
Central Valley Regional Water Quality Control Board

16 August 2016

Casey Creamer
Kings River Watershed Coalition Authority
P.O. Box 8259
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REVIEW OF THE KINGS RIVER WATERSHED COALITION AUTHORITY'S COMPREHENSIVE GROUNDWATER QUALITY MANAGEMENT PLAN

Thank you for your 20 November 2014 submittal of the Kings River Watershed Coalition Authority's (Coalition) Comprehensive Groundwater Quality Management Plan (GQMP). The GQMP was submitted in accordance with the Waste Discharge Requirements General Order for Growers in the Tulare Lake Basin that are Members of a Third Party Group, Order No. R5-2013-0120 (General Order). Based on Central Valley Water Board staff review of the document, additional information must be provided in the GQMP to meet the requirements listed in the General Order's Monitoring and Reporting Program (MRP).

The enclosed staff review memo contains GQMP elements in need of revision. A key element that needs to be addressed is the addition of more detailed information regarding the management practices to be implemented prior to the availability of MPEP results and schedules for implementation of those practices.

Please revise the GQMP in accordance with the staff review memo and submit an updated GQMP by **17 October 2016**. If you have any questions regarding this letter, please contact David Sholes at (559) 445-6279 or by e-mail at david.sholes@waterboards.ca.gov.

Sincerely,

Original signed by:

Pamela C. Creedon
Executive Officer

Enclosure: Central Valley Water Board Staff Review Memo of the Coalition's GQMP

cc: Sue McConnell, Central Valley Water Board, Rancho Cordova

Central Valley Regional Water Quality Control Board

TO: David Sholes, CEG
Senior Engineering Geologist

FROM: Eric Warren
Water Resource Control Engineer

DATE: 16 August 2016

**SUBJECT: REVIEW OF THE COMPREHENSIVE GROUNDWATER QUALITY
MANAGEMENT PLAN FOR THE KINGS RIVER WATERSHED COALITION
AUTHORITY**

On 20 November 2014, the Kings River Watershed Coalition Authority (Coalition) submitted a Comprehensive Groundwater Quality Management Plan (GQMP) in accordance with Waste Discharge Requirements General Order R5-2013-0120 (General Order). Groundwater Quality Management Plans are the key mechanism used by the Order to help ensure that waste discharges from irrigated lands do not cause or contribute to exceedances of applicable water quality objectives in the underlying groundwater, unreasonably affect applicable beneficial uses, or cause or contribute to a condition of pollution or nuisance.

Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff reviewed the GQMP to determine compliance with requirements pursuant to section VIII.I. of the General Order, and Appendix MRP-1 of the General Order's Monitoring and Reporting Program (MRP). Based on staff review, additional information needs to be provided in the GQMP in order for the plan to meet the requirements of the General Order. Table 1 provides descriptions of the required components of a Groundwater Quality Management Plan, which are listed in Appendix MRP-1 of the MRP. The table also lists the sections of the GQMP in which each component is addressed, and whether the specific General Order requirement was adequately met. General comments and recommended revisions/additions for incomplete items are provided below. The memorandum item numbers correspond to item numbers in Table 1.

Staff Issues and Recommendations

Item 1. Constituents of Concern

The GQMP clearly communicates that nitrate is the primary focus of the management plan; however, a comprehensive plan should identify and address all Constituents of Concern (COCs) identified by the Coalition's Groundwater Quality Assessment Report (GAR). Multiple pesticide

detections were identified during the GAR data analysis process, and additional sources of pesticide data were also provided to the Coalition by staff in the Executive Officer's 26 April 2016 conditional approval letter.

Staff Recommendation: The GQMP should be revised to identify the extent of pesticide impacts to groundwater and the measures that will be taken to address the issue. The GQMP also needs to discuss the overlap with the Department of Pesticide Regulations (DPR) Groundwater Protection Areas, and how DPR requirements will be included in the outreach material to address pesticide COCs when appropriate.

Salinity (i.e., total dissolved solids [TDS]) is listed as a constituent of concern, but the GQMP provides minimal information regarding the influence of irrigated lands on salinity. Groundwater salinity increase is stated in the *Water Quality Control Plan for the Tulare Lake Basin, Second Edition* (Basin Plan) as the greatest long-term problem facing the entire Tulare Lake Basin.

Staff Recommendation: The GQMP should be revised to acknowledge the role that irrigated agricultural operations play in mobilizing and contributing salts to groundwater, and expand on the CV-SALTS process the Coalition is participating in to address this issue.

