



The Otter Project

[www.otterproject.org](http://www.otterproject.org)

Public Workshop  
Eastern San Joaquin General Order  
Deadline: 6/1/16 by 12:00 noon

P.O. Box 269  
Monterey, CA 93942  
831/663-9460

June 1, 2016

Chair Felicia Marcus and Board Members  
c/o Jeanine Townsend, Clerk to the Board  
State Water Resources Control Board  
1001 I Street, 24th Floor  
Sacramento, CA 95814



Sent via electronic mail to: [commentletters@waterboards.ca.gov](mailto:commentletters@waterboards.ca.gov)

**RE: Comments to A-2239(a)-(c).**

Dear Chair Marcus and Board Members:

Thank you for the opportunity to comment on the Agricultural Discharge WDRs for the East San Joaquin (ESJ), A-2239(a)-(c). We are keenly aware that the ESJ WDRs are meant to serve as a partial template for future agricultural orders including the Central Coast Waiver for Agricultural Discharges. The following comments are made on behalf of The Otter Project, Monterey Coastkeeper (the water quality program of The Otter Project), our 2000 members, and our board of directors.

We sincerely appreciate the time and dedication the SWRCB board and staff have spent on the critically important issue of agricultural discharges. Yet the fact remains that the incremental steps taken by the Board have not kept pace with nutrient loads or the ever-changing slew of toxic pesticides discharged into streams and groundwater. Nutrients and pesticides found in streams and groundwater serve no functional use to agriculture, they are simply wasted chemicals that have left the farm. Regulation of agricultural discharges should act as a backstop to dissuade wasteful practices.

The Otter Project / Monterey Coastkeeper partners with a number of organizations and is a member of the California Coastkeeper Alliance. Instead of repeating information contained in other letters, we incorporate by reference the following comment letters into these comments:

1. The comment letter submitted June 1, 2016 and co-signed by numerous environmental and environmental justice organizations, including The Otter Project;
2. The 20+ page comment letter submitted June 1, 2016 by the California Coastkeeper Alliance.

In addition, the Draft ESJ Order is partially shaped by, and repeatedly references the August 10, 2015 ruling by Judge Frawley in *Monterey Coastkeeper et al. v. State Water Resources Control Bd.* (Super Ct. Sacramento County, 2015, No. 34-2012-80001324). The complete ruling is attached to this letter as *Attachment 1*.

The simple purpose of this letter is to offer additional information on Toxicity Testing of Surface Waters and Sediments, and Remote Monitoring.

## Toxicity Testing of Surface Waters and Sediments

The Draft ESJ Order currently suggests aquatic toxicity testing using a standard 3-species test using a water flea (*Ceriodaphnia dubia*), flathead minnow (*Pimephales promelas*), and algae (*Selenastrum capricornutum*). This test is generally effective for testing for organophosphate pesticides such as Diazinon and chlorpyrifos, and for most herbicides. While the flathead minnow is sensitive to pyrethroid pesticides, pyrethroids adhere to sediment particles and are found only in lower amounts in the water itself.

To test for sediment toxicity, the Draft correctly suggests using an amphipod (*Hyalella azteca*). The amphipod is sensitive to pyrethroid pesticides. In addition, the amphipod *H. azteca* is native to California waters, is often abundant in healthy streams, and is part of the base of many aquatic ecosystems. *H. azteca* is also preferred prey of steelhead trout, a listed species in many California streams. In short, if waters kill *H. azteca* there are important implications for the entire aquatic system.

What the Draft fails to recognize is the changing and evolving mix of pesticides used on farms as illustrated by Table 1.

	2006	2008	2010	2012	2014
Chlorpyrifos	222,598	156,997	136,855	98,700	134,887
Diazinon	15,367	6,860	4,890	5,569	3,751
Imidacloprid	4,605	12,680	18,917	25,362	36,356

*Table 1. Agricultural use (lbs.) of select pesticides in Madera, Merced, and Stanislaus counties by year. Source: California Department of Pesticide Regulation, Pesticide Use Annual Summaries, available at <http://www.cdpr.ca.gov/docs/pur/purmain.htm>.*

As shown, chlorpyrifos was generally declining until 2014 (more recent statistics have not been reported yet); Diazinon has been in steady decline, and imidacloprid (a neonicotinoid) use has been steadily increasing.

The danger and environmental risks of these changes is perfectly illustrated by the changes in pesticide use in the ESJ. Neonicotinoids are believed to contribute to honey bee colony collapse disorder. See Renee Johnson, “Honey Bee Colony Collapse Disorder,” Congressional Research Service Review (July 7, 2010), available at <http://www.fas.org/sgp/crs/misc/RL33938.pdf>. Indeed, a recent study published by the National Institutes of Health explains that neonicotinoids are becoming ever more popular “largely due to their high toxicity to invertebrates, the ease and flexibility with which they can be applied, their long persistence, and their systemic nature, which ensures that they spread to all parts of the target crop.” J.M. Bonmatin, et al., “Environmental fate and exposure; neonicotinoids and fipronil,” Environ. Sci. Pollut. Res. Int. 2015; 22: 35–67 (Aug. 7, 2014), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4284396/>. “However,” the study explains, “these properties also increase the probability of environmental contamination and exposure of nontarget organisms . . . Persistence in soils, waterways, and nontarget plants is variable but can be prolonged; for example, the half-lives of neonicotinoids in soils can exceed 1,000 days, so they can accumulate when used repeatedly . . . Breakdown results in toxic metabolites, though concentrations of these in the environment are rarely measured.” Id.; see also National Pesticide Information Center, “Imidacloprid (Neonicotinoid) Technical Fact Sheet, available at <http://npic.orst.edu/factsheets/imidacloprid.pdf>.

Growers in the ESJ have switched to a pesticide that is not being tested for and is more toxic, breaks down to toxic metabolites, and is more persistent.

The result is that toxicity in aquatic ecosystems is undetected and underestimated. Studies have been conducted on the Central Coast illustrating this point.

Sample	Ceriodaphnia Survival Percentage	Hyalella Survival Percentage
untreated	80	86
untreated	100	54
untreated	96	98
untreated	96	0
untreated	0	0
untreated	96	50
<b>Samples meeting toxicity standards</b>	<b>5 of 6</b>	<b>2 of 6</b>

Table 2 - Extracted from Phillips, B.M et al, 2015, *The Effects of the Landguard A900 Enzyme on the Macroinvertebrate Community in the Salinas River, California, United States of America*. Arch Environ Contam and Toxicol, Vol. 69, Number 1. The purpose of the study was to measure the efficacy of Landguard treatment; "untreated" refers to samples taken before treatment (treated samples are omitted in this table). This study illustrates the utility of using *H. azteca* in toxicity studies.

A more extensive follow-up study was conducted adding a midge (*Chironomus* sp.), sensitive to neonicotinoids.

FALL 2014: DPR/SWAMP/CMP Region 3			
Salinas and Santa Maria Valley Sites	<i>Hyalella</i> 10d water	<i>Chironomus</i> 10d water	EPA 3 species chronic
Water Sample	SWAMP		CMP
Alisal Slough @ Hartnell Rd	T	T	-
Chualar Creek @ Chualar River Road*	T	NT	NT
Main St. Ditch @ Main St.	NT	NT	NT
Orcutt Creek @ West Main	T	T	NT
Oso Flaco Creek @ OF Lake Rd	T	T	NT
Quail Creek @ SR-101	T	T	NT
Rec Ditch III (Near Airport Blvd)	T	T	NT
Solomon Creek @ SR-1	NT	T	NT
Tembladero Slough @ Haro	T	NT	NT
Percent Toxic	78%	67%	0%
Combined Percent Toxic	89%		

Table 3 - The fourth column (EPA /CMP) lists the results of the Central Coast grower's toxicity test. NT stands for "not toxic." Columns two and three represent results when other EPA approved tests are used. T stands for "toxic." The grower's testing found no toxicity at any of the listed sites. Independent testing, using both *Hyalella* (a native amphipod) and *Chironomus* (a midge) found 89% of the same sites to be toxic.

**Suggested Changes:**

- We suggest that the monitoring and reporting requirements include toxicity testing using a panel of test organisms including the 3-species test (already in the draft); *Hyalella* (already in the Draft), sensitive to pyrethroid pesticides; and adding *Chironomus*, sensitive to neonicotinoid pesticides.
- We suggest that a narrative requirement be added for an annual evaluation of pesticides in use, in consultation with UC Davis Marine Pollution Studies Laboratory at Granite Canyon, to determine if the panel of test organisms should be modified.

**Remote Monitoring**

The Draft ESJ Order, at points, relies on the recommendations of the Agricultural Expert Panel for monitoring guidance. That Panel, comprised of retired academics and agricultural consultants, was reluctant to embrace new and emerging technologies for the remote monitoring of surface and ground water quality.

In response to the Expert Panel, The Otter Project / Monterey Coastkeeper retained an expert consultant, Dr. Mark Kram, to offer a more enlightened and optimistic view.

We believe that water quality monitoring could be accomplished more efficiently and cost effectively if done in real-time, continuously, and remotely. A network of water quality sensors, measuring and continuous reporting a variety of physical and chemical parameters, could offer valuable insights into site specific water quality, the flow or plume of contaminants through a system, and could ultimately point to sources of contamination.

A sensing network could serve and bring together CASGM, SGMA, and Ag Order monitoring and reporting.

While the ESJ may not be the optimal opportunity to pilot a remote sensing program, we mention it here because it is our view of the future of monitoring. Further, we believe a pilot program on the Central Coast, may be advisable.

A copy of Dr. Kram's report is attached as attachment 2.

### **In Conclusion**

In conclusion, we believe it is past time for the Board to take a more aggressive posture in the regulation of agricultural discharges. Ag Orders must have specific and meaningful standards, monitoring and reporting of a representative sample of individual discharges as well as receiving water monitoring, all data must be publicly reported, and time schedules must have deadlines for compliance.

Thank you for your consideration.

Sincerely,

A handwritten signature in blue ink, appearing to read 'S. Shimek', with a stylized flourish at the end.

Steve Shimek  
Executive Director  
exec@otterproject.org

Attachment

One

**SUPERIOR COURT OF CALIFORNIA**

**COUNTY OF SACRAMENTO**

**MONTEREY COASTKEEPER, et al.**

**v.**

**CALIFORNIA STATE WATER  
RESOURCES CONTROL BOARD**

**OCEAN MIST FARMS, et al.**

Case Number: 34-2012-80001324

**RULING ON SUBMITTED MATTER**

Date: May 15, 2015

Time: 10:00 a.m.

Dept.: 29

Judge: Timothy M. Frawley

**I.**

**Introduction**

On March 15, 2012, the Central Coast Regional Water Quality Control Board (Regional Board) adopted a Conditional Waiver of Waste Discharge Requirements (Order No. R3-2012-0011) and related Monitoring and Reporting Program (Order Nos. R3-2012-0011-01, R3-2012-0011-02, and R3-2012-0011-03) governing discharges from irrigated agricultural lands in the Central Coast region. The "Waiver" waives the requirement for dischargers to file a "Report of Waste Discharge" and obtain "Waste Discharge Requirements" (a permit) for surface and ground water discharges from irrigated lands, provided dischargers comply with certain specified conditions.

Respondent California State Water Resources Control Board (State Board) received five petitions for review of the waiver. One of the petitions was filed by Petitioners Monterey Coastkeeper and Santa Barbara Channelkeeper (among others). Petitioners are non-profit corporations seeking to protect and enhance the State's water resources. The other four petitions were filed by entities representing farmers or agricultural

interests, including the Respondent-Intervenors in this action. Together, the five petitions alleged over forty deficiencies in the Regional Board's proposed Waiver. The State Board accepted the petitions for review and elected to review the Regional Board's proposed Waiver.

On September 24, 2013, the State Board adopted an Order (Order WQ 2013-0101), resolving the petitions for review and making amendments to the Waiver. Regional Board staff subsequently incorporated the State Board's amendments into a final "Modified Waiver."

This action followed. Petitioners Monterey Coastkeeper, Antonia Manzo, Environmental Justice Coalition for Water, California Sportfishing Protection Alliance, Pacific Coast Federation of Fishermen's Association, and Santa Barbara Channelkeeper seek a peremptory writ of mandate finding that the Modified Waiver violates the California Water Code, the Regional Basin Plan, the State Antidegradation Policy, Government Code § 11513, and CEQA; and commanding the Board to set aside the Waiver and prepare a new waiver after supplemental environmental review under CEQA. The court shall grant the petition and issue a peremptory writ of mandate commanding Respondent State Board to reconsider the Waiver.

## II.

### Background Law

The Porter-Cologne Water Quality Control Act is the principal law governing water quality regulation in California. Enacted in 1969, the Porter-Cologne Act establishes as state policy that "the quality of all waters of the state will be protected for use and enjoyment by the people of the state." (Water Code § 13000.) The Act provides that "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (*Ibid.*)

The Legislature designated the State Board and nine regional water quality control boards (regional water boards) as the agencies with primary responsibility for the regulation of water quality under the Porter-Cologne Act. (Water Code § 13001.) The State Board formulates and adopts state-wide policy for water quality control, allocates funds, and oversees the activities of the regional water boards. (Water Code §§ 13140, 13320.) Each regional water board is responsible for, among other things, water quality protection, permitting, inspection, and enforcement actions within its region. (Water Code § 13225(a).)

## A. Central Coast Basin Plan

The Porter-Cologne Act requires each regional water board to adopt a "water quality control plan" (also called a "basin plan") for areas within its region. (Water Code § 13240.) In the basin plan, a regional water board is required to identify and designate the "beneficial uses" of each water body in the region. (Water Code §§ 13050(j), 13240.) Among the beneficial uses that can be designated for a water body are: municipal water supply, contact recreation, non-contact recreation, warm water habitat, cold water habitat, and agricultural supply.

Basin plans also are required to establish "water quality objectives" (aka, "water quality standards"). Water quality objectives are numeric or narrative standards that must be met in order to ensure water bodies will be suitable for their particular beneficial uses and will not constitute a nuisance. (Water Code § 13241.) Factors a regional water board must consider in establishing water quality objectives include, but are not limited to, the following:

- (a) Past, present, and probable future beneficial uses of water.
- (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
- (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
- (d) Economic considerations.
- (e) The need for developing housing within the region.
- (f) The need to develop and use recycled water. (Water Code § 13241.)

Basin plans also must contain an implementation plan that describes the actions necessary to achieve the relevant water quality objectives. (Water Code § 13242.) An implementation plan must include "a description of the nature of the actions which are necessary to achieve objectives," a time schedule for the actions to be action, and a description of monitoring activities that will be used to determine whether water quality objectives are being achieved. (*ibid.*)

Basin plans distinguish between "point sources" of pollution, which are discharges that come from specifically identifiable sources such as waste water treatment facilities, industrial drain pipes, and municipal storm drains, and "nonpoint sources," which are discharges from diffuse, land-use driven sources such as agricultural runoff, road



construction, and logging. Nonpoint sources of water pollution are not as easily regulated or controlled as point sources.

