
Central Valley Regional Water Quality Control Board

17 June 2016

Parry Klassen, Executive Director
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1201 L Street
Modesto, CA 95354

**REVIEW OF THE EAST SAN JOAQUIN WATER QUALITY COALITION'S
GROUNDWATER QUALITY MANAGEMENT PLAN**

Thank you for your 23 February 2015 submittal of the East San Joaquin Water Quality Coalition's (ESJWQC's) Groundwater Quality Management Plan (GQMP). The GQMP was submitted in response to Waste Discharge Requirements General Order for Growers in the Eastern San Joaquin River Watershed that are Members of a Third Party Group (Order No. R5-2012-0116-R3). 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 attached 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 resubmit an updated GQMP by **29 July 2016**. If you have any questions regarding this letter, please contact Sue McConnell at 916-464-4798 or sue.mcconnell@waterboards.ca.gov.



Pamela C. Creedon
Executive Officer

Attachment: Central Valley Water Board Staff Review Memo of the ESJWQC GQMP

Central Valley Regional Water Quality Control Board

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DATE: 16 June 2016

SUBJECT: REVIEW OF THE 23 FEBRUARY 2015 COMPREHENSIVE GROUNDWATER QUALITY MANAGEMENT PLAN FOR THE EAST SAN JOAQUIN WATER QUALITY COALITION

On 23 February 2015, the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) received the East San Joaquin Water Quality Coalition (ESJ or Coalition) Comprehensive Groundwater Quality Management Plan (GQMP). The GQMP was reviewed to determine compliance with requirements pursuant to section VIII.H. of Waste Discharge Requirements General Order R5-2012-0016-R3 (Order), and Appendix MRP-1 of Attachment B (Monitoring and Reporting Program) to the Order.

Staff recommends that the GQMP be revised to meet the terms and conditions of the Order before approval can be considered.

Provision IV.C.9 of the Order requires that the Coalition work cooperatively with the Central Valley Water Board to ensure all Members are taking necessary steps to address exceedances or degradation. Specifically, as a part of the Membership List submittal, the Coalition is required to identify growers who have failed to implement improved water quality management practices within the timeframe specified by the GQMP. This Order requirement needs to be discussed in the GQMP.

Attachment A to the Order summarizes the requirements and purpose for GQMPs (excerpted below):

Groundwater quality management plans will be required where there are exceedances of water quality objectives, where there is a trend of degradation that threatens a beneficial use, as well as for high vulnerability groundwater areas. Instead of development of separate GQMPs, the Order allows for the submittal of a comprehensive GQMP. GQMPs will only be required if irrigated lands may cause or contribute to the groundwater quality problem. GQMPs are the key mechanism under the Order to help ensure that waste discharges from irrigated lands are meeting Groundwater Receiving Water Limitation III.B. The limitation applies immediately unless the Member is implementing the GQMP in accordance with the approved time schedule. The GQMP will include a schedule and milestones for the implementation of management practices. The schedule must identify the time needed to identify new management practices

necessary to meet the receiving water limitations, as well as a timetable for implementation of identified management practices. The MPEP will be the process used to identify the effectiveness of management practices, where there is uncertainty regarding practice effectiveness under different site conditions. However, the GQMP will also be expected to include a schedule for implementing practices that are known to be effective in partially or fully protecting groundwater quality.

The main elements of a GQMP are A) investigate potential irrigated agricultural sources of waste discharge to groundwater, B) review physical setting information for the plan area such as geologic factors and existing water quality data, C) considering elements A and B, develop a strategy with schedules and milestones to implement practices to ensure discharge from irrigated lands are meeting Groundwater Receiving Water Limitation III.B, D) develop a monitoring strategy to provide feedback on GQMP progress, E) develop methods to evaluate data collected under the GQMP, and F) provide reports to the Central Valley Water Board on progress.

Staff comments are provided below. All GQMP components not discussed are complete and do not need to be revised. Table 2 below lists the GQMP requirements.

Item 2. Constituents of Concern (COCs)

Order requirement: A discussion of the COCs that are the subject of the plan and the water quality objectives or triggers requiring preparation of the management plan.

