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Central Valley Regional Water Quality Control Board

27 July 2017

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2904 West Main Street
Visalia, CA 93291

REVIEW OF THE TULE BASIN WATER QUALITY COALITION'S COMPREHENSIVE GROUNDWATER QUALITY MANAGEMENT PLAN

Thank you for your 20 September 2016 submittal of the Tule Basin Water Quality Coalition's (Coalition) Comprehensive Groundwater Quality Management Plan (GQMP). The GQMP was submitted in response to 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). Central Valley Water Board staff has reviewed the GQMP and has noted areas within the plan that must be addressed to comply with the General Order.

The enclosed staff review memorandum contains GQMP elements in need of revision. Key elements that need to be addressed are the prioritization of groundwater quality management plan areas, identification of specific management practices to be implemented prior to the availability of results from the Southern San Joaquin Valley Management Practices Evaluation Program (SSJV MPEP) report, and performance goals for implementation of those practices.

Please revise the GQMP in accordance with the staff review memorandum and resubmit an updated GQMP by **15 September 2017**. If you have any questions regarding this letter, please contact David Sholes at (559) 445-6279 or by email at david.sholes@waterboards.ca.gov.

Sincerely,

FOR 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
Richard Schafer, R.L. Schafer and Associates, Visalia
David De Groot, 4 Creeks Civil Engineering and Land Surveying, Visalia

Central Valley Regional Water Quality Control Board

TO: David Sholes, PG 4321 *DAS*
Senior Engineering Geologist
Irrigated Lands Regulatory Program

FROM: Ryan K. West *Ryan K. West*
Engineering Geologist
Irrigated Lands Regulatory Program

DATE: 27 July 2017

SUBJECT: REVIEW OF THE TULE BASIN WATER QUALITY COALITION
COMPREHENSIVE GROUNDWATER QUALITY MANAGEMENT PLAN

On 20 September 2016, the Tule Basin Water Quality Coalition (Coalition) submitted a Comprehensive Groundwater Quality Management Plan (GQMP) as required by section VIII.I. of Waste Discharge Requirements General Order R5-2013-0120 (General Order). Groundwater Quality Management Plans are a key mechanism under the General Order to help ensure that waste discharges from irrigated lands do not cause or contribute to an exceedance 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.

Table 1 (see page 8 of this memorandum) lists the General Order's requirements for the GQMP and identifies where in the document they have been addressed. A summary of the Coalition's GQMP approach, public comments, and staff recommendations are discussed below.

Summary of the Coalition's GQMP Approach

The Coalition's GQMP focuses on ensuring that appropriate agricultural management practices are implemented by member growers to address constituents of concern (COCs) in groundwater. Nitrate is the primary COC in groundwater management plan areas, with salts and pesticides also recognized as COCs. Specific practices that may reduce deep percolation of nitrate to groundwater (Dzurella et al., 2012) are identified in the GQMP, and will be discussed with member growers at outreach and education events. Technically and economically feasible management practices identified as part of the Southern San Joaquin Valley Management Practices Evaluation Program (SSJV MPEP) will be implemented by applicable growers as they are identified.

The actions that will be taken to meet the objectives of the GQMP include:

- Education of members;
- Implementation of management practices; and
- Identification and tracking of management practices.

Education of Members – The Coalition will coordinate with the SSJV MPEP team to define outreach curricula reflecting protective management practices throughout the GQMP area. Education and outreach events are planned to occur a minimum of once per year. Outreach curricula pertaining to the initial inventory of management practices, including relevant meeting materials, videos, flyers, and online tools will be developed by the SSJV MPEP team. Resources will be organized into a Grower/Advisor webpage to increase accessibility for coalition members and consultants. Information on proper wellhead management and proper well destruction will be provided at outreach events.

Implementation of Management Practices – According to the GQMP, certain practices identified as protective are included in the Farm Evaluation forms. As additional protective management practices are identified through research or by work completed by the SSJV MPEP, the Coalition will reach out to growers to promote implementation of the additional practices.

Identification and Tracking of Management Practices - Nitrogen management methods and irrigation methods identified through Farm Evaluations (submitted by growers) will be tracked by the Coalition. A baseline of protective practices currently implemented by growers in groundwater management plan areas will be defined with the first submission of Farm Evaluations. Future Farm Evaluation submittals will enable the Coalition to track trends and progress in implementation of protective practices (relative to the baseline) over time throughout the groundwater management plan areas.