The relevant basin plan is the Central Coast Water Quality Control Plan (the "Basin Plan"), which was adopted by the Regional Board in 1975. The Basin Plan has been amended many times over the years and is subject to regular review every three years. Consistent with the Porter-Cologne Act, the primary objective of the Basin Plan is to show how the quality of the surface and ground waters in the Central Coast should be managed to provide the highest water quality reasonably possible. (RB 9165.)

As required by the Porter-Cologne Act, the Basin Plan establishes beneficial uses for water bodies in the Central Coast region, identifies water quality objectives to protect the established beneficial uses, and includes a program of implementation that describes the actions necessary to achieve the objectives. (RB 9173-209.) The implementation program includes a description of the nature of actions necessary to achieve the objectives, a time schedule for the actions to be taken, and a description of monitoring to be undertaken to determine compliance with the objectives.

#### B. The Nonpoint Source (NPS) and Antidegradation Policies

Basin plans must be consistent with state water quality policies. (Water Code § 13146.) Two water quality policies are relevant to this case: the State Board's Policy for Implementation and Enforcement of Nonpoint Source Pollution Control Program, also known as the "NPS Policy", and the Statement of Policy with Respect to Maintaining High Quality of Water, Resolution No. 68-16, which is commonly referred to as the "Antidegradation Policy."

The State Board adopted the NPS Policy in 2004. The NPS Policy guides regional water boards regarding nonpoint sources of pollution, consistent with the legislative direction in Water Code § 13369. The NPS Policy has the force and effect of a regulation.

The NPS Policy requires that nonpoint source pollution control programs contain five "key elements." In particular, a nonpoint source pollution control program must (1) explicitly address nonpoint source pollution in a manner that achieves and maintains water quality objectives; (2) include a description of management practices and program elements expected to be implemented; (3) include a time schedule and quantifiable milestones designed to measure progress towards achieving water quality objectives; (4) include sufficient feedback mechanisms to ensure that the program is achieving its stated purpose, and ascertain whether additional or different actions are required; and

(5) state the potential consequences for failure to achieve the program's objectives. (RB 9417-20.)

The NPS Policy recognizes that nonpoint source pollution control is a complicated endeavor that addresses longstanding problems and that achieving objectives will take a significant amount of time. (RB 9422.) The NPS Policy recognizes that implementing management practices may be an effective way to control nonpoint source pollution. (RB 9413.)

The State Board adopted the Antidegradation Policy in 1968. The Antidegradation Policy applies whenever (a) there is high quality water, and (b) an activity which produces or may produce waste or an increased volume or concentration of waste that will discharge into such high quality water. The Antidegradation Policy provides, in relevant part:

Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained. (RB 9377.)

High quality waters are determined based on specific properties or characteristics. Because the determination is made on a constituent by constituent basis, waters can be considered high quality for some constituents, but not for others. (*Asociacion de Gente Unida por el Agua v. Central Valley Regional Water Quality Control Bd.* ["AGUA"] (2012) 210 Cal.App.4th 1255, 1271.)

By its terms, the Antidegradation Policy seems to require a comparison of existing water quality to water quality objectives as of the date on which those water quality objectives were established. Such an interpretation prevents the Policy from being triggered when

existing water quality is equal to or less than the water quality objectives as of the date those objectives took effect, even if historically water quality exceeded applicable objectives.

However, courts and the State Board have interpreted the phrase “existing quality of water” to mean “baseline water quality,” which, in turn, is defined as the “best quality that has existed” since the Antidegradation Policy took effect in 1968, unless subsequent lowering was due to regulatory action consistent with state and federal antidegradation policies. (*Id.* at p.1270; see also Administrative Procedures Update 90-004, pp.4-5 [providing guidance in implementing the policy as part of the NPDES permitting process].)

Thus, when undertaking an antidegradation analysis, the regional water board must determine the baseline water quality, and compare that baseline water quality with current water quality objectives. If the baseline water quality is equal to or less than the objectives, the water is not “high quality” and the Antidegradation Policy is not triggered. The relevant water quality objectives govern the water quality that must be maintained or achieved. . (*AGUA, supra*, at p.1270.) But if the baseline water quality is better than the water quality objectives, the Policy is triggered and the baseline water quality must be “maintained” unless the water board makes the findings required to permit degradation.<sup>1</sup> (*AGUA, supra*, at p.1270.)

To permit a proposed discharge that will degrade “high quality” water, a regional water board must find that the discharge (1) will be consistent with maximum benefit to the people of the State; (2) will not unreasonably affect present and anticipated beneficial use of the water; and (3) will not result in water quality less than that prescribed in water quality plans and policies. In addition, the board must ensure the discharge is utilizing the “best practicable treatment or control (BPTC)” to ensure pollution or nuisance will not occur and that the highest quality consistent with the maximum benefit to the people of the State will be maintained. (RB 9377-78.)

Any actions that can adversely affect high quality surface waters are also subject to the federal antidegradation policy developed under the Clean Water Act. (40 C.F.R. § 131.12.) Where the federal antidegradation policy is applicable, the State Board has interpreted its Antidegradation Policy as incorporating the federal policy. (See State Water Board Order WQ 86-17, pp.16-19.)

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<sup>1</sup> Under this interpretation, use of the term “maintained” might be a misnomer because actual, current water quality will in some cases have degraded below applicable water quality objectives. In such instances, the water is considered “high quality” only in the sense that its quality was, at some point between 1968 and the present, better than current water quality objectives.

### C. Waste Discharge Requirements

Under the Porter-Cologne Act, anyone discharging or proposing to discharge waste that could affect water quality must file a report (aka, a "Report of Waste Discharge") and obtain either a permit (aka, "Waste Discharge Requirements") or a waiver (aka, a "Conditional Waiver of Waste Discharge Requirements").<sup>2</sup>

Waste Discharge Requirements can be issued to an individual discharger who has filed a Report of Waste Discharge and requested the permit. (Water Code § 13260). Alternatively, a regional water board may issue Waste Discharge Requirements for a group of dischargers if the board determines that (i) the discharges are produced by the same or similar operations, (ii) the discharges involve the same or similar types of waste, (iii) the discharges require the same or similar treatment standards, and (iv) the discharges are more appropriately regulated under general discharge requirements than under individual discharge requirements. (Water Code § 13263(i).)

Waste Discharge Requirements must be consistent with any applicable state and regional water quality control plans (basin plans) and policies. When issuing Waste Discharge Requirements, regional water boards are required to consider a number of factors, including the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Water Code section 13241.

Waste Discharge Requirements may contain any number of conditions, including effluent limitations, treatment standards, monitoring requirements, and a compliance schedule. (Water Code § 13263.) However, water boards generally may not specify the design, location, type of construction, or particular manner of compliance with the requirements. (Water Code §13360; *Tahoe-Sierra Pres. Council v. State Water Res. Control Bd.* (1989) 210 Cal.App.3d 1421, 1438 ["Section 13360 is a shield against unwarranted interference with the ingenuity of the party subject to a waste discharge requirement . . . . It preserves the freedom of persons who are subject to a discharge standard to elect between available strategies to comply with that standard."])

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<sup>2</sup> The federal Clean Water Act also requires a permit to discharge pollutants from point sources to surface waters. These permits are known as National Pollutant Discharge Elimination System (NPDES) permits. Congress has delegated to states with approved water quality programs, like California, the authority to issue NPDES permits. (Water Code § 13374.) Hence, Waste Discharge Requirements issued by regional water boards ordinarily also serve as federal NPDES permits. (Water Code § 13374; *Waterkeepers Northern California v. State Water Resources Control Bd.* (2002) 102 Cal.App.4th 1448, 1452.) Nonpoint source discharges to surface waters, and discharges to groundwater, are exempt from the permitting provisions of the Clean Water Act.

#### D. Conditional Waivers of Waste Discharge Requirements

The Porter-Cologne Act authorizes a water board to waive Waste Discharge Requirements for a specific discharge or specific type of discharge if the board determines that a waiver is consistent with any applicable state or regional water quality control plan (basin plan) and is in the public interest. (Water Code § 13269.) Waivers must have conditions and persons subject to the waiver must comply with such conditions. (*Ibid.*) Thus, in practical terms, Conditional Waivers operate in the same manner as Waste Discharge Requirements: the discharger is permitted to discharge waste provided the discharger meets the conditions specified in the Waiver.

Such conditions generally "shall" include, but are not limited to, individual, group, or watershed-based monitoring requirements, unless the board determines that the discharges at issue do not pose a significant threat to water quality. When imposed, monitoring requirements must be designed to support the development and implementation of the Waiver program, including verifying the adequacy and effectiveness of the Waiver's conditions. In establishing monitoring requirements, the water board may consider the volume, duration, frequency, and constituents of the discharge; the extent and type of existing monitoring activities; the size of the project area; and other relevant factors. Monitoring results must be made available to the public. (*Ibid.*)

Conditional Waivers are limited to five-year terms, but subject to renewal. As with Waste Discharge Requirements, a water board may issue an individual or a group Waiver.

### III.

#### Background Facts and Procedure

The Central Coast region has approximately 435,000 acres of irrigated land and approximately 3000 agricultural operations generating discharges of waste.<sup>3</sup> It also has more than 17,000 miles of surface waters and approximately 4000 square miles of groundwater basins that may be affected by discharges of waste from irrigated lands.

Because agricultural discharges are non-point source discharges, historically they have been subject to minimal regulation. Regulatory authorities instead focused on addressing point source discharges such as wastewater treatment plants and industrial dischargers. However, agricultural discharges have not been exempt from regulation.

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<sup>3</sup> In 2004, the region had approximately 600,000 acres of irrigated crop land, but only about 2,500 agricultural operations. (See RB 60.)

The Regional Board first approved a “blanket” waiver of waste discharge requirements for irrigation return flows and stormwater runoff in 1983. The 1983 waiver was not especially demanding: the waiver did not require any monitoring or reporting of wastewater discharges.

At the time the 1983 waiver was adopted, the Water Code allowed water boards to approve a waiver provided it was “not against the public interest.” (Former Water Code § 13269.) The Legislature subsequently amended the Water Code to require that waivers be consistent with applicable water quality control plans (basin plans), include monitoring provisions, and expire after a five-year term. The legislation also provided that waivers in effect on January 1, 2000, if not specifically renewed, would sunset on January 1, 2003.

In response to the change in the law, on July 9, 2004, the Regional Board adopted Order No. R3-2004-0117, a conditional waiver of waste discharge requirements for discharges from irrigated lands in the Central Coast region (the “2004 Waiver”).<sup>4</sup> In adopting the 2004 Waiver, the Regional Board found that water quality in the Central Coast region “has been shown to be impaired by such constituents as pesticides and nutrients, lending . . . urgency to the need to adopt additional requirements for irrigated operations.” (RB 9.)

The 2004 Waiver classified dischargers into one of two tiers, and imposed the following conditions: completion of 15 hours of farm water quality education; development of a farm water quality management plan (that addresses, at a minimum, erosion control, irrigation management, nutrient management, and pesticide management); implementation of management practices in accordance with the Farm Plan; surface receiving water quality monitoring (individual, group/cooperative, or watershed-based); and reporting. (RB 60 et seq.) The Waiver did not require any groundwater monitoring.

The Waiver included a time schedule and milestones to achieve compliance with the conditions of the Waiver, but the time schedule and milestones only covered reporting and monitoring.

The goal of the 2004 Waiver was to improve and protect water quality by providing a program to manage discharges from irrigated lands that cause or contribute to exceedances of water quality standards. The Waiver sought to achieve this goal through education and by requiring dischargers to prepare and implement farm water

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<sup>4</sup> The 2004 Waiver also waived the requirement for a Report of Waste Discharge if dischargers submit a “Notice of Intent” to comply with the conditions of the 2004 Waiver.

quality management plans (Farm Plans). A Farm Plan is a document that, among other things, identifies practices that are or will be implemented to manage discharges of pesticides, nutrients, and other pollutants, to protect water quality. In adopting the 2004 Waiver, the Regional Board hoped to improve irrigation efficiency and minimize fertilizer applications, by ensuring that growers evaluate crop nutrient requirements and consider the nitrate content of their irrigation water and soil in making fertilizer decisions. (RB 73.)

Regional Board staff recognized that the goal of achieving water quality standards represents a “long-term” effort that “cannot be achieved” during the five-year waiver term. (RB 15, 62.) The intent of the program during the first five-year cycle was to enroll growers in the program, educate growers about management practices, improve management practices and recordkeeping, gather information, and improve water quality. Staff indicated that few, if any, enforcement actions would be initiated based on water quality data, unless there was clear evidence of a flagrant or deliberate attempts to degrade water quality. (RB 17.)

The 2004 Waiver took effect on July 9, 2004, and had a term a five years, meaning it was due to expire on July 9, 2009. In anticipation of the expiration of the 2004 Waiver, Regional Board staff initiated a stakeholder process in December 2008, and extended the 2004 Waiver for one additional year, until July 10, 2010, to afford the stakeholder process time to reach a consensus.

Unfortunately, the stakeholder process was not successful. Thus, in February 2010, the Regional Board released a preliminary draft waiver to replace the 2004 Waiver (the “2010 Draft Waiver”), along with a corresponding staff report. (RB 1194-1272.)

The staff report explains the rationale behind the recommendations contained in the 2010 Draft Waiver as follows:

The intent of the 2004 Conditional Waiver was to regulate discharges from irrigated lands to ensure that such dischargers are not causing or contributing to exceedances of any Regional, State, or Federal numeric or narrative water quality standard. The requirements of the 2004 Conditional Waiver focused on enrollment, education and outreach, the development of Farm Water Quality Management Plans (Farm Plans), and receiving (watershed-scale) water quality monitoring. However, substantial evidence indicates discharges of waste are causing significant exceedances of numeric and narrative water quality standards resulting in negative impacts on beneficial uses. (RB 1131; see also RB 1140.)

The staff report indicates that agricultural discharges "continue to contribute to already significantly impaired water quality and impose certain risk and massive costs to public health, drinking water supplies, aquatic life, and valued water resources." (RB 1130.) It concludes that while the 2004 Waiver was a significant step, the 2004 Waiver "lacks clarity and focus on water quality requirements and does not include adequate compliance and verification monitoring." (RB 1141.) "At a minimum, agricultural discharges continue to severely impact water quality in most receiving waters." Thus, achievement of desired water quality outcomes is "uncertain and unmeasured." (*Ibid.*)

Building upon the 2004 Waiver, the 2010 Draft Waiver retained the requirement that dischargers prepare a Farm Plan (with corresponding management practices), and it retained the 2004 Waiver's surface receiving water monitoring requirements. However, to further reduce or eliminate waste discharges, the 2010 Draft Waiver proposed to impose new, more stringent monitoring and reporting requirements, with an emphasis on "high risk" dischargers in the most severely impaired areas. (RB 1142, 1246 et seq.)

