

STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED AMENDMENTS
TO 20.6.2, THE COPPER MINE RULE,

No. WQCC 12-01(R)

New Mexico Environment Department,
Petitioner.

REBUTTAL TESTIMONY OF CONNIE TRAVERS

Q: Please state your name.

A: My name is Connie Travers.

Q: Ms. Travers, have you reviewed the Amended Petition filed by the New Mexico Environment Department ("NMED") on February 18, 2013, including NMED's amendments to its Proposed Copper Mine Rule?

A: Yes.

Q: Have you reviewed the direct testimony submitted by other parties to this proceeding?

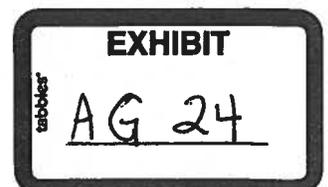
A: Yes.

Q: Whose testimony did you review?

A: I reviewed the testimony of nine witnesses for Freeport McMoRan, Inc. ("FMI"): T. Neil Blanford, John Brack, Timothy Eastep, Jim B. Finley Jr., Michael Grass, Lynn Lande, Lewis Munk, James C. Scott, and Thomas L. Shelley. I reviewed the testimony of NMED witnesses Adrian Brown and Tom Skibitski. I also reviewed the testimony of Sally Smith, member of the Copper Rule Advisory Committee and co-founder of the Gila Resources Information Project ("GRIP"); James R. Kuipers, a witness for GRIP and Turner Ranch Properties; Brian Shields on behalf of Amigos Bravos; and William C. Olson.

Q: The testimony of NMED witnesses states that NMED's Proposed Copper Rule will protect ground water at places of withdrawal of water for present and reasonably foreseeable future use (e.g., Skibitski Testimony, pp. 8-9, 11-12; Brown Testimony, pp. 3, 11-12, 21, 23, 24, 26, 29). What is your opinion of this testimony?

A: In my opinion, the Proposed Copper Rule will not necessarily protect ground water at places of withdrawal for present and reasonably foreseeable future use.



Q: What is the basis of your opinion?

A:

- The February 18, 2013 Amended Copper Rule does not require consideration of whether ground water beneath or downgradient of mine facilities is a place of withdrawal for present and reasonably foreseeable future use. The Proposed Rule allows mining companies to degrade ground water quality, in excess of water quality standards, beneath and downgradient of mine facilities to a point or points of compliance, regardless of and without consideration of the potential for this ground water to be withdrawn and used now or in the future.
- The Proposed Rule does not require pollution prevention measures for waste rock and tailings facilities. It allows ground water beneath waste rock dumps and tailings impoundments to become contaminated, and then relies on interceptor wells to capture contaminated ground water before it reaches a downgradient monitoring well (i.e., “a point of compliance”). As I described in my direct testimony, relying on a capture and containment system creates a risk that contamination will not be captured, particularly in the complex fractured rock systems present at most mine sites, and creates a risk of excursions on- and offsite. NMED witness Mr. Brown acknowledges that, “capture is generally not feasible in bedrock downgradient of the waste stockpile, due to low permeability and ineffectiveness of extraction well systems to capture a significant proportion of the ground water.” Brown Testimony, p. 23. Mr. Brown expresses the same opinion about the inability to capture impacted ground water in bedrock downgradient of a tailings impoundment. Brown Testimony, p. 30. The Proposed Rule relies on interceptor systems capturing ground water that has been degraded by seepage from waste rock and tailings impoundments, rather than preventing ground water degradation in the first place. This is less protective than the current requirements and is not protective of “places of withdrawal.”
- Mr. Skibitski testifies that “The proposed Copper Mine Rule does not alter or define the concept of ‘place of withdrawal.’” Skibitski Testimony, p. 8. This is not accurate. NMED’s Proposed Copper Mine Rule would alter the concept of “place of withdrawal” as defined by the Commission in its 2009 Decision and as implemented by NMED over the decades by establishing a point of compliance regulatory system to establish compliance with water quality standards, as described in my direct testimony. This represents a significant change. While NMED’s Proposed Rule does not “define” “place of withdrawal,” the Rule does not address or take into consideration the factors established by the Commission to determine place of withdrawal, i.e., hydrology, geology, water quality prior to discharge, past present and future land use, past and current water use, and population trends. As such, the Proposed Rule fundamentally ignores the Commission’s definition.
- Mr. Skibitski states that, “the proposed Copper Mine Rule codifies existing practices and contains measures to prevent, minimize, or contain the pollution of ground water to the maximum extent practicable.” Skibitski Testimony, p. 9. However, the Proposed Rule would not prevent or minimize pollution. Preventing pollution to the “maximum extent