A baseline analysis for reported Nitrogen Applied versus Crop Yield (A/Y) will also be established and tracked from grower submittals of Nitrogen Management Plan Worksheets. The Coalition will develop summary statistics to identify potential outliers from the A/Y data, and initiate outreach specific to individual outliers and provide education on how to implement different management practices. Feedback will also be provided to growers on their relative performance within similar cropping systems based on provided nitrogen application data and on-farm practices.

The identification and tracking of management practices through Farm Evaluation and Nitrogen Management Plan submittals will allow the Coalition to monitor progress in implementation of protective practices. Other monitoring methods such as groundwater monitoring will be accomplished through the implementation of the groundwater quality trend monitoring program and the SSJV MPEP. Groundwater Quality Assessment Report (GAR) updates will also assemble and evaluate additional groundwater data. The Coalition intends to compare trends in management practices (long term) to trends in groundwater quality (long term), in order to measure the effectiveness of both the management practices and the education and outreach.

Summary of Public Comments

The Tule Basin Water Quality Coalition's draft GQMP was released for a 30-day public comment period prior to staff review. One joint comment letter was received from Leadership Counsel for Justice and Accountability, Community Water Center, and Clean Water Action (Commenters). The Commenters issues are summarized as follows:

- 1) Specific performance measures and timelines are lacking;
- 2) No assurances were provided that adequate steps will be taken to meet receiving water limitations;
- 3) The GQMP does not include monitoring to ensure recommended management practices are actually being implemented;
- 4) In regards to implementation of recommended management practices, it is unclear what "technically and economically feasible for growers to implement" will look like in practice;
- 5) A work plan for how the Coalition will identify improperly abandoned wells and wells with insufficient wellhead protection should be included in the GQMP;
- 6) The conditional approval of the GAR required additional work. There needs to be a work plan to ensure the work is completed;
- 7) The constituent data in the groundwater quality table (page 15 of the GQMP) is not very useful as it lacks trend data; and
- 8) Several sources of nitrate contamination were listed, yet the GQMP fails to provide a work plan on how to address nitrate contamination from dairies, septic systems, and small water systems.

Summary of Staff Comments and Recommendations

Central Valley Water Board staff have reviewed the GQMP to determine compliance with the General Order. Based on staff review, and considering the public comments received, additional information is needed. Some of the issues contained in the public comment letter are addressed by staff comments and recommendations. Other issues will be addressed as the Groundwater Quality Trend Monitoring Program and the SSJV MPEP are implemented. Staff provided comment on two issues and find seven areas that require additions/revisions.

- Groundwater Chemistry within the GQMP Area
Section B.3.b.ii. of Appendix MRP-1 of the Monitoring and Reporting Program 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); the GQMP should also reference and provide figures of existing Piper Diagrams, Stiff Diagrams and/or Durov Diagrams.

Staff Comment: The information provided in the GQMP was sufficient to address the information required by Section B.3.b.ii. of Appendix MRP-1. Additional groundwater quality data for the Coalition's area can be obtained from the National Water Quality Monitoring Council website (<https://www.waterqualitydata.us/portal/>). This site contains both recent and historical groundwater quality data (including well depths) that the

Coalition may find useful for prioritizing groundwater management plan areas and/or for comparing/contrasting to Groundwater Quality Trend Monitoring Program well data.

- Inventory of Existing Management Practices

Section B.1.d. of Appendix MRP-1 of the Monitoring and Reporting Program requires that the GQMP provide a baseline inventory of identified existing management practices in use within the management plan area that could be affecting the concentrations of nitrate in groundwater and the locations of the various practices.

Staff Comment: The Coalition submitted a Farm Evaluation Summary Report (dated 3 January 2017) which contained a baseline inventory of existing management practices and the locations of the practices. The information contained in the Farm Evaluation Summary Report is sufficient to meet the requirements of Section B.1.d. of Appendix MRP-1.

- Management Practices

The GQMP provided a list of management practices documented to improve nitrogen fertilizer efficiency (Dzurella et al. 2012), and stated that many of the practices on the list are currently implemented by growers who strive to minimize fertilizer loss and maximize irrigation water application efficiency. The Coalition will continue to support grower efforts to implement management practices through outreach and support in conjunction with the SSJV MPEP; appropriate well maintenance and destruction of abandoned wells will also be promoted in order to protect groundwater quality.