Unlike the 2004 Waiver, the 2010 Draft Waiver proposed to require all farm operations to conduct individual surface water discharge monitoring of their farm operation. If discharge monitoring demonstrates the discharge is impairing or has the potential to impair surface waters, the Draft Waiver required that discharge to be eliminated or treated/controlled to meet water quality standards. (RB 1144-45.)

In addition, the Draft Waiver required all dischargers to conduct annual groundwater monitoring of all irrigation and drinking water wells, and develop a plan to monitor and characterize groundwater quality in the area.

The 2010 Draft Waiver required dischargers to identify, select, and implement management practices to meet water quality standards, maintain existing high quality water, and achieve compliance with the Waiver. (RB 1256.) It also required dischargers to update their Farm Plan at least annually, with monitoring and site evaluation results. (RB 1248, 1255.)

The 2010 Draft Waiver included new requirements for pesticide runoff, nutrient and salt management, sediment/erosion control, and aquatic habitat protection (including minimum riparian buffer widths for streams). (RB 1265.) And it prohibited application of fertilizer "in excess of crop needs." (RB 1251.)



The 2010 Draft Waiver included a time schedule for compliance. Under the Draft Waiver, irrigation runoff either must be eliminated within two years, or the following pollutants must be eliminated or treated/controlled to meet applicable water quality standards by the specified dates: toxicity (within two years); turbidity (within three years); nutrients (within four years), and salts (within four years). (RB 1147, 1267 et seq.) Additionally, the Draft Waiver required dischargers to implement management practices to reduce pollutant loading to groundwater. (*Ibid.*)

Staff acknowledged that to “fully control” all discharges and achieve compliance with water quality standards would take longer than the five-year period of the Waiver, but staff recommended adoption of the Draft Waiver as a reasonable starting point to improve water quality. (*Ibid.*)

After holding public workshops and receiving comments, Regional Board staff released further revised versions of the draft order in November 2010, March 2011, July 2011, and August 2011.<sup>5</sup> (RB 3766-4213, 4901-5700, 6388-6555; SB 7337.) Ultimately, on March 15, 2012, the Regional Board adopted Order No. R3-2012-0011, renewing and revising the 2004 Waiver. (RB 8465-628.) (For ease of reference, the court shall refer to the Regional Board’s Order approving a Conditional Waiver of Waste Discharge Requirements and Report of Waste Discharge, and the related Monitoring and Reporting Programs, as the “2012 Waiver”).

In adopting the 2012 Waiver, the Regional Board made a number of findings, including the following:

- 5. Since the issuance of the [2004 Waiver], the Central Coast Water Board has compiled additional and substantial empirical data demonstrating that water quality conditions in agricultural areas of the region continue to be severely impaired or polluted by waste discharges from irrigated agricultural operations and activities that impair beneficial uses, including drinking water, and impact aquatic habitat on or near irrigated agricultural operations. The most serious water quality degradation is caused by fertilizer and pesticide use, which results in runoff of chemicals from agricultural fields into surface waters and percolation into groundwater. . . . [¶]**

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<sup>5</sup> The Board also extended the 2004 Waiver, several times, through September 30, 2012, to allow further time to develop a new conditional waiver.

6. **Nitrate pollution of drinking water supplies is a critical problem throughout the Central Coast Region. Studies indicate that fertilizer from irrigated agriculture is the largest primary source of nitrate pollution in drinking water wells and that significant loading of nitrate continues as a result of agricultural fertilizer practices. Studies indicate that irrigated agriculture contributes approximately 78 percent of the nitrate loading to groundwater in agricultural areas. Hundreds of drinking water wells serving thousands of people throughout the region have nitrate levels exceeding the drinking water standard. This presents a significant threat to human health as pollution gets substantially worse each year, and the actual numbers of polluted wells and people affected are unknown. Protecting public health and ensuring safe drinking water is among the highest priorities of this Order. This Order prioritizes conditions to control nitrate loading to groundwater and impacts to public water systems. . . . [¶]**
  
7. **Agricultural use rates of pesticides in the Central Coast Region and associated toxicity are among the highest in the State. Agriculture-related toxicity studies conducted on the Central Coast since 1999 indicate that toxicity resulting from agricultural discharges of pesticides has severely impacted aquatic life in Central Coast streams. Some agricultural drains have shown toxicity nearly every time the drains are sampled. Twenty-two sites in the region, 13 of which are located in the lower Salinas/Tembladero watershed area, and the remainder in the lower Santa Maria area, have been toxic in 95% (215) of the 227 samples evaluated. This Order prioritizes conditions to address pesticides that are known sources of toxicity and sources of a number of impairments on the 2010 List of Impaired Waterbodies, specifically chlorpyrifos and diazinon. . . . [¶]**
  
8. Existing and potential water quality impairment from agricultural waste discharges takes on added significance and urgency, given the impacts on public health, limited sources of drinking water supplies and proximity of the region's agricultural lands to critical habitat for species of concern.
  
10. This Order requires compliance with water quality standards. Dischargers must implement, and where appropriate update or improve, management practices, which may include local or regional control or treatment practices and changes in farming practices to effectively

control discharges, meet water quality standards and achieve compliance with this Order. **Consistent with the Water Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (NPS Policy, 2004), dischargers comply by implementing and improving management practices and complying with the other conditions, including monitoring and reporting requirements. This Order requires the discharger to address impacts to water quality by evaluating the effectiveness of management practices (e.g., waste discharge treatment and control measures), and taking action to improve management practices to reduce discharges.** If the discharger fails to address impacts to water quality by taking the actions required by this Order, including evaluating the effectiveness of their management practices and improving as needed, the discharger may then be subject to progressive enforcement and possible monetary liability.

14. Dischargers have the option of complying with surface receiving water quality monitoring conditions identified in MRP Order No. R3-2012-0011, either individually or through a cooperative monitoring program. **The Central Coast Water Board encourages Dischargers to participate in a cooperative monitoring program to comply with surface receiving water quality monitoring conditions.**

16. Many owners and operators of irrigated lands within the Central Coast Region have taken actions to protect water quality. In compliance with the 2004 Agricultural Order, most owners and operators enrolled in the 2004 Agricultural Order, implemented the Cooperative Monitoring Program (CMP), participated in farm water quality education, developed farm water quality management plans and implemented management practices as required in the 2004 Agricultural Order. The 2004 Agricultural Order did not include conditions that allowed for determining individual compliance with water quality standards or the level of effectiveness of actions taken to protect water quality, such as individual discharge monitoring or evaluation of water quality improvements. This Order includes new or revised conditions to allow for such evaluations. Many owners and operators of irrigated lands within the Central Coast Region have taken actions to protect water quality. In compliance with the 2004 Agricultural Order, most owners and operators enrolled in the 2004 Agricultural Order, implemented the Cooperative Monitoring Program (CMP), participated in farm water

quality education, developed farm water quality management plans and implemented management practices as required in the 2004 Agricultural Order. **The 2004 Agricultural Order did not include conditions that allowed for determining individual compliance with water quality standards or the level of effectiveness of actions taken to protect water quality, such as individual discharge monitoring or evaluation of water quality improvements. This Order includes new or revised conditions to allow for such evaluations.** (See RB 8299-303 [emphasis added].)

The 2012 Waiver was similar to the 2004 Waiver in that it required farm water quality education and farm water quality management plans (or an approved alternative water quality improvement program), required dischargers to implement management practices, required surface receiving water quality monitoring and reporting, imposed time schedules and milestones, and required compliance reporting. Like the 2004 Waiver, the 2012 Waiver encouraged "cooperative" monitoring and reporting efforts.

The 2012 Waiver was more demanding than the 2004 Waiver. The 2012 Waiver (1) classified dischargers into three tiers based on criteria intended to assess a discharger's threat to water quality; (2) required groundwater monitoring and reporting; (3) required maintenance of riparian/vegetative cover in aquatic habitat areas; (4) required the installation of back flow prevention devices; and (5) imposed heightened requirements on the dischargers posing the biggest threats to water quality, including nitrogen balance ratios, irrigation and nutrient management plans, water quality buffer plans, individual surface discharge water quality monitoring and reporting, photo monitoring, total nitrogen reporting, and annual compliance forms.

But some provisions of the 2012 Waiver were less demanding than the 2010 Draft Waiver. For example, the 2010 Draft Waiver required all dischargers within 1000 feet of any surface waterbody to implement management practices sufficient to eliminate discharge of nutrients and salts within four years, and required all dischargers to meet this standard within six years. The 2010 Draft Waiver required the nutrient management element of the Farm Plan to include an estimation of the amount of fertilizer applied in excess of crop needs (if applicable) and an estimation of excess/residual fertilizer/nutrients in the root zone at the end of the growing season. (RB 1259-60.)

Under the 2012 Waiver, only "Tier 2 and 3" dischargers determined to have high nitrate loading risks were subject to additional nutrient management practices. Only Tier 3 dischargers were required to initiate individual surface water discharge monitoring and

reporting, and only Tier 3 dischargers with high nitrate loading risk farms were required to determine crop nitrogen uptake values and report progress toward nitrogen balance ratio targets. Only Tier 3 dischargers with farms adjacent to an impaired waterbody were required to prepare and implement a Water Quality Buffer Plan.

The 2012 Waiver required dischargers to comply with water quality standards and with the Regional Basin Plan, and to "effectively control" discharges of pesticides, toxic substances, sediment, turbidity, and nutrients, within specified time lines, but staff acknowledged that, in practice, staff would withhold enforcement if dischargers were meeting conditions of the Waiver regarding implementation, monitoring and reporting. (See SB 2345-46.)

To comply with CEQA, the Regional Board prepared a Subsequent Environmental Impact Report ("SEIR"). The SEIR originally was based on the 2010 Draft Waiver. On August 10, 2011, the Regional Board issued an Addendum to the SEIR to reflect the subsequent revisions to the Draft Waiver and the Board's conclusion that a new SEIR was not required. The Board ultimately concluded that the proposal to "renew" the 2004 Waiver, with "clarifications and new conditions," might have significant environmental effects on biological resources. Thus, the Board adopted a Statement of Overriding Considerations with respect to biological resources. In all other respects, the Board concluded that the 2012 Waiver would not have any new significant environmental effects that had not already been evaluated in the Negative Declaration for the 2004 Waiver.

Five parties petitioned the State Board for review of the Regional Board's 2012 Waiver. (SB 1-1646; see also SB 7164.) One of the five petitions was filed by Petitioners Monterey Coastkeeper and Santa Barbara Channelkeeper (as well as San Luis Obispo Coastkeeper). The other four petitions were filed by entities representing agricultural interests, including Respondent-Intervenors.

In their petition for administrative review, Petitioners argued that the Regional Board had "substantially weakened" staff's proposed controls on nitrate pollution, removing any "firm targets" for nitrate discharges. In the 2010 Draft Waiver proposed by staff, dischargers were required to calculate and "meet" nitrogen balance ratio targets. However, in the 2012 Waiver, the Regional Board revised this requirement to require only that dischargers "report progress towards" achieving nitrogen balance ratio "milestones." Petitioners argued that the revisions rendered the Waiver's controls on nitrate pollution "too weak" to achieve compliance with the Basin Plan, in violation of Water Code section 13269. Thus, Petitioners urged the State Board to reject the

Regional Board's revision "eliminating nitrate ratio balance targets" for Tier 3 dischargers.

The agricultural interests raised a variety of procedural and substantive challenges to the 2012 Waiver. Among other things, they argued that the Waiver's conditions are unreasonable and excessive and inconsistent with the Basin Plan and the Porter-Cologne Act. They also argued that the Board's SEIR is inadequate and that the Board failed to comply with CEQA by relying on the 2004 Negative Declaration and failing to adequately analyze and mitigate the adverse environmental effects of the new, 2012 Waiver.

The agricultural interests also requested the State Board stay certain provisions of the 2012 Waiver pending resolution of the petitions. The State Board granted the request and issued a stay order on September 19, 2012, staying Provisions 44(g), 68, 74, and 67 of the 2012 Waiver (and Part 3 of the related Tier 2 and Tier 3 Monitoring and Reporting Programs).

On September 17, 2012, the State Board initiated its review of the petitions by transmitting a "30-day letter" inviting the Regional Board and all interested persons to respond to the petitions. In response to the 30-day letter, the State Board received responses from several parties, including Petitioners and Respondent-Intervenors.

On June 6, 2013, the State Board released a first revised draft Waiver and received public comments. On August 20, 2013, the State Board released a second revised draft Waiver, followed by another public comment period. On September 9, 2013, the Board released a third revised draft Waiver, followed by yet another public comment period. A final draft Waiver was released on September 20, 2013, prior to the September 24, 2013, Board hearing.

On September 24, 2013, after receiving testimony from the public and interested parties, as well as Regional and State Board staff, the State Board adopted its final Order WQ 2013-0101. (See SB 7162-234 [redline version].) The State Board's Order upheld most of the provisions of the Regional Board's 2012 Waiver, but also amended several requirements. The most significant revision was to replace the Waiver's nitrogen balance ratio requirement with an expanded nitrogen reporting protocol.

In its Order, the State Board indicated that it was in the process of convening a panel of experts to assess existing agricultural nitrate control practices and propose new practices to protect groundwater in the Central Coast region. The State Board indicated that many of the groundwater issues contested in the petitions should be addressed by

the expert panel. Thus, the State Board emphasized that its Order constitutes only an interim determination as to how to move forward on the “difficult and complex questions presented in the petitions,” pending the expert panel’s “more thorough examination of the underlying issues.” (SB 7165.)

The Regional Board staff modified Order No. R3-2012-0011 as directed by the State Board’s Order WQ 2013-0101. (For ease of reference, the court shall refer to the Regional Board’s modified Order, and the related Monitoring and Reporting Programs, as the “Modified Waiver”).

This lawsuit followed. The Amended Petition alleges that the State Board abused its discretion in adopting Order No. WQ 2013-0101, modifying the 2012 Waiver, because the Order violates the California Water Code, the Basin Plan, and California’s Antidegradation Policy, and because the Board improperly excluded highly-relevant scientific evidence that Petitioners submitted during the public review and comment period (namely, a report by Thomas Harder and Jay. R Lund entitled “Addressing Nitrate in California’s Drinking Water,” also known as the “U.C. Davis Report”). The Amended Petition also alleges that the State Board violated CEQA by failing to undertake additional environmental review before adopting its final Order.

The Amended Petition seeks a peremptory writ of mandate commanding Respondent State Board to set aside its Order No. WQ 2013-0101, remanding this matter for further proceedings consistent with this court’s order, and reinstating the Regional Board’s 2012 Waiver until the State Board complies with the writ. Petitioners also seek an award of reasonable attorney fees under California Civil Procedure Code section 1021.5.