Staff review:

- a. Atrazine - Pages 78-79 identify eight pesticides that exceeded an applicable drinking water standard in existing monitoring datasets. Page 80 states that only three of the pesticides are currently registered for agricultural use with DPR (diazinon, atrazine, and simazine) but that only two (simazine and diazinon) will be described in the GQMP Zone sections. It does not explain why atrazine was left out. Atrazine needs to be included as a GQMP COC. The GQMP also needs to discuss the overlap with DPR Ground Water Protection Areas, and how DPR requirements will be included in the outreach material to address pesticide COCs when appropriate.
- b. "Legacy" pesticides – The GQMP lists five agricultural pesticides with measured exceedances that are no longer registered for legal use in California (i.e., "legacy" pesticides): aldicarb sulfone, DBCP, ethylene dibromide, ethylene dichloride, and naphthalane.

The coalition should notify growers about the legacy pesticide exceedances in the areas where this has occurred, especially if the exceedances have occurred in or near domestic drinking water wells and provide information regarding practices to be implemented that prevent the spread of the pollution.

- c. Recent pesticide data - Table 14 states that the pesticide data evaluated to determine COCs was through 2011. If there is more recent pesticide data available, it should also be used.

- d. Map of pesticide exceedance sections – Please update Figure 45 to differentiate the exceedance sections into legacy vs. currently registered pesticides.
- e. Diazinon trigger limit - Table 15 lists the GQMP constituent limits that will trigger a management plan, with 0.1 ug/l listed for diazinon. This numeric objective (listed in Table III-2A of the Sacramento and San Joaquin Rivers Basin Plan) applies to certain surface water reaches. The Chemical Constituents groundwater objective in the Basin Plan requires that at a minimum, groundwaters designated for use as domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) contained in Title 22 of the California Code of Regulations. While there is no trigger limit for diazinon, it is linked to discharges from agricultural operations and can potentially impact MUN groundwater beneficial use. Diazinon should be included in the Groundwater Trend Monitoring Program. If an ILRP trigger limit for diazinon is established, the GQMP may need to be revised to include diazinon as a COC.

Item 5. Land Use Data

Order requirement: Land use maps which identify the crops being grown in the GQMP area. These maps may already be presented in the Groundwater Assessment Report and may be referenced and/or updated as appropriate. Map(s) must be in electronic format using standard ArcGIS shapefiles.

Staff review: The last paragraph on page 67 explains that DWR land use data, which is 11 to 18 years old depending on the county, was used in the GQMP instead of the 2013 or 2014 USDA land use data because the DWR data differentiates between irrigated and non-irrigated cropland. However, the data in Table 9 (page 68) shows that non-irrigated crop acreage is extremely limited. (Approximately 998,000 irrigated acres vs. 25,000 non-irrigated with 98% of the 25,000 non-irrigated acres being grains, hay, or pasture.) The GAR presented the 2012 USDA land use data.

Since non-irrigated cropland makes up only about two percent of the total cropland, and is virtually nonexistent in the high intensity crops, the most recent land use data should be used in the GQMP.

Item 11. Hydrology / Tile Drains

Order requirement: 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).

Staff review: This GQMP required element is complete overall. However, page 43 has a section called *Known Tile Drains*. The paragraph describes using DWR tile drain sampling locations to map tile drains. It states that none of these sampling locations are within the coalition region, but that tile drains are used by some members.

The coalition conducts management practice surveys of its members. If information is collected on tile drain usage as a part of these surveys, it should be used to create accurate maps of tile drains.

Item 14. Irrigation water sources and associated general water chemistry

Order requirement: 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 anions and cations, nutrients, TDS, pH, dissolved oxygen and hardness).

Staff review: The GQMP does not identify irrigation water sources (surface water origin and/or groundwater) and their available general water chemistry (range of EC, concentrations of major anions and cations, nutrients, TDS, pH, dissolved oxygen and hardness). However, the Order specifies that this is only required if it is possible to obtain this information. The GQMP should address this requirement, providing any relevant information where available and describing what information is not available or not possible to obtain.

