

## Central Valley Regional Water Quality Control Board

30 October 2015

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### **SACRAMENTO VALLEY WATER QUALITY COALITION'S GROUNDWATER QUALITY ASSESSMENT REPORT**

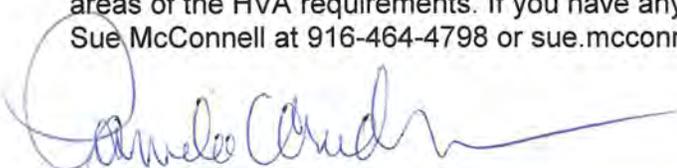
Thank you for your 18 September 2014 submittal of the Sacramento Valley Water Quality Coalition's (SVWQC's) Groundwater Quality Assessment Report (GAR). The GAR was submitted in response to Waste Discharge Requirements General Order for Growers in the Sacramento River Watershed that are Members of a Third Party Group (Order No. R5-2014-0030). Central Valley Water Board staff has reviewed the GAR and has noted areas within the report that must be addressed to comply with the General Order.

Attached is the staff review memo, which indicates elements of the GAR that need revision. The review memo includes items that must be promptly revised (summarized below), as well as items that must be addressed in the Groundwater Trend Monitoring Program. Please revise the GAR in accordance with the staff review memo and resubmit by **15 January 2016**.

#### Items to be revised for approval of the 2015 GAR

1. Identify disadvantaged communities reliant on groundwater as a significant source of drinking water and which could be impacted by High Vulnerability Areas (HVAs).
2. Include pesticide monitoring data in the vulnerability analysis.
3. Assess all areas covered by SACFEM that can potentially have irrigated agriculture.
4. Ensure Nitrate Groundwater Pollution Hazard Index results are not used to remove HVAs.
5. Reclassify moderate vulnerability areas as either high or low vulnerability areas.
6. Have the GAR signed and stamped by the appropriate licensed professional.

Members within HVAs identified in the 2014 GAR and any new HVAs identified during GAR revisions will need to comply with HVA requirements. Given the General Order contains HVA requirements that must be met by 1 March 2016, the Coalition and the subwatershed groups are required to begin informing the members within the currently identified high vulnerability areas of the HVA requirements. If you have any questions regarding this letter, please contact Sue McConnell at 916-464-4798 or [sue.mcconnell@waterboards.ca.gov](mailto:sue.mcconnell@waterboards.ca.gov).



Pamela C. Creedon  
Executive Officer

Attachment: Central Valley Water Board Staff Review Memo of the SVWQC GAR

KARL E. LONGLEY ScD, P.E., CHAIR | PAMELA C. CREEDON P.E., BCEE, EXECUTIVE OFFICER

## Central Valley Regional Water Quality Control Board

**TO:** Sue McConnell, P.E.  
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**FROM:** Dana Kulesza  
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**DATE:** 21 October 2015

**SUBJECT:** REVIEW OF THE GROUNDWATER QUALITY ASSESSMENT REPORT FOR THE  
SACRAMENTO VALLEY WATER QUALITY COALITION

On 18 September 2014, the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) received the Sacramento Valley Water Quality Coalition (SVWQC or Coalition) Groundwater Quality Assessment Report (GAR). The GAR provides the foundational information necessary for design of the Management Practices Evaluation Program, the Groundwater Quality Trend Monitoring Program, and the Groundwater Quality Management Plan. The GAR was reviewed to determine compliance with requirements pursuant to section VIII.D.1 of Waste Discharge Requirements General Order R5-2014-0030 (Order), and section IV.A of Attachment B (Monitoring and Reporting Program or MRP) to the Order.

Overall, staff recommends that the GAR be revised to meet the terms and conditions of the Order. Recommended revisions are separated into those that are critical and need to be addressed in this GAR and revisions that can be addressed within the Groundwater Quality Trend Monitoring Program.