practicable” would be preventing pollution of ground water in places of withdrawal at mine sites, rather than proposing to allow contamination and then attempting to capture migrating contaminated ground water.

- Contaminated ground water is not stopped by a mine permit or facility boundary. Pumping draws ground water toward a well from all directions. A well located in a “place of withdrawal” just outside of a mine permit boundary will draw water from inside and outside the permit boundary. If ground water inside the mine permit boundary is contaminated, it can be drawn toward pumping wells located outside the boundary. Thus, even if ground water contamination is limited by rule to areas within the mine permit boundary, ground water at places of withdrawal outside the boundary can be at risk of contamination.
- In New Mexico, there will be places of withdrawal of ground water for current or future use within and adjacent to a copper mine site. Using the Tyrone Mine site as an example, in its February 4, 2009 Decision in the *Tyrone* case, the Water Quality Control Commission (“Commission”) identified a large number of places of withdrawal on and adjacent to the Tyrone Mine site. I would like to refer to AGO Exhibit 25, which is a map of the Tyrone Mine site. This map shows the many “places of withdrawal” identified by the Commission in its Decision. Those are identified in the yellow boxes on the map.¹ (The locations, which are not intended to be to-scale, are identified based on

¹ The map is based on the Commission’s Decision, FOF ¶¶ 87, 119, 120, 124, 125; COL¶¶ 47, 49:

The Commission found that Tyrone withdraws ground water from a number of locations inside the Mining and Minerals Division (“MMD”) Permit Boundary:

- Tyrone withdraws 4000 to 5000 acre-feet of ground water per year for mining purposes from one or more open pits. Blandford, Tr. vol. 7, p. 1719, lines 11-13; Shelley, Tr. vol. 1, p. 73, line 21 to p. 74, line 5.
- Tyrone withdraws variable amounts of ground water for mining purposes from approximately 75 pump-back wells, which intercept contaminated ground water. Shelley, Tr. vol. 1, p. 52-54; Blandford, Tr. vol. 7, p. 1649, line 23 to p. 1652, line 3.
- Tyrone collectively withdraws approximately 60 acre-feet of ground water per year from two drinking water supply wells referred to as the “Fortuna Wells.” Blandford, Tr. vol. 7, p. 1763, lines 18-25.
- Figure 9 from Dr. John Shomaker, Tyrone’s expert hydrogeologist, shows areas of withdrawal of water and potential withdrawal of water for domestic and livestock use contiguous to and surrounding the MMD Permit Boundary. Tyrone Ex. 907, Fig. 9.

The Commission found that:

- Tyrone does not dispute that the Fortuna Wells, located inside the MMD Permit Boundary, are a place of withdrawal of water. Shelley, Tr. vol. 1, pp. 56-57, lines 24-4; Mohr, Tr. vol. 1, pg. 296, lines 5-10; Tyrone Ex. 901 at 10.
- Tyrone does not dispute that lands owned by third parties within the MMD Permit Boundary and all of the area immediately outside and surrounding the MMD Permit Boundary are “places of withdrawal of water for present or reasonably foreseeable future use” within the meaning of NMSA 1978, § 74-6-5(E)(3).

