Ms. Travers and Mr. Olson would have cause to complain, because a system that met the standards at only those locations, and failed it elsewhere downgradient, would be acceptable under a "point of compliance" rule. Each unit has its own methods of detection and protection, for example, process water impoundments are required by Rule to have liners and leak detection systems, and leach piles are required by Rule to be lined. The result is that there are varying locations of contamination and where they are measured is determined by design. The monitoring system measures the effectiveness of those systems. The Rule does not provide for a line to be drawn around the entire copper mine and the compliance of the facility to regulatory standards measured at designated point of compliance wells; rather the Rule employs various methods of water quality protection around each specific unit.

Finally, in a "point of compliance" rule, there are designated points of compliance downgradient of the facility, at which compliance is measured. None of the groundwater upgradient of the facility points of compliance is required to meet the standards. In the proposed Rule, this is not allowed. Each unit (which includes its containment system, if any) is expected to perform in such a way as to protect against groundwater exceedances at any point of withdrawal for present and future use. Water quality is monitored on the perimeter of the unit to ensure that this protection is working, and that no water leaves the unit that has the potential to cause an exceedance of standards during operations. Following operations, the facility must be closed in a manner that prevents ongoing impacts to water quality.

5. CONTAMINATION BY RULE VERSUS CONTAMINATION BY VARIANCE

5.1 Testimony

Witness Kuipers testifies that the decision to allow unavoidable pollution should be made using variances on a site-by-site basis, not by rule (Kuipers, p. 4). Witnesses Travers and Olson generally concur (Travers, p.16; Olson, p. 20).

5.2 Rebuttal

The decision to allow unavoidable pollution by rule rather than on a site by site basis is a distinction without a difference. The Department has uniformly supported variance petitions in this matter by enforcing the same requirements as are embodied in the Rule (see, for example, petition variances granted for the Savannah pit leach stockpile at Tyrone and Lee Hill leach stockpile at Chino[1]). Indeed, the proposed Rule language is incorporated directly from these variances, which were agreed to at the time by all stakeholders. By including these agreed conditions in the Rule, the result is the same, but permitting uncertainty and permitting time are both reduced, which is beneficial to New Mexico's economy and an appropriate use of delegated regulatory power by NMED.

All witnesses' testimony related to the requirements of the Rule with respect to waste rock piles and tailings impoundments, and whether they should be lined. It has been the finding of the NMED in the cited variance petitions that it is infeasible to line these facilities when they are very large, and variances have been twice granted, as noted above. The size of these facilities also renders feasible the capture of any seepage discharge that may cause pollution of

[1] NMED's Response to Petition for Variance for the Savannah Pit Leach Stockpile, No. WQCC 11-03 (V); Statement of Reasons and Order Granting Variance; NMED's Response to Petition for Variance for the Lee Hill Leach Stockpile, No. WQCC 12-05 (V); Findings of Fact, Conclusions of Law, and Order Granting Variance, No. WQCC 07-02(V), attached as **NMED Exhibits 22 through 25**.

groundwater at points of withdrawal. Finally, the variances granted have been temporary; after closure, the groundwater at points of withdrawal beneath and outside the waste rock stockpiles and tailings impoundments is required to meet the standard, as does the Rule.

6. SLOPE STABILITY

6.1 Testimony

Witness Scott testifies that "The state-of-the-practice for non-water impounding hard rock mining stockpiles in the southwestern United States is a minimum static factor of safety of 1.3 and a minimum seismic factor of safety of 1.0" (Scott, p.24, and Exhibit D). Witness Shelley concurs without presenting any supporting evidence (Shelley, p.15 [static], p.16 [pseudostatic]).

6.2 Rebuttal

Slope stability requirements under the proposed Rule are addressed at 20.6.7.33.B NMAC. The requirements for tailings impoundments not regulated by the office of the state engineer, leach stockpiles, or waste rock stockpiles are as follows:

> "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" [20.6.7.33.B]

In his testimony, witness Scott initially considers that these requirements are "reasonable and appropriate" (Scott, p.19). However, later in his testimony he concludes that they are too high, as noted above.