Item 3. Groundwater Basins

The GQMP does not visually identify the groundwater basins/sub-basins addressed.

Staff Recommendation: To provide clarity to interested parties, the GQMP should be revised to include a map of the Coalition coverage area that clearly delineates the groundwater basins being addressed by the GQMP. These boundaries are evaluated and published by the Department of Water Resources in the Bulletin 118 series.

Item 4. Previous Work Conducted

The GQMP does not contain a sufficient summary of previous work conducted to identify the presence and extent of COCs within the management areas.

Staff Recommendation: The GQMP should be revised to include a discussion of the Groundwater Quality Assessment Report (GAR) methodology and conclusions, in addition to applicable studies that have been conducted by other entities.

This section must be updated to reflect designated High Vulnerability Areas (HVAs) as described in the Executive Officer's 26 April 2016 GAR Conditional Approval letter.

Item 7. Irrigated Agricultural Sources of Constituents of Concern

The GQMP provided a discussion regarding potential nitrate sources, factors, and potential mechanisms for groundwater impacts. However, as stated in Item 1, the discussion needs to be expanded to address the pesticide and salinity issues identified in the GAR.

Staff Recommendation: This information should be provided in a revised GQMP.

Item 9. Management Practices that could be Affecting Groundwater Quality

The “*Baseline Inventory of Management Practices*” section of the GQMP primarily focuses on the application of fertilizers and pesticides, and provides little information regarding irrigation practices in the management area.

Staff Recommendation: The GQMP should be revised to include a discussion regarding the types of irrigation used by growers, intrinsic factors affecting the distribution of management practices (e.g., crop type, soil conditions, water availability, etc.), and any groundwater quality risks that may be associated with the practices.

Item 10. Summary of Available Water Quality Data

On 26 April 2016 a letter was issued to the Coalition by the Executive Officer conditionally approving the Coalition’s GAR. The letter and enclosed staff review identified additional information that needed to be collected, evaluated, and incorporated into future work items such as the GQMP (e.g., HVAs must include all areas where Nitrate and EC concentrations in groundwater are at 50% of the MCL or higher and have a trend indicating a statistically significant increasing concentration). This included additional water quality data available through the GeoTracker Groundwater Ambient Monitoring Program (GAMA), the Central Valley Dairy Representative Monitoring Program, and the Department of the Interior Bureau of Reclamation’s Pump-in Program.

Staff Recommendation: The GQMP should be revised to include a discussion of these data sources, and additional areas of known groundwater quality impacts which may be attributed to irrigated agriculture, if any.

Item 12. General Groundwater Chemistry within the GQMP Area

Section B.3.b.ii. of Appendix MRP-1 of the MRP requires that information be provided on groundwater basin(s) and sub-basins contained within the GQMP area, including a discussion of their general water chemistry (range of EC, concentrations of major anions and cations, nutrients, TDS, pH, dissolved oxygen and hardness); Piper Diagrams, Stiff Diagrams and/or Durov Diagrams should also be provided for the GQMP area. However, the GQMP only provided: (1) a broad discussion of the general types of groundwater in the Coalition area (e.g., “odorless, low EC, low hardness, neutral pH to waters with elevated EC, strong sulfur smell, high hardness, and alkaline pH”); and (2) a list of constituents known to be present in local groundwater.

Staff Recommendation: The GQMP should be revised to contain a more detailed description of groundwater chemistry (range of EC, concentrations of major anions and cations, nutrients, TDS, pH, dissolved oxygen and hardness) in the Coalition’s area, and provide diagrams (Piper, Stiff, and/or Durov) that represent the general chemistry of groundwater in various regions of the management plan area.

Item 16. Irrigation Water Quality

Section I.B.3.c. of Appendix MRP-1 of the MRP requires that information be provided regarding identification, where possible, of irrigation water sources (surface water origin and/or

groundwater) and their available general water chemistry (range of EC, concentrations of major cations and anions, nutrients, TDS, pH, dissolved oxygen, and hardness). The information provided in the GQMP was insufficient to identify the sources and quality of irrigation water within the GQMP area.

Staff Recommendation: The GQMP should be revised to include this information in a narrative or tabular format that contains data for the following constituents/parameters: range of EC, concentrations of major cations and anions, nutrients, TDS, pH, dissolved oxygen, and hardness. Data provided for surface water should identify the source of the water (e.g., Kings River).

Item 17. Management Plan Strategy/Approach

The management plan strategy and approach described in the GQMP lacks adequate specificity regarding the actions that will be taken to address the identified water quality issues.