Item 15. Project Organizational Chart

Order requirement: Identify 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). This will include an organizational chart with identified lines of authority and a discussion of each individual's responsibilities.

Staff review: The GQMP identifies several key individuals that will be involved in major aspects of the project. However, there is no data manager, sample collection lead, or quality assurance manager identified. If these are identified in a different coalition document, please provide a reference in the GQMP or rename them here.

Item 18. Approach to Address COCs

Order requirement: The GQMP should include a description of the approach to be utilized (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). Any prioritization included in the management plan must be consistent with the requirements in section XII of the Order, Time Schedule for Compliance.

Staff review:

- a. The High Vulnerability Areas are divided into three areas and labeled "Priority 1", "Priority 2", and "Priority 3." The GQMP does not describe how or if implementation will occur differently in each of these areas. The GQMP is written as if all actions will take place simultaneously in all HVAs, regardless of priority status.
- b. Ninety-five percent of nitrate exceedance wells are in Priority Areas 2 and 3 (see Table 1 below). Although the GQMP doesn't describe how the priority areas will be addressed (see Item 18.a), staff presumes that actions will occur in the Priority 1 Area

first. The GQMP does not discuss why almost all nitrate exceedances are outside of the Priority 1 Area. Wells and areas where nitrate is already exceeding the MCL should be addressed first, unless there is clear justification provided for not doing so.

Table 1. Number of Nitrate Exceedance Wells

GQMP Zone	HVA Priority		
	1	2	3
Modesto	4	81	107
Merced	27	68	68
Chowchilla	0	19	69
Madera	0	7	21
Turlock	27	428	257
Total Wells	58	603	522

Item 19. Identify Management Practices to be Implemented

Order requirement: Identify 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 the receiving water limitations of the 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).

Staff review: Page 93 briefly mentions a limited number of wellhead protection and nitrogen management practices that are currently being communicated to members as options, and states that MPEP study outcomes will ultimately result in the list of management practices that growers will implement. The GQMP should be expanded to include the required information listed above. The GQMP needs to include more information regarding the wellhead protection and nitrogen management practices that are being outreached to growers and discuss the practices' technical and economic feasibility and effectiveness at protecting water quality. Nitrogen management practices include nitrogen management plan (NMP) development and reporting.

Item 21. Schedule and Milestones to Meet GW Receiving Water Limitations

Order requirement: Include a specific schedule and milestones for the implementation of management practices and tasks outlined in the management plan, which will reduce loading of COCs. The schedule must include the following items: time estimated to identify new management practices needed and 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). The overall time schedule for compliance must be consistent with the requirements in section XII of the Order, Time Schedule for Compliance.¹

¹ XIII. Time Schedule for Compliance - When a SQMP or GQMP is required pursuant to the provisions in section VIII.H, the following time schedules shall apply as appropriate in order to allow Members sufficient time to achieve compliance with the surface and groundwater receiving water limitations described in section III of this Order. The Central Valley Water Board may modify these schedules based on evidence that meeting the compliance date is technically or economically infeasible, or when evidence shows that compliance by an earlier date is feasible

(footnote continued on next page)

Staff review: The requirements for this item have been partially met.

The following are the milestones provided in the GQMP (page 106):

Milestone 1: Within 2 years of the approved GQMP, additional management practices will be implemented by members in high vulnerability areas especially regarding well management and nitrogen management (Target Date–2018).

Milestone 2: Within 3 years of the initiation of the MPEP studies, identify a schedule for implementation of practices identified as effective by the MPEP (Target Date –2020).

Milestone 3: Within 10 years of approved GQMP, all known abandoned wells will be properly abandoned (Target Date–2026).

Milestone 4: Within 10 years of conducting Groundwater Trend Monitoring, show a reduction of the amount of nitrate being discharged to groundwater by irrigation agriculture for the priority crops almonds, walnuts and tomatoes through a combination of implemented management practices and monitoring data.