Staff Recommendation: Specific management practices that growers must implement as a first step to protect groundwater quality include: (1) wellhead protection and proper maintenance of un-used wells; (2) proper destruction of abandoned wells; and (3) accounting for the amount of nitrate in irrigation supply water in order to reduce the amount of excess nitrogen applied. The Coalition's outreach and education programs should inform growers of the need to implement these three practices. The GQMP should also state that growers will be required to implement additional protective management practices identified through the MPEP process and that growers with the crops and conditions identified for a verified management practice must implement that practice or its equivalent. A minimal implementation timeline between MPEP identification and grower implementation of a given practice should also be identified in the GQMP.

- Management Plan Strategy/Approach

Section C.1. of Appendix MRP-1 of the Monitoring and Reporting Program requires 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 addressed simultaneously [area wide]). The Coalition's management plan strategy was discussed in the GQMP and was also outlined in Appendix A of the GQMP in a technical memorandum by the Southern San Joaquin Valley Management Practice Evaluation Program (SSJV MPEP) Team entitled

Identification of Management Practices to Minimize Nitrate Leaching from Crop Root Zones to Satisfy Groundwater Quality Management Plan Requirements.

The Coalition's management plan strategy will focus on education and outreach programs to promote the implementation of agricultural management practices that are known to be protective of groundwater quality. The GQMP indicated that nitrate would be a priority with respect to COCs, but only provided a broad description of how the groundwater management plan areas may be prioritized.

Staff Recommendation: Unless the Coalition plans to address the entire HVA at one time, the GQMP must show how groundwater management plan areas will be prioritized. The prioritization criteria listed in section 3.1.2 of the GQMP should be used to define and delineate areas for prioritization, and a map showing delineated areas should also be provided. The Coalition's prioritization criteria need to include source areas for disadvantaged communities (DACs) that rely on groundwater. A phased approach for growers to implement management practices (i.e., well head protection, accounting for nitrate in irrigation water, and proper destruction of abandoned wells) within each of the prioritized areas should be included along with a time schedule for implementation of each phase.

- Performance Goals

Section C.4.e. of Appendix MRP-1 of the Monitoring and Reporting Program requires that the GQMP establish measurable performance goals that are aligned with the elements of the management plan strategy. The GQMP states "Performance goals for the implementation of protective practices to limit deep percolation of nitrate are based on baselines of currently adopted protective management practices."

Staff Recommendation: While comparing data obtained from future Farm Evaluations to a baseline will provide useful information regarding adoption of management practices, performance goals also need to be established in accordance with the prioritization of groundwater quality management plan areas and the time schedule associated with prioritization (unless entire Coalition HVA will be addressed at one time).

Information contained in the Farm Evaluations could be used to help establish performance goals within prioritized areas. For example, if information contained in the Farm Evaluations indicates that 70% of growers are currently implementing known practices to protect groundwater quality (e.g., well head protection, accounting for nitrate in irrigation water) in the highest priority groundwater management plan area, then the Coalition could establish higher performance goals for implementation of these practices in the following years in order to reach complete implementation within the shortest period practicable. Information contained in the Farm Evaluations could help the Coalition determine which growers need additional outreach.

The GQMP needs to establish performance goals in accordance with the prioritization of groundwater quality management plan areas and the time schedule associated with prioritization.

- Time Schedule for Compliance

Section XII. of the General Order requires that the time schedule for compliance with Groundwater Limitation III.B must be as short as practicable, but may not exceed 10 years from the date the GQMP is submitted for approval by the Executive Officer. The GQMP did not provide appropriate technical or economic justification to demonstrate the proposed time schedule is as short as practicable.

Staff Recommendation: The GQMP must indicate that the proposed time schedule is the shortest possible and include discussion of the following items to support the time schedule: (1) The immediate and short-term or near-term management practices that will be implemented; (2) The implementation schedule for additional management practices that are dependent upon MPEP results will closely follow the MPEP schedule and efforts will be made to minimize, to the maximum extent possible, the lag time between when a practice is proven to be protective of groundwater in the MPEP, and when that practice is rolled out to appropriate coalition members for implementation within the GQMP areas; and (3) For management practices requiring substantial monetary investment prior to implementation, the GQMP should justify the proposed implementation schedule by indicating that the schedule will be based on a reasonable timeframe to budget for the required funding necessary to implement the practice, but under no circumstances will the schedule exceed 10 years.

- Outreach Strategy

Section C.4.c. of Appendix MRP-1 of the Monitoring and Reporting Program requires the GQMP to identify the strategy for informing growers of the water quality problems that need to be addressed, method for disseminating information on relative management practices to be implemented, and a description of how the effectiveness of the outreach efforts will be evaluated.

