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August 6, 2012

Adam Laputz
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Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
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**Re: Comments on the Eastern San Joaquin River Watershed Tentative WDRs and MRP for Discharges from Irrigated Lands, July 2012.**

Dear Mr. Laputz,

The University of California Cooperative Extension Groundwater Hydrology program (http://groundwater.ucdavis.edu) provides technical support and outreach on groundwater issues specifically related to agricultural and rural regions in California. We recently published the UC Davis report for the SWRCB SBX2 1 Report to the Legislature on "Addressing Nitrate in California's Drinking Water" (http://groundwaternitrate.ucdavis.edu) and are actively engaged in research and extension activities to support a better understanding of the interface between agriculture and groundwater (http://groundwater.ucdavis.edu/Publications/ ). I am also a member of the Central Valley Regional Water Board ("CVRWB") Groundwater Monitoring Advisory Workgroup ("GMAW").

The comments provided here on the Eastern San Joaquin River Watershed Tentative WDRs and MRP for Discharges from Irrigated Lands (ESJR ILRP) are primarily intended to clarify the framework applied by the ESJR ILRP to regulate waste discharges to **groundwater** from **non-point sources**. A non-point source of waste discharge to groundwater is defined here as a source comprised of one to (typically) many individual land parcels (e.g., field, orchard, animal corral, and/or animal waste storage lagoon) that are mostly (but not exclusively) contiguous in space, with some level of waste discharge occurring from a large portion of the area within each land parcel.

The 2007 Waste Discharge Requirements General Order for Existing Milk Cow Dairies (Order No. R5-2007-0035, "Dairy General Order") was the first regulatory program by the Central Valley Regional Water Board ("CVRWB") designed to regulate waste discharge to groundwater from non-point sources. The proposed ESJR ILRP complements the Dairy General Order

program to regulate waste discharges to groundwater from all irrigated lands in the Central Valley (that are not already regulated under the Dairy General Order).

**Non-point source waste discharge to groundwater** is a significantly different process than **non-point source waste discharge to surface water**. It is also different from **point source waste discharge to groundwater**. Therefore, fundamental differences exist in the implementation of a regulatory program designed to protect groundwater quality from non-point source impacts when compared to regulatory programs designed to protect surface water quality from non-point sources or designed to protect groundwater quality from point- sources.

The most important differences between an irrigated lands non-point source of groundwater waste discharge (specifically: nitrate and salt discharge) and a point-source of groundwater waste discharge (e.g., leaky underground storage tanks, industrial waste spillage, landfills) are:

- Irrigated lands non-point sources are nearly contiguous across the landscape and cover millions of acres in the Central Valley (tens to hundreds to thousands of acres per grower/land-owner), while point-sources are generally less than one to a few acres in size.
- Irrigated lands non-point sources intentionally "leak". In other words, irrigated lands intentionally provide some groundwater recharge as part of reasonable and necessary agricultural practices, while point-sources are managed to be sealed against accidental waste discharge (e.g., underground storage tanks, industrial spillage prevention, landfills).
- The concentration range of salts and nitrates in groundwater is typically less than two orders of magnitude, while industrial contaminants accidentally leaked from point sources may occur at concentrations that are many orders of magnitude above regulatory limits.

The most important differences between an irrigated lands non-point source of groundwater waste discharge and the same non-point source of surface water waste discharge is:

- Contaminant travel times in groundwater are on the order of years/decades to millennia before discharging to production wells or into streams, while the contaminant travel time in surface watersheds is typically on the order of hours to days.
- Groundwater aquifers have no single, defined outlet, while each surface watershed has a defined single stream outlet.

These differences have many consequences for the design of an effective ILRP monitoring program to protect groundwater quality, when compared to the ILRP surface water monitoring program, or when compared to the type of groundwater monitoring programs in place to regulate point sources.

Most significantly, it is impossible to directly measure, in detail, the impact to groundwater quality from across irrigated lands non-point sources. For example, the nitrate loading to groundwater varies within individual fields, between fields of the same crop, between crops, between growers, and between different hydrogeologic and soils regions.

