# Direct testimony and rebuttal: Proposed Copper Mine Rule

Prepared by:
Connie Travers
April 23, 2013



A60045

# Qualifications

- B.S. Geology; M.S. Applied Hydrogeology (Stanford University)
- 25 years of work on water quantity and quality issues at mine sites
- Work on proposed, active, expanding and abandoned mines for both the mining industry and government/regulatory agencies
- Taught classes and seminars for EPA re: characterizing and predicting water quality impacts from hard rock mines
- Work on copper mines, including natural resource damage assessment for Chino, Tyrone, and Cobre for NMONRT

# Proposed Copper Mine Rule

- Significantly decreases the protection of ground water resources at copper mine sites
- Allows mining companies to degrade ground water quality, in excess of water quality standards, beneath and downgradient of mine facilities (including their inceptor systems) to monitoring wells, *regardless of the potential for this ground water to be withdrawn and used now or in the future.*

# Proposed Copper Mine Rule

- Establishes a "point of compliance" system where standards are met at downgradient monitoring well(s), but can be exceeded upgradient of these points.
- Relies on interceptor systems to capture contaminated groundwater
- May set precedent for other industries

# Proposed Copper Mine Rule

Differs from existing system/practice:

- Allows contamination by Rule, rather than by requiring a mining company to obtain a variance if water quality standards will be exceeded. Variance is a public process and considers site-specific conditions
- Proposed Rule does not require consideration of places of withdrawal in determining area that can exceed groundwater standards

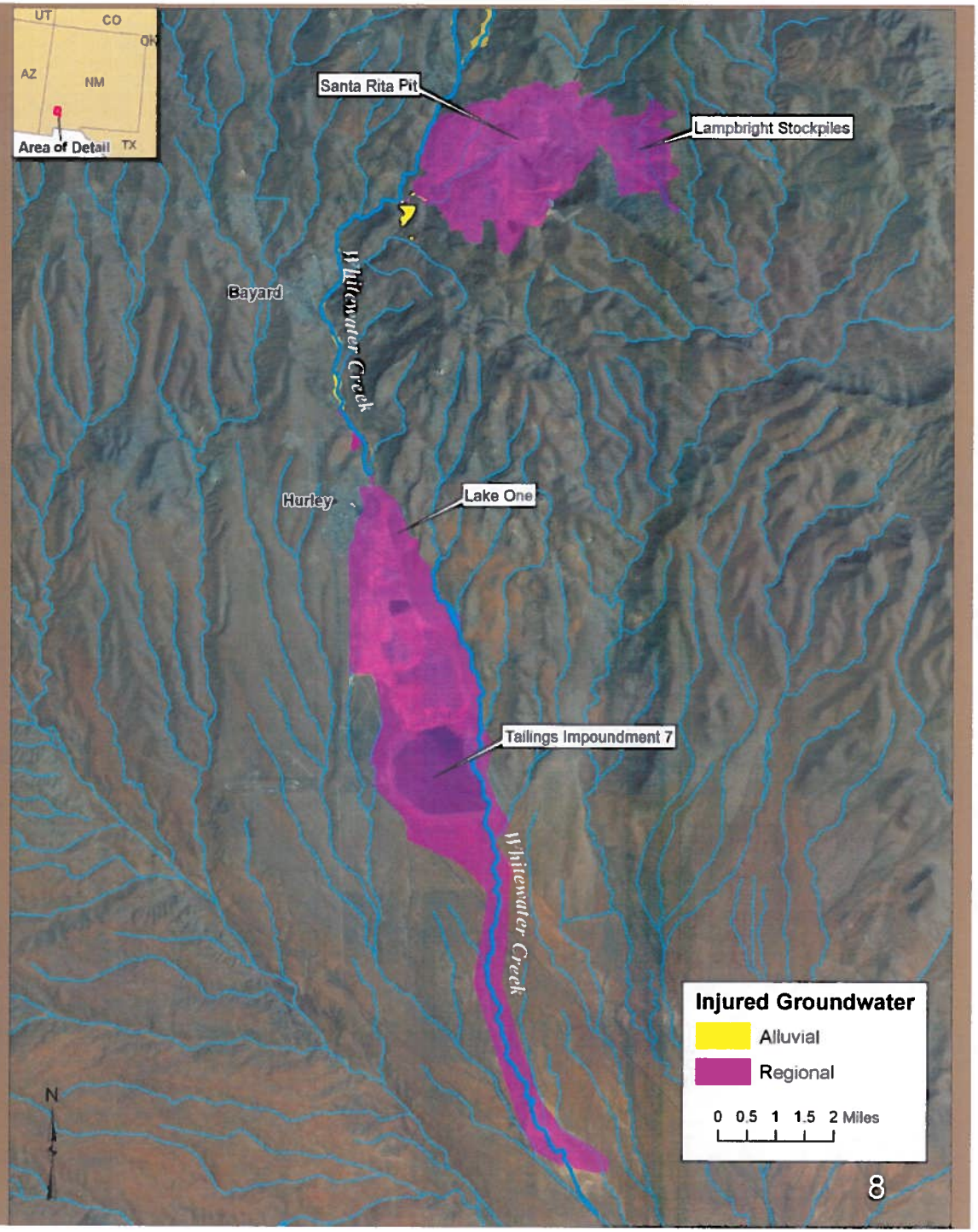
# Risks of ground water contamination from copper mines

- Open pit and underground copper mines pose a great risk of groundwater contamination
- Facilities are often very large
- Typical ground water contaminants include metals such as copper, cadmium, lead and zinc, acidity, sulfate and TDS
- Weathering of sulfides and generation of acid and dissolution of metals (acid rock drainage) can occur for hundreds of years, providing a potential source of ground water contamination

