

Central Valley Regional Water Quality Control Board
27/28 March 2014 Board Meeting

RESPONSE TO PEER REVIEW COMMENTS

AMENDMENT TO THE WATER QUALITY CONTROL PLAN FOR
THE SACRAMENTO AND SAN JOAQUIN RIVER BASINS TO
PROVIDE A GROUNDWATER REGULATORY FRAMEWORK TOWARDS
CLOSURE OF THE ROYAL MOUNTAIN KING MINE SITE
CALAVERAS COUNTY

The Central Valley Water Board developed an amendment (Proposed Amendment) to the Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin (Basin Plan) to facilitate closure of the Royal Mountain King Mine Site (RMKM Site or Site). Board staff prepared an initial draft Staff Report (October 2012) to identify and describe several options consistent with the State Water Board's *RMKM Remand Order*.

The October 2012 Proposed Amendment contained the following elements:

1. De-designate the municipal and domestic supply (MUN) groundwater beneficial use within the western portion of the RMKM Site.
2. De-designate the agricultural supply (AGR) groundwater beneficial use within the southwestern portion of the RMKM Site.
3. Establish a site-specific objective of 5,000 mg/L of TDS in groundwater to maintain protections for a limited AGR use (cattle watering) within the northwestern portion of the RMKM Site.
4. Establish a variance exempting certain constituents from consideration when setting limits pertaining to the industrial supply and process (IND and PRO, respectively) groundwater beneficial uses within the western portion of the RMKM Site.

Two independent peer reviewers were selected by the State Water Board to review the draft Staff Report: Steven Gorelick, PhD, NAE, Cyrus F. Tolman Professor Environmental Earth System Science Stanford University, Stanford, California; and Kerry A. Rood, MS, DVM, Associate Professor and Extension Veterinarian Utah State University, Logan, Utah. In November 2012, Board staff provided the peer reviewers with the October 2012 draft Staff Report and other key documents, supporting references, and instructions to focus review efforts.

The peer reviewers were asked to provide their scientific review and comment on two specific topics:

1. The proposed boundaries for de-designating the MUN beneficial use of groundwater in the western portion of the RMKM Site and for de-designating the AGR beneficial use in the southwestern portion of the Site are scientifically reasonable and defensible interpretations of the geological and hydrological conditions. Although groundwater quality and quantity vary greatly across the RMKM Site, the differences are generally less between monitoring wells within each Site portion. (See Section 1.2 Background and Need for Proposed Basin Plan Amendment.)

De-designation of the MUN beneficial use is based on meeting one of the exception criteria of the *Sources of Drinking Water Policy* (levels of TDS exceed 3,000 mg/L). De-designation of the AGR beneficial use is based on existing background levels of TDS that range up to, and over, 10,000 mg/L. These high levels of TDS render the groundwater unusable for any known AGR use. Groundwater data and geologic site information indicate that the groundwater can exceed 3,000 mg/L TDS in the western portion of the Site and it can exceed 5,000 mg/L TDS in the southwestern portion of the Site.

2. The proposed site-specific objective of 5,000 mg/L for TDS will continue to support livestock watering in the northwestern portion of the RMKM Site. (See Section 2.2 Agricultural Supply.)

Groundwater with TDS levels up to 5000 mg/L supports livestock watering for cattle, sheep, swine and horses in accordance with National Academy of Sciences' guidelines in "A Guide to the Use of Saline Waters for Livestock and Poultry." (NAS, 1974.)

The peer reviewers were not limited to addressing only the scientific issues presented above and were asked to contemplate the broader perspective:

- (a) In reading the staff technical report and proposed Basin Plan language, are there any additional scientific issues that are part of the scientific basis of the proposed de-designation rules not described above? If so, please comment with respect to the statute language given above.
- (b) Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices?

Comments by Dr. Steven Gorelick

G-1: The data provided do not support the notion that TDS levels over 3,000 mg/L or, for that matter, over 5,000 mg/L are ubiquitous in the Fault zone or in the Greenstone buffer zone to the east. Therefore, TDS levels in these areas do not meet the either the MUN de-designation criterion or the stock watering limitations, respectively. Dr. Gorelick divided the site into eight sub-regions based on the groundwater TDS levels likely to occur in each.

Response: Upon further review of the data, Board staff agrees with Dr. Gorelick's assessment that TDS levels over 3,000 mg/L (or 5,000 mg/L) are not ubiquitous in the Fault zone or in the Greenstone buffer zone. In the November 2013 draft Staff Report (Figure 4, p.40) a much smaller area is delineated where TDS levels in groundwater are very likely to exceed 3,000 mg/L (the *Sources of Drinking Water Policy* TDS criterion protecting MUN) or even 5,000 mg/L (the stock watering TDS limitation protecting AGR), consistent with Dr. Gorelick's assessment. This smaller area is only a portion of the overall proposed groundwater de-designation area; MUN and AGR groundwater uses will also be designated in areas underneath, and downgradient of, the waste management units that have not already been closed. This approach provides a reasonable way to move the RMKM towards closure and recognizes groundwater beneath and immediately downgradient of the WMUs at the Site is not being, nor is it likely to be, utilized for MUN or AGR, either due to the poor quality of the groundwater or the placement of mine waste in the units. Title 27 requirements direct that no land uses are to be permitted on WMUs that might impair their physical integrity. This requirement will practically exclude any well installation beneath the WMUs for MUN and AGR

purposes. The Proposed Amendment includes implementation provisions that will require Meridian to continue to implement a groundwater management strategy at the RMKM Site to ensure that existing groundwater impacts will not spread.