Staff Recommendation: The GQMP should be revised to include a detailed description of the management practices that will be implemented, specific dates and milestones for implementation, which areas/commodities/practices will be prioritized, if any, and how rates of implementation will be determined.

Item 18, 20, & 32. Description of Actions to Achieve Compliance and Identification/Validation of Protective Practices

On 1 June 2016, subsequent to the submittal of the GQMP, the Southern San Joaquin Valley Water Quality Coalition (SSJVWQC) submitted a discussion draft Management Practices Evaluation Program Workplan (MPEP) as part of the group's official comments on the State Water Resources Control Board (SWRCB) proposed East San Joaquin River Watershed Agricultural Order.

Staff Recommendation: The GQMP should be revised to reflect the conceptual approach described in the discussion draft MPEP. It is important that the GQMP describe the interaction between the MPEP, Trend Monitoring, and GQMP processes, and the actions that will be taken to ensure compliance with receiving water limitations.

Item 25. Protective Management Practices

Section I.C.4.b. of Appendix MRP-1 of the MRP requires that information be provided regarding the identification of management practices that will be used to control sources of COCs from irrigated lands that are: technically feasible; economically feasible; proven to be effective at protecting groundwater quality; and will comply with sections III.A and B of the General Order. While the GQMP does list three practices that have been identified as effective in protecting groundwater (drip/microsprinkler irrigation, split application of fertilizers, and increased use of foliar fertilizers), literature is available which identifies additional practices. The discussion draft MPEP identifies 40 specific practices which have been documented to improve nitrogen fertilizer efficiency, which were modified from Technical Report 3 of the UC Davis Report for the SWRCB SBX2 1 Report to the Legislature (Dzurella, K. N., et al. "Nitrogen source reduction to protect groundwater quality." (2012)).

Staff Recommendation: These additional practices should be evaluated to determine their applicability to the management plan area, and be incorporated into a revised GQMP if appropriate.

Item 26. Outreach Strategy

The GQMP identified the outreach strategy that will be used to disseminate information to participating growers. However, no discussion was provided regarding how the Coalition will evaluate the effectiveness of the outreach efforts.

Staff Recommendation: The GQMP should be revised to include a description of how information will be collected from growers, the type of information being collected, how the information will be verified, and how the information will be reported. The GQMP should additionally contain measureable performance goals that are aligned with the elements of the management plan strategy.

Item 27 & 28. Schedule and Milestones for Implementation

Section I.C.4.d. of Appendix MRP-1 of the MRP requires that the GQMP include a schedule and milestones for the implementation of management practices that are known to be effective in partially or fully protecting groundwater quality. As stated in Item 17, the GQMP does not provide sufficient information regarding practices to be implemented, milestones, or metrics that will be used to measure success of the management plan.

Staff Recommendation: The GQMP should be revised to provide a specific schedule and performance goals for the phased implementation of management practices that are known to be protective of groundwater quality. Implementation of known protective practices should begin, to a reasonable extent, within the first year of management plan approval.

Item 29. Monitoring Compliance

The GQMP states that the MPEP Workplan will describe the process used to evaluate the effectiveness of management practices and the monitoring system designed to conduct the evaluation. Groundwater monitoring conducted as part of the Trend Monitoring Program will provide additional information regarding the changes in groundwater quality in response to management practices implemented.

The evaluation of management practice effectiveness provided by the MPEP is separate from the evaluation of *implementation* effectiveness required in the GQMP. Section I.E.2 of Appendix MRP-1 of the MRP requires that the GQMP identify the information necessary to quantify program effectiveness going forward, and describe the approach for determining the effectiveness of implemented practices.

Staff Recommendation: The GQMP should be revised to include shorter-term metric(s) (e.g., a 3-year running average of applied/removed nitrogen) that will be used to evaluate program effectiveness in conjunction with the long term groundwater quality data provided by the Trend

Monitoring Program. The GQMP should also be revised to identify the information that will be collected to support the metric(s), and how the information will be used.

Item 31. Data Analysis Methods

Section E.1 of Appendix MRP-1 of the MRP requires that the GQMP describe the methods to be utilized to perform data analysis (graphical, statistics, modeling, index computation, or some combination thereof). However, the GQMP did not specifically describe the methods to be utilized to perform data analysis.