The objectives of the GAR are to:

- Assess all available, applicable and relevant data and information to determine the high and low vulnerability areas where discharges from irrigated lands may result in groundwater quality degradation;
- Establish priorities for implementation of monitoring and studies within high vulnerability areas;
- Provide a basis for establishing work plans to assess groundwater quality trends;
- Provide a basis for establishing work plans and priorities to evaluate the effectiveness of agricultural management practices to protect groundwater quality; and
- Provide a basis for establishing groundwater quality management plans in high vulnerability areas and priorities for implementation of those plans.

In order to assess groundwater quality vulnerability within the Sacramento River watershed, the GAR splits the area into two regions: the valley floor and the upper watersheds. A GIS-based analysis was conducted for areas on the valley floor containing irrigated agriculture (according to the particular spatial land use dataset used). This included first considering hydrogeologic susceptibility factors, Nitrate Pollution Hazard Index (NHI) results, and existing groundwater

quality data to create an initial susceptibility map. The initial map was refined by looking at nitrate data above one-half the maximum contaminant limit (MCL) at the sub-watershed level. A qualitative analysis for the six upper watersheds considered known groundwater quality, geologic characteristics, agronomic practices, and sustainability programs. The GAR classifies all six upper watersheds as entirely low vulnerability.

While Board staff might have chosen other approaches, the general approach of the GAR is reasonable, provided that the recommended changes are addressed. Additionally, the GAR will be updated every five years, providing opportunities to revisit the approach taken and data used in the first GAR.

Table 1 of the GAR provides descriptions of the required components from the Order and MRP, and lists the section in the GAR that addresses each component. Recommended revisions are provided below. If an item does not have recommended revisions, the GAR has met the requirements for that item. The memorandum item numbers correspond to item numbers in Table 1.

### **Items to be revised for approval of the 2015 GAR**

#### **Item 8. Identification of Disadvantaged Communities**

The Order requires that the GAR provide readily available groundwater recharge information, including identification of areas contributing recharge to urban and rural communities where groundwater serves as a significant source of supply.

The GAR must identify areas contributing recharge to urban and rural communities where groundwater serves as a significant supply. The GAR must also identify Disadvantaged Communities (DACs) reliant on groundwater as a significant source of drinking water and lie within or are subject to potential impacts from High Vulnerability Areas (HVA). This criterion should be utilized when prioritizing future trend monitoring, management practice evaluation and groundwater quality management plan work within the Coalition's HVAs. California Water Code Section 79505.5 contains the definition for DACs. The Department of Water Resources web-based mapping tool may be used to delineate DACs as census designated places:  
<https://gis.water.ca.gov/app/dacs/>

#### **Items 10/12. Existing Water Quality Impacts and Vulnerable Conditions**

The Order requires determining where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities.

- a. *Consideration of Pesticide Data.* Pesticide data must be included in the vulnerability analysis. Appendix J summarizes pesticide data collected by DPR in a table, but this information exists exclusive from the rest of the GAR. The GAR also does not include maps of the pesticide data, and does not break it down by subwatershed. Section 3.2.1 states "The DPR dataset will be evaluated in this GAR; however, the GAMA GeoTracker data from DPR are not included in this review. The following datasets were reviewed in depth for potential use in this analysis: CDPH, DWR, USGS, and GAMA (SWRCB 2011)." The GAR's HVA analysis needs to utilize all available pesticide data.

- b. *Land Use Information and Vulnerability.* The draft GAR vulnerability analysis was only conducted for agricultural land in the outdated single-year DWR GIS land use set (also see Item 6 below). In the years since those DWR land use surveys, agricultural areas have changed. For example, there has been significant expansion of orchard acreage on the eastern and western margins of the Sacramento Valley floor. Many of these orchards were not analyzed for groundwater vulnerability.

Any areas that can potentially have irrigated agriculture need to be included in the final HVAs, regardless of current land use or existing water quality data. The Sacramento Valley floor area covered by the SACFEM groundwater vulnerability model must include all areas that could have irrigated agriculture for the GAR.