# Remediation and control of contaminated ground water

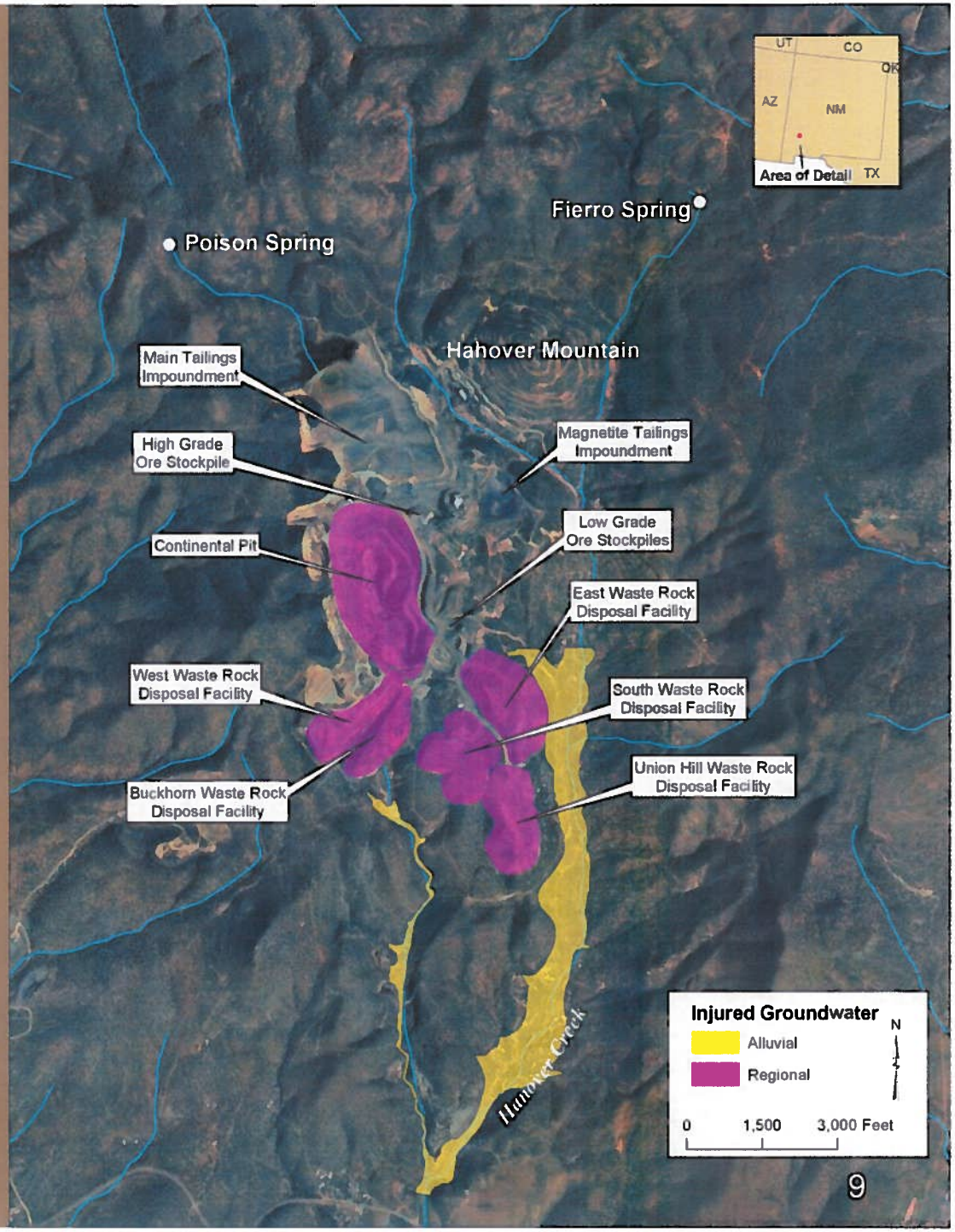
- Remediation and/or hydraulic control of ground water contaminated by releases from mining is expensive.
- Mine facilities can release acid, metals, and other constituents to ground water for hundreds to thousands of years (e.g., testimony of FMI experts indicates ARD will be released at Chino and Tyrone mines for >100 yrs)
- Ground water remediation and control systems often must be managed for generations.
- Requires adequate financial assurance (section removed from 2/18/2013 Amended Rule)