In reaching this conclusion, witness Scott reviewed and presented a large number of papers, texts, and regulations. However, Scott fails to include in his evaluation possibly the most relevant regulation: the New Mexico Coal Surface Mining Rule (19.8 NMAC). This regulation is specific to New Mexico (as is the Rule), and relates to another mining activity in the state with significant similarities to copper mining. For the record, the requirements in the coal mining act are shown in Table 1, and generally require a static factor of safety of 1.5 outside the open pit (excess spoil) and 1.3 inside (backfilling and grading) and an earthquake (pseudo-static) factor of safety of 1.1 or 1.2 for the equivalent of tailings impoundments (coal processing waste) and waste rock stockpiles (excess spoil).

Table 1 - New Mexico Coal Surface Mining Rule Factors of Safety

Facility Unit	Static Factor of Safety	Earthquake Factor of Safety	Section
Impoundments: • Class B or C • Other	 1.5 1.3	 1.2 --	 19.8.20.2017.E(2) NMAC 19.8.20.2017.E(3) NMAC
Excess Spoil: • General requirement • Valley Fills • Durable Rock Fills	 1.5 1.5 1.5*	 -- -- 1.1	 19.8.20.2034.F 19.8.20.2035.A NMAC 19.8.20.2037.B(2) NMAC
Coal Processing Waste: • Dams and Embankments	 1.5	 1.2	19.8.20.2049.A(1) NMAC 19.8.20.2049.A(2) NMAC
Backfilling and Grading: • Highwall • Thin Overburden (cover) • Thick Overburden (cover)	 1.3 1.3 1.3	 -- -- --	 19.8.20.2055.A(2) NMAC 19.8.20.2057.B(1) NMAC 19.8.20.2058.B(1) NMAC
Primary Roads: • Embankments	 1.3	 --	 19.8.20.2077.A(5) NMAC

* End of construction

However, Scott's conclusion as to appropriate factors of safety is not supported by the evidence that he presents (Scott, Exhibit D) nor by the evidence he fails to present (19.8.20 NMAC): it is in fact the low end of the ranges of the factors of safety in the regulations and published texts that he references. A more accurate summation of the literature and regulation for waste rock stockpiles at closure is:

Long term static Factor of Safety for Critical Slopes:	1.3-1.5
Long-term static Factor of Safety for Non-Critical Slopes:	1.3
Pseudo-static (Earthquake) Factor of Safety:	1.0-1.2

The Rule values are the same as the majority of factor of safety values in use in New Mexico and globally; as such are "reasonable and appropriate", consistent with Mr. Scott's earlier statement (Scott, p.19).

Neither Mr. Scott nor Mr. Shelley presents any evaluation or other support for how protective their proposed factors of safety in fact would be. This would be more convincing testimony, particularly for a Rule that is specifically designed for the conditions in New Mexico, for which they both claim extensive experience. Had they done so, they would have reported that at design time for these facilities there is essentially no large-scale shear test data of the strength of as-mined size waste rock, and limited information on the strength of the tailings pile materials. The adequacy of a factor of safety is dependent on the variability of the parameters that are used to compute the safety of the slope. If there is little data on the principal parameter determining factor of safety (the effective stress angle of friction of the material in the slope), then its actual value is uncertain, and the design factor of safety must be set high to ensure that the probability of stability (the probability that the actual factor of safety will be unity or more) is acceptable (often set at 95% confidence for critical slopes). So in the case of at least waste rock piles, the factor of safety of 1.5, the most commonly used and upper end of "the state of practice" range, is reasonable and prudent, and was so selected in the Rule.

With respect to the pseudo static (earthquake) factor of safety, witnesses Scott and Shelley both recommend that the Rule-required Factor of Safety of 1.1 be reduced to 1.0 (Scott, p.24; Shelley, p.16). If their advice was taken and the factor of safety was set at 1.0, this would mean that, by definition, there is a 50% probability of failure under the design earthquake loading. This follows from the uncertainty in all parameters; for example, in 50% of the cases evaluated the actual effective stress friction angle will be less than the design value, and so the actual factor of safety will be less than unity in half the cases. Such a high probability of failure under the design earthquake loading is not acceptable as a regulatory matter, and so the factor of safety of 1.1 is the minimum that is credible in the Rule. Indeed, factors of safety are set above unity exactly to accommodate uncertainty in the stability evaluation, including uncertainties associated with loading, strength parameters, geometry, water conditions, foundation conditions, and the like.