- a. The Target Dates for completion of Milestones 1 through 3 are not supported with technical or economic justification as to why the proposed schedules are as short as practicable (see footnote 1 below). The proposed target dates for implementation of practices to meet Groundwater Limitation III.B are 2018, 2020, and 2026.
- b. Milestone 1 is not specific enough. It states that “Within 2 years of the approved GQMP, additional management practices will be implemented by members in high vulnerability areas especially regarding well management and nitrogen management (Target Date – 2018).” This milestone should clarify the meaning of the statement: “additional management practices will be implemented”. In the proceeding pages of the GQMP, there are discussions of additional implementation measures for well management and nitrogen management practices. Additional implementation measures mentioned for nitrogen management include testing of irrigation water, tissue and soil. If this is what is intended for Milestone 1, please clarify within the milestone section, along with more information on the additional well management practices. Also, please provide a rough percentage of the members (targets for implementation) that will be implementing these additional practices, along with a prioritized schedule for implementation of these practices.

(footnote continued from previous page)

(modifications will be made per the requirements in section VI of this Order). Any applicable time schedules for compliance established in the Basin Plan supersedes the schedules given below (e.g., time schedules for compliance with salinity standards that may be established in future Basin Plan amendments through the CV-SALTS process, or time schedules for compliance with water quality objectives subject to an approved TMDL).

Groundwater: The time schedule identified in a GQMP 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 proposed time schedules in the GQMP must be supported with appropriate technical or economic justification as to why the proposed schedules are as short as practicable.

- c. The Target Date for completion of Milestone 3 (2026) does not meet Groundwater Limitation III.B (see footnote 1 below). Please provide interim milestones regarding proper abandonment of abandoned wells, with timelines for addressing the following: the 2% of the Coalition that identified abandoned wells but did not indicate the wells were destroyed; the 32-36% of the Coalition that did not provide information on abandoned wells, and the 9% of the Coalition that identified abandoned wells but did not indicate the wells were properly destroyed. If the proper destruction of abandoned wells is still projected to take 10 years, please provide appropriate technical or economic justification as to why 10 years is as short as practicable and also a prioritized schedule of implementation (e.g., within 2 years, x wells will be addressed, etc.).

Item 22. Performance Goals

Order requirement: 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.

Staff review: This requirement is partially complete. There are six performance goals (and performance measures for each goal) provided in the GQMP: The goals are provided by the Coalition to reflect the steps necessary to guarantee GQMP objectives are met and water quality improves in the ESWQC.

1. Identify member parcels in areas requiring a GQMP.
 - 1.1 Map parcels of members in each GQMP Zone
2. Review the members' Farm Evaluation Plan survey (FEPs) to determine number/type of well management practices in place.
 - 2.1 Review FEP from 100% of member parcels in a GWMP for well management practices.
 - 2.2 Identify members with abandoned wells where it is unknown how they were abandoned (e.g. unknown method, no selection on survey).
 - 2.3 Identify well management practices not currently used by members that can be recommended to prevent discharges to groundwater
3. Review the members' Farm Evaluation Plan survey (FEPs) to determine number/type of irrigation, pesticide and nitrate management practices in place.
 - 3.1 Review FEP from 100% of member parcels in GWMP for irrigation, pesticide and nitrate management practices.
 - 3.2 Identify management practices not currently used by members that can be recommended to prevent discharges to groundwater based on MPEP study results.
4. Conduct outreach to inform members of water quality problems and recommend additional practices.
 - 4.1 Provide groundwater monitoring results at meetings with members and discuss practices that can be used to reduce leaching of COCs to groundwater.
 - 4.2 When available and appropriate, provide information to members on the results of the MPEP.
 - 4.3 Track attendance at meetings attended by the targeted members.

5. Improve understanding of effective management practices to reduce potential for leaching of COCs.
 - 5.1 Identify high priority crops and any data gaps through the NMP Technical Advisory Group.
 - 5.2 Conduct studies through the MPEP to help fill data gaps regarding management practice effectiveness.
 - 5.3 Create online resources regarding MPEP study results and information regarding the 4Rs.