The proposed ILRP, like the Dairy General Order, considers these differences and therefore proposes a very different approach to groundwater monitoring from that used by CVRWB (and other regulatory agencies) at point sources. The ILRP has, in principle, all the elements necessary for a successful implementation and provides significant and necessary flexibility to

the Third-Party Groups and their Members (as defined in the ILRP) and to the CVRWB for its implementation.

However, the ILRP would benefit from a clearer outline and rationale of the regulatory approach taken to monitor waste discharge to groundwater from the non-point sources regulated under the ILRP. Specifically, I propose that the "Groundwater Monitoring Strategy" explicitly identify three parallel tracks rather than two parallel tracks, that the organization of the ESJR-ILRP reflect the organization of the three parallel tracks of groundwater monitoring, and that they be listed and described in the following order:

1) Nitrogen Budget / Farm Management Practices Monitoring Program
2) Representative Groundwater Monitoring Program
3) Regional and Temporal Trend Groundwater Monitoring Program

The following provide specific recommendations that also explain the rationale for the proposed changes.

**Attachment A to Order R5-2012-XXXX – Information Sheet, p.11 "*Groundwater Monitoring Strategy Rationale*":**

Replace the second ("The Groundwater Monitoring Strategy…") and third paragraph ("A Representative Groundwater Monitoring Program….") with the following:

"The Groundwater Monitoring Strategy consists of three parallel and complementary tracks:

1) Nitrogen Budget / Farm Management Practices Monitoring Program
2) Representative Groundwater Monitoring Program
3) Regional and Temporal Trend Groundwater Monitoring Program

The Nitrogen Budget / Farm Management Practices Monitoring Program (NB/FMP-MP) consists of a Farm Evaluation and an Annual Nitrogen Budget (see below). The NB/FMP-MP is intended to provide a Member ("Member" as defined in the ESJR-ILRP) and the CVRWB with a "proxy" groundwater monitoring tool that is linked directly and immediately to the actual Member actions that may cause a waste discharge to groundwater. The Member has direct control of the outcome of the NB/FMP-MP by adjusting the Member's management practices in irrigated lands. The NB/FMP-MP also provides a "proxy" groundwater monitoring measurement that serves as an ongoing feedback in real time (at annual time scales) to the Third Party Group and CVRWB; and that demonstrates the performance of an individual Member with respect to the potential waste discharge. The NB/FMP-MP (in lieu of direct groundwater monitoring) also provides the primary regulatory vehicle to justify enforcement actions against individual Members.

The purpose of the Representative Groundwater Monitoring Program ("RGMP") is to provide the field research and research data necessary to assess and evaluate the groundwater quality impact as a function of the "proxy" groundwater monitoring data collected under the NB/FMP-MP. A Representative Groundwater Monitoring Program (RGMP) is to be developed where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities (high vulnerability areas). The RGMP develops the tools necessary to identify how data collected by the Members under the NB/FMP-MP "proxy" groundwater monitoring data relate to actual groundwater quality impacts (e.g., nitrate impact in

shallow groundwater), whether site and/or commodity-specific existing agricultural management practices are protective of groundwater quality in the high vulnerability areas, and to assess the effectiveness of any newly implemented management practices instituted to improve groundwater quality. By establishing the link between management practices and actual groundwater discharge, the RGMP also provides guidance to Members on how to improve management practices and how these improvements affect waste discharge to groundwater (particularly nitrate and salt leaching). It provides the CVRWB with the assessment needed to build confidence that the NB/FMP-MP as the primary regulatory enforcement tool is appropriate to protect groundwater quality. The RGMP is implemented at selected, relevant research sites with appropriate monitoring instrumentation and monitoring networks including groundwater monitoring wells. The RGMP is designed to appropriately reflect the diversity in agricultural crops and their management practices and the diversity in hydrologic and hydrogeologic conditions to allow for an effective implementation of the NB/FMP-MP. Given the wide range of management practices/commodities within the third-party's boundaries, it is anticipated that the third-party will rank or prioritize their high vulnerability areas and commodities, and present a phased approach to implement the RGMP. Representative monitoring has been designed to answer GMAW questions 2, 5, 6, and 7. Existing monitoring wells can be utilized where available for representative monitoring