Staff Recommendation: *The GQMP should be revised to include a detailed description of the methods to be utilized to perform data analysis.*

The GQMP states that groundwater well sampling locations/surface elevations will not be published due to privacy issues. However, this is not consistent with the monitoring and reporting requirements of the Order. Section V.C of the MRP states,

“Location map(s) showing the sampling sites/monitoring wells, crops, and land uses within the third party’s geographic area must be updated (based on available sources of information) and included in the Monitoring Report. An accompanying GIS shapefile or geodatabase of monitoring site and monitoring well information must include the CEDEN comparable site code and name (surface water only) and Global Positioning System (GPS) coordinates (surface water sites and wells used for monitoring). The map(s) must contain a level of detail that ensures they are informative and useful. GPS coordinates must be provided as latitude and longitude in the decimal degree coordinate system (at a minimum of five decimal places).”

Staff Recommendation: *The Coalition should develop all groundwater monitoring work plans with the understanding that the location of sampling points will be provided. However, individual well owner information does not need to be included as part of the annual Monitoring Report.*

Item 33. Required Certification Statement

Section IX.3 of the MRP states that each person signing a report required by the Order must provide following certification:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel or represented Members properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment for violations.”

The GQMP does not contain the required signature and certification statement of the individual authorized to bind the party submitting the report.

Staff Recommendation: *The signature and certification statement should be included in a revised cover page for the GQMP and any future reports submitted by the Coalition.*

Table 1. Components of the Groundwater Quality Management Plan

Item No.	Required Component	Location in GQMP	Item Complete
Introduction and Background			
1	Provide a discussion of the constituents of concern (COCs) that are the subject of the GQMP.	Page 10	N
2	Provide a discussion of the water quality objective(s) or trigger(s) requiring preparation of the management plan.	Page 10	Y
3	Identification (both narrative and in a map form) of the boundaries (geographic and groundwater basin[s] or portion of a basin) to be covered by the GQMP including how the boundaries were delineated.	Page 26	N
4	Provide a summary of previous work conducted to identify the occurrence of the COCs (e.g., studies, monitoring conducted) for the GQMP area.	Page 13	N
Physical Setting and Information			
5	Provide land use maps which identify the crops being grown in the GQMP area (these maps may already be presented in the GAR). Map(s) must also be provided in electronic format as ArcGIS shapefiles.	Page 14-16, Figure 3 & 4	Y
6	Provide soil types and other relevant soils data as described by the NRCS soil survey or other applicable studies. The soil unit descriptions and a map of their aerial extent within the study area must be included.	Page 22-25, Figure 6 & 7	Y
7	Identification of the potential irrigated agricultural sources of the COC(s) for which the management plan is being developed. If the potential sources are not known, a source identification study may be designed and implemented.	Page 17	N
8	Provide a list of the designated beneficial uses as identified in the <i>Water Quality Control Plan for the Tulare Lake Basin</i> , Second Edition, revised January 2004 (Basin Plan).	Page 17	Y
9	Provide a baseline inventory of identified existing management practices in use within the management plan area that could be affecting the concentrations of COCs in groundwater and locations of the various practices.	Page 17-21	N
10	Provide a summary, discussion, and compilation of available groundwater quality data for the parameters addressed by the management plan. The GAR developed for the Coalition's area, and groundwater quality data compiled in that document, may serve as a reference for these data.	Page 21	N
Geology and Hydrogeology			
11	Provide regional and area specific geology, including stratigraphy and existing published geologic cross-sections.	Page 22	Y

Item No.	Required Component	Location in GQMP	Item Complete
12	Provide information on groundwater basin(s) and sub-basins contained within the GQMP area, including a discussion of their general water chemistry as known from existing publications, including the GAR (range of EC, concentrations of major cations and anions, nutrients, TDS, pH, dissolved oxygen, and hardness). The discussion should reference and provide figures of existing Piper Diagrams, Stiff Diagrams and/or Durov Diagrams for the GQMP area.	Page 26	N
13	Provide information regarding known water bearing zones, areas of shallow and/or perched groundwater, as well as areas of discharge and recharge to the basin/sub-basin in the GQMP area (rivers, unlined canals, lakes, and recharge or percolation basins).	Page 26-28	Y
14	Identification of which water bearing zones within the GQMP area are being utilized for domestic, irrigation, and municipal water production	Page 26-28	Y
15	Aquifer characteristics such as depth to groundwater, groundwater flow direction, hydraulic gradient, and hydraulic conductivity, as known or estimated based on existing information.	Page 28-29	Y
16	Identification, where possible, of irrigation water sources (surface water origin and/or groundwater) and their available general water chemistry (range of EC, concentrations of major cations and anions, nutrients, TDS, pH, dissolved oxygen, and hardness).	Page 29	N
Management Plan Strategy			
17	Provide a description of the approach to be utilized by the management plan (e.g., multiple COC's addressed in a scheduled priority fashion, multiple areas covered by the plan with a single area chosen for initial study, or all areas simultaneously [area wide]). Any prioritization included in the management plan must be consistent with the requirements in section XII of the General Order, Time Schedule for Compliance.	Page 30	N
18	Provide a description of actions to be taken in order to achieve compliance with the receiving water limitations of the General Order (section III).	Page 31	N
19	Provide a description of how the Coalition plans to educate Members about the sources of the water quality exceedances in order to promote prevention, protection, and remediation efforts that can maintain and improve water quality.	Page 31	Y
20	Provide a description of how the Coalition will identify, validate, and implement management practices to reduce loading of COCs to surface water or groundwater, as applicable, thereby improving water quality.	Page 31	N
21	Identification of key individuals involved in major aspects of the project (e.g., project lead, data manager, sample collection lead, lead for stakeholder involvement, quality assurance manager).	Page 32-33	Y
22	Provide a discussion of each individual's responsibilities.	Page 32	Y
23	Provide an organizational chart with identified lines of authority.	Page 33	Y