6. Improve understanding of effective management practices to reduce potential for leaching of COCs.
 - 6.1 Evaluate monitoring results from the Groundwater Trend Monitoring Program for COCs.

In general, the performance goals do not include specific targets that identify the expected progress towards meeting a desired outcome. Performance goals must be established that will measure progress towards meeting the objectives of the GQMP and should include measurables such as the anticipated percentage of members that will participate in GQMP related outreach and education (e.g. 100%), the expected percentage of members within the GQMP areas that will be implementing well head protection measures, the anticipated percentage of members that will be implementing the additional practices discussed earlier, etc. Performance goals 4 and 5 are very reliant on the MPEP. The GQMP includes discussions of early implementation of practices that will occur prior to results being available through the MPEP. Either Performance goals 4 and 5 need to include additional information (with milestones and schedules) regarding these early implementation activities, or there should be a performance goal with milestones dedicated specifically to the early implementation activities. Also, the names of performance goals 5 and 6 are identical. One or both of the goals should be revised to distinguish the difference between the goals.

Finally, there needs to be an additional performance goal for the Coalition to implement an effective outreach plan for outliers identified through the nitrogen management plan summary report analysis. The outreach plan must include the schedule for providing the growers with the A/R or A/Y information when A/R is not available and the process for informing the growers of where they stand relative to other growers of the same crops in similar conditions. The performance goal needs to measure the progress of this practice to minimize nitrogen available to leach below the root zone.

Item 23. Water Quality Monitoring

Order requirement: The third-party's Management Practice Evaluation Program (MPEP) and Groundwater Quality Trend Monitoring shall be evaluated to determine whether additional monitoring is needed to evaluate the effectiveness of the GQMP. This may include commodity-based representative monitoring that is conducted to determine the effectiveness of management practices implemented under the GQMP. 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 Order.

Management practice-specific or commodity-specific field studies may be used to approximate the contribution of irrigated lands operations. Where the third-party determines

that field studies are appropriate or the Executive Officer requires a technical report under CWC 13267 for a field study, the third-party must identify a reasonable number and variety of field study sites that are representative of the particular management practice being evaluated.

Staff review: The GQMP does not include a monitoring program, and does not state that the MPEP and Trend Monitoring Program will be evaluated to determine if additional monitoring will be needed to evaluate the GQMP effectiveness. The GQMP needs to be revised to include these items.

Item 24. GQMP Data Evaluation

Order requirement: Describe the methods that will be used to evaluate and present the data generated by GQMP monitoring (graphical, statistics, modeling, index computation, or some combination thereof).

Staff review: This required element is missing from the GQMP and should be added.

Item 25. Management Practice Implementation and Effectiveness Evaluation

Order requirement: Describe how all information necessary to evaluate program effectiveness going forward will be collected, evaluated, and reported. This will include (a) how implemented management practices data will be collected from growers; (b) how it is reported by the growers; (c) how the information will be verified; and (d) the approach for determining the effectiveness of the management practices implemented. For (d), 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.

Staff review: This required element is partially complete. There is a section on page 96 called Tracking of Management Practices which meets (a) and (b) above. There is also a brief section called *Information Needed to Quantify Program Effectiveness* on page 150. This should be expanded to include (c) and (d). The discussion in the GQMP focuses on collection of information from the growers regarding implementation of management practices. To fulfill the Order requirement, there must be a linkage to the MPEP effort to verify effectiveness of the practices implemented or to develop new practices that need to be implemented to protect groundwater quality. This includes information regarding how the Coalition will work with members on implementation of MPEP practices.

Table 2. Groundwater Management Plan Requirements.