# Injured Groundwater at the Chino Mine – 13,935 acres



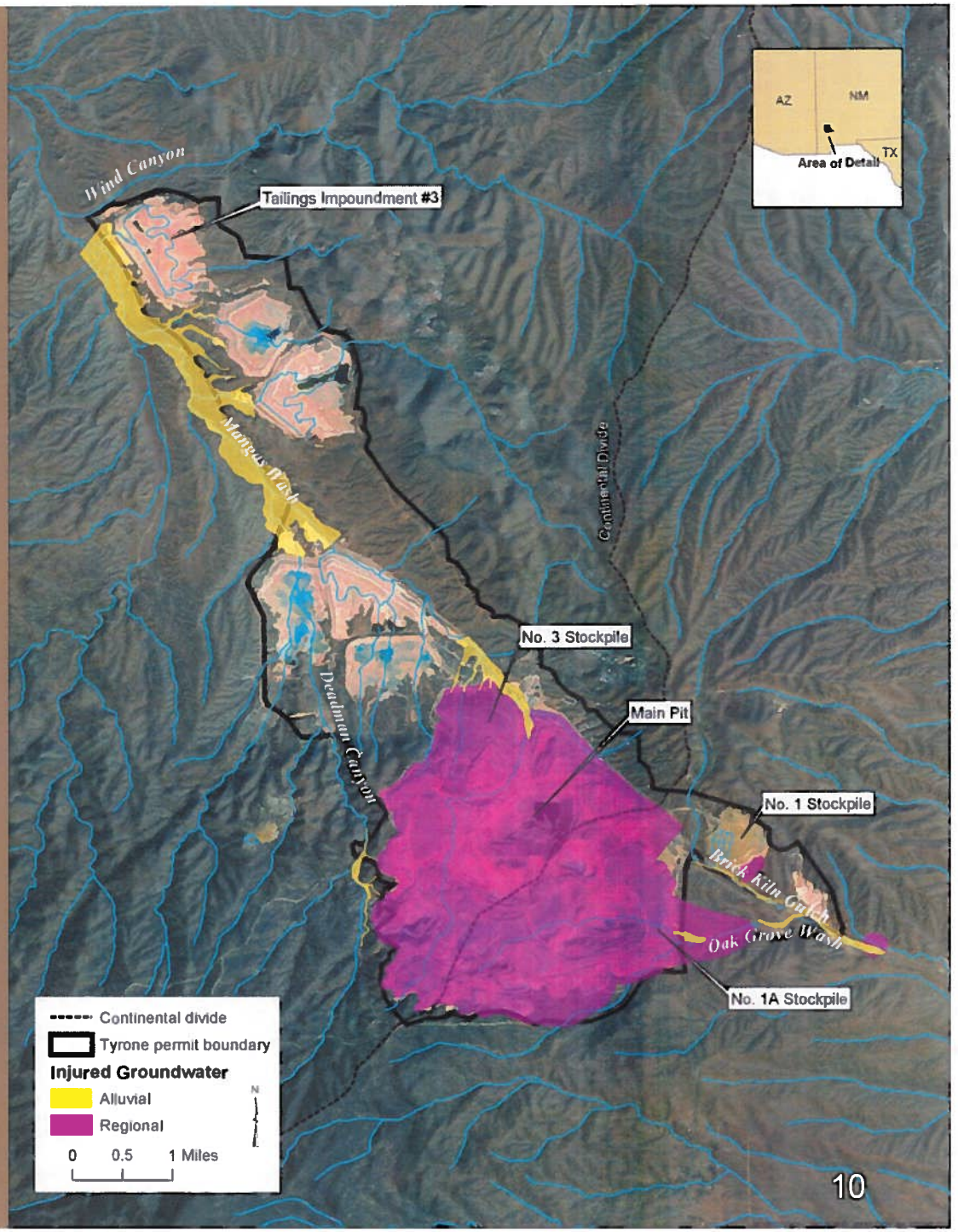

Source: Final Groundwater Restoration Plan for the Chino, Cobre and Tyrone Mine Facilities, NMONRT 2012 [AGO Ex. 11]

# Injured Groundwater at the Cobre Mine – 528 acres

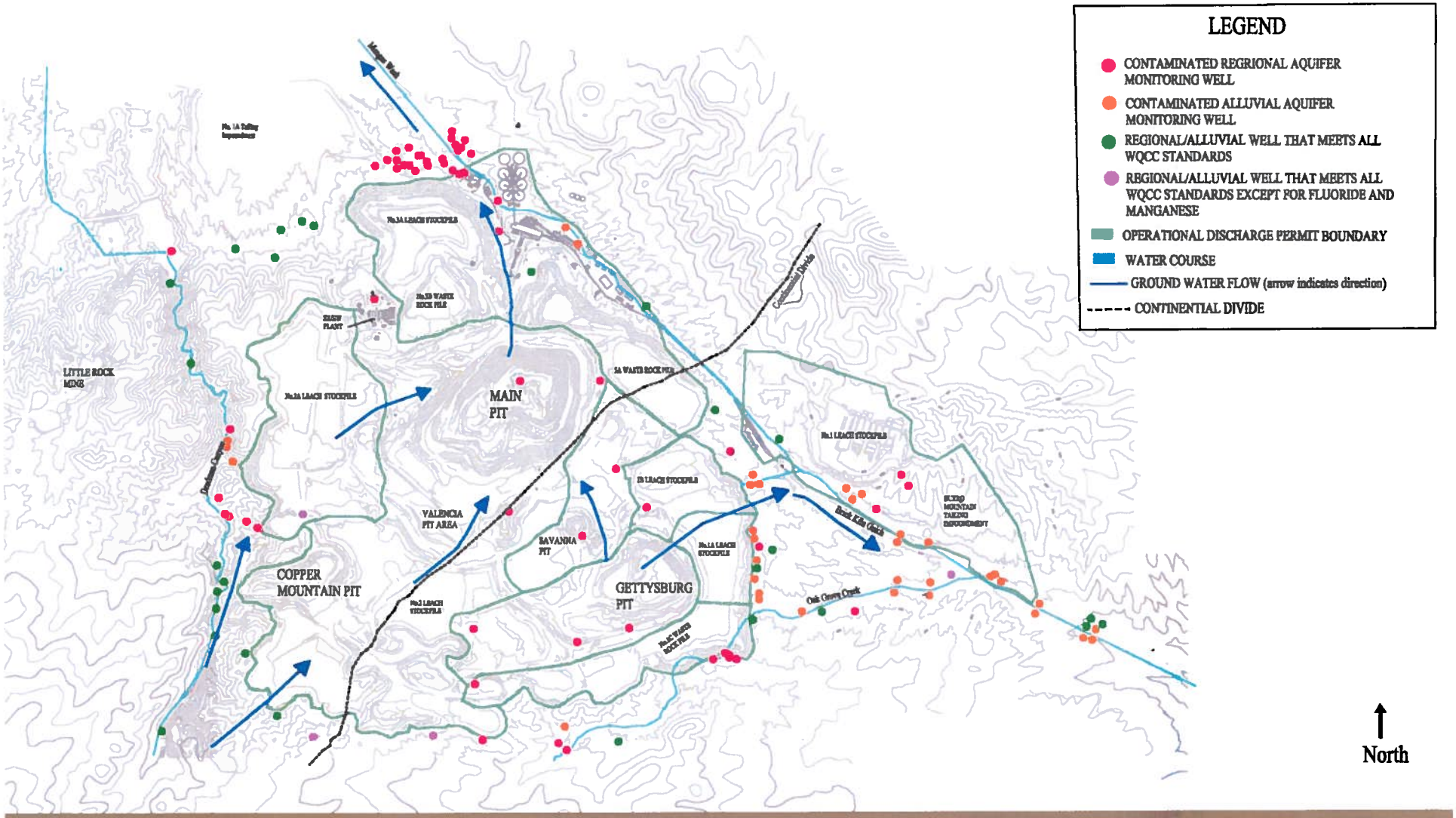



Source: Final Groundwater Restoration Plan for the Chino, Cobre and Tyrone Mine Facilities, NMONRT 2012