The purpose of the third monitoring program track, the Regional and Temporal Trend Groundwater Monitoring Program ("RTTGMP"), is to provide an adequate record of actual regional groundwater quality distribution (spatial, regional trends) and of actual long-term groundwater quality changes (temporal trends) in irrigated lands regions. The RTTGMP provides the actual measurement of groundwater quality resulting from activities in irrigated lands and is intended to be specific to irrigated lands (and relevant subgroups within irrigated lands, e.g., individual commodity groups), but is not designed to provide information on groundwater quality impacts from individual Members. The groundwater quality measured as part of the RTTGMP does not reflect current waste discharges but is designed to reflect relatively recent (less than 5 – 10 years) waste discharge activities in irrigated lands (and its subgroups). Trend monitoring has been developed to answer GMAW questions 1 and 4. At a minimum, trend monitoring must include annual monitoring for electrical conductivity, pH, dissolved oxygen, temperature, nitrate as nitrogen (N), total kjeldahl nitrogen, and once every five year monitoring for total dissolved solids, carbonate, bicarbonate, chloride, sulfate, boron, calcium, sodium, magnesium, and potassium. Existing shallow wells, such as domestic supply wells, will be used for the trend groundwater monitoring program. The use of existing wells is less costly than installing wells specifically designed for groundwater monitoring, while still yielding data which can be compared with historical and future data to evaluate long-term groundwater trends. The RTTGMP is intended to assure the public that no long-term degradation of regional water quality occurs and that the ILRP leads to actual long-term groundwater quality improvements where necessary. In the long-term, the RTTGMP will allow for a rigorous evaluation of the success of the NB/FMP-MP program that is designed and adjusted in tandem with the RGMP program."

**Attachment A to Order R5-2012-XXXX – Information Sheet, p.14 "*Groundwater Quality Management Plans (GQMPs)*":**

Move this entire section "Groundwater Quality Management Plans" up immediately in front of (before) the section on "Groundwater Quality Monitoring". Then the GQMP rationale section immediately follows the SQMP rationale section. The Groundwater Quality Monitoring section is then immediately followed by the Farm Evaluation and Nitrogen Budget sections.

**Attachment A to Order R5-2012-XXXX – Information Sheet, p.15 "*Sediment and Erosion Control Plans*":**

Move this entire section down and insert just before the section "Technical Reports" (p.18). Thus, the three sections on "Farm Evaluation", "Nitrogen Budget", and "Spatial Resolution…." remain together.

**Order R5-2012-XXXX (Tentative WDR), Section VII and VIII:**

Switch out the order of sub-sections C and D, such that the section "Annual Nitrogen Budget" follows "VII.B. Farm Evaluation" and the section "Annual Nitrogen Budget Worksheet Template" follows VIII.B. "Farm Evaluation Template".

**Attachment B to Order R5-2012-XXXX – MRP:**

Sections IV.C. and IV.D. should be restructured to better identify and present the overall strategy of the groundwater quality monitoring program, including the "proxy" groundwater monitoring explained above, i.e., the Farm Evaluation and the Nitrogen Budget (Nitrogen Budget and Farm Management Practices Monitoring Program) need to be included here, if only by reference to the main order section VII and VIII (sections on Farm Evaluation, Annual Nitrogen Budget). The sequence of subsections should be:

IV.C.1. Nitrogen Budget and Farm Management Practices Monitoring Program
IV.C.2. Representative Groundwater Monitoring Program
IV.C.3. Regional and Temporal Trend Groundwater Monitoring Program

IV.D.1. Nitrogen Budget and Farm Management Practices Monitoring Program Workplan
IV.D.2. Representative Groundwater Monitoring Program Workplan
IV.D.3. Regional and Temporal Trend Groundwater Monitoring Program Workplan

**Attachment B to Order R5-2012-XXXX – MRP, Section IV.C., page 14:**

Replace the first paragraph of Section IV.C. "The strategy…." with the following paragraphs:

"The strategy for groundwater monitoring consists of three parallel tracks; 1) a Nitrogen Budget and Farm Management Practices (Farm Evaluation) Monitoring Program, which is a "proxy" groundwater monitoring program; 2) a Representative Groundwater Monitoring Program, and 3) a Regional and Temporal Trend Groundwater Monitoring Program. Each of these three groundwater monitoring programs has its own specific objectives, and the design of the associated monitoring networks will differ in accordance with the specific objectives to be reached. While it is anticipated that these three groundwater monitoring programs will provide sufficient data to evaluate whether management practices of irrigated agriculture are protective of groundwater quality, the Executive Officer may also, pursuant to Water Code section 13267, order Members to perform groundwater monitoring. Such an order may occur, for instance, if violations of the Order are documented or the irrigated agricultural operation is found to be a significant threat to groundwater quality.

1. Nitrogen Budget and Farm Management Practices (Farm Evaluation) Monitoring Program

a. Objectives – The objectives of the Nitrogen Budget and Farm Management Practices (Farm Evaluation) Monitoring Program are (1) to provide each Member with a monitoring tool that is linked directly to field management practices, while also providing indirect or "proxy" information on potential impacts to groundwater quality, (2) to document the farm management practices that are relevant to potential groundwater quality impacts, (3) to develop a nitrogen budget to evaluate the potential for nitrate leaching to groundwater.

b. Implementation – see General Order Sections VII.B., VII.C.

c. Reporting – see General Order Sections VIII. B., and VIII.C."

**Attachment B to Order R5-2012-XXXX – MRP, Section IV.C.1, page 14:**

Move the entire Section 1 ("Trend Groundwater Monitoring Program") to below Section 2 ("Representative Groundwater Monitoring Program")

Then replace the heading "1. Trend Groundwater Monitoring Program" with "3. Regional and Temporal Trend Groundwater Monitoring Program"

**Attachment B to Order R5-2012-XXXX – MRP, Section IV.C.2, page 15:**

Replace:

"The RGMP requires monitoring of wells completed into first encountered groundwater."

with the following sentence:

"The RGMP requires monitoring of wells completed into first encountered groundwater representative of recharge water quality from the targeted land use source."

**Attachment B to Order R5-2012-XXXX – MRP, Section IV.D., page 16:**

Replace the first paragraph of Section IV.D. "The third-party…." with the following paragraph:

"The third-party shall work with Central Valley Water Board staff in the development of Nitrogen Budget and Farm Management Practices (Farm Evaluation) Monitoring Program workplan. The third-party shall develop and submit workplans for conducting Representative Groundwater Monitoring Program and the Regional and Temporal Trend Groundwater Monitoring Program to the Executive Officer for approval. These workplans shall be submitted within two (2) years of third-party receipt of a NOA from the board. Required workplan elements are presented in the sections below.

1. Nitrogen Budget and Farm Management Practices (Farm Evaluation) Monitoring Workplan

The third-party shall work with Central Valley Water Board staff in the development of a draft Farm Evaluation Template and Nitrogen Budget Worksheet Template. The third-party shall make the final Farm Evaluation Template and Nitrogen Budget Worksheeet Template available to its Members within 30-days of receiving the final Farm Evaluation Template and Nitrogen Budget Worksheet Template as approved by the Central Valley Water Board's Executive Officer."

**Attachment B to Order R5-2012-XXXX – MRP, Section IV.D.1, page 16:**

Move the entire Section 1 ("Trend Groundwater Monitoring Program Workplan") to below Section 2 ("Representative Groundwater Monitoring Program")

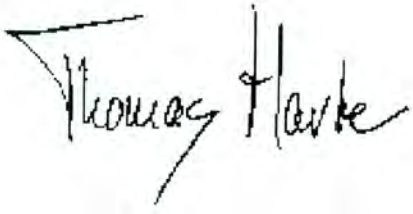
Then replace the heading "1. Trend Groundwater Monitoring Program Workplan" with "3. Regional and Temporal Trend Groundwater Monitoring Program Workplan"

**Attachment B to Order R5-2012-XXXX – MRP, Section IV.D.2, page 17:**

No changes proposed.

I appreciate the opportunity to comment on this ILRP.

Regards,



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