The Commission found that the following areas identified as places of withdrawal of water by Clint Marshall, NMED hydrogeologist, are places of withdrawal:

- Areas on the north side of the mine around the Mangas Valley tailings impoundments. Marshall, Tr. vol. 13, p. 3293, lines 11-17.
- Areas to the west and to the east of the 1A Tailings Impoundment. Marshall, Tr. vol. 13, p. 3294, lines 3-10.

the Commission's description in its Decision.) *Most significantly, this map shows that there are places of withdrawal within the Tyrone Mine site where, under the Proposed Copper Rule, ground water contamination above water quality standards would be allowed.* These areas include, but are not limited to, the areas near the open pits identified by the Commission as places of withdrawal.

- In addition, during the 2007 hearing before the Commission, NMED hydrogeologist Clint Marshall provided three maps showing existing ground water wells in the vicinity of the Tyrone Mine (NMED Exs. 21, 22, and 23) [attached as AGO Exs. 26, 27, and 28, respectively]. Mr. Marshall identified wells within a 4-mile radius of the Tyrone Mine perimeter because this area “encompasses the greatest extent of contamination that has migrated from the Tyrone Mine in the past, and is also consistent with EPA (United States Environmental Protection Agency) guidance used by federal and State Superfund programs.” Marshall Testimony, p. 12 [AGO Ex. 13]. He determined that within a 4-mile radius of the mine site, there were 84 wells for domestic, industrial, and agricultural use in 1972 (Trauger map) [AGO Ex. 26] and 349 wells in 2006 (Office of the State Engineer's WATERS well database) [AGO Ex. 27]. Mr. Marshall combined information on domestic and agricultural wells from two data sources onto a more local map of the area just around the mine site [AGO Ex. 28]. This map shows wells located on and adjacent to the Tyrone Mine site, including a well 200 feet south of the No. 1C waste rock facility in Oak Grove Draw, 4 wells in Deadman Canyon, and supply wells at the old Tyrone Mine site. In support of his testimony, Mr. Marshall also provided a list of all public water systems in Grant County (NMED Ex. 24) [AGO Ex. 29], that shows that the Fortuna Wells on the Tyrone Mine site provide water supply for 450 people, and the Burrow Mountain Homestead water system, located 2.5 miles from the Tyrone Mine, serves 79 people. Marshall Testimony, pp. 13-14 [AGO Ex. 13]. This information demonstrates that there is present use of ground water in the area within and surrounding the Tyrone Mine boundary.

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- An area immediately south of the 1A Tailings Impoundment. Marshall, Tr. vol. 13, p. 3295, line 9.
 - An area to the southeast of the 3A Stockpile and to the east of the 3B Waste Rock Pile around the old mill site. Marshall, Tr. vol. 13, p. 3296 to 3297, line 2.
 - Open areas around the pits. Marshall, Tr. vol. 13, p. 3297, line 24 to p. 3298, line 1.
 - The area on the east side of the mine south of the 5A Waste Rock Pile, “which has fantastic views of the Savannah Pit.” Marshall, Tr. vol. 13, p. 3298, line 19 to 3299, line 8.
 - An area south of the Gettysburg Pit. Marshall, Tr. vol. 13, p. 3299, lines 9-18.
 - Areas on the southwest corner of the mine. Marshall, Tr. vol. 13, p. 3302, lines 19-24.
 - An area to the west of the Gettysburg Pit, along the 1 C Stockpile. Marshall, Tr. vol. 13, p. 3300, lines 9-15.
 - Areas on the southeast side of the mine along and within Oak Grove Draw. Marshall, Tr. vol. 13, p. 3302, line 25 to p. 3303, line 15.
 - An area on the east side of the mine to the southeast of the No. 1 Stockpile. Marshall, Tr. vol. 13, p. 3303, lines 9-15.
 - Areas in the southeast corner of the mine, around the reclaimed Burro Mountain Tailings. Marshall, Tr. vol. 13, p. 3303, lines 16-24.
 - Areas on the west side of the mine in Deadman Canyon. Marshall, Tr. vol. 13, p. 3304, lines 1-19.