# Injured Groundwater at the Tyrone Mine - 6280 acres




Source: Final Groundwater Restoration Plan for the Chino, Cobre and Tyrone Mine Facilities, NMONRT 2012



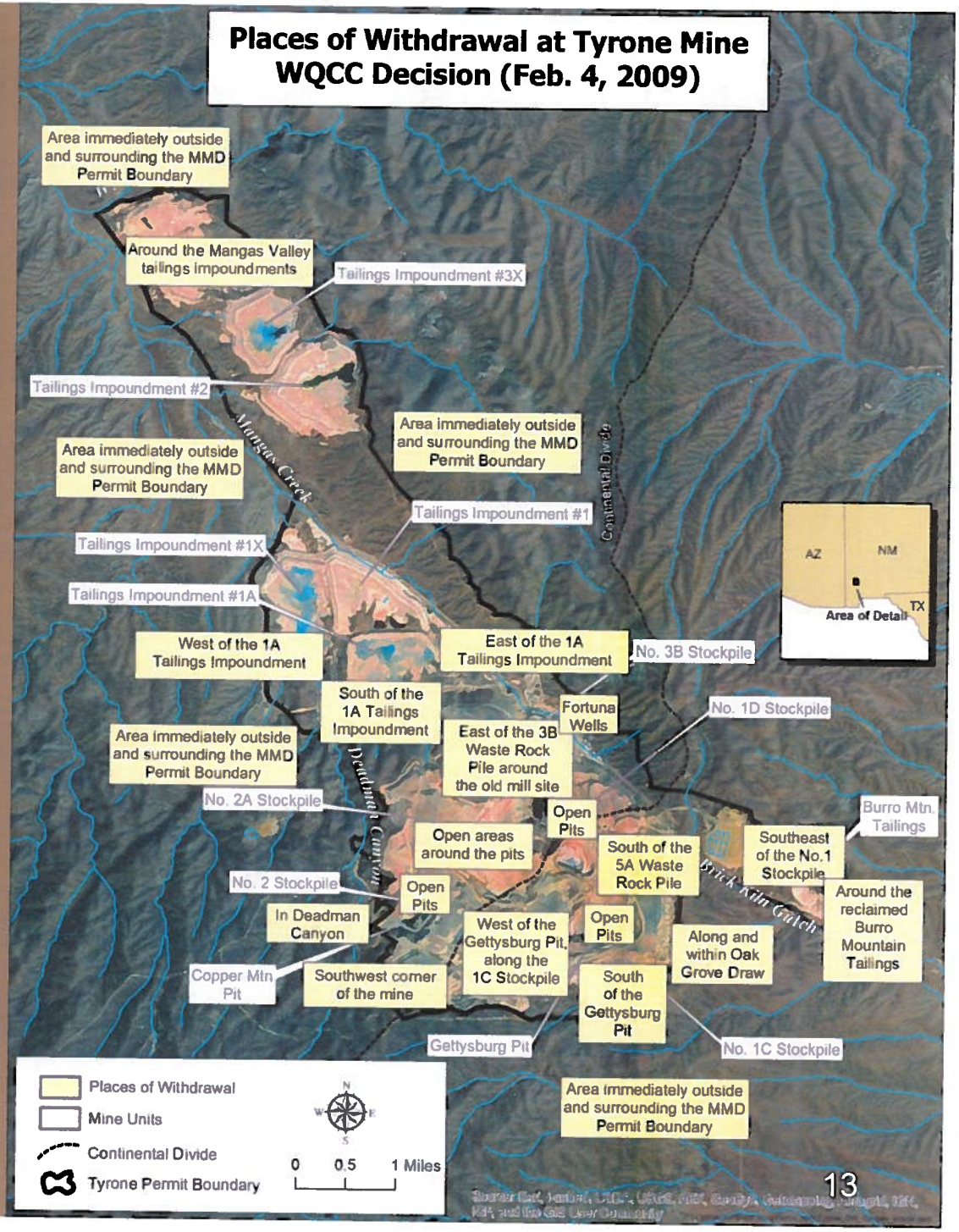

Source: C. Marshall presentation in 2007 WQCC hearing

# Place of withdrawal in Proposed Rule

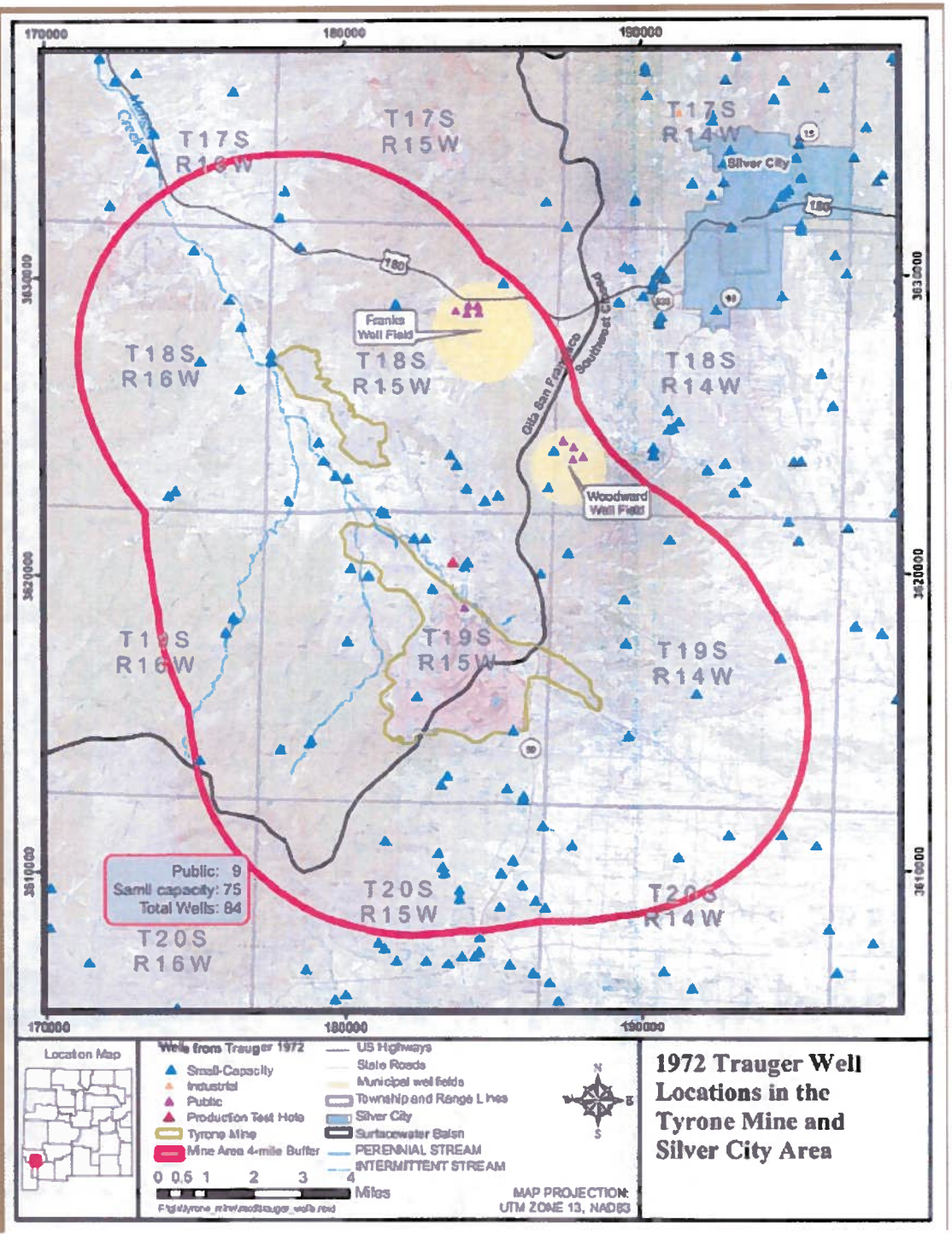
- Place of withdrawal for present and reasonably foreseeable future use is not discussed in Proposed Rule.
- Rule does not consider the factors established by WQCC to determine place of withdrawal, i.e., hydrology, geology, water quality prior to discharge, past present and future land use, past and current water use, and population trends.

# WQCC places of withdrawal where exceedances would be allowed under the Proposed Rule

- *South of the Gettysburg Pit*
- *West of Gettysburg Pit along the 1C Stockpile*
- *East of the 3B Waste Stock Pile*
- *South of the 5A Waste Rock Pile*
- *Open pits*
- *Open areas around the pits*