#### **Items 14 and 16. Groundwater Vulnerability Designations and Prioritization**

- a. *Use of Moderate Vulnerability.* MRP section IV.A.4 requires that the GAR designate high/low vulnerability areas for groundwater in consideration of high and low vulnerability definitions in Attachment E of the Order. Therefore, moderate vulnerability areas must be appropriately classified as high or low vulnerability areas, based on the initial groundwater susceptibility results. The formerly moderate vulnerability areas that become HVAs could be lower on the prioritization scheme for addressing the HVAs.
- b. *Nitrate Groundwater Pollution Hazard Index.* Section 4 describes why and how the Nitrate Groundwater Pollution Hazard Index (NHI) was used to estimate pollution hazard based on soil type using a square-mile section average hazard index. The NHI is a model that estimates the relative threat of nitrate leaching pass the root zone, but it is not correlated to actual impacts to groundwater. Without information on the effectiveness of practices and whether the NHI is protective of groundwater, it cannot be used to move any sections of land that were classified high vulnerability in the Hydrogeologic Susceptibility Analysis to low vulnerability. This needs to be clarified in the GAR.
- c. *Ranking of High Vulnerability Areas.* Per the Order requirements in MRP section IV.A.1 (GAR Objective 2) and MRP section IV.A.3, prepare a ranking of high vulnerability areas to provide a basis for prioritization of work plan activities. This prioritization has not been proposed in the current GAR.

#### **Item 17. Compliance with Sections 6735(a) and 7835 of the California Business and Professions Code.**

Section 7835 of the California Business and Professions Code states that *"All geologic plans, specifications, reports, or documents shall be prepared by a professional geologist or registered certified specialty geologist, or by a subordinate employee under his or her direction. In addition, they shall be signed by the professional geologist or registered certified specialty geologist or stamped with his or her seal, either of which shall indicate his or her responsibility for them."*

Section 6735(a) of the California Business and Professions Code states that *"All civil (including structural and geotechnical) engineering plans, calculations, specifications, and reports (hereinafter referred to as "documents") shall be prepared by, or under the responsible charge of, a licensed civil engineer and shall include his or her name and license number. Interim documents shall include a notation as to the intended purpose of the document, such as "preliminary," "not for construction," "for plan check only," or "for review only." All civil*

*engineering plans and specifications that are permitted or that are to be released for construction shall bear the signature and seal or stamp of the licensee and the date of signing and sealing or stamping. All final civil engineering calculations and reports shall bear the signature and seal or stamp of the licensee, and the date of signing and sealing or stamping. If civil engineering plans are required to be signed and sealed or stamped and have multiple sheets, the signature, seal or stamp, and date of signing and sealing or stamping shall appear on each sheet of the plans. If civil engineering specifications, calculations, and reports are required to be signed and sealed or stamped and have multiple pages, the signature, seal or stamp, and date of signing and sealing or stamping shall appear at a minimum on the title sheet, cover sheet, or signature sheet."*

Although not specified as a requirement in the Order, the GAR contains information that is consistent with the requirement of the aforementioned sections of the California Business and Professions Code, and, therefore, the appropriate signature or stamp needs to be included.

#### High Vulnerability Areas and Need for Certification of Nitrogen Management Plans

Members within HVAs identified in the September 2014 GAR and any new HVA identified during GAR revisions will need to comply with the HVA requirements. Given the General Order requires the certification of Nitrogen Management Plans and submittal of Nitrogen Management Plan Summary Reports by 1 March 2016, staff recommends that the Coalition and the subwatershed groups begin informing the members within the currently identified high vulnerability areas of the HVA requirements.

#### **Items to be addressed in the Groundwater Quality Trend Monitoring Program**

##### **Items 1 through 5. GAR Objectives**

Overall, the GAR generally meets most of the objectives. It includes an assessment of available, applicable and relevant data and information to determine high and low vulnerability areas where discharges from irrigated lands may result in groundwater quality degradation. It provides a basis for establishing plans to assess groundwater quality trends and evaluate the effectiveness of agricultural management practices to protect groundwater quality; and provides a basis for implementation of management plans in high vulnerability areas.