Furthermore, Dr. John Shomaker, a consulting hydrogeologist for Phelps Dodge Tyrone, Inc., testified at the *Tyrone* hearing in 2007 that the hydraulic conductivity data for the aquifer at the Tyrone Mine is high enough to support domestic wells, and in some areas higher-capacity wells. Shomaker Testimony, pp. 1586-1587. He provided a figure in his written testimony that shows the extent of areas capable of supporting domestic wells, based on criteria of a sufficiently high aquifer hydraulic conductivity, low slope, and absence of mine facilities. These areas included all land immediately outside of the Tyrone Mine permit boundary. Shomaker Testimony, Tyrone Ex. 907; Figures 9 and 10 [AGO Ex. 30]. This information demonstrates that there is a present or reasonably foreseeable future use of ground water immediately adjacent to the Tyrone Mine boundary. (Dr. Shomaker also acknowledged that there are a number of locations *within* the Tyrone Mine boundary that would support domestic wells and higher capacity wells. See Comm'n Decision, FOF ¶¶ 112-14.)

As discussed above, if contaminated ground water is present within the mine boundary, as allowed by the Proposed Copper Rule, this contamination can be drawn toward pumping wells located near the boundary. Therefore, even if ground water contamination is limited to areas within the mine boundary, ground water at places of withdrawal outside the boundary may become contaminated.

- Because the Proposed Copper Rule allows ground water contamination beneath and downgradient of mine facilities without consideration of current or future use, it does not protect ground water at places of withdrawal for present and reasonably foreseeable future use.

Q: What has been the basic strategy employed at the Chino, Tyrone, and Cobre mines to prevent ground water contamination above water quality standards?

A: The strategy has been to allow ground water underneath mine facilities to become contaminated and then attempt to capture the contaminated water before it migrates off-site. The capture systems have primarily employed pumping wells, such as those around the open pit, and interceptor wells, such as those downgradient of unlined leach stockpile, waste rock, and tailings facilities. However, interceptor systems have not always succeeded in preventing migration of contaminated ground water at these mines. For example, although the mines aim to collect pregnant (i.e., copper-rich) leach solution ("PLS") from the unlined leach stockpiles, leakage and lack of capture of PLS has caused ground water contamination in Oak Grove Wash at the Chino Mine and in the upper Mangas Wash and Deadman Canyon at the Tyrone Mine. See Restoration Plan, p. 3-4 [AGO Ex. 11].

Q: Has this basic strategy of capture and containment resulted in ground water contamination above standards at these three sites?

A: Yes. As I described in my direct testimony, the movement of contaminated waters from mine facilities such as leach stockpiles, waste rock piles, the open pit, and tailings impoundments has caused ground water contamination at the Tyrone, Chino, and Cobre mines. Ground water quality has been severely degraded within the central mining areas at the Chino, Tyrone, and

Cobre mines. Leachate from the ore stockpiles, areas around the open pits, and waste rock has contaminated ground water beneath and downgradient of the facilities. The alluvial, regional, and bedrock aquifers are affected by releases from the mines. The total areal extent of injured ground water at the three mines is 20,743 acres. *See* Figures 3.2, 3.3, and 3.4 [AGO Ex. 11].

Q: Does the Proposed Copper Mine Rule aim to change this basic strategy?

A: No. The Proposed Rule would allow ground water beneath mine facilities, and between the mine facilities and monitoring wells (i.e., at “points of compliance” as described in my direct testimony) to exceed ground water quality standards. No measures are required to reduce or mitigate ground water contamination beneath or downgradient of these facilities. Rather, the Proposed Rule provides that contaminated ground water will be captured by interceptor wells such that concentrations at downgradient monitoring wells will not exceed ground water quality standards. The one exception is for new leach stockpiles outside the open pit surface drainage area, where the Proposed Rule requires liners beneath the facility and overlying solution collection system to reduce the potential for ground water contamination.

Q: In your opinion, will NMED’s Proposed Rule better protect New Mexico’s ground water resources?