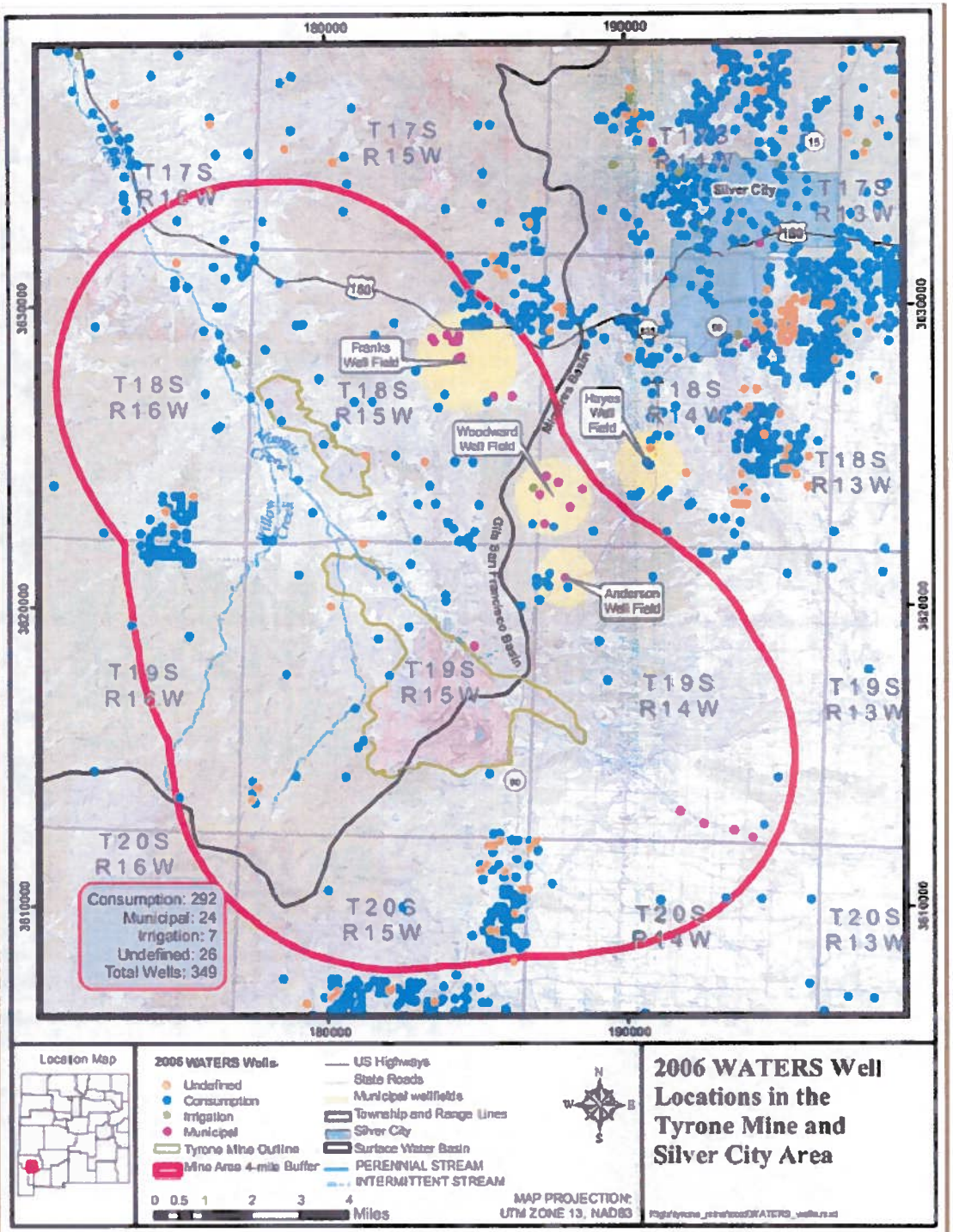


# Use of groundwater (Trauger 1972). Wells near Tyrone Mine



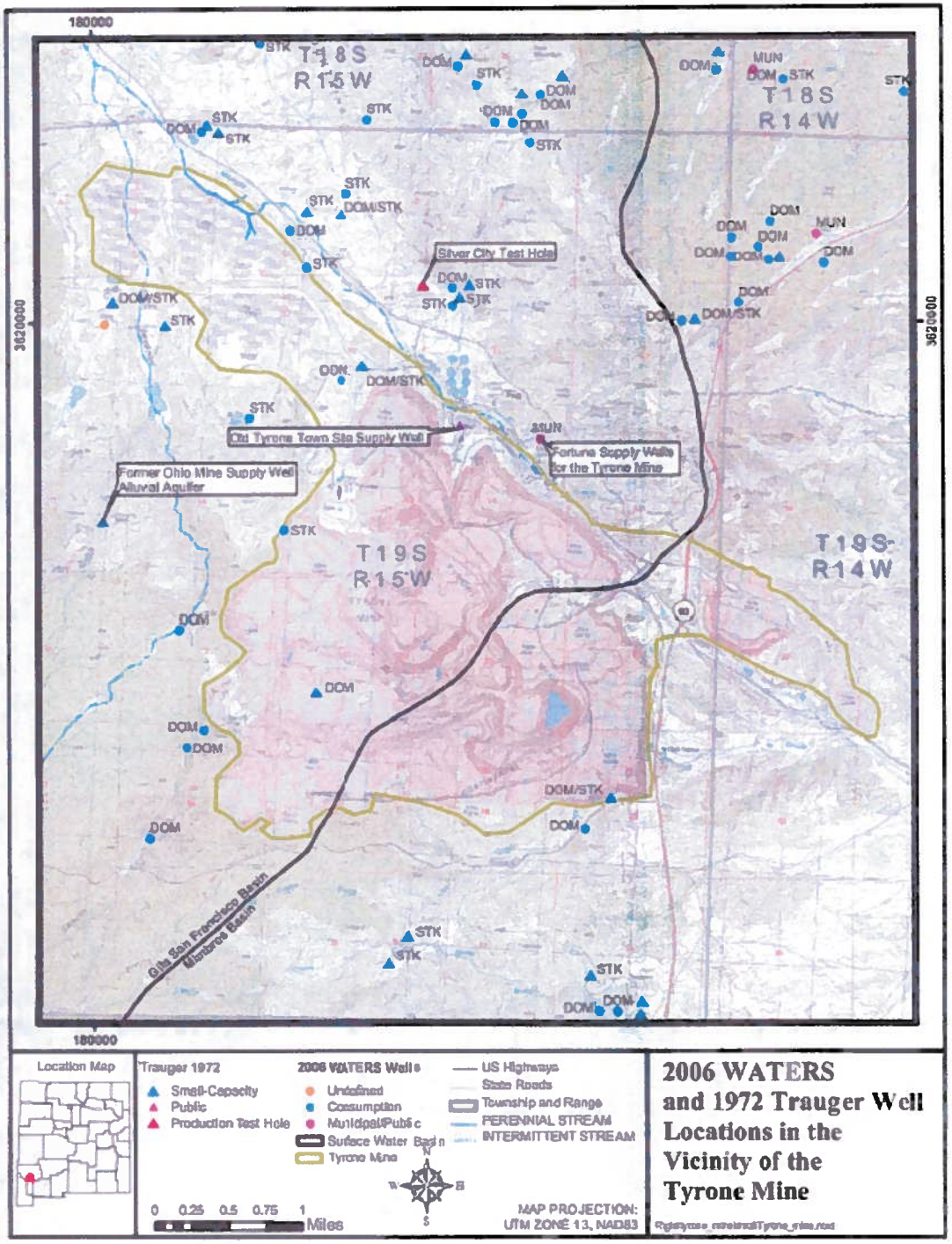

Source: 1972 Trauger Well Locations; C. Marshall testimony in 2007 hearing; NMED Ex. 21

# Use of groundwater- (WATERS 2006) Wells near Tyrone Mine




Source: 2006 WATERS Well Locations; C. Marshall testimony in 2007 hearing; NMED Ex. 22

# Use of groundwater near Tyrone Mine




Source: 2006 WATERS and 1972 Trauger Well Locations; C. Marshall testimony in 2007 hearing; NMED Ex. 23