Respondents oppose the petition. Respondent State Board also has filed a demurrer alleging that the Fifth Cause of Action (CEQA) fails to state facts sufficient to constitute a cause of action due to Petitioners’ failure to exhaust administrative remedies. (Because the demurrer is duplicative of the State Board’s arguments opposing the petition, the court need not, and does not, address it further in this ruling.)

#### IV. Standard of Review

The challenges to the Board’s actions are reviewed under Code of Civil Procedure section 1094.5. (Water Code § 13330(e).) The inquiry under section 1094.5 is whether the agency has (1) proceeded without, or in excess of, jurisdiction; (2) whether there was a fair trial; and (3) whether there was any prejudicial abuse of discretion. Abuse of

discretion is established if the agency has not proceeded in the manner required by law, the order or decision is not supported by the findings, or the findings are not supported by the evidence. (Civ. Proc. Code § 1094.5(b).)

Under Water Code section 13330(e), the Court is authorized to exercise its independent judgment on the evidence. In applying the independent judgment test, the trial court reweighs the evidence from the hearing and makes its own determination as to whether the administrative findings are supported by the weight (i.e., preponderance) of the evidence. (*Vaill v. Edmonds* (1991) 4 Cal.App.4th 247, 257.)

Even where the independent judgment test applies, the factual findings of the agency come before the court with a presumption of correctness. (*Fukuda v. City of Angels* (1999) 20 Cal.4th 805, 811-12, 817.) It is presumed that the agency regularly performed its official duty. (*Id.*; *Elizabeth D. v. Zolin* (1993) 21 Cal.App.4th 347, 354.) The burden falls on the petitioner attacking the administrative decision to convince the court that the administrative proceedings were unfair, were in excess of jurisdiction, or that the agency's findings are contrary to the weight of the evidence. (*Fukuda, supra*, at pp. 811-12.)

The amount of deference to be afforded to an agency's interpretation of a statute or regulation is "contextual," and must be considered in light of the agency's expertise and technical knowledge, its thorough analysis of the issues, and its consistency over time. (*California Society of Anesthesiologists v. Brown* (2012) 204 Cal.App.4th 390, 405; *McCormick v. County of Alameda* (2011) 193 Cal.App.4th 201, 207-08; see also *Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 7-8.) In general, where an agency is charged with enforcing a statute or regulation, its interpretation is entitled to considerable weight. (*Family Planning Associates Med. Group, Inc. v. Belshe* (1998) 62 Cal.App.4th 999, 1004.) However, the court itself is the ultimate arbiter of the interpretation of the law. (*C.E. Buggy, Inc. v. Occupational Safety & Health Appeals Bd.* (1989) 213 Cal.App.3d 1150, 1156.)

The court reviews the State Board's compliance with CEQA by evaluating whether there was a prejudicial abuse of discretion. (Pub. Res. Code § 21168.5.)

In a mandate proceeding to review an agency's decision for compliance with CEQA, the court reviews the administrative record to determine whether the agency abused its discretion. Abuse of discretion is shown if the agency has not proceeded in the manner required by law, or the determination is not supported by substantial evidence. (*Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1106.) Judicial review differs significantly depending on whether the claim is



predominantly one of improper procedure or a dispute over the facts. (*Clover Valley Foundation v. City of Rocklin* (2011) 197 Cal.App.4th 200, 211-12.)

Where the alleged defect is that the agency has failed to proceed in the manner required by law, the court's review is *de novo*. (*Ibid.*) Although CEQA does not mandate technical perfection, CEQA's information disclosure provisions are scrupulously enforced. (*Ibid.*) A failure to comply with the requirements of CEQA which results in an omission of information necessary to informed decision-making and informed public participation constitutes a prejudicial abuse of discretion, regardless whether a different outcome would have resulted if the agency had complied with the disclosure requirements. (*Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1198.)

Where the alleged defect is that the agency's factual conclusions are not supported by substantial evidence, the reviewing court must accord deference to the agency's factual conclusions. The reviewing court may not weigh conflicting evidence to determine who has the better argument and must resolve all reasonable doubts in favor of the administrative decision. The court may not set aside an agency's approval of an EIR on the ground that an opposite conclusion would have been equally or more reasonable. (*Ebbetts Pass Forest Watch v. California Dept. of Forestry & Fire Protection* (2008) 43 Cal. 4th 936, 945.)

Regardless of what is alleged, an EIR approved by a governmental agency is presumed legally adequate, and the party challenging the EIR has the burden of showing otherwise. (*Santa Clarita Organization for Planning the Environment v. County of Los Angeles* (2007) 157 Cal.App.4th 149, 157-58.)

## V.

### Requests for Judicial Notice

The request for judicial notice filed by Respondent-Intervenors, although unopposed, is denied because Respondent-Intervenors have failed to furnish the court with sufficient information to enable it to take judicial notice of the matters listed.

VI.  
Discussion

A. Did Petitioners exhaust their administrative remedies?

As a preliminary matter, Respondents contend that a number of the issues Petitioners raise in their Opening Brief were not presented to the State Board or were presented in contravention of a State Board rule restricting comments to revisions made since the prior draft.<sup>6</sup> The issues that Respondents contend were not properly presented to the State Board relate to provisions of the Modified Waiver addressing (i) pesticide controls [specifically, monitoring use of certain categories of pesticides], (ii) vegetation buffers, (iii) tile drains, (iv) tiering, (v) individual surface water discharge monitoring, (vi) compliance with the State's Antidegradation Policy, and (vii) compliance with CEQA. Because the State Board did not have the opportunity to fully consider those issues, Respondents contend that Petitioners failed to exhaust their administrative remedies.

Petitioners respond that all of the issues presented in this litigation were raised by Petitioners or other interested parties during the administrative process, and therefore are properly before this court.

In general, the court agrees with Petitioners that the purpose of exhaustion of administrative remedies is satisfied if the issue properly was raised during the administrative process, regardless of who raised it. (See *Evans v. City of San Jose* (2005) 128 Cal.App.4th 1123, 1137.)

On the other hand, as Petitioners concede, consideration of whether exhaustion has occurred depends upon the particular procedures applicable to the public agency in question. (See Reply Brief, p.4, lines 1-3 [citing *Citizens for Open Government v. City of Lodi* (2006) 144 Cal.App.4th 865, 876].) In this case, the applicable procedures include State Board regulations governing the administrative process.

Under State Board regulations, any petition for State Board review of an action by a regional board must be in writing and must include a full and complete statement of the reasons the regional board's action was inappropriate or improper. (See 23 C.C.R. § 2050.) Further, if the action that is the subject of the petition for review was taken by the regional board after notice and opportunity to comment, the petition to the State Board shall be limited to those substantive issues or objections that were raised before

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<sup>6</sup> Under State Board regulations, where staff makes revisions to a proposed order, subsequent comments are limited to the revisions. (23 C.C.R. § 2067; see also SB 6673.)

the regional board. (*Ibid.*) In short, an “aggrieved person” cannot present issues for the first time to the State Board.

Upon receipt of a petition that complies with § 2050, the State Board may solicit responses to the petition. (23 C.C.R. § 2050.5.) After review of the regional board's records pertaining to the matter, the State Board may deny the petition, set aside or modify the regional board order, or direct the regional board to take appropriate action. (23 C.C.R. § 2052.)

Before taking final action, the state board may, in its discretion, hold a hearing for the purpose of oral argument, receipt of additional evidence, or both. (*Ibid.*) When a state board hearing is held, the decision of the State Board will be based on that evidence and testimony in the record of the hearing. When no hearing is held, the decision of the Board will be based on the record before the regional board, except that, in either case, the record may be supplemented by other evidence and testimony pursuant to section 2050.6. (23 C.C.R. § 2064.)

The State Board also has the authority to order review of a regional board's action on its own motion. (23 C.C.R. § 2050.5.) When review is undertaken on the Board's own motion, all affected persons known to the Board shall be notified and given an opportunity to submit information and comments, subject to such conditions as the Board may prescribe. (23 C.C.R. § 2055.)

Formal disposition of petitions occurs at board meetings. At such meetings, the Board may invite comments from interested persons. Comments must be based on evidence contained in the record or legal argument. No new evidence is submitted at the meeting. (23 C.C.R. § 2067.)

The regulations further provide that when the Board makes revisions to a proposed order, subsequent written comments are limited to those revisions. (23 C.C.R. § 2067.)

In this case, even though petitions challenging the Regional Board's Waiver were filed by Petitioners and by agricultural interests, the Board ultimately decided to review the Regional Board's actions on its own motion – apparently because the Board could not meet the time limits for deciding the petitions. (See 23 C.C.R. § 2050.5.)

The only issue raised in the petition filed by Petitioners was the Regional Board's decision to “eliminate” the nitrogen balance ratio targets – specifically, by replacing the requirement to “meet” nitrogen balance ratio targets with the requirement merely to “report progress” towards nitrogen balance ratio milestones. In contrast, the agricultural

interests raised numerous objections to the Waiver, challenging nearly every aspect of the Waiver as well as the Regional Board's compliance with CEQA.

Petitioners submitted a written response to the petitions filed by the agricultural interests. Rather than challenging the Regional Board's Waiver, Petitioners defended it. Petitioners argued that the petitions are "wholly without merit" and should be denied. Among other things, Petitioners argued that the Regional Board "acted properly and appropriately in issuing the 2012 Waiver" after an extensive public process, and that the Waiver is "consistent with the Basin Plan and squarely within the public interest." (See SB 5434.) Petitioners argued that the 2012 Waiver is a "proper and appropriate" application of the Regional Board's mandate. (SB 5434.) Petitioners specifically defended the Waiver's tiering system, vegetation buffer/filter strip requirements, and time schedules to achieve compliance over the "longer term," among other provisions. (See SB 5434-42.)

In addition, Petitioners defended the Regional Board's CEQA determinations, arguing that the Regional Board "adhered to CEQA requirements" when it incorporated the analysis from the 2004 Negative Declaration into an SEIR, and when it issued an addendum to that SEIR. (SB 5454-58.)

Petitioners continued to defend the Waiver through the State Board's first draft order. In their comments to that draft, Petitioners stated that their petition "likely would have been withdrawn" were it not for the efforts by agricultural interests to "overturn" the 2012 Waiver and revert to the 2004 Waiver. (SB 5726.) However, in the course of defending the Regional Board's Waiver, Petitioners expressed some dissatisfaction with a perceived weakening of the Waiver to "appease" growers. (SB 5727.)

Petitioners' main objection to the Waiver continued to be the elimination of the requirement to "meet" nitrogen balance ratio targets. Rather than restore the requirement to "meet" nitrogen balance ratios, the State Board proposed to eliminate nitrogen balance ratio targets entirely (and eliminate the requirement to report crop nitrogen uptake values), and instead require high-risk dischargers to report total nitrogen applied. Petitioners objected to this because it would give staff no estimate of the amount of nitrogen removed at harvest, and therefore no means to assess the amount of nitrogen being discharged as waste.

Petitioners also objected to other changes made by the State Board in its draft order, including the Board's proposal to reduce the requirements applicable to containment structures (Provision 33). Petitioners also expressed concerns about the Board's

proposal to convene an expert review panel, and the Regional Board's Cooperative Groundwater Monitoring Program. (See SB 5724 *et seq.*)

Agricultural interests, other environmental organizations, and the Regional Board also submitted comments. The comments submitted by the environmental groups and Regional Board discussed a range of issues, including that the Waiver fails to comply with the anti-degradation requirements; that the Board had inappropriately weakened Provision 11 (third party water quality projects), Provisions 44.d and 44g (Farm Plan effectiveness and compliance), Provisions 76 & 77 and Section B.1 of Part 6 of the Tier 3 MRP (nutrient reporting), Provision 78 (nitrogen balancing ratios), Provision 82 (control of pollutant discharges), Part 3A of the Tier 2 and 3 MRP (reporting of management practice effectiveness), and Part 5A of the Tier 3 MRP (individual surface water discharge monitoring), among other provisions.

In response to the State Board's second draft order, Petitioners objected that the changes had further weakened the Waiver, such that it bore little resemblance to the original February 2010 Draft Waiver. Petitioners argued that if the Waiver is going to provide meaningful water quality protection, the State Board must: (1) require growers to meet and report nutrient balancing ratios; (2) require Tier 3 growers participating in cooperative groundwater monitoring programs to monitor and report results annually; and (3) ensure that growers implement "effective" management practices, not just "modified" management practices.

In addition, Petitioners commented that the initial 2010 Draft Waiver included a "comprehensive list of pesticides," but the most recent draft only focuses on diazinon and chlorpyrifos. Petitioners argued this represented a "missed opportunity" for the Board to reduce discharges of toxic pesticides. (See SB 6301 *et seq.*)

Agricultural interests, other environmental organizations, and the Regional Board also submitted comments. The topics addressed in such comments included Provision 51 (groundwater monitoring), Provisions 76-77 (nutrient balance ratios), Provision 11 (third party water quality programs), Provision 33 (containment structures), Provisions 22-23, 84-87, and 87A (compliance), and Provision 72 (individual surface water discharge monitoring), among others.

By the time of the State Board's third draft order, Petitioners, exasperated with the perceived weakening of the Waiver, indicated that they no longer supported the Waiver and urged the Board to restore many of the provisions from the 2010 Draft Waiver, including (1) the pesticide/toxicity provisions; (2) the requirement for all Tier 2 and 3 growers to report crop nitrogen uptake values and nitrogen balance ratios; (3) the

requirement for all Tier 3 growers to “meet” nitrogen balance ratios; (4) sediment control requirements; and (5) aquatic habitat control requirements. Petitioners also urged the Board to admit the U.C. Davis report into evidence; to delete cooperative groundwater monitoring provisions allowing “statistical characterization” of water quality based on existing and collected data; and to delete language providing that iterative implementation of “modified management practices” would be sufficient to comply with the Waiver. (See SB 6730 *et seq.*)

Again, Petitioners were not the only ones to comment. Agricultural interests, other environmental organizations, and the Regional Board also submitted comments in response to the State Board’s draft order. Topics covered by such comments included Provision 11; Provision 33; Provision 51; Part 2, Section A.6-7 of the Tier 1-3 MRPs; and provisions addressing nutrient management, among others.

The court is sympathetic to the Board’s position that Petitioners should be limited to the issues specifically raised by Petitioners in their petition for review and during the course of administrative proceedings before the State Board. However, as described above, the purpose of the exhaustion doctrine is satisfied as long as the issue was raised during the administrative process, regardless who raised it. In light of the long and complicated history behind the Board’s adoption of the Modified Waiver, the court is persuaded that the issues raised by Petitioners have been fully exhausted. Thus, the court shall proceed to decide the issues on their merits.<sup>7</sup>

B. Does the Modified Waiver violate Water Code section 13269?

The Porter-Cologne Act authorizes a waiver of waste discharge requirements only if the waiver is both consistent with the applicable basin plan and in the public interest. (Water Code § 13269.) In addition, Water Code section 13269 requires a waiver to include monitoring requirements “designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver’s conditions.” (*Ibid.*) Petitioners contend that the Modified Waiver violates Water Code section 13269 because it is not consistent with the Basin Plan, does not include adequate monitoring provisions, and is not in the public interest. The court agrees.