A: The Proposed Rule is less protective than the current requirements as described in the 2009 Decision of the Commission and the testimony of NMED witnesses during the 2007 hearing.

Q: In your reading of their testimony, did NMED’s or FMI’s technical witnesses discuss the general factors or policies that should guide the Commission’s determination as to what constitutes a “place of withdrawal of water for present or reasonably future use” of ground water?

A: No. I did not see any discussion in the NMED or FMI witnesses’ testimony of factors or policies that should guide the Commission’s determination as to what constitutes a “place of withdrawal of water for present or reasonably future use.”

Q: Did any of FMI’s technical witnesses discuss how the Proposed Copper Mine Rule will protect ground water at “places of withdrawal”?

A: The testimony of FMI’s technical witnesses does not address current or future ground water use. The witnesses do not describe “places of withdrawal,” nor do they address how the Proposed Rule will protect ground water at “places of withdrawal.”

Q: Referring to NMED’s February 18, 2013 Amended Rule, are there any additions or revisions to your direct testimony that you would like to make in light of the Amended Rule?

A: Yes, there are revisions that I would like to make to my direct testimony, which was based on the October 30, 2012 Proposed Rule, to reflect changes made in the February 18, 2013 Amended Rule. I will organize these changes into two categories: (1) substantive changes based on new

language in the Amended Rule, and (2) changes to correctly reflect revised direct quotes and changes to section numbering used in citations. I will address these in order, below.

Substantive changes:

Flow-through pits: In the February 18, 2013 Amended Rule, the requirements for flow-through pits were significantly altered from those in the October 30, 2012 Proposed Rule. The Amended Rule now requires pumping of flow-through pits in perpetuity to maintain capture of contaminated water. The Amended Rule states that, “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 monitoring well locations specified by 20.6.7.28 NMAC, 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 the open pit must be pumped in order to maintain an area of open pit hydrologic containment.” *See* 20.6.7.33.D(2) NMAC.

This change in requirements in the Amended Rule is more protective of downgradient ground water than the requirements in the October 30, 2012 Proposed Rule. Thus, the comments in my direct testimony about degradation of ground water from flow-through pits (pp. 14-15) no longer apply under the Amended Rule.

However, it should be noted that because the Amended Rule requires that water from a flow-through pit will be pumped and treated in perpetuity the State must require adequate financial assurance to ensure this occurs in the event the mining company goes out of business or is otherwise is not able to fund the perpetual pumping. NMED withdrew its proposed financial assurance regulations. The Commission should require adequate financial assurance if pumping and treatment in perpetuity will be required.

Monitoring: Some requirements for monitoring at 20.6.7.28 NMAC were changed from the October 30, 2012 Proposed Rule to the February 18, 2013 Amended Rule.

- A requirement for quarterly monitoring for new monitoring wells was added (*see* 20.6.7.28.I NMAC), whereas in the October 30, 2012 Proposed Rule there was no guidance on the frequency of monitoring for new wells. Thus, my comments about the lack of guidance as to the sampling frequency do not apply to the February 18, 2013 Amended Rule.
- However, I have several comments about the monitoring requirements in the Amended Rule. The Amended Rule no longer contains a specific list of required analytes to be determined in samples from new monitoring wells. *See* 20.6.7.28.I NMAC. For new monitoring wells, the Amended Rule states that, “Sampling analyte lists shall be based on the geochemical characteristics of the solution or material contained in the impoundment or mine unit intended to be monitored, including constituents that can be generated from the materials present through degradation, oxidation, decay or any other expected process. Proposed analytes shall include field parameters as required in Subsection F of this Section, alkalinity-bicarbonate, alkalinity-carbonate, metals, and other analytes from Section 20.6.2.3103 NMAC as applicable.” *See* 20.6.7.28.I NMAC.