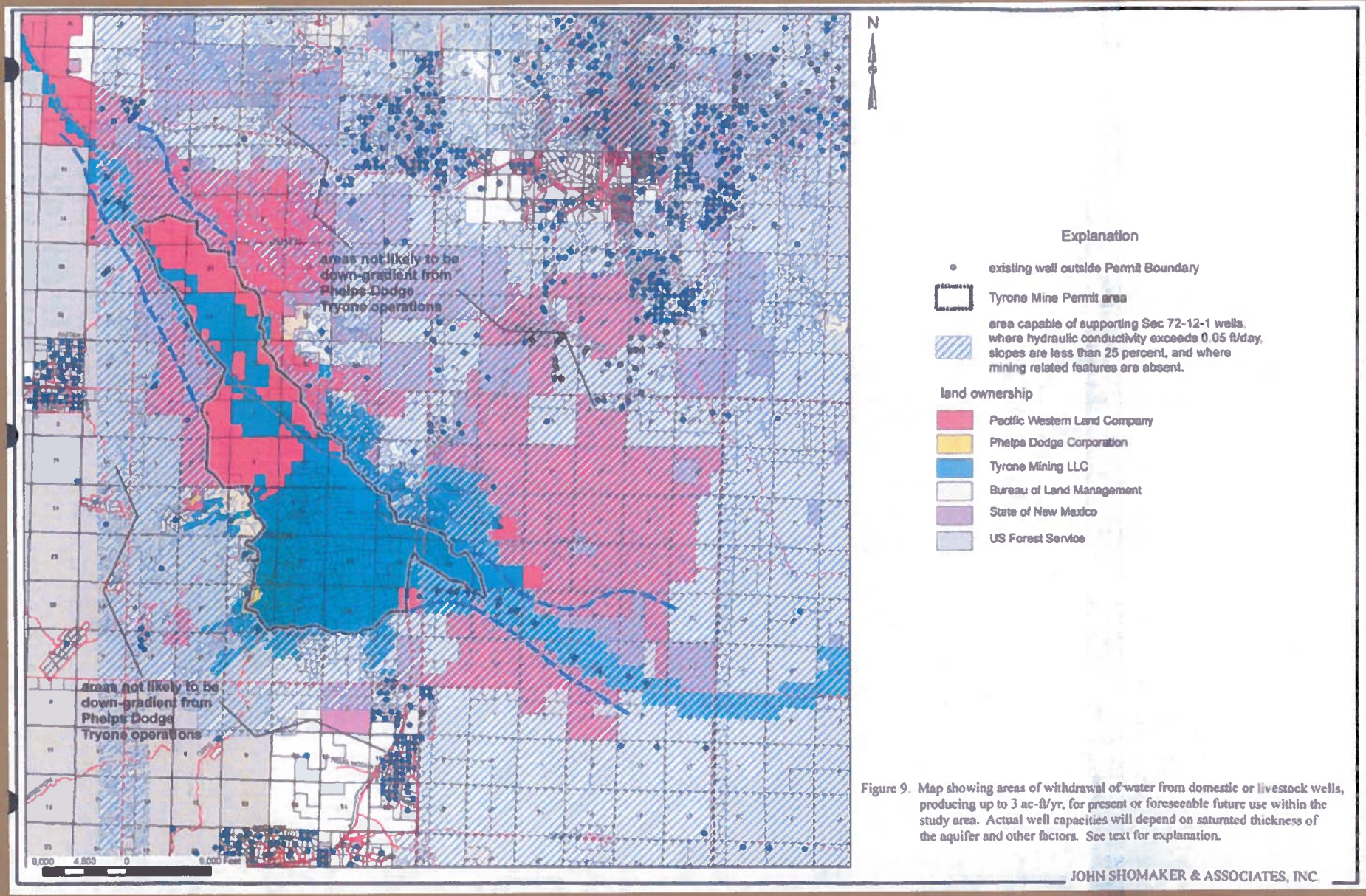
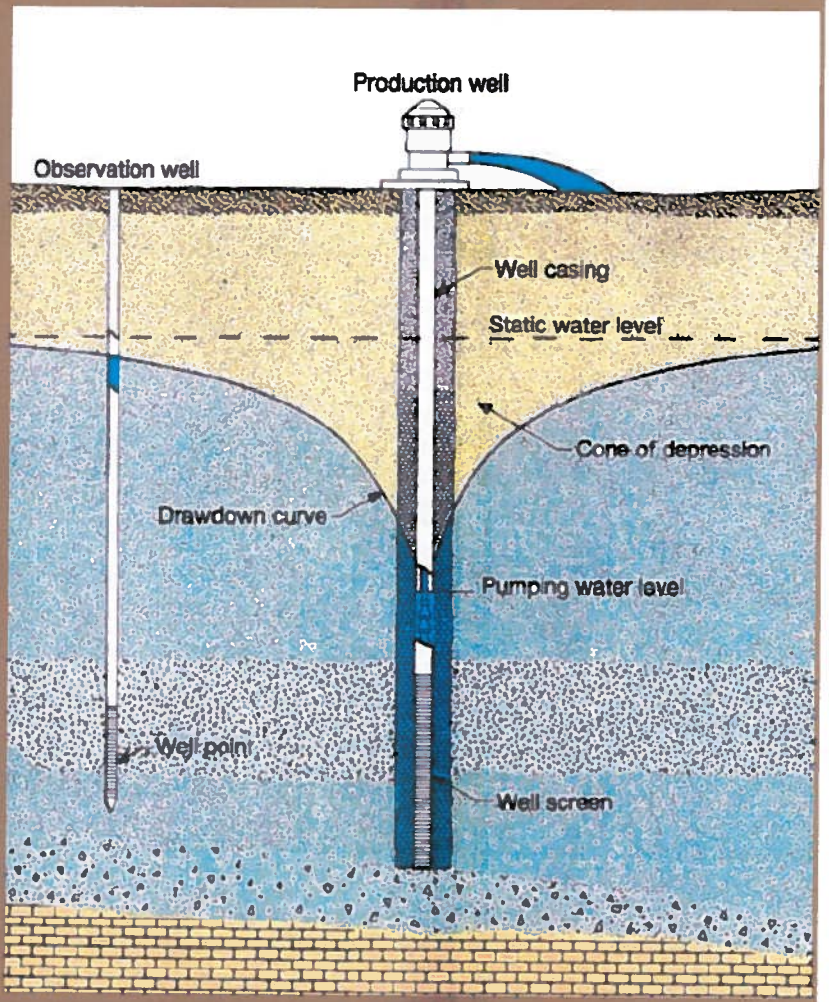



Figure 9. Map showing areas of withdrawal of water from domestic or livestock wells, producing up to 3 ac-ft/yr, for present or foreseeable future use within the study area. Actual well capacities will depend on saturated thickness of the aquifer and other factors. See text for explanation.

Source: Figure 9, Shomaker Direct Testimony in 2007 Hearing

# Proposed Rule risks – wells drawing contaminated water

- 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.