Review Memo Item Number	Requirement Description	Location in GQMP	Staff Review Notes
Conditions Requiring Preparation of a GQMP, <i>Order R5-2012-0116-r2</i> , section VIII.H			
1	<p>A GQMP shall be developed by the third-party where: (1) there is a confirmed exceedance² (considering applicable averaging periods) of a water quality objective or applicable water quality trigger limit (trigger limits are described in section VIII of the MRP) in a groundwater well and irrigated agriculture may cause or contribute to the exceedance; (2) in high vulnerability groundwater areas to be determined as part of the Groundwater Assessment Report process (see MRP section IV); (3) the Basin Plan requires development of a groundwater quality management plan for a constituent or constituents discharged by irrigated agriculture; or (4) the Executive Officer determines that irrigated agriculture may be causing or contributing to a trend of degradation of groundwater that may threaten applicable Basin Plan beneficial uses.</p> <p>In lieu of submitting separate groundwater quality management plans in the timeframe identified in section VIII.H.1, the third-party may submit a Comprehensive Groundwater Quality Management Plan within 60 days of the Executive Officers approval of the Groundwater Quality Assessment Report. With the exception of the timeframe identified in section VIII.H.1, all other provisions applicable to groundwater quality management plans in this Order and the associated MRP apply to the Comprehensive Groundwater Quality Management Plan. The Comprehensive Groundwater Quality Management Plan must be updated at the same time as the Management Plan Progress Report (see attached MRP, Appendix MRP-1, section I.F) to address any constituents and areas that would have otherwise required submittal of a Groundwater Quality Management Plan.</p>	Entire GQMP	Complete

² A “confirmed exceedance of a water quality objective in a groundwater well” means that the monitoring data are determined to be of the appropriate quality and quantity necessary to verify that an exceedance has occurred.

Review Memo Item Number	Requirement Description	Location in GQMP	Staff Review Notes
Requirements contained in <i>Order R5-2012-0116-r2, Appendix MRP-1</i>			
CONSTITUENTS OF CONCERN			
2	A discussion of the constituent(s) of concern (COCs) that are the subject of the plan and the water quality objective(s) or trigger(s) requiring preparation of the management plan.	p.78	List of pesticide COCs should be revised to include legacy pesticides.
3	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 study may be designed and implemented to determine the source(s) or to eliminate irrigated lands as a potential source. Requirements for source identification studies are given in section I.G below. In the alternative, instead of conducting a source identification study, the third-party may develop a management plan for the COC(s) that meets the management plan requirements as specified in this appendix.	p.92	Complete
BACKGROUND INFORMATION – BOUNDARIES, LAND USE, WATER QUALITY, GEOLOGY, PERSONNEL			
4	Identification (both narrative and in map form) of the boundaries (geographic and groundwater basins) to be covered by the management plan, including how the boundaries were delineated. Land use maps which identify the crops being grown in the GQMP area. These maps may already be presented in the Groundwater Assessment Report (GAR) and may be referenced and/or updated as appropriate. Map(s) must be in electronic format using standard ArcGIS shapefiles.	p.18	This section should also integrate a discussion and map of HVAs and HVA prioritization scheme.
5	A list of the designated beneficial uses as identified in the applicable Basin Plan.	p. 67	CDL data, updated annually, should be used vs. DWR data, which is often 15 years old.
6	A summary, discussion, and compilation of available groundwater quality data for the parameters addressed by the management plan. The GAR may serve as a reference for these data.	p. 91	Complete
7		p.79	Complete

Review Memo Item Number	Requirement Description	Location in GQMP	Staff Review Notes
8	Soil types and other relevant soils data as described by the appropriate Natural Resources Conservation Service (NRCS) soil survey or other applicable studies. The soil unit descriptions and a map of their areal extent within the study area must be included. The GAR developed for the third-party's geographic area, and the soils mapping contained in that document, may satisfy this requirement.	p. 34 + GAR	Complete
9	Regional and area specific geology, including stratigraphy and existing published geologic cross-sections.	p. 30	Complete
10	A discussion of the general water chemistry as known from existing publications for the groundwater sub-basins contained within the GQMP area (range of EC, concentrations of major anions and cations, nutrients, TDS, pH, dissolved oxygen and hardness). The discussion should reference and provide figures of existing Piper (tri-linear) diagrams, Stiff diagrams and/or Durov Diagrams (see definitions in Attachment E of the Order).	p. 60	Complete
11	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).	p. 48	Complete. Tile drain question
12	Identification of which water-bearing zones within the GQMP area are being utilized for domestic, irrigation, and municipal water production.		Complete
13	Aquifer characteristics such as depth to groundwater, groundwater flow direction, hydraulic gradient, and hydraulic conductivity, as known or estimated based on existing information (see definitions in Attachment E of the Order).		Complete
14	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 anions and cations, nutrients, TDS, pH, dissolved oxygen and hardness).		Not included. Only required if identification is possible. GQMP should address this item either way.
15	Identification of key individuals involved in major aspects of the project (e.g., project lead, data manager, sample collection lead,	p. 97	Partially complete. Data manager, sample collection lead, and QA manager are not