While site-specific geochemical characteristics of the solutions and materials within specific mine facilities should be considered in determining the list of analytes, it is not clear from the new language how the geochemical characteristics of the solution or material will be measured or used to determine the analyte list. The important criterion for ground water protection is to monitor for any constituents that, if released from the mine facility, could cause an exceedance of water quality standards in Section 20.6.2.3103 NMAC. This will require a comparison between ground water quality standards and the concentrations of analytes in the solution or that could be leached from mined material, and those that can be generated through expected environmental processes. Determination of concentrations would likely consider geochemical testing (e.g., static and kinetic tests) of materials and potentially calculations or modeling. The methods used to predict or measure concentrations are not specified in the Rule. Thus, it is unclear in the Amended Rule how this evaluation of risk to ground water will be conducted such that an appropriate analyte list can be developed.

The Rule does not provide requirements for analyte detection limits. Adequate monitoring also requires that detection limits for monitored analytes be substantially below (by at least two to three times) water quality standards specified in 20.6.2.3103 NMAC such that an exceedance of standards or an increase in concentrations can be easily detected.

Finally, the analyte list in Section 20.6.2.3103 NMAC includes sulfate, chloride, and fluoride, and the Amended Rule adds alkalinity; together these analytes cover typical major anions at most mines. However, major cations are not included in the Amended Rule or in Section 20.6.2.3103, and they should be included to allow a quality control check on ion balance in ground water samples. Therefore, I recommend that the Amended Rule language on proposed analytes be changed to read as follows: “Proposed analytes shall include field parameters as required in Subsection F of this Section, bicarbonate and carbonate alkalinity, sodium, potassium, calcium, and magnesium, and as applicable other and metals and analytes from Section 20.6.2.3103 NMAC.” As I noted above, the Rule would then need to specify how the list of applicable analytes will be determined.

Changes to correctly reflect revised direct quotes and changes to section numbering used in citations:

In addition, the following changes to section numbers or quotations in my direct testimony should be modified to reflect the February 18, 2013 Amended Rule:

Page and paragraph in direct testimony

Direct testimony statement re: October 30, 2012 Proposed Rule

Revision to testimony to reflect February 18, 2013 Amended Rule

p. 9, 5th para.	“ . . . interceptor wells or other measures to reduce, attenuate or contain the discharge of leachate that may cause ground water to exceed applicable standards” would be required. 20.6.7.21.B(1)(c) NMAC.	“Ground water impacted by waste rock stockpiles in excess of applicable standards should be captured and contained as applicable.” 20.6.7.21.B(1)(c) NMAC.
p. 9, 7th para.	20.6.7.21.B(1)(d) NMAC.	20.6.7.21.B(1)(b) NMAC -- but appears to be incorrectly labeled in Amended Rule and should be (e).
p. 10, 2nd para.	Interceptor wells “will be able to efficiently capture seepage such that applicable standards will not be exceeded at monitoring well locations specified by 20.7.7.28 NMAC.” 20.6.7.22.A(4)(a)(vi) NMAC.	Ground water impacted by the tailing impoundment in excess of applicable standards shall be captured and contained through the construction of interceptor systems as applicable. 20.6.7.22.A(4)(c) NMAC. As well as ...”would cause ground water to exceed applicable standards at monitoring well locations specified by 20.6.7.28 NMAC.” 20.6.7.22(4)(e) NMAC.
p. 10, 3rd para.	20.6.7.22.B(1)(d) NMAC.	20.6.7.22.A(4)(e) NMAC.

The remainder of my opinions and testimony on the October 30, 2012 Proposed Rule remain unchanged and are still relevant to the February 18, 2013 Amended Rule.

Q: Does NMED’s February 18, 2013 Amended Rule change your opinion that adoption by the Commission of NMED’s Proposed Rule establishes a point of compliance regulatory system that will result in exceedances of water quality standards at “places of withdrawal” of water at and around copper mine sites?

A: No, my fundamental opinions, as expressed in my direct testimony dated February 22, 2013, remain unchanged.

This ends my rebuttal testimony, which is true and accurate to the best of my knowledge.



Connie Travers

3/15/13
Date