- a. The GAR needs to establish priorities for implementation of monitoring and studies within high vulnerability areas.

##### **Item 6. Land Use Information**

- a. The GAR used a combination of Department of Pesticide Regulation's (DPR) 2013 Pesticide Use Reports and Department of Water Resources' (DWR) 1994 – 2008 land use surveys to develop a land use coverage for the GAR. The USDA Cropland Data Layer (also called CropScape) is crop-specific spatial data (GIS) available annually. This is currently the most complete, up-to-date land use data publically available and should be used in the Groundwater Quality Trend Monitoring Program, unless the Coalition provides justification why the land use information used in the GAR is more appropriate.

##### **Item 8. Groundwater Recharge Information**

The Order requires that the GAR provide groundwater recharge information, if readily available, including identification of areas contributing recharge to urban and rural communities where groundwater serves as a significant source of supply.

- a. While section 2.1.3.1 provides some general information on groundwater recharge across the region, the GAR should include subwatershed specific groundwater recharge information. Here are some example groundwater recharge information sources that could be considered:
  - i. According to the Glenn-Colusa Irrigation District's Landowner Groundwater Well Program for 2008-2009, the Glenn-Colusa Irrigation District recharges 180,000 acre-feet to the aquifer system on an annual basis.
  - ii. According to the 2009 Sacramento Valley Regional Water Management Plan Annual Update, Meridian Farms Water Company (MFWC) is located on the east side of the Sacramento River east of the community of Meridian and directly southwest of the Sutter Buttes. The Company's distribution and conveyance system includes approximately 16 miles of main canals and 19 miles of major laterals. Seepage from the canals and laterals is approximately 15% of conveyed water.
  - iii. Reclamation District 1004's Main Canal is reported to be subject to considerable conveyance losses through seepage, resulting in delivery inefficiencies. RD 1004 estimates that it currently loses as much as 60 cfs (the equivalent production of one pump) through the upper reaches of its Main Canal.
  - iv. The Yolo County Flood Control and Water Conservation District reports that in an average year, more than 25 percent of the surface water diverted from Cache Creek for irrigation goes directly to groundwater recharge.

#### **Item 10. Shallow Groundwater Constituent Concentrations from Existing Monitoring Networks**

Section 2.1.4 provides a brief overview of groundwater quality in the Sacramento Valley. This section describes that elevated nitrate has been measured in shallow wells in the Gridley-Marysville area and the Corning-Chico area. Appendix E summarizes the 2010 USGS GAMA report on groundwater quality in the Sacramento Valley.

- a. Review of additional available data (Luhdorff & Scalmanini, 2004) indicates that an additional area of shallow groundwater nitrate has been identified in the region north and east of Esparto, California (see Figure 5.16). This information should be evaluated and if deemed appropriate, described and added to the high vulnerability areas.

#### **Item 11. Existing Groundwater Data Collection and Analysis Efforts**

The Order requires that the groundwater data compilation and review shall include all readily accessible information on existing monitoring well networks, individual well details, and monitored parameters. For existing monitoring networks (or portions thereof) and/or relevant data sets, the third-party should assess the possibility of data sharing between the data-collecting entity, the third-party, and the Central Valley Water Board.

- a. Table 1-1 in section 3.2.4 should be amended (under the dataset "Groundwater well databases and projects") to include DPR and county data that was utilized in the GAR.

- b. Section 3.2.1 summarizes the existing groundwater datasets utilized in the GAR, with a separate subsection for each dataset. Figures showing the well locations for some of the datasets are included (DPH and GAMA); please include figures for the remainder of the datasets (DWR, USGS, DPR, and the county datasets).
- c. Section 3.2 provides an overview of the groundwater quality datasets utilized in the report, with a subsection for each dataset. For most datasets, there is a brief statement on whether there were samples above or below thresholds. The same or similar statement is repeated in each subsection: "Most constituents that were detected in groundwater samples were found at concentrations below drinking-water thresholds." The GAR should include specific information when results were above thresholds, where these results were measured, and when. This should be presented in narrative and tabular format, and could be summarized by geographic region, dataset, or other unit.
- d. Section 3.2.2.3 states that 398 domestic wells were sampled in El Dorado County, and refers to Table 3-3. However, the wells listed in this table total 589.