Review Memo Item Number	Requirement Description	Location in GQMP	Staff Review Notes
16	<p>lead for stakeholder involvement, quality assurance manager). This will include an organizational chart with identified lines of authority and a discussion of each individual's responsibilities. Identification of the entities or agencies that will be contacted to obtain data and assistance.</p>	p. 100	<p>identified. Complete</p>
MANAGEMENT PLAN ACTIONS – MANAGEMENT PRACTICES			
17	<p>A baseline inventory of existing management practices in use within the management plan area that could be affecting the concentrations of the COCs and locations of the various practices. A description of the approach to be utilized (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). Any prioritization included in the management plan must be consistent with the requirements in section XII of the Order, Time Schedule for Compliance.</p>	p. 71	Complete
18	<p>Identify 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 the receiving water limitations of the 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.</p>	p. 92	<p>Partially complete. There is no approach description or timeline for the three Priority Areas.</p>
19	<p>Identify 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</p>	p. 93	Partially included
20	<p>Identify 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</p>	p.97, 101, 103	<p>A description of how the effectiveness of the outreach efforts will be evaluated is not included.</p>

Review Memo Item Number	Requirement Description	Location in GQMP	Staff Review Notes
21	<p>how the effectiveness of the outreach efforts will be evaluated. Include a specific schedule and milestones for the implementation of management practices and tasks outlined in the management plan, which will reduce loading of COCs. The schedule must include the following items: time estimated to identify new management practices needed and 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). The overall time schedule for compliance must be consistent with the requirements in section XII of the Order, <i>Time Schedule for Compliance</i>.</p>	p. 106	<p>Partially complete. Not specific enough. Proposed schedule not consistent with <i>XII. Time Schedule for Compliance</i> in the Order.</p>
22	<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. 102, 106	<p>Partially complete. Does not include specific targets. There are 4 milestones on p. 106, but these are not specific enough. Performance Goals 5 and 6 are identical.</p>
MONITORING			
23	<p>The third-party's Management Practice Evaluation Program and Groundwater Quality Trend Monitoring shall be evaluated to determine whether additional monitoring is needed to evaluate the effectiveness of the GQMP. 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>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 Order. Management practice-specific or commodity-specific field studies may be used to approximate the contribution of irrigated lands operations. Where the third-party determines that field studies are appropriate or the Executive Officer requires a technical report under CWC 13267 for a field study, the third-party must identify a</p>		<p>GQMP does not state that his evaluation will occur.</p> <p>GQMP does not propose separate GQMP monitoring plan. Therefore, need to make sure the MPEP and Trend Monitoring is designed to meet goals and objectives of the GQMP. The GWMP should state that these plans will include all monitoring needed to track effectiveness of GQMP, for all COCs. For example, will GQMP pesticides be monitored for in the Trend Program?</p> <p>Alternatively, a separate GQMP monitoring program can be added to the GQMP.</p>

Review Memo Item Number	Requirement Description	Location in GQMP	Staff Review Notes
	reasonable number and variety of field study sites that are representative of the particular management practice being evaluated.		
24	Methods to be used to evaluate the data generated by GQMP monitoring. Methods to present data and perform data analysis (graphical, statistics, modeling, index computation, or some combination thereof).	Not included	Needs to be added.
25	Information necessary to evaluate 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. 96, 150	Partially complete. Page 150 (section called <i>Information Needed to Quantify Program Effectiveness</i>) should be expanded to describe how the data collected will be used to assess program effectiveness.