Mr. Scott's testimony is further inconsistent with the evaluation performed by myself and presented in my direct testimony which found that for dry slopes in granular materials, a static Factor of Safety of 1.3 is necessary to provide a high probability of stability for dry slopes, due to the significant uncertainty in (particularly) the effective stress friction angle of the material (Brown, 2013[2]). As the slopes in waste rock piles and tailings impoundments cannot be guaranteed to be dry at all times (and probably will not be, particularly if the facilities are lined), a static Factor of Safety of 1.5 would appear to be necessary to provide protection against this additional uncertainty.

Both witnesses Scott (p.24 with respect to tailings impoundments only) and Shelley (p.17 with respect to tailings impoundments not regulated by the office of the state engineer, leach stockpiles, or waste rock stockpiles) recommend changing the Rule by deleting 20.6.7.33.B NMAC, and relying on 20.6.7.17.A NMAC ("Practice of Engineering"). The grounds for both are covered by Mr. Scott's statement that "[a]ll of these [factor of safety and critical structure] judgments require site specific evaluations and are best left to licensed professional engineers as appropriate under New Mexico law" (Scott, p.24). This is in my professional opinion unwise

[2] Expert Testimony of Adrian Brown, P.E. in Support of the New Mexico Environment Department Proposed Copper Mine Rule, dated February 22, 2013, p.16.

in the Rule. Allowing engineers to define acceptable factors of safety subjects them to the pressures of the mining companies for whom they work to set the lowest credible factor of safety, which produces the cheapest reclaimed slope, but the least stable and least reliable slope (see for example Brown, 2010 for a discussion of reliability of analyses in mining geoscience)[3]. An example of this is Scott's testimony: he is a certified New Mexico professional engineer that works for a consulting firm in the mining industry and he recommends the lowest factors of safety he was able to identify in the literature (Scott, p. 19). It is more protective of the groundwater that may be impacted by slope failure for NMED to set conservative but reasonable factors of safety, and require professional design to those values. Most of the regulations surveyed by Scott, and the directly relevant one that he did not include, take this approach (Scott, Exhibit D).

Scott further states that: "Listing minimum criteria [i.e. factors of safety] like this may or may not be protective or appropriate." This is directly contradictory with his earlier testimony that these requirements are "reasonable and appropriate" (Scott, p.19).

In summary, with respect to slope stability, witnesses Scott and Shelley recommend a long term static Factor of Safety of 1.3 and a pseudo-static Factor of Safety of 1.0. These values are inconsistent with, and lower than, reasonably conservative factors of safety drawn from their own testimony. In addition (or in the alternative) they both recommend that the factors of safety be removed from the Rule, and the Rule relies upon engineering judgment for factors of safety. This proposal is without merit because the Rule would then be insufficiently prescriptive to achieve protective stability analyses.

7. BACKGROUND CONCENTRATION

7.1 Testimony

Witness Blandford states on page 5 of his written testimony that "Background concentration of a constituent in ground water, therefore, is the concentration that would exist at a given location if mining never occurred. This definition is equivalent to the "existing concentration" applied in Section 20.6.2.3101.A NMAC for a mine site where mining activities have not affected a concentration value".

7.2 Rebuttal

"Existing concentrations" and "background concentrations" are distinct concepts. Background is a natural concentration that occurs from undisturbed geologic materials, while the existing concentration is the condition that existed at the time the WQCC regulations were adopted in 1977.

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[3] Brown A, 2010. *Reliable Mine Water Technology*, **Mine Water and the Environment**, Volume 29, Number 2, June 2010, pp.85-91, attached as **NMED Exhibit 26**.

8. CHANGES TO SECTION 20.6.7.21 NMAC - REQUIREMENTS FOR COPPER MINE WASTE ROCK STOCKPILES

8.1 Testimony

Testimony is anticipated objecting to changes made to Section 20.6.7.21, "Requirements for Copper Mine Waste Rock Stockpiles" of the finally submitted proposed Rule.

8.2 Rebuttal

This section has been revised to address the three components of managing impacts to ground water from waste rock stockpiles in a clear and concise manner. These include storm water management, seepage collection (note new definition for "seepage"), and capture and containment of impacted ground water. The previous language for this section failed to discuss necessary components of an interceptor system that were described in greater detail in the tailing impoundment section (20.6.7.22). A requirement that the permittee demonstrate adequate water rights to operate an interceptor system to contain impacted ground water was also added. The language in this section follows a parallel format with the tailing impoundment language.