#### **Item 12. Existing Water Quality Impacts and Vulnerable Conditions**

Determine where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities.

- a. Section 4.2.4.1 states "Nitrate can be measured as nitrogen (N) or nitrate ( $\text{NO}_3$ ). Most readily available datasets report nitrate as  $\text{NO}_3$ . Therefore, nitrate as  $\text{NO}_3$  is used for all data reporting in this GAR. The Maximum Contaminant Level (MCL) for nitrate as  $\text{NO}_3$  is established at 45 mg/L." It is unclear if the GAR preparers verified that every data point used is  $\text{NO}_3$  data, or if this was assumed based on the statement "Most readily available datasets report nitrate as  $\text{NO}_3$ ." It would not be accurate to use 45 mg/l nitrate as  $\text{NO}_3$  as a threshold to compare to nitrate-N data (nitrate-N data should be compared to 10 mg/l). This section needs to be expanded to clearly describe whether any of the original data was reported as nitrate-N. If this is the case, this data either needs to be converted to nitrate as  $\text{NO}_3$  so it can be accurately compared to 45 mg/l, or 10 mg/l needs to be used as the threshold for comparison for these data points.
- b. If there is any readily available nitrite data, this should also be evaluated. The nitrite MCL is 1 mg/l.

#### **Item 16. Groundwater Vulnerability Designations**

- a. Section 4.2.5 (*Assumptions and Limitations*) briefly describes some of the GAR data limitations:
  - i. Limitations are mentioned throughout the GAR that should be incorporated into this section. For example, the fourth bulleted item in section 6.2.1.1 states "93 sections do not include sufficient wells with nitrate results to estimate the generalized groundwater nitrate concentration under 27,700 acres of agriculture." There are similar statements in each of the subwatershed sections.

- b. Please provide information describing how the cutoff values in the Susceptibility Ranking Scheme (Table 4-8) and the Initial Vulnerability Rankings (Table 4-9) were derived.
- c. Section 6.3 mentions areas exhibiting high salinity in Colusa County, but it is not clear if these areas are included in the HVAs. If salinity shows increasing trends in this area, it should also be included in the HVAs.
- d. A column should be added to Table 18-1 for the number of data gap sections per subwatershed.
- e. Section 18.2.1 states “Agronomic practices are protective of groundwater quality” in the proposed low vulnerability areas (LVAs). One of the purposes of the GAR is to help direct the management practice evaluation program (MPEP) work, which will evaluate which agricultural practices are protective of groundwater quality. It is premature to conclude that all management practices in LVAs are protective before the MPEP has been implemented.

**Items to be addressed in the 5 year GAR Update**

**Items 10/12. Existing Water Quality Impacts and Vulnerable Conditions**

The Order requires determining where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities.

- a. *Upper Subwatersheds.* The upper subwatersheds were evaluated for vulnerability and the results are provided in the subwatershed-specific sections of the GAR, but the information was not incorporated into the final HVA analysis description. However, we recognize that due to geologic factors and less intensive farming operations that further upper watershed vulnerability analysis is a lower priority than that of the valley floor. The conclusions of the upper watershed vulnerability analyses and any new information on the upper watersheds must be added to the HVA map and description during the 5-year GAR update.

