California Regional Water Quality Control Board
Colorado River Basin Region

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Linda S. Adams
*Secretary for*
*Environmental Protection*

Arnold Schwarzenegger
*Governor*

December 9, 2010

Alexandria B. Boehm, Ph.D.
158 Charles Marx Way
Palo Alto, CA 94304

Dear Dr Boehm:

**SUBJECT: RESPONSES TO SCIENTIFIC PEER REVIEW COMMENTS FOR THE STAFF REPORT IN SUPPORT OF A BASIN PLAN AMENDMENT TO CONDITIONALLY PROHIBIT WASTEWATER DISCHARGES FROM SEPTIC TANK SUB-SURFACE DISPOSAL SYSTEMS IN THE TOWN OF YUCCA VALLEY, SAN BERNARDINO COUNTY, CALIFORNIA**

Thank you for reviewing and commenting on the subject staff report. This letter provides responses to your comments provided by letter dated September 9, 2010. Your comments are summarized below in the order presented in your letter. Our response to each comment is provided in **bold type,** with text deleted from the staff report indicated by ~~strikethrough~~, and text added to the staff report indicated by underline.

1. Use of the USGS study as the main scientific basis for the proposed Basin Plan Amendment.

COMMENT: "The available data are sufficient to logically conclude that increases in nitrate were concurrent with the water level increases due to recharge in portions of the aquifer..... The USGS report is well written, logical, and scientifically sound. Its use is appropriate as a scientific basis for the amendment."

**RESPONSE: Agreed.**

2. Modeling used in USGS study.

COMMENT: "When the modeling results are considered in light of the rest of the evidence provided in the USGS report, it strongly supports the idea that septage is the source of nitrate in the aquifer."

**RESPONSE: Agreed. The evidence is sufficient to conclude septage is the source of nitrate in the aquifer.**

3. Adequacy of data used in the USGS study.

COMMENT: "The data collected and mined for the USGS study together are adequate in supporting the conclusion that septage is to blame for the high nitrate levels in the aquifer in the Warren Subbasin... It would have been nice if the authors had more delta-N15 data for the septage end-member, but scientists agree that sewage has a high delta-N15 of nitrate, so there is not a huge need to better characterize the end member. Nitrate to chloride ratios also point to septage as a source of pollution. These data, taken together with the time series data on nitrate and groundwater level, and the modeling simulation results, support that septage is a source of nitrate to the aquifer."

**RESPONSE: Agreed. Although additional delta-N15 data is preferable, the information available indicates septage is the cause of the high nitrate levels in groundwater from the Warren Subbasin.**

4. Relationship of septic tank discharges to groundwater recharge efforts used in the USGS study.

COMMENT: "The USGS authors present two conceptual models to explain how septage could be causing the high nitrate levels in the groundwater and why the nitrate became elevated when the groundwater rose. They provide sufficient evidence and logic to conclude that the rising groundwater levels due to artificial recharge have entrained nitrate rich septage in the unsaturated zone."

**RESPONSE: Agreed.**

5. Groundwater data collected subsequent to the USGS study from 2002-2010.

COMMENT: "Data presented in appendix D of groundwater level and nitrate concentrations in the Midwest hydrogeologic unit suggests that nitrate concentrations have become lower in particular wells since the publication of the USGS report. However, nitrate is still higher than 10 mg/L nitrate as nitrate in all wells in 2010 (10 mg/L nitrate as nitrate is the background level in groundwater, and 44 mg nitrate as nitrate is EPA standard).... The data presented in the USGS report indicates that there is a large amount of septage entering the ground in the subbasin and suggests the unsaturated zone has limited ability to denitrify. I do not think that the limited data provided in appendix D can be used to logically conclude that future groundwater quality threats will not be an

issue or to prove that the downward trend will continue and nitrate will decrease to less than 10 mg/L nitrate as nitrate..."

**RESPONSE:** **Agreed. The data does not conclusively indicate that downward trends in nitrate levels will continue, nor indicate that groundwater quality will be protected in the future.**

COMMENT: "Another issue that is not discussed in the USGS is the potential for waterborne pathogens to be present in the groundwater, particularly viruses. If nitrate from septage was found in the groundwater, then there is a possibility that human pathogens could also be present. Granted there are various removal mechanisms for pathogens in the subsurface, but the possibility of their presence does exist. This is something that should be looked into in the near future if possible. The staff report does acknowledge this issue, which is good and appropriate."