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<sup>7</sup> In the course of reaching this decision, the court has not reviewed or considered Petitioners’ Supplemental Brief on Administrative Exhaustion, which was filed without leave.

1. Is the Modified Waiver consistent with the Basin Plan?

Petitioners argue that the Modified Waiver is not consistent with the Basin Plan because it lacks specific, enforceable measures necessary to meet the Basin Plan's water quality objectives, and because it fails to comply with the NPS Policy and the Antidegradation Policy.

a. Compliance with Water Quality Objectives

The Central Coast Basin Plan establishes water quality objectives to protect beneficial uses of water, establishes a program of implementation to achieve water quality objectives, and incorporates state plans and policies, including the NPS Policy and the Antidegradation Policy. (RB 9165, 9193-94.)

As relevant here, the objectives for nitrates, toxicity, pesticides, and sediment provide, in relevant part:

**Nitrates:** Water shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. (RB 9195.) For municipal and domestic water supplies, the narrative standard has been converted into a numeric Maximum Contaminant Level (MCL) of 45 mg/L as Nitrate (NO<sub>3</sub>) or 10 mg/L as Nitrogen (N), which is equivalent to the State's drinking water standard. (RB 9197, 9199, 9357; see also RB 5450.) In addition, although not part of the Basin Plan, Regional Board staff has estimated that a standard of 1 mg/L as Nitrogen is necessary to protect aquatic life from biostimulation. (RB 5450.)

**Toxicity:** All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life. (RB 9196.)

**Pesticides:** No individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life. (RB 9196.)

Sediment: The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. (RB 9195.)

To achieve these objectives, the Basin Plan provides, among other things, that:

- The discharge of pollutants into surface fresh waters shall be discontinued. (RB 9353.)
- Waste discharges shall not contain materials in concentrations which are hazardous to human, plant, animal, or aquatic life. (RB 9355.)
- Wastewaters percolated into the ground waters shall be of such quality at the point where they enter the ground so as to assure the continued usability of all ground waters of the basin. (RB 9353.)

The Basin Plan includes a program of implementation to meet the objectives, a time schedule for actions to be taken, and enforcement mechanisms to ensure compliance with the objectives. The Basin Plan provides that control measures implemented by the Regional Board must provide for the attainment of the Basin Plan's beneficial uses and water quality objectives. (RB 9211.)

The Modified Waiver ostensibly requires compliance with the Basin Plan and its water quality objectives. (See SB 7238, 7253, 7347; see also SB 7347.) It does so by means of a "long term" approach that seeks to achieve compliance with water quality objectives over time through "iterative" implementation of management practices.

This iterative approach is described in Provision 83.5 of the Modified Waiver [or Provision 87.5 of the Order], which provides:

To comply with Provisions 22, 23, 33, and 80 - 83 of this Order, Dischargers must (1) implement management practices that prevent or reduce discharges of waste that are causing or contributing to exceedances of water quality standards; and (2) to the extent practice effectiveness evaluation or reporting, monitoring data, or inspections indicate that the implemented management practices have not been effective in preventing the discharges from causing or contributing to exceedances of water quality standards, the Discharger must implement improved management practices. (SB 7362.)



Petitioners argue that the State Board's iterative approach is not sufficient to achieve compliance with the Basin Plan's water quality objectives because it lacks specific, enforceable standards against which to measure existing management practices; lacks meaningful deadlines/timeframes; lacks adequate feedback mechanisms to determine if management practices are effective.

Petitioners further complain that the Modified Waiver is less protective of water quality than the 2012 Waiver and previous draft waivers circulated by the Regional Board and its staff. Petitioners note that the Regional Board's 2010 Draft Waiver would have required Tier 3 dischargers to meet nitrogen balance ratio targets. Petitioners argue that, at growers' insistence, the Regional Board weakened this requirement so that, instead of requiring Tier 3 dischargers to "meet" nitrogen balance ratio targets, they merely had to "report progress towards" achieving nitrogen balance ratio "milestones." (RB 8327.) Then, in the Modified Waiver, the State Board eliminated the nitrogen balance ratio requirement altogether. (SB 7210-16, 7359-60.) Under the Modified Waiver, Tier 2 and 3 dischargers determined to have high nitrate loading risk merely are required to report total nitrogen applied. Petitioners contend that requiring dischargers to calculate and meet nitrogen balance ratio targets is essential to prevent excessive use of fertilizer and make progress toward achieving the Basin Plan's water objectives.

Petitioners contend that the State Board's elimination of nitrogen balancing and reporting might be acceptable if the Board adopted other enforceable standards to control nitrate pollution. However, Petitioners contend, as a result of the Board's modifications, there is not a single enforceable standard in the Modified Waiver that will require agricultural dischargers to use less nitrogen. Thus, Petitioners argue, nitrate contamination will continue to worsen and the Waiver will not achieve the Basin Plan's objectives.

Apart from the lack of enforceable standards, Petitioners contend the State Board also weakened other provisions that were critical to achieve compliance with the Basin Plan's water quality objectives. Petitioners cite several examples.

First, Petitioners contend the State Board eliminated the requirement of Farm Plans to describe and report the results of methods used to verify the effectiveness of management practices, treatment/control measures, and farming practices. Petitioners contend that the Regional Board already had watered down an earlier proposal to require dischargers to show that their discharges do not impair water quality. (RB 3786; see also RB 1129.) Petitioners contend that the State Board then further weakened the Waiver to require only a "description of the method and schedule" for assessing the effectiveness of each management practice, treatment, and control measure. (SB

7190.) Thus, Petitioners argue, the requirement went from dischargers having to show discharges do not impair water quality; to dischargers only having to describe their verification methods and results; to dischargers only having to describe their methods for evaluating effectiveness, with no need to demonstrate compliance or provide results.

Second, Petitioners contend the State Board weakened the Waiver's pesticide controls. In the 2010 Draft Waiver, Regional Board staff proposed to require that within two years dischargers within 1000 feet of a surface waterbody implement management practices sufficient to "eliminate toxicity in irrigation runoff or eliminate the discharge of irrigation runoff" or demonstrate that any irrigation runoff has been sufficiently treated or controlled that it will not cause or contribute to exceedances of any toxicity water quality standards. (RB 1258.) The Modified Waiver requires monitoring for certain pesticides and provides that Tier 3 dischargers must "effectively control" individual waste discharges of pesticides, but relies on the iterative management practices approach to achieve compliance. (SB 7361.) For the reasons describe above, Petitioners contend the iterative approach is not sufficient to attain water quality standards.

Third, Petitioners contend the State (and Regional) Board weakened the requirement for vegetation buffers. Petitioners argue that in the 2010 Draft Waiver, the Regional Board initially proposed to require all growers either to maintain vegetation buffers or develop and implement a Riparian Function Protection and Restoration Plan, as part of the discharger's Farm Plan. (RB 165-67.) However, in the 2012 Waiver, the Regional Board required only a small number of growers – a subset of Tier 3 dischargers – to comply with this requirement, and the State Board upheld this change. Petitioners contend this change stripped the Waiver of necessary buffer requirements.

Fourth, Petitioners contend that the Modified Waiver fails to adequately regulate the discharge of pollutants from "tile drains," merely requiring dischargers to describe tile drain discharges and management measures that dischargers have implemented or will implement to "minimize" impacts to water quality. (See SB 7351.)

Fifth, Petitioners contend the State Board reduced the number of growers subject to the Modified Waiver's most stringent requirements. As described above, the Modified Waiver assigns each discharger to one of three tiers, which determine the requirements applicable to the discharger. (SB 5659.)

The tier designations are based on criteria intended to capture the risk to water quality, including whether the discharger uses the pesticides chlorpyrifos or diazinon, proximity of the discharger's farm to an impaired surface waterbody, farm size, and whether the discharger grows crop types with high potential to discharge nitrogen to groundwater. A

discharger is classified as a Tier 3 discharger – the tier expected to pose the highest threat to water quality – if (a) the discharger grows crop types with high potential to discharge nitrogen to groundwater and the farm total irrigated acreage is 500 acres or more, or (b) the discharger applies chlorpyrifos or diazinon at the farm, and the farm discharges irrigation or stormwater runoff to a waterbody listed as impaired for toxicity or pesticides. (SB 7344-45.)

A discharger is classified as a Tier 1 discharger – the lowest threat tier – if the discharger is a certified sustainable agriculture program or if all of the following conditions are true: (a) the discharger does not use chlorpyrifos or diazinon; (b) the discharger is located more than 1,000 feet from a surface waterbody listed as impaired for toxicity, pesticides, nutrients, turbidity, or sediment; and (c) the discharger either does not grow crop types with high potential to discharge nitrogen to groundwater or, if the discharger does grow such crops, the farm has less than 50 acres of total irrigated area and is not within 1,000 feet of a well that is part of the public water system and that exceeds the maximum contaminant level (MCL) for nitrogen-related pollutants. (*Ibid.*)

Dischargers that do not meet the criteria for Tier 1 or Tier 3 are classified as Tier 2 dischargers. (*Ibid.*)

Tier 3 dischargers must comply with more stringent requirements than Tier 2 dischargers, and Tier 2 dischargers must meet more stringent requirements than Tier 1 dischargers. For example, dischargers in all three tiers must prepare Farm Plans, obtain water quality education, maintain riparian areas, and conduct groundwater and surface receiving water quality monitoring and reporting. However, only Tier 2 and Tier 3 dischargers are required to submit annual compliance forms and report nitrate loading risk levels. Only Tier 2 and Tier 3 dischargers with high nitrate loading risks are required to report total nitrogen applied in their annual compliance forms. Only Tier 2 and Tier 3 dischargers with farms adjacent to impaired waterbodies are required to conduct photo monitoring. Only Tier 3 dischargers are required to conduct and report individual surface water discharge monitoring. Only Tier 3 dischargers with high nitrate loading risks are required to develop and implement an Irrigation and Nutrient Management Plan (INMP). And only Tier 3 dischargers with farms adjacent to impaired waterbodies are required to develop and submit vegetation buffer plans.

Although the State Board concluded that the Modified Waiver is “more stringent” than the 2004 Waiver, (SB 7281), this conclusion was based primarily on the Tier 3 requirements. Regional Board staff found the 2012 Waiver imposed “fewer” requirements on Tier 1 dischargers, and “comparable” requirements on Tier 2 dischargers, as compared to the 2004 Waiver. (RB 7756; see also SB 487, 1978.)

The Regional Board's early proposals would have placed approximately 11% of farms and 54% of irrigated acreage in Tier 3. (RB 4863-64.) In contrast, the Modified Waiver placed only about 3% of farms and 14% of irrigated acreage into Tier 3. (RB 7779.) Under the Regional Board's early proposals, about 59% of farms and 79% of irrigated acreage would be in either Tier 2 or 3, whereas under the Modified Waiver, about 45% of farms and 61% of irrigated acreage would be in Tier 2 or 3.

Further, under the Modified Waiver, a discharger may request to be moved to a lower, less stringent tier. (See SB 7346.) Dischargers may qualify for a tier change by participating in an alternative third party water quality improvement project or program demonstrating a "reasonable chance of improving water quality and/or reducing pollutant loading." (SB 7343.)

Even if the Tier 3 requirements are more stringent than the 2004 Waiver, Petitioners argue that the number of growers subject to the "more stringent" Tier 3 requirements is too small to achieve the Basin Plan's water quality objectives. In sum, Petitioners argue the Modified Waiver is, at most, only marginally stronger than the 2004 Waiver, and it is not strong enough to comply with the Basin Plan. The Regional and State Boards have removed or weakened nearly every substantive standard, pollution control, and monitoring provision needed to protect water quality.

Respondents do not dispute that nitrate and pesticide pollution are problems in the Central Coast region. But Respondents contend it is irrelevant whether the final Waiver is more or less protective of water quality than previous drafts, especially drafts published by Regional Board staff. Respondents contend that only the portions of the 2012 Waiver actually issued by the Regional Board and timely challenged in the petitions to the State Board, and the limited amendments made by the State Board, are properly before this court.

Further, Respondents contend the Modified Waiver's approach to solving the water quality problems in the Central Coast region is consistent with the Basin Plan. While Petitioners may prefer a program that achieves immediate compliance with all water quality objectives, Respondents argue that the Basin Plan permits the State Board to adopt an iterative, long-term approach to address the long-term water quality issues. (See SB 7186.) Implementation of increasingly more effective management practices over time constitutes compliance with water quality requirements. In fact, Respondents contend, such an approach is the only realistic way to improve water quality in a watershed degraded by decades of past practices.

Respondents deny that the State Board's modifications gutted the Waiver's requirements, rendering it inadequate. Rather, they contend, the State Board made the Waiver clearer, more reliable, and easier to implement and enforce.

With regard to nitrogen balance ratios, Respondents argue that the State Board reasonably exercised its discretion in deciding to replace provisions that would have required dischargers to calculate data based on speculative and unreliable variables, with a more detailed nitrogen application reporting requirement.

In regard to farm plans, Respondents argue that the State Board reasonably responded to concerns expressed by agricultural interests and the Regional Board that the term "verify" implied the need for costly studies and statistical analyses, and modified the language to clarify that standard farming practices would be sufficient to evaluate practice effectiveness. (SB 5537, 7188-90, 7351.) Respondents contend this minor change does not change the nature of the Farm Plan requirement.

In regard to pesticide controls, vegetation buffers, tile drains, and the tiering criteria, Respondents argue that the State Board did not modify anything in the Waiver relating to these provisions. Thus, Respondents argue that Petitioners' arguments are not properly before the court. In any event, Respondents argue, they lack merit.

On balance, the court agrees with Petitioners that the Modified Waiver is not consistent with the Basin Plan because it lacks sufficiently specific, enforceable measures and feedback mechanisms needed to meet the Basin Plan's water quality objectives.

The court recognizes, as did the Regional Board, the State Board, and staff, that immediate compliance with water quality standards is not possible without complete cessation of agricultural activity – which is not a "viable or desirable" waste discharge control option. (SB 2362.) The NPS Policy recognizes that, where water already is degraded, it may take time to achieve water quality objectives. Even Petitioners do not contend that the Modified Waiver must achieve "instantaneous compliance" with the Basin Plan's water quality standards. Rather, Petitioners argue, the Modified Waiver must include requirements reasonably designed to show measurable progress toward improving water quality over the short-term and achieving water quality standards in a meaningful timeframe. The court agrees.

The problem with the Modified Waiver is that there is little to support a conclusion that the Waiver will lead to quantifiable improvements in water quality or even arrest the continued degradation of the region's waters.