Staff Recommendation: The GQMP should identify early targeted outreach to extreme outliers (e.g., growers with “exceptionally high” A/Y or A/R nitrogen ratios for their crop across the HVA, after considerations that would explain such a high ratio are taken into account). The GQMP must identify the method(s) of outreach to outliers and describe how the outreach will be performed. The GQMP must include specific actions and a timeline for outreach.

- Organizational Chart

Section C.3.c. of Appendix MRP-1 of the Monitoring and Reporting Program requires that an organizational chart be provided that identifies lines of authority. The GQMP did not provide an organizational chart.

Staff Recommendation: The GQMP should contain an organizational chart that includes growers as a responsible party (in the organizational chart) since they are responsible for implementation of practices.

- Recharge Areas

As part of the conditional approval of the Coalition's Groundwater Quality Assessment Report (GAR), groundwater recharge information missing from the GAR was to be provided in the Coalition's GQMP.

Staff Recommendation: Specific information should be provided regarding how groundwater recharge is related to the depth to groundwater maps, the recharge basin map, or the groundwater elevation map (these maps were provided in the GAR). This evaluation is an important step in identifying the areas that contribute recharge to urban and rural communities within the Coalition's area where groundwater serves as a significant source of supply. For example, the disadvantaged community of Pixley is situated over a north-south trending groundwater ridge produced by groundwater depressions positioned to the east and west of town. Recharge to Pixley groundwater wells is likely from both north and south of town. Another example can be observed at the disadvantaged community of Terra Bella. The portion of Deer Creek east of Road 256 likely provides a significant portion of recharge to the groundwater wells in Terra Bella.

Table 1. Components of the Groundwater Quality Management Plan

Item No.	Required Component	Location in GQMP
Introduction and Background		
1	Provide a discussion of the constituents of concern (COCs) that are the subject of the GQMP.	Section 2.9
2	Provide a discussion of the water quality objective(s) or trigger(s) requiring preparation of the management plan.	Section 2.8.2
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.	Section 1.3 Attachment A
4	Provide a summary of previous work conducted to identify the occurrence of the COCs (e.g., studies, monitoring conducted) for the GQMP area.	Section 2.8.2
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.	Section 2.6 Attachment F
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.	Section 2.3 Attachment C Attachment C.1
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.	Section 2.9
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).	Section 2.10
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.	Section 2.11
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.	Section 2.8.2
Geology and Hydrogeology		
11	Provide regional and area specific geology, including stratigraphy and existing published geologic cross-sections.	Section 2.4
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.	Section 1.3 Section 2.8.2 Table 6

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).	Section 2.4 Section 2.8.1
14	Identification of which water bearing zones within the GQMP area are being utilized for domestic, irrigation, and municipal water production.	Section 2.4
15	Aquifer characteristics such as depth to groundwater, groundwater flow direction, hydraulic gradient, and hydraulic conductivity, as known or estimated based on existing information.	Section 2.5 Section 2.8.1 Attachments H & I Table 3
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).	Section 2.7 Section 2.7.1 Section 2.7.2 Table 5
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.	Section 3 Appendix A (incomplete)
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).	Section 3.2 Section 3.4.6.1
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.	Section 3.2.1 Appendix A
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.	Section 3.4 Section 3.4.6.1 Appendix A
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).	Section 3.3
22	Provide a discussion of each individual's responsibilities.	Section 3.3
23	Provide an organizational chart with identified lines of authority.	Not provided
24	Identification of the entities or agencies that will be contacted to obtain data and assistance.	Section 3.4.1
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.	Section 3.4.2 Section 3.4.3 Appendix A (incomplete)

26	<p>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.</p>	<p>Section 3.2.1 Section 3.4.1 Section 3.4.2 Section 3.4.3 Section 4.6</p>
27	<p>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).</p>	<p>Section 3.4.6 Section 3.4.6.1 (incomplete)</p>
28	<p>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.</p>	<p>Section 3.4.6.1 Section 3.5 (incomplete)</p>
<p>Monitoring Methods</p>		
29	<p>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.</p>	<p>Section 4</p>
30	<p>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.</p>	<p>Section 4</p>
<p>Data Evaluation</p>		
31	<p>Methods to be utilized to perform data analysis (graphical, statistics, modeling, index computation, or some combination thereof).</p>	<p>Section 5.1</p>
32	<p>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.</p>	<p>Section 5</p>