Item No.	Required Component	Location in GQMP	Item Complete
24	Identification of the entities or agencies that will be contacted to obtain data and assistance.	Page 32	Y
25	Identification of management practices used to control sources of COCs from irrigated lands that are 1) technically feasible; 2) economically feasible; 3) proven to be effective at protecting water quality, and 4) will comply with sections III.A and B of the General Order. Practices that growers will implement must be discussed, along with an estimate of their effectiveness or any known limitations on the effectiveness of the chosen practice(s). Practices identified may include those that are required by local, state, or federal law. Where an identified constituent of concern is a pesticide that is subject to DPR's Groundwater Protection Program, the GQMP may refer to DPR's regulatory program for that pesticide and any requirements associated with the use of that pesticide provided that the requirement(s) are sufficient to meet water quality objectives.	Page 34-35	N
26	Identification of outreach that will be used to disseminate information to participating growers. This discussion shall include: the strategy for informing growers of the water quality problems that need to be addressed, method for disseminating information on relevant management practices to be implemented, and a description of how the effectiveness of the outreach efforts will be evaluated. The third-party may conduct outreach efforts or work with the assistance of the County Agricultural Commissioners, U.C. Cooperative Extension, Natural Resources Conservation Service, Resource Conservation District, California Department of Food and Agriculture, or other appropriate groups or agencies.	Page 35-36	Y
27	Provide a specific schedule and milestones for the implementation of management practices and tasks outlined in the management plan. Items to be included in the schedule include: time estimated to identify new management practices as necessary to meet the Order's surface and groundwater receiving water limitations (section III of the Order); a timetable for implementation of identified management practices (e.g., at least 25% of growers identified must implement management practices by year 1; at least 50% by year 2).	Page 35-36	N
28	Establish measureable performance goals that are aligned with the elements of the management plan strategy. Performance goals include specific targets that identify the expected progress towards meeting a desired outcome.	Missing	N
Monitoring Methods			
29	The monitoring system must be designed to measure effectiveness at achieving the goals and objectives of the GQMP and capable of determining whether management practice changes made in response to the management plan are effective and can comply with the terms of the General Order.	Page 36-37	N (Additional work needed)

Item No.	Required Component	Location in GQMP	Item Complete
30	The third-party's Management Practice Evaluation Program and Groundwater Quality Trend Monitoring shall be evaluated to determine whether additional monitoring is needed in conjunction with the proposed management strategy(ies) to evaluate the effectiveness of the strategy(ies). This may include commodity-based representative monitoring that is conducted to determine the effectiveness of management practices implemented under the GQMP. Refer to section IV of the MRP for groundwater monitoring requirements.	Future Work Item	Future Work Item
Data Evaluation			
31	Methods to be utilized to perform data analysis (graphical, statistics, modeling, index computation, or some combination thereof).	Page 37	N
32	Identify the information necessary to quantify program effectiveness going forward, including the tracking of management practice implementation. The approach for determining the effectiveness of the management practices implemented must be described. Acceptable approaches include field studies of management practices at representative sites and modeling or assessment to associate the degree of management practice implementation to changes in water quality. The process for tracking implementation of management practices must also be described. The process must include a description of how the information will be collected from growers, the type of information being collected, how the information will be verified, and how the information will be reported.	Missing	N
Other			
33	Section IX.3 of the MRP states that each person signing a report required by the Order must include the provided certification statement.	Missing	N