For the most part, the Modified Waiver continues the approach adopted by the 2004 Waiver. This is problematic because the 2004 Waiver has failed to make meaningful progress in improving water quality or attaining water quality standards. The 2004 Waiver has been "successful" in getting growers to join cooperative monitoring groups, prepare Farm Plans, and provide reports. But it has failed to improve water quality or even halt the continued degradation of the region's water resources.

The focus of the 2004 Conditional Waiver was on enrollment, education, and assessing agricultural water quality. The 2004 Conditional Waiver did not emphasize compliance with water quality standards or follow the State Board's NPS Policy. (RB 2132, 2151.) The 2004 Waiver lacked clarity regarding water quality requirements, did not include time schedules or milestones to achieve compliance with water quality standards, and did not include compliance and verification monitoring to measure and assure progress towards restoration of water quality and protection of beneficial uses. (RB 1141, 2133, 2151.)

Since the adoption of the 2004 Waiver, the Regional Board has documented that agricultural discharges continue to load pollutants to already-severely-impaired water bodies, further degrading water quality and impairing beneficial uses. (RB 2133, 2145, 2149; see also RB 3767, 3897-98, 3974; SB 17, 61.)

The 2004 Waiver has not been successful because it lacks adequate standards and feedback mechanisms to assess the effectiveness of implemented management practices in reducing pollution and preventing further degradation of water quality. The Modified Waiver suffers from the same defect.

The Modified Waiver is based on an "iterative approach" to attain water quality standards, by which dischargers must implement "management practices" to prevent or reduce discharges of waste that are causing or contributing to exceedances of water quality standards. To the extent monitoring data shows implemented management practices have not been effective in preventing discharges from causing or contributing to exceedances, the Modified Waiver requires the discharger to implement "improved" management practices. (SB 7362.)

In theory, the Modified Waiver ensures that dischargers will, over time, implement "effective" management practices because it requires them to implement increasingly "improved" management practices until there are no more discharges causing or contributing to exceedances of water quality standards. Thus, if there is an exceedance at one of the 50 surface receiving water monitoring locations, all growers with

discharges that "contribute" to that exceedance must implement increasingly "improved" management practices until the exceedance is eliminated.<sup>6</sup>

In practice, this approach is highly unlikely to work because the receiving water monitoring data, submitted in most cases by a cooperative monitoring group, does not identify the individual discharges that are "causing or contributing" to the exceedance. As a result, neither the Board, nor the cooperative monitoring group, nor (in many cases) the grower, can identify where the pollution is coming from or whether the grower's management practices are effectively reducing pollution and degradation.

It is possible for an iterative management practice approach to meet statutory requirements without requiring individual surface discharge monitoring for all discharges. But there must be some means to verify that implemented management practices are effectively controlling the relevant discharge. If they are not, the Waiver must ensure that dischargers will implement effective management practices that will make measurable progress towards attaining water quality standards. The Modified Waiver does not do that.<sup>9</sup>

While the court agrees that implementation of management practices may be an acceptable means to achieve water quality standards, as the NPS Policy makes clear, implementing management practices is not a substitute for actual compliance with water quality standards. Management practices are merely a means to achieve water quality standards. Adherence to management practices does not ensure that standards are being met. The Modified Waiver recognizes this, but fails to do anything about it. Under the Modified Waiver, if monitoring or inspections indicate that implemented management practices are not effective, the discharger simply must make a "conscientious effort" to identify and implement "improved management practices."

The Modified Waiver does not define what constitutes "improved" management practices, or include any additional monitoring or standards by which to verify the "improved" management practices are effectively reducing pollution. Under the Modified Waiver, compliance is achieved as long as the discharger implements a new

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<sup>6</sup> If monthly monitoring is required, as is the case with nitrates, growers would have to implement "improved" management practices every month until the exceedance is eliminated.

<sup>9</sup> The court is aware that Tier 3 dischargers with a high nitrate loading risk, must submit an INMP Effectiveness Report to evaluate reductions in nitrate loading to surface water and groundwater based on the implementation of irrigation and nutrient management practices. (See SB 7214.) However, this appears to be a one-time requirement that applies to only a small subset of growers. The Effectiveness Report does not "save" the Waiver.

management practice which the discharger *believes* will be an improvement.<sup>10</sup> In this court's view, this is inadequate to ensure any meaningful progress toward achieving quantifiable reductions in pollutant discharges. (See RB 5149 [Regional Board staff rejecting a similar proposal by agricultural interests because the proposal did not contain adequate verification monitoring or feedback mechanisms to determine if management practices were working or whether additional management practices should be taken].)

For Tier 3 dischargers required to conduct individual surface discharge monitoring, there is a mechanism at least to determine whether the grower's implemented management practices are reducing pollution.<sup>11</sup> But the Waiver does not set any benchmarks for defining how much "improvement" a grower must show to demonstrate compliance. The Waiver seems to assume that any perceived improvement is enough, as long as the improved management practice was implemented in good faith. It is difficult for the court to see how this is an enforceable standard. In effect, the Modified Waiver guarantees that the Regional Board will not take enforcement action against a discharger as long as the discharger believes it is implementing "improved" management practices, even if the "improved" management practices remain completely ineffective at controlling discharges of waste.

In addition, there is another, more fundamental problem with the Waiver, which is the small number of growers subject to the "more stringent" requirements of Tier 3. Tier 3 includes only about 3% of growers and only about 14% of the irrigated acreage in the region. In addition, Tier 3 growers can move to a lower tier by participating in an approved alternative third-party project/program (determined to have a "reasonable chance of improving water quality and/or reducing pollutant loading") or, some cases, simply by switching to pesticides other than diazinon or chlorpyrifos. Thus, at most, about 3% of growers will be subject to the "more stringent" requirements of the Modified Waiver. The vast majority of growers, 97% or more, will be subject to requirements equal to, or less stringent than, the 2004 Waiver. And for the vast majority of growers, the Waiver does not require any individual surface discharge monitoring or other focused monitoring to identify the sources of exceedances or assess the effectiveness of individual farm management practices. It is unreasonable for the Board to keep doing the same things it has been doing and expect different results.

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<sup>10</sup> This assumes, of course, that growers acknowledge their operations are "causing or contributing to" the exceedance. As a practical matter, growers may deny that their operations are responsible, and point the finger at other operations. It is not clear how the Regional Board would prove otherwise.

<sup>11</sup> The same is true of the groundwater monitoring program because even in the case of a cooperative groundwater monitoring program that relies on representative sampling, the Waiver requires direct sampling of the individual well level if there is a concern that nitrate concentration in the well may approach the Maximum Contaminant Level. (See SB 7193.)



The court is not persuaded that an adequate Waiver necessarily must include nitrogen balancing ratios,<sup>12</sup> broader farm plan reporting, more rigorous pesticide controls, mandatory vegetation/riparian buffers, and/or more comprehensive tile drain monitoring. The court simply concludes that the Modified Waiver, as currently structured, lacks sufficient measures to meet the Basin Plan's water quality objectives and, as a result, the Waiver is not consistent with the Basin Plan.

b. Compliance with the NPS and Antidegradation Policies

Petitioners also argue that the Modified Waiver does not comply with the Basin Plan because it does not comply with California's NPS and Antidegradation Policies.

i. The NPS Policy

The Basin Plan incorporates California's NPS Policy. (RB 9348.) As described above, the NPS Policy requires that nonpoint source pollution control programs include the following five "key elements:"

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<sup>12</sup> Although the court does not find that nitrogen balance ratio targets are *required* to meet water quality standards, the court fails to understand why they were not included as reportable milestones. In eliminating the requirement, the Board bemoans the lack of reliable data on crop nitrogen uptake values. However, the Board retained the requirement for certain Tier 3 dischargers to identify crop nitrogen uptake values in their INMP for use in nutrient balance calculations. The Board stated that this information is "important" to both the discharger and the professional certifying the INMP in determining the appropriate amount of nitrogen to be applied at the farm. (SB 7209.) The Board also stated that the practice of recording and budgeting of nitrogen application is a relatively low-cost, standard industry practice that is widely recommended by agronomists and crop specialists and already utilized by many growers. (SB 7205.) Thus, the lack of reliable crop nitrogen uptake values does not appear to be an impediment to nitrogen balancing. Further, if the Board currently lacks reliable crop nitrogen uptake values, it presumably could obtain that information from growers under the Waiver. Yet the Board struck the requirement to have crop nitrogen uptake values reported to the Board. (SB 7210.)

Likewise, it is unclear why the Board deleted in Provision 44(g) the requirement for Farm Plans to describe the "results" of methods used to verify practice effectiveness. This is critical information that needs to be reported to the Board. Although it doesn't necessarily have to be reported as part of the Farm Plans, the NPS Policy requires sufficient feedback mechanisms to ensure that the Waiver is achieving its stated purpose, and/or determine whether additional or different actions are required. For Tier 2 and 3 dischargers, this change is arguably of little importance, because those dischargers are required to report the information in their Annual Compliance Form. (See SB 7219.) But the change could be important as to Tier 1 dischargers.

Nevertheless, the court realizes that these are issues that cannot be decided in a vacuum; they must be considered in the context of the Waiver as a whole. Here, for example, instead of requiring dischargers to report progress toward nitrogen balancing ratios, the Board imposed nitrogen application reporting requirements. The court refuses to tell the Board what elements must be included in the Waiver. Rather, the court shall review the Waiver as a whole and decide whether it meets legal requirements.

**KEY ELEMENT 1:** An NPS control implementation program's ultimate purpose shall be explicitly stated. Implementation programs must, at a minimum, address NPS pollution in a manner that achieves and maintains water quality objectives and beneficial uses, including any applicable antidegradation requirements.

**KEY ELEMENT 2:** An NPS control implementation program shall include a description of the MPs [Management Practices] and other program elements that are expected to be implemented to ensure attainment of the implementation program's stated purpose(s), the process to be used to select or develop MPs, and the process to be used to ensure and verify proper MP implementation.

**KEY ELEMENT 3:** Where a RWQCB determines it is necessary to allow time to achieve water quality requirements, the NPS control implementation program shall include a specific time schedule, and corresponding quantifiable milestones designed to measure progress toward reaching the specified requirements.

**KEY ELEMENT 4:** An NPS control implementation program shall include sufficient feedback mechanisms so that the RWQCB, dischargers, and the public can determine whether the program is achieving its stated purpose(s), or whether additional or different MPs or other actions are required.

**KEY ELEMENT 5:** Each RWQCB shall make clear, in advance, the potential consequences for failure to achieve an NPS control implementation program's stated purposes. (RB 9417-20.)

Most nonpoint source management programs depend, at least in part, on implementation of management practices to control nonpoint sources of pollution. (RB 9413.) Successful implementation of management programs typically requires (i) adaptation to specific conditions, (ii) monitoring to assure practices are properly applied and are effective in attaining and maintaining water quality standards, (iii) immediate mitigation if practices are not effective, (iv) improvement of management practice implementation or additional management practices when needed to resolve a deficiency. (*Ibid.*)

Before approving a specific NPS pollution control program, the water board must determine there is a "high likelihood" that implementation of the program will be

successful and attain the applicable water quality objectives. (RB 9417.) This includes consideration of the management practices to be used and the process for ensuring their proper implementation, as well as assessment of their effectiveness. (*Ibid.*)

The NPS Policy recognizes that there are instances where it will take time to achieve water quality requirements. (RB 9419.) Where a water board determines it is necessary to allow time to achieve water quality requirements, the NPS Policy requires the program to include specific time schedules and quantifiable milestones designed to measure progress toward reaching the specified goals. (*Ibid.*) A time schedule may not be longer than that which is necessary to achieve an NPS implementation program's water quality objectives. (*Ibid.*)

Adherence to best management practices does not excuse compliance with water quality requirements. (RB 9413.) A nonpoint source pollution control program must include verification measures adequate to determine whether the program is meeting its objectives, and a description of the course of action to be taken if the verification/feedback mechanisms indicate or demonstrate the program is failing to achieve its stated objectives. (RB 9419-20.)

The Modified Waiver does not meet the requirements of the NPS Policy because it lacks adequate monitoring and reporting to verify compliance with requirements and measure progress over time; specific time schedules designed to measure progress toward reaching quantifiable milestones; and a description of the action(s) to be taken if verification/feedback mechanisms indicate or demonstrate management practices are failing to achieve the stated objectives. The Board has failed to show a "high likelihood" that implementation of the Modified Waiver will be successful in attaining the applicable water quality standards.

For these reasons, the court agrees with Petitioners that the Modified Waiver does not comply with the NPS Policy.

i. The Antidegradation Policy

The Basin Plan also incorporates California's Antidegradation Policy. (RB 9194, 9418, 9348.) The Antidegradation Policy is designed to protect water quality that is higher than necessary to protect designated beneficial uses. (RB 9418.) The Policy prohibits the degradation of "high quality" waters absent specific findings, and requires restoration of high quality waters that have been degraded below water quality standards. (RB 9377.)

To permit a proposed discharge that will degrade “high quality” water, a water board must find that the discharge (1) will be consistent with maximum benefit to the people of the State; (2) will not unreasonably affect present and anticipated beneficial use of the water; and (3) will not result in water quality less than that prescribed in water quality plans and policies. In addition, the board must ensure the discharge is utilizing the “best practicable treatment or control (BPTC)” to ensure pollution or nuisance will not occur and that the highest quality consistent with the maximum benefit to the people of the State will be maintained. (RB 9349, 9377-78; see also RB 8548.)

As described above, the first step in an antidegradation analysis is to determine whether there are “high quality” waters that may be affected by discharges. If the receiving water is high quality and an activity will discharge waste into the water, the Policy presumes that the quality of the water will be degraded by the discharge. (*AGUA*, *supra*, 210 Cal.App.4th at p.1272.)

To determine if water is “high quality,” the Policy requires the water board to compare the “baseline water quality” to the water quality objectives established to protect designated beneficial uses. The baseline water quality is the “best quality of the receiving water that has existed since 1968 . . . unless subsequent lowering was due to regulatory action consistent with State and federal antidegradation policies.” (*Id.* at p.1270.)

If the baseline water quality is equal to or less than the established water quality objectives, the water is not “high quality” and the objectives set forth the water quality that must be maintained or achieved. The Antidegradation Policy is not triggered. (*AGUA*, *supra*, at p.1270.) If the baseline water quality is better than the water quality objectives, the Policy is triggered and the baseline water quality must be “maintained” in the absence of the findings required by the Policy. (*Ibid.*)

The Regional Board found the Waiver to be consistent with the Antidegradation Policy because it will “improve” water quality. (RB 8509; see also SB 7229.) Petitioners contend that the Waiver violates the Antidegradation Policy because it allows continued degradation of high quality waters and the Board has not made the findings required to allow such degradation.

The court is unable to decide whether the Waiver violates the Antidegradation Policy because the Board has failed to apply the Policy in the manner directed by the Court in *AGUA*, including any consideration of whether the waters are “high quality” waters. On remand, the Board is directed to consider whether the Waiver is consistent with the Antidegradation Policy, as interpreted by the Court in *AGUA*.