Driscoll, 1986

# Proposed Rule risks – failure to capture

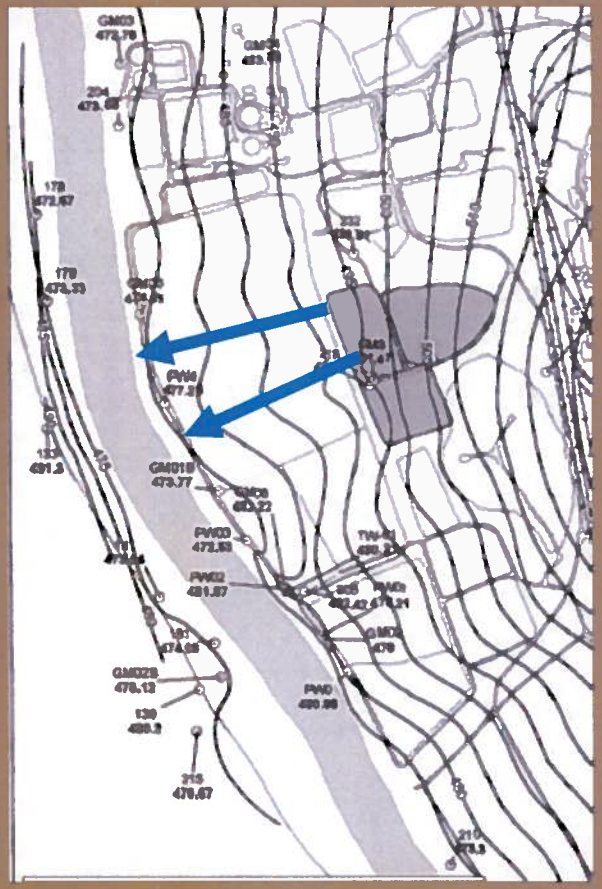
- Relying on a capture and containment system creates a risk that contamination will not be captured, particularly in the complex fractured rock systems present at most mine sites, and creates a risk of excursions on- and offsite.

# Proposed Rule risks – failure to capture

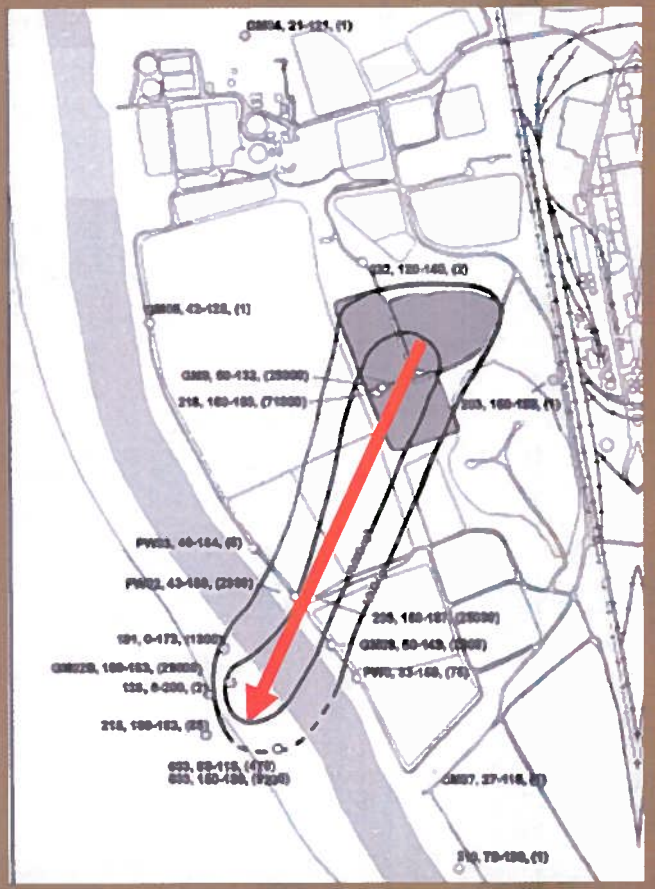
Examples:

- PLS degradation of groundwater at Oak Grove Wash at Chino and upper Mangas Wash and Deadman Canyon at Tyrone
- At Tyrone, failure of capture systems downgradient of the 1C Waste Stockpile has contaminated both shallow alluvial aquifer and the regional aquifer.

# Fractures can create unexpected flow paths- Avtex Superfund Site



1) Groundwater gradient inferred from water level measurements



2) Direction of contaminant plume migration

Source: Exponent 2001

# Proposed Rule risks – failure to capture

NMED witness Mr. Brown direct testimony:

> Capture is generally not feasible in bedrock downgradient of the waste stockpile or tailings impoundment, due to low permeability and ineffectiveness of extraction well systems to capture a significant proportion of the ground water. (p. 23, 30)

# Regulations of other states

- States with Point of Compliance systems (AZ, CO, ID) clearly identify them as such
- Proposed Rule is establishing a POC system, but not identifying it as such
- Montana requires that if groundwater will be degraded, an applicant can apply for a site-specific mixing zone, or area where standards can be exceeded. This is similar to the variance process currently in place in NM

# Abatement requirements are unclear in Proposed Rule

The language in the Proposed Rule

- Does not require that corrective action plans will result in ground water meeting standards
- "The permittee *may* be required to submit to the department for approval an abatement plan…" (20.6.7.30). The plan does not state under what conditions an abatement plan is required.

Language should be clear that if water quality standards are *still exceeded* after corrective actions have been implemented, abatement *shall be required.*

# Waste rock facilities and tailings impoundments that would cause exceedances

For new waste rock facilities and tailings impoundments

- If the permittee or the department determines that the proposed waste rock facility or tailings impoundment, when operated in accordance with the requirements of the Rule "would cause ground water to exceed applicable standards at monitoring well locations specified by 20.6.7.28 NMAC, the permittee may propose, or the department may require additional controls, including but not limited to, a liner system…"

Thus, even if there is a showing that water quality standards would be exceeded at a monitoring well, there is no requirement for additional controls.

# Alternative approach

1. Based on site-specific conditions and seven criteria identified by WQCC in 2009 Decision, determine what portion of copper mine is a place of withdrawal for present or reasonably foreseeable future uses of water
2. Require compliance with water quality standards at places of withdrawal.
3. Allow mining companies to obtain variances (a public process that considers site-specific conditions) for ground water to exceed standards in certain circumstances

# Alternative approach (cont.)

4. If any corrective measures implemented do not result in ground water meeting standards, require abatement of ground water exceeding water quality standards at places of withdrawal.
5. Allow mining companies to request alternative abatement standards upon closure if standards cannot be met because of the demonstrated technical infeasibility of meeting those standards