**Table 1.** Components of the Groundwater Assessment Report

Item No.	Required Component	Location in GAR
<b>GAR Objectives – MRP section IV.A.1</b>		
1	Provide an assessment of all readily available, applicable and relevant data and information to determine the high and low vulnerability areas where discharges from irrigated lands may result in groundwater quality degradation.	Throughout
2	Establish priorities for implementation of monitoring and studies within high vulnerability or data gap areas.	Not included
3	Provide a basis for establishing Monitoring Workplans developed to assess groundwater quality trends.	Throughout
4	Provide a basis for establishing Management Practices Evaluation Program (MPEP) Workplans and priorities developed to evaluate the effectiveness of agricultural management practices to protect groundwater quality.	Throughout
5	Provide a basis for establishing groundwater quality management plans in high vulnerability areas and priorities for implementation of those plans.	Throughout

<b>Required GAR Components – MRP section IV.A.2</b>		
6	Detailed land use information with emphasis on land uses associated with irrigated agricultural operations. The information shall identify the largest acreage commodity types in the third-party area, including the most prevalent commodities comprising up to at least 80% of the irrigated agricultural acreage in the third-party area. If the third-party manages the area through sub-watershed groups, the GAR information should be developed for each sub-watershed.	Executive Summary 2.5 5 through 17
7	Information regarding depth to groundwater, provided as a contour map(s), if readily available. Tabulated and/or graphical data from discrete sampling events may be submitted if limited data precludes producing a contour map.	2.1.3.2 Appendix D
8	Groundwater recharge information, if readily available, including identification of areas contributing recharge to urban and rural communities where groundwater serves as a significant source of supply.	2.1
9	Soil survey information, including significant areas of high salinity, alkalinity and acidity.	2.1.2
10	Shallow groundwater constituent concentrations from existing monitoring networks (potential constituents of concern include any material applied as part of the agricultural operation, including constituents in irrigation supply water [e.g., pesticides, fertilizers, soil amendments, etc.] that could impact beneficial uses or cause degradation).	2.1.4 Appendix E
11	Information on existing groundwater data collection and analysis efforts relevant to this Order (e.g., Department of Pesticide Regulation [DPR], United States Geological Survey [USGS], State Water Board Groundwater Ambient Monitoring and Assessment [GAMA], California Department of Public Health, local groundwater management plans, etc.). This groundwater data compilation and review shall include all readily accessible information relevant to the Order on existing monitoring well networks, individual well details, and monitored parameters. For existing monitoring networks (or portions thereof) and/or relevant data sets, the third-party should assess the possibility of data sharing between the data-collecting entity, the third-party, and the Central Valley Water Board.	3 5 through 17 Appendix E Appendix J
<b>GAR Data Review and Analysis – MRP section IV.A.3</b>		
12	Determine where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities.	1.2.4.1 2.1.4 2.4 4 5 through 17
13	Determine the merit and feasibility of incorporating existing groundwater data collection efforts, and their corresponding monitoring well systems for obtaining appropriate groundwater quality information to achieve the objectives of and support groundwater monitoring activities under this Order. This shall include specific findings and conclusions and provide the rationale for conclusions.	3.2.8
14	Prepare a ranking of high vulnerability areas to provide a basis for prioritization of work plan activities.	Not included
15	Describe pertinent geologic and hydrogeologic information for the third-party area(s) and utilize GIS mapping applications, graphics, and tables, as appropriate, in order to clearly convey pertinent data, support data analysis, and show results.	Throughout

**Groundwater Vulnerability Designations – MRP section IV.A.4**

16	<p>The GAR shall designate high/low vulnerability areas for groundwater in consideration of high and low vulnerability definitions provided in Attachment E of the Order. The vulnerability designations will be made using a combination of physical properties (soil type, depth to groundwater, known agricultural impacts to beneficial uses, etc.) and management practices (e.g., irrigation method, crop type, nitrogen application and removal rates, extent of implementation, etc.). The third-party shall provide the rationale for proposed vulnerability determinations.</p>	<p>Partial, 4 through 18</p>
<b>Other</b>		
17	<p>Section 7835 of the California Geologist and Geophysicist Act states that “All geologic plans, specifications, reports, or documents shall be prepared by a professional geologist or registered certified specialty geologist, or by a subordinate employee under his or her direction. In addition, they shall be signed by the professional geologist or registered certified specialty geologist or stamped with his or her seal, either of which shall indicate his or her responsibility for them.”</p>	<p>Not included</p>