2. Does the Modified Waiver have adequate monitoring provisions?

As described above, Water Code section 13269 requires a conditional waiver of waste discharge requirements to include monitoring requirements “designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. (Cal. Water Code § 13269(a)(2).) Additionally, monitoring results must be made available to the public. (*ibid.*) A water board may waive monitoring requirements only for discharges that “do not pose a significant threat to water quality.” (Water Code § 13269(a)(3).) Petitioners argue that the Modified Waiver violates section 13269 because its monitoring program is inadequate to verify its effectiveness, and the Waiver fails to disclose adequate monitoring data to the public.

Petitioners contend that the Modified Waiver's surface water monitoring program suffers from two fatal flaws. First, it does not require surface discharge water quality monitoring and reporting from all dischargers. (It only requires surface discharge monitoring from Tier 3 dischargers, and then only for some discharges -- “outfalls,” but not sheet flows.) In all other cases, the Waiver measures receiving water pollution concentrations, rather than actual discharges. Second, the Waiver allows dischargers to join cooperative monitoring groups in lieu of individual monitoring.

Petitioners contend the Modified Waiver's groundwater monitoring program is equally flawed. First, the Waiver only requires dischargers to monitor the primary irrigation well and wells used for drinking water purposes. Growers can simply avoid identifying their wells as “drinking water wells” to avoid having to do any monitoring. Second, the Waiver does not require growers to sample their primary irrigation well. Instead, Tier 1 and 2 growers and growers who join cooperative groups can use existing data or studies to estimate pollution levels. Third, the frequency of monitoring – twice the first year and once every five years for Tier 1 and 2, once every year for Tier 3 – is inadequate.

Respondents contend the State Board did not materially change the monitoring standards for surface water and groundwater quality, except to make some clarifying revisions to the cooperative groundwater monitoring provisions. Thus, Respondents argue that Petitioners' arguments are not properly before the court. Regardless, Respondents contend the Waiver's monitoring provisions comply with the requirements of the Water Code.

Petitioners have failed to persuade the court that surface discharge monitoring of all discharges is required – or even possible given that there are approximately 435,000 acres of irrigated land and approximately 3000 agricultural operations generating discharges of waste. The Board struck an appropriate balance in requiring individual surface discharge water monitoring for “high risk” dischargers, while retaining surface receiving water monitoring for other dischargers.

Likewise, both the Water Code and the NPS Policy expressly allow the use of cooperative or watershed-based monitoring. (RB 9414-16; Wat. Code § 13269.) While individual monitoring might provide more information, it would be complicated, costly, and would threaten to overwhelm Regional Board staff. The Board acted within its discretion in generally supporting the use of cooperative or watershed-based monitoring, and limiting individual surface discharge reporting to “high-risk” dischargers.

Petitioners have failed to show that the frequency of groundwater sampling is insufficient, that the proposed statistical monitoring is impermissible,<sup>13</sup> or that the Waiver fails to disclose adequate monitoring data to the public.<sup>14</sup>

The court agrees with Petitioners, however, that the Waiver’s compliance/verification monitoring is inadequate. Because the Waiver relies on implementation of management practices to achieve water quality standards, monitoring must be sufficient to verify the effectiveness of the management practices that are implemented. Problems arise when the implemented management practices are not effectively controlling discharges of pollution. The limitations of the cooperative surface receiving water monitoring in identifying the source of exceedances was the impetus behind the inclusion of the individual surface water discharge monitoring for Tier 3 dischargers in this Waiver.

The Board acknowledged the limitations of the representative monitoring approach, and even suggested possible solutions, but failed to include the necessary changes in its Waiver. (See SB 7198-99.) As a result, the Waiver continues to be inadequate to identify and resolve exceedances for all but the small class of dischargers subject to individual surface discharge monitoring.<sup>15</sup> The Waiver does not contain adequate

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<sup>13</sup> The Board’s Waiver required direct sampling where the statistical method projected nitrate at half the safe level, and repeat sampling if the statistical method projected nitrate at 80% of the safe level. The court agrees with Petitioners, however, that the Waiver should define what it means to be “statistically valid.”

<sup>14</sup> As discussed above, the court is troubled by the amendments to Provision 44(g) alleviating Tier 1 dischargers of the requirement to report results of methods used to verify practice effectiveness in their Farm Plans.

<sup>15</sup> It is noteworthy that the Board admitted that compliance monitoring was not a “primary” focus of the Waiver’s groundwater monitoring provisions. (See SB 7191.) Rather, the monitoring was focused on

monitoring provisions to verify that management practices are effectively controlling pollution.

3. Is the Modified Waiver in the public interest?

As described above, the Porter-Cologne Act prohibits waivers unless they are “in the public interest.” (Cal. Water Code § 13269(a)(1).) Petitioners argue that the Modified Waiver is not in the public interest because there is no evidence it will lead to quantifiable improvements in water quality or arrest the continued degradation of the Central Coast Region’s waters. The court agrees, for the reasons stated above.

C. Did the Board abuse its discretion by excluding the U.C. Davis report?

Recognizing a need to protect the public health by preventing or reducing the contamination of groundwater, the California Legislature appropriated about fifty million dollars for grants for projects to protect public health by preventing or reducing the contamination of groundwater that serves as a major source of drinking water for a community. (Water Code § 83002(b)(2)(D).)

Of this amount, two million dollars was appropriated for pilot projects in the Tulare Lake Basin and the Salinas Valley focusing on nitrate contamination. The stated purpose of the pilot projects was to identify sources of groundwater nitrate contamination; estimate the proportionate contributions to such contamination by source and category of discharger; identify and analyze options to reduce nitrate levels and prevent continuing nitrate contamination and the estimated costs associated with such options; identify methods and costs to treat nitrate contaminated groundwater for use as drinking water; identify methods and costs to provide an alternative water supply to affected communities; and identify potential funding sources to pay for treatment or alternative drinking water supplies. (Water Code § 83002.5.)

In June 2010, the State Board selected experts at the University of California, Davis, to study the causes of, and solutions for, nitrate contamination in the Salinas Valley. The final U.C. Davis Report was published on March 13, 2012.

On March 15, 2012, Petitioner Monterey Coastkeeper attempted to introduce the Report during the public hearing on the 2012 Waiver. The Regional Board declined, stating

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monitoring drinking water quality. This is telling. The monitoring required by the Waiver may be adequate for the purpose of monitoring drinking water quality, but it is not sufficient for the purpose of verifying the effectiveness of implemented management practices.

that the Report was submitted too late to be included in the administrative record. (RB 8130-32.)

After Petitioners and the agricultural interests filed their petitions for administrative review with the State Board, however, the Regional Board requested the State Board to take official notice of the U.C. Davis Report. (SB 7163.) The State Board recognized the "significance of the information and analysis contained in the Report," but declined to take official notice of it, stating:

[F]or the short-term purposes of resolving the Petitions, we find that the administrative record already before us contains sufficient evidence of the impact of agricultural practices on drinking water in the Central Coast region as well as practices that may ameliorate the problem. (*Ibid.*)

The State Board committed to convene an expert panel to consider the findings of the Report and assess agricultural nitrate control practices. (*Ibid.*)

While Petitioners recognize the Board has discretion to decide whether to accept additional evidence, Petitioners contend that the Board abused its discretion in refusing to consider the U.C. Davis Report because it is unique, highly relevant, and the most current scientific information available addressing groundwater contamination in the Salinas Valley.

Respondents contend the Board appropriately declined to consider the U.C. Davis Report because it was not published until the day before the Regional Board adopted the 2012 Waiver, was not part of the administrative record, and was cumulative of other evidence already in the record (including a PowerPoint presentation of the draft U.C. Davis Report itself). Instead, the State Board appropriately committed to convene an expert panel to consider fully the findings of the U.C. Davis Report.

The court is not persuaded that the Board abused its discretion in refusing to admit the U.C. Davis Report. However, on remand the Board is directed to reconsider whether the Report should be admitted into the record.

D. Did the Board violate CEQA by failing to undertake additional environmental review before adopting its final Order?

Petitioners' final contention is that the State Board violated CEQA by making substantial changes to the 2012 Waiver without conducting supplemental environmental review.



Respondents contend the Modified Waiver did not constitute a substantial change to the 2012 Waiver such that it required additional environmental review.

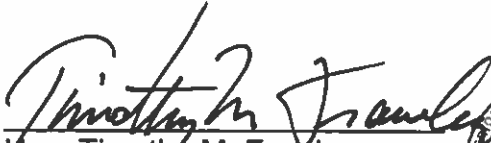
While the court is not persuaded that the Board's incremental changes to the Waiver necessarily required a Subsequent EIR, it is possible that some additional environmental review was required to address the changes to the Waiver since preparation of the Regional Board's SEIR, which was based on the 2010 Draft Waiver. On remand, the Board is directed to consider what, if any, supplemental review may be required to comply with CEQA in connection with the Waiver.

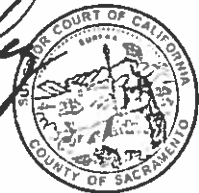
VII.  
Disposition

For the reasons described above, the court shall grant the petition and issue a peremptory writ of mandate compelling Respondent State Board to set aside its Order No. WQ 2013-0101 and reconsider the Conditional Waiver of Waste Discharge Requirements (Order No. R3-2012-0011) and related Monitoring and Reporting Program (Order Nos. R3-2012-0011-01, R3-2012-0011-02, and R3-2012-0011-03). The State Board may choose to allow the Modified Waiver to remain in effect on an interim basis while the State Board takes action to formulate a new waiver consistent with this ruling.

Counsel for Petitioners is directed to prepare a formal judgment and writ (consistent with this ruling); submit them to opposing counsel for approval as to form; and thereafter submit them to the court for signature and entry of judgment in accordance with Rule of Court 3.1312.

Dated: August 10, 2015

  
Hon. Timothy M. Frawley  
California Superior Court Judge  
County of Sacramento



**CERTIFICATE OF SERVICE BY MAILING**  
**(C.C.P. Sec. 1013a(4))**

I, the undersigned deputy clerk of the Superior Court of California, County of Sacramento, do declare under penalty of perjury that I did this date place a copy of the above entitled RULING in envelopes addressed to each of the parties, or their counsel of record as stated below, with sufficient postage affixed thereto and deposited the same in the United States Post Office at Sacramento, California.

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Dated: August 10, 2015

By: F. Temmerman  
Deputy Clerk, Department 29  
Superior Court of California,  
County of Sacramento

Attachment

Two

**Review of**

**“Draft Conclusions of the Expert Agricultural Panel, Recommendations  
to the State Water Resources Control Board Pertaining to the Irrigated  
Lands Regulatory Program”**

**In Fulfilment of SBX2 1 of the California Legislature**

**August 6, 2014**

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## Introduction

My name is Dr. Mark Kram, and I have been retained by the leaders of the Otter Project to review the document entitled “*Draft Conclusions of the Expert Agricultural Panel, Recommendations to the State Water Resources Control Board pertaining to the Irrigated Lands Regulatory Program*”, which has been released for public comment in fulfillment of SBX2 1 of the California Legislature. As such, review comments have been organized and presented below as General Comments, Recommendations, Specific Comments, and Summary and Conclusions. I have also included references, a brief summary of my background and selected publications, and a list of selected technology vendors and contacts referenced in other parts of this document.

In response to recently observed elevated nitrate concentrations in groundwater resources near and adjacent to critical agricultural regions, the State Water Board developed recommendations in four key areas to promote the remediation of nitrate contaminated groundwater. These areas include:

- 1) Provide safe drinking water
- 2) Monitoring, notification, and assessment
- 3) Nitrogen tracking and reporting
- 4) Groundwater protection

In addition, the State Water Board recommended that the Legislature approve of the formation of an expert panel to assess existing agricultural nitrate control programs, and to develop recommendations for improvement, as needed, with a focus on protection of groundwater quality. The State Water Board then contracted to a panel of experts, each retained based on key areas of expertise that include familiarity with agricultural practices and understanding of fate and transport of pollutants in soil and water media.

Key objectives of this review report include identifying areas of common ground between the agricultural communities and other stakeholders, evaluating the panel’s recommendations as described in their report, and to introduce and propose new technologies that can effectively and efficiently meet key drinking water quality and regulatory objectives with minimal burden to the grower community. Fortunately, the complex nitrate management issue has many features in common with the relatively mature environmental assessment and remediation industry focused on groundwater and soil restoration at hazardous waste release sites. As such, where possible, recommendations will be proposed for leveraging mature and innovative approaches, technologies and policies developed for such endeavors.

## General Comments

- 1) A well-functioning and environmentally sustainable agricultural community is critical for reasons related to societal benefits associated with economic, security, drinking water supply, energy and long-term environmental considerations.

- 2) Since agricultural practices in California have been granted exemption or leniency regarding addressing the potential nitrate contaminant issues for so long, and a comprehensive nitrate management policy has not yet been developed or implemented by the regulatory community, it is critical to understand that contamination emanating from legacy activities will need to be considered when addressing relationships between cause-and-effect for current and future agricultural practices. In addition, loading studies seem to conclude that legacy sources alone do not account for the nitrates found in the groundwater or vadose zone. As such, implementation of compliance programs will need to be flexible and account for temporal, spatial, and site-specific characteristics, as a one-size-fits-all or even an aggregated (e.g., by crop, region, or common field characteristics) approach may not be appropriate.
- 3) Any solution proposed will require substantial financial resources for development of policies, integration of new practices, monitoring, education, and implementation of private sector and government programs.
- 4) It is in the best interest of all parties to derive a balanced approach towards managing agricultural practices that weighs public benefits against the interests of individuals or aggregated parties. For instance, if the privatization of profit overwhelmingly favors socialization of the risks (e.g., contamination of the public drinking water resources), public financial resources will need to be made available to address the unfavorable outcomes. As such, a decision regarding what is a fair level of public financial burden will need to be determined.
- 5) An ideal outcome of this process should include the use of the most effective technologies and practices that would result in pragmatic policies that can meet key drinking water quality objectives with the least amount of burden endured by the grower community to ensure compliance, continual improvement, and restoration supported by defensible trend analyses.
- 6) While an enforcement component to drinking water resources management policy will eventually be required, given the complexities involved, many in the environmental community would be willing to accept an initial transitional period that emphasizes education and monitoring network deployment while acknowledging near term improvements to management practices as verified by defensible documentation (e.g., reduction in nitrate amendment exceedance and improved soil/water quality).
- 7) Given what we know about widespread contamination of our groundwater resources and what we understand about the loading already present in the vadose zone, the environmental community realizes progress will require years, even decades of effort, adding to the urgency to immediately initiate comprehensive monitoring and responses.
- 8) Low-cost denitrification bioreactors (Diaz et al., 2003; Christianson et al., 2013), engineered wetlands, and other types of passive treatment systems and approaches should be considered for many of the properties to reduce nitrate releases to the environment. Monitoring of these can also be accomplished via the emerging state-of-practice automation technologies to evaluate efficiency and to determine loads that can be tracked over time (Kram et al., 2011).
- 9) All hazardous material risks are comprised of source, pathway, and receptor components. The panel is advocating against understanding site-specific pathway components. It is impossible to manage what is not measured. Unlike the hazardous waste and groundwater remediation industries, the agricultural community has not yet been required to produce key site

assessments or to develop monitoring programs sufficient to adequately determine cause-and-effect relationships. The panel is suggesting that since this is complex, we should not attempt to pursue this type of relationship. This does not make sense from a scientific perspective, particularly since there exist decades of historical and ongoing related efforts, thousands of experienced practitioners, and comprehensive libraries full of standards and guidance documents available from analogous industries (e.g., groundwater assessment, groundwater and soil remediation, landfill and oil and gas industries), and new and emerging technologies that will greatly facilitate compliance (e.g., sensors, automation, geospatial mapping, remote sensing, drone deployed technologies, high resolution direct push sensing and well installation, etc.).