- G-2: The Proposed Amendment does not address issues related to the southern site boundary and implies that induced and/or expected natural offsite long-term migration of contaminated groundwater to the south either is acceptable or will not occur.

Response: Board staff reviewed the available data and found that poor-quality groundwater does not extend to the southern boundary of the RMKM Site; therefore the proposed de-designation area no longer extends to the southern boundary of the Site. Meridian will continue to be regulated by waste discharge requirements (WDRs) and will be required to monitor groundwater, including near the southern boundary. This monitoring will be used to ensure there will be no migration of impacted groundwater outside of the de-designation area. Groundwater outside the area of de-designation will retain its designated beneficial uses, and all permits issued to Meridian (NPDES and WDRs) will require Meridian to ensure that these beneficial uses are protected.

- G-3: Central to the Proposed Amendment is the determination of the boundaries for proposed MUN and AGR groundwater de-designation areas and the AGR site-specific objective region. To be scientifically defensible, the establishment of these boundaries must be based primarily on water quality (i.e., TDS) historical data, sound interpretation of groundwater flow directions, and hydrogeologic as well as zonal hydrogeochemical characteristics.

Response: As described in the response to the peer reviewer's comment, G-1, the November 2013 draft Staff Report includes the proposal to de-designate the MUN and AGR groundwater uses not only in areas where TDS levels likely exceed 3,000 mg/L (based on the *Sources of Drinking Water Policy's* TDS exception criterion), but also in areas underneath, and immediately downgradient of, the unclosed waste management units based on a site-specific policy rationale. This approach provides a reasonable way to move the RMKM towards closure and recognizes groundwater beneath and immediately downgradient of the WMUs at the Site is not being, nor is it likely to be, utilized for MUN or AGR, either due to the poor quality of the groundwater or the placement of mine waste in the units. Title 27 requirements direct that no land uses are to be permitted on WMUs that might impair their physical integrity. This requirement will practically exclude any well installation beneath the WMUs for MUN and AGR purposes. De-designation of MUN and AGR groundwater uses in these areas will allow Meridian to focus their resources on other aspects of Site closure. See, also, Response to Comment G-1.

- G-5: Since the background concentrations of the targeted constituents in groundwater were historically variable over the Site, permitting a site-wide, uniform variance value for the industrial service supply (IND) and industrial process supply (PRO) beneficial uses is potentially problematic.

Response: Board staff agrees that there is significant variability in groundwater quality throughout the site. The intent of the proposed Amendment is not to set a uniform variance value for IND and PRO, but to ensure that the groundwater beneficial uses outside of the

MUN and AGR de-designation and IND and PRO variance area are fully protected. In the November 2013 draft Staff Report, the proposed groundwater area for the IND and PRO variance was reduced from site-wide, to match the area proposed for MUN and AGR de-designation.

G-6: Should the de-designations proceed, what are the impacts of these de-designations on subsequent discharge of groundwater to surface waters?

Response: The Proposed Amendment does not de-designate surface water beneficial uses. Beneficial use protections will continue in all areas that are not de-designated, and Meridian will be required to ensure that discharges from the Site do not cause impacts to these beneficial uses. All potential discharges that may impact groundwater, as well as non-point discharges to surface waters, will be regulated by the Closure WDRs. A point-source discharge to surface waters from Skyrocket Pit is regulated by an NPDES permit that must be periodically revised to address compliance issues and/or the implementation of new treatment technologies.

G-7: Dr. Gorelick suggested that the groundwater contour map(s) be constructed to reflect convergent flow along the Littlejohns Fault and other major faults. Groundwater contours around preferential flow paths, such as major faults, often show more angularity reflecting convergent flow toward the fault. Smoothing out contours near such preferential flow paths can give a distorted view of flow directions. Consideration of monitored TDS values can provide some guidance with respect to flow directions and consequently the placement of hydraulic head contours.

Response: Board staff modified the groundwater contours shown on Figure 3 in the November 2013 draft Staff Report to improve the accuracy of interpreted groundwater flow directions at the Site, particularly along the fault zone at the southern end of the Site.

G-8: As a general comment, the Proposed Amendment contained numerous supporting references, but did not contain groundwater monitoring well concentration data, nor were maps presented showing all of the monitored wells or any posted TDS concentrations.

Response: The raw monitoring well data and a Site map were provided to the peer reviewer upon his request. His comments reflect that he considered these materials in preparing his review of the October 2012 draft Staff Report. The data and maps used to develop and revise the draft Staff Report have been added as references in the November 2013 draft Staff Report.

Comments by Dr. Kerry A. Rood

R-1: The reviewer agrees with the draft Staff Report that high levels of TDS that range up to, and exceed, 10,000 mg/L in the southwestern portion of the Site are harmful to livestock production and health. The reviewer also agrees that groundwater with TDS levels below 5,000 mg/L support livestock AGR use.

Response: Board staff appreciates Dr. Rood's review of the draft Staff Report and his comments. However, the November 2013 draft Staff Report no longer includes a

recommendation for a site-specific groundwater objective and a staff response is not necessary.

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