**RESPONSE:** **Agreed. The threat of waterborne human pathogens in groundwater merits further investigation.**

6. Does the Staff Report omit any important issues?

COMMENT: The staff report does not omit any issues. However, I think it would be strengthened with the following considerations:

"Page 10 of the staff report, last paragraph. The report claims that the *downward migration of the septic system effluent locally contaminated groundwater with nitrate and pathogens* (quote is not exact). There are two problems with this sentence. The first is that the USGS report actually concluded that the most probable manner in which the groundwater became contaminated was by the water table rising due to infiltration of State Water Project water which subsequently entrained septage in the unsaturated zone. So the description of the mechanism whereby the groundwater became contaminated is not accurately described in the sentence. Second, no data were provided in my review packet that showed elevated concentrations of pathogens in the groundwater. While I am certain they would likely be found if analyses were done, there is not a scientific basis to state this. I suggest re-phrasing this sentence."

**RESPONSE:** **Agreed. The statement you refer to in the last paragraph of page 10 of the Staff Report will be revised to read as follows:**

These features, combined with the high density of septic systems found in some areas of Yucca Valley [footnote to be added here—see below] , ~~has facilitated the downward migration of~~ are among the factors that contribute to septic system effluent, locally contaminating groundwater with salts (particularly nitrates) ~~and pathogens associated with domestic waste~~.

[Footnote: Approximately 92% of the Town is zoned for residential and commercial development on one-half acre or smaller lots. The highest density occurs with multi-family zoning, which allows up to ten dwelling units per acre (see Appendix B).]

7. Is the scientific portion of the proposed rule based upon sound knowledge, methods and practice?

COMMENT: "Page 18, last paragraph. It would be good to point out that nitrate, besides affecting human health, also can seriously adversely affect ecosystem health. Although Yucca Valley is in the dessert and there is minimal exfiltration of groundwater, any above ground septage leakage or groundwater exfiltration into surface waters could lead to eutrophication and possibly changes in vegetation, etc."

**RESPONSE: Staff allude to ecosystem impacts on page 17, Table 3, in the column labeled "Reason For Concern", where it states "Nitrogen is an aquatic plant nutrient that contributes to eutrophication and loss of dissolved oxygen in surface waters such as lakes." The staff report focuses on groundwater impacts because the Town of Yucca Valley has no perennial surface waters.**

COMMENT: "Page 23, top partial paragraph. It would strengthen the report if the staff explained what lines of evidence were used in the USGS report."

**RESPONSE: Thank you for your suggestion. The following will be added to the end of the paragraph at the top of page 23:**

Septic system density varies widely in Yucca Valley. However a study by USGS, *Evaluation of the Source and Transport of High Nitrate Concentrations in Groundwater, Warren Subbasin, California* (2003), clearly indicates groundwater in Yucca has been degraded by septic system discharges, particularly in areas with high densities of residential lots (i.e. several septic systems per acre). ~~This is due in part to the poor performance of septic systems in high density areas given inadequate soils, and excess loading~~. USGS used several lines

of evidence to demonstrate adverse impacts to water quality from septage in specific areas of the Warren Subbasin aquifer including: land use information; well data (historical groundwater levels and nitrate concentrations); nitrogen isotopes; caffeine and pharmaceutical analyses, and state of the art groundwater flow and solute transport models. USGS also showed that continued and expanded conjunctive use of the aquifers may cause high nitrate levels in large portions of the aquifer.

8. Additional comments regarding the staff report.

COMMENT: "I felt the staff report was very well written and highlights the evidence for failing septic tanks in the Yucca Valley area – something that is not covered in the USGS report. This result, in conjunction with all the evidence provided by the USGS, indicates that the proposed amendment to the basin plan is needed and scientifically warranted."

**RESPONSE: Thank you.**

Thank you for reviewing the scientific elements of the proposed Basin Plan Amendment to Conditionally Prohibit Wastewater Discharges from Septic Tank Sub-Surface Disposal Systems in the Town of Yucca Valley, California. Your contribution to this process is greatly appreciated.

If you have further comments or questions, please contact Jon Rokke at (760) 776-8959.

Sincerely,

Joan Stormo
Senior Engineering Geologist, PG, CHG
Colorado River Basin
Regional Water Quality Control Board

JR/tab

File: Yucca Valley Septic Prohibition