- 10) While many of the panel's recommendations (e.g., education, appropriate training for key entities in specific roles, tracking of nitrogen amendments, etc.) are exceptional, and they accurately point to many of the complexities associated with the challenges at hand, unfortunately, their recommendations as presented in the report will not enable the communities involved to meet key drinking water quality objectives. More specifically,
- a. The panel proposes extremely limited monitoring and reporting.
  - b. The panel advocates for data collection activities at temporal and spatial scales that are not sufficient.
  - c. The panel advocates for data collection and reporting at an aggregated coalition scale, as opposed to supporting site-specific understanding of the fate and transport of nitrate throughout the system at a granular scale sufficient to be able to eventually understand cause-and-effect, and that would allow for the identification of nitrate source areas where specific challenges persist.
  - d. The panel appears to emphasize what is not possible, characterizes the application of well-founded scientific principals and methods as futile, and does not consider the important lessons that can be learned from the hazardous waste and groundwater restoration fields as well as the associated regulatory tools already in place (e.g., GeoTracker, ITRC guidance, etc.).
  - e. The panel does not consider the many fine technologies available for expedited site characterization, automated sensing, analyses (temporal and spatial), and reporting that are commercially available or in beta testing. These technologies have the potential to greatly improve the understanding of conditions and trends, and could significantly alleviate the majority of the grower's site-specific assessment, monitoring and reporting burden.
  - f. With respect to surface water considerations, while the panel advocates for monitoring in downstream areas to determine general locations of pollution sources, they also advocate against monitoring at specific discharge points. With new sensing technologies, an automated monitoring and data processing network at actual discharge points could be extremely helpful in identifying where issues persist, notifying the appropriate entities (not for punishment, but to assist with management decisions [at least initially]), and tracking trends and geospatiotemporal relationships with other factors (e.g., correlations with specific crops, climate, etc.).



- g. Beyond modification of the amounts of nitrogen based materials purchased and applied, the panel does not consider alternative nitrate pollution control and containment options such as passive bioreactors, engineered wetlands, and other potential technologies.

## Recommendations

Initial recommendations for consideration include the following:

- 1) Collectively identify a multi-pronged set of pragmatic solution components (e.g., education, monitoring of purchases, site-specific field and groundwater monitoring, changes over time and space, deployment and installation and monitoring of passive bioreactors, etc.) that result in nitrate load reductions while not excessively burdening farmers.
- 2) It is proposed that the term “non-point source” be discontinued where appropriate, and that new terminology be derived to better define some of these types of pollution sources (e.g., “aggregated source”). If application of an amendment at a specific location (or even materials from a canal or discharge pipe emanating from a specific activity or location) can be identified as the cause of drinking water quality impairment, the description of this type of source should no longer be ambivalent or imply that a pollution source cannot be identified and appropriately addressed.
- 3) We can’t manage what we can’t measure. As such, establish a monitoring network that will yield information appropriate for applying quantifiable performance based metrics (e.g., load reduction percentage in soil and concentration reduction in groundwater).
- 4) Water level maps (past, present, and automated updates) should be developed and maintained/updated to determine direction and flow of nitrate solute plumes. This mapping is synergistic with State initiatives to map, track, and potentially regulate withdrawals from over-tapped groundwater aquifers through programs such as CASGEM.
- 5) Comprehensive calibrated models need to be developed to specifically identify source terms, predicted nitrate concentration distributions over time and space under various scenarios and assumptions (e.g., nutrient loads, soil storage and fluxes, extraction rates, etc.) and evaluate specific remedial responses (e.g., percentage load reductions for specific agricultural tiles).
- 6) Need to establish location-specific nitrate reduction objectives based on tile and crop nutrient requirements relative to amounts administered, with detailed attention paid to developing a quantifiable and verifiable amendment allocation program with zero-net-excess and zero nutrient discharge objectives.
- 7) Comprehensive monitoring for nitrate in groundwater, soil, and at the soil surface should be implemented; preferably automated using innovative technologies for detection, remote reporting, and geospatiotemporal mapping and archiving.
- 8) An understanding of the spatiotemporal groundwater nitrate mobility and changes in mass discharge (ITRC, 2010; Kram et al., 2011; Suthersan et al., 2011) should be developed at local and regional scales to help determine whether water quality is improving, identify locations

where additional attention is warranted, and to better determine cause-and-effect relationships both in the near term and well into the future.

- 9) A comprehensive network of shallow groundwater monitoring wells and transects should be installed for determining mass discharge over time and space (ITRC, 2010).
- 10) Employ automated monitoring networks to better understanding source terms, mass flux and mobility distributions, to track changes/improvements over time and space, to evaluate bioreactor performance, and to recommend or automate modification of amendment practices (e.g., precision agriculture in the true sense of the concept).
- 11) Identify funding sources and develop new programs (e.g., establish a Nitrate Cleanup Fund Program, supported by surcharges on all nitrogen amendment purchases) to pay for the educational, monitoring, reporting, and management components required to resolve issues associated with impaired water quality.
- 12) Directly apply as many aspects as possible developed for the hazardous waste management and groundwater remediation industries. This would include technologies, policies, engagement of recognized expertise, and integration of tracking and regulatory tools such as GeoTracker and discharge permits.
- 13) Development of new standards and training tools that incorporate best agricultural management practices with an emphasis on reduction in excess nitrate amendment.

## Specific Comments

Specific comments are organized by page number and specific section, where applicable, below.

- 1) p.ii - The expert panel recommends four key programmatic elements comprising a paradigm shift in regulatory attempts to reduce nitrate levels in groundwater. Responses to these components are briefly described below:
  - a) I concur with most of Element #1 (e.g., *"All farmers should have good irrigation and nitrogen management plans"*). However, why should there be any exemptions from monitoring? Reducing nitrate loads to be equal to or below the natural attenuation capacity of the soil and surroundings is key, and if there are site specific characteristics associated with growing rice on clay soils, verification of claims associated with relative impact should be part of the process. If the objective is *"to ensure that ongoing efforts are protective of groundwater quality"*, it is essential that a detailed understanding of cause-and-effect relationships and relative contributions to the total loads (even if suspected to be negligible) are developed and confirmed within the context of dynamic settings. If these relationships are not developed, it will be nearly impossible to meet the stated water quality objectives.
  - b) Regarding Element #2, I concur that reporting should be simple and effective. However, the basic reporting elements should also include nitrogen amounts applied relative to the natural attenuation capacity (which should consist of soil and crop uptake considerations relative to the shortest vertical distance to groundwater and lateral distance to surface water discharge locations as well as residual nitrate resulting from previous amendment campaigns). Once a location-specific sustainable load capacity has been determined, monitoring can be

automated as much as possible so that farmers are not burdened with sampling and reporting requirements. The data could be represented by intuitive geospatial and temporal renderings so that farmers and their consultants can actively determine where the sustainable capacity has been exceeded based on quantified metrics such as nitrate concentrations in runoff and downgradient groundwater monitoring wells, canals and discharge pipes. Eventually, after the residual nitrate in the system stored from past practices has exceeded residence times, a more accurate depiction of the balance between amendment and impact will emerge. This will be different based on site specific conditions, crops, climate and other factors. As such, a granular-scaled monitoring effort will be essential for successfully reducing the nitrate levels within the groundwater and surface water resources.

- c) Regarding Element #3, while grouping similar types of fields could be of interest from a broader perspective, and would be supported for general assessment purposes, emphasizing this in a policy driver will not resolve the issues at hand, as each site has very specific qualities that result in a range of impacts. While common characteristics such as crop and soil type may exist among properties in a certain region or coalition, when it comes to fate and transport of chemicals in the environment, heterogeneity prevails due to preferential pathways and other natural and anthropogenic factors. As such, the recommended grouping approach would not allow for data reduction at a level of resolution that is amenable to separating signal (e.g., specific groundwater contaminant sources) from noise. Therefore, it is recommended that the nitrate attenuation capacity be estimated and used as a metric for determining the maximum sustainable nitrate amendment policy for each property and set of growing conditions. This could be accompanied by source-specific monitoring efforts to assess whether the natural attenuation capacity has been properly estimated or exceeded, and then adjusted accordingly through time based on the monitoring results. This iterative granular-scaled approach has far greater probability of achieving the stated objectives that include modification of nitrate application practices to achieve improved water quality conditions.
  - d) Regarding Element #4, it is agreed that a comprehensive educational program should be implemented. This could include training related to determination of nitrate attenuation capacity, monitoring, striking a balance between amendment application and assimilation capacity, use of innovative technologies, and identifying methods for continuous process improvement. We recommend that the educational program be multi-lingual at all levels. Growers are not only Caucasian and Hispanic, but include Hmong and many tribal ethnicities from Central and South America. We would further add that the educational program must be continually available. The high rate of turnover of growers in some regions such as the Central Coast will require frequent and continuous educational offerings.
- 2) p.ii – In the General Understanding by the Panel section, the panel points to many challenges with the currently available data and cautions against misinterpreting future trends in groundwater quality. While there is agreement regarding the challenges that currently exist when deriving nitrogen loads and determining causes of observed changes, it is essential that a comprehensive monitoring effort be initiated immediately, that the monitoring campaign

encompasses multiple scales both spatially as well as temporally in both the vadose and groundwater zones, that a better understanding of nitrogen fate and transport be derived and observed, and that specific performance metrics be developed and evaluated based on corresponding data collection activities tied to key questions and irrigated land management strategies. While challenges exist, these objectives are very achievable given currently available technologies combined with newer technologies that have recently become available to understand key geospatial and temporal trends. A multiple-lines-of-evidence strategy can provide exceptional results when the data is collected at an appropriate scale. Had this type of monitoring program been in place years prior to the recent discovery of the nitrate challenges, it is likely that the regulatory and management strategies could have by now been far more effective at protecting drinking water and ecological resources. The longer it requires to initiate and implement such a strategy, the longer it will be before these challenges can be sufficiently resolved.

- 3) p.iv – While there are concerns with the Panels Key Points, a few highlights are presented below.
  - a. The Panel’s Point D (whereby the members argue against monitoring of the first water bearing zone) makes very little sense from a scientific perspective. Maintaining that monitoring should be avoided because interpretations are complex is not an effective argument. While it is recognized that the vadose zone can serve as a nitrate storage regime base on past practices, it is essential that observations over time and space in the shallow saturated zone be evaluated and monitored beginning as early as possible and over multiple scales. For reference, in the hazardous waste industry, conceptual models of contaminant distribution are typically developed for the vadose zone based on comprehensive sampling and materials are often excavated to protect receiving groundwater. While this would be cost-prohibitive for many locations, it could be very useful to at least begin monitoring areas with relatively shorter vadose zone residence times (e.g., shallow groundwater regions), develop estimates regarding fluxes and transport timing using multiple lines of empirical evidence, and then to generate projections regarding when to expect chemical signals that reflect current practices. Dynamic work plans and conceptual models identical to those employed in the EPA Triad Approach (ITRC, 2003) would be ideal for this situation.
  - b. The Panel’s Point F (use nitrogen applied to crop in lieu of NHI and groundwater concentration) is troubling. The NHI and groundwater concentrations relate to risk. While the amount of nitrogen applied is critical to track (and modify accordingly), ultimately it is the groundwater concentration and associated NHI that will be used to determine whether risks exist. It is recommended that both amount of nitrogen be monitored as well as the groundwater concentrations impacted by these soil amendments.
  - c. The Panel’s Point H (accurate assessments of deep percolation of individual fields are impossible to derive) argues against attempting to develop a range of flux and transport estimates. Without these, how then can management practices be determined to be appropriate? There is a cause-and-effect relationship between the amendment

management practice and the resulting health of the receiving water, and the linkage with respect to timing of the nitrate signal is represented by the specific rate and amount of material flowing through the vadose zone interface. Ideally, a balance between the amendment introduction and the assimilation capacity of the vadose zone must be struck in order to reduce the amount of nitrate infiltrating to the groundwater. Without an appropriate estimate of the maximum suspected transport time (and corresponding adjustment of the amendment introduction practice to err on the side of caution), a prudent and effective nitrate pollution management program will be impossible to develop or implement.

- d. The Panel's Point S (an index should be developed, but groundwater nitrate concentration monitoring over the next 10-20 years may not reflect impact) is very important, as it is recognized that for some sites, nitrate stored in the vadose zone from past practices will continue to impact groundwater resources. It could be helpful, therefore, to select key locations for lysimeter sampling and other types of monitoring to track the nitrate transport front, and determine whether the regions just below the rhizosphere are improving based on adjusted amendment practices. In addition, newly available sensors can help track nitrogen in the soil over time and space. Regarding an index, an attempt to reflect the assimilative capacity of the vadose zone (which can be dynamic) in this metric is recommended. Ideally, the amount of nitrogen added should not exceed the amount that is required for the crop. Sensors can help evaluate whether this has been exceeded and can be monitored remotely to help identify where practices need to be adjusted. In addition, it is possible to use the sensor data to automate the nitrogen amendment activities (e.g., fertigation schedules). Furthermore, tracers may be added to the nitrogen amendment over specific intervals to help derive estimates of nitrate transport timing.
- e. The Panel's Point T (only compare multi-year data) does not make sense from a scientific perspective. Data should be monitored on a continuous high-frequency basis, and trends can be identified and interpreted on an ongoing basis. As stated above, amendment practices can even be automated using sensor driven detection and logic based controllers.
- f. The Panel's Point W (not to require annual nitrogen cycle computations) is an argument against improvement to the process or condition. To help facilitate farmer documentation and computation efforts with minimal disruption, automation should be pursued as much as possible. This could include software with an intuitive interface and minimal time for completion of the computations. When properly designed, key factors will remain the same over time. As such, the regulatory body can offer assistance to the farmers or their consultants for the first