9. CHANGES TO SECTION 20.6.7.22, REQUIREMENTS FOR COPPER CRUSHING, MILLING, CONCENTRATOR, SMELTING, AND TAILINGS IMPOUNDMENT FACILITIES

9.1 Testimony

Testimony is anticipated objecting to changes made to Section 20.6.7.22, "Requirements for Copper Crushing, Milling, Concentrator, Smelting, and Tailings Impoundment Facilities" in the Department's Amended Petition.

9.2 Rebuttal

This section has been revised in a similar manner to the waste rock stockpile language in Section 21. The previous language failed to address storm water management in the same comprehensive manner as the original waste rock stockpile language, inconsistently used the terms "seepage" and "drainage", and failed to adequately describe the intended function of interceptor systems for capture and containment of impacted ground water. A requirement that the permittee demonstrate water rights to operate an interceptor system to contain impacted ground water was also added.

10. CHANGES TO SECTION 20.6.7.28, WATER QUALITY MONITORING REQUIREMENTS FOR ALL COPPER MINE FACILITIES

10.1 Testimony

Testimony is anticipated objecting to changes made to Section 20.6.7.28, "Water Quality Monitoring Requirements for All Copper Mine Facilities" in the Department's Amended Petition.

10.2 Rebuttal

The changes to the Rule and the reasons for the changes are as follows:

1. Background monitoring. The Rule now requires installation of monitoring wells prior to construction of various facilities with sufficient time to allow for collection of background water quality data. This is self-evidently necessary; background can only be established by reading(s) taken before institution of the action.
2. Continuing existing monitoring. The Rule has been modified to allow for existing copper mine facilities to continue with monitoring programs that are in place and have been used for many years. The rationale is that these programs have proved adequate and appropriate for monitoring for impacts from existing operations.
3. Monitoring parameter list. The Rule has been modified to replace the previously-proposed limited prescriptive list of sampling constituents with a more effective and flexible requirement to customize monitoring to address the range of possible contaminants present in the specific facility unit being monitored. The rationale is that the prescriptive list could allow a permittee to fail to monitor for constituents which if released have the potential to cause an exceedance of standards. By conditioning the monitoring parameter list to expectable contaminants, all significant threats are monitored.
4. Sampling of waste streams. The Rule has been modified by adding requirements for sampling of waste streams at copper mine facilities. The rationale for this change is to allow development of the comprehensive monitoring parameter list required by the change discussed in item 4 above.
5. Parameter reduction. The Rule has been modified by changing the criteria for elimination or reduction of sampling requirements, so that it is based on the material characteristics of the unit being monitored rather than the prior requirement of the absence of a contaminant in ground water. The rationale for this change is that the prior approach would allow elimination of a potentially harmful parameter simply because a release had not yet occurred, or the contaminant had not yet reached a monitoring well. The modified approach avoids that obvious failing in monitoring.
6. Reporting requirements. The Rule has been modified by adding standardized reporting requirements. The rationale for this change is that these requirements are in existing

discharge permits, and have been found to be necessary for uniform application of the regulations.

11. CHANGES TO SECTION 20.6.7.33.H, CLOSURE WATER MANAGEMENT AND TREATMENT PLAN

11.1 Testimony

Testimony is anticipated objecting to changes made to Section 20.6.7.33.H, "Closure Water Management and Treatment Plan" in the Department's Amended Petition.

11.2 Rebuttal

The changes to the Rule and the reasons for the changes are as follows:

1. Interceptor system operation and life. The Rule has been modified by adding language that acknowledges operation of interceptors systems and requires evaluation of the expected life of such systems and planning for operation until interceptor and other water management systems are no longer necessary. This requirement has been added to ensure that appropriate financial assurance is secured for long term operation of water management systems following closure, or in the event of forfeiture.
2. Equalization of requirements for new and existing mine closure. The Rule has been modified by deletion of the phrase "for an existing copper mine facility" in several places including: use of alternate abatement standards as "applicable standards"; impoundment overflow capacity requirements; and, closure requirements within an OPSDA. The reason for this requirement is to equalize closure requirements for new and existing mines where such equalization is clearly appropriate for protection of groundwater.

12. CERTIFICATION

I, Adrian Brown, do hereby certify that I prepared the testimony provided in this report, and that the work reported herein was performed to normal standards of professional care.

Signed and sealed this 14th Day of March, 2013

Adrian Brown, P.E.

New Mexico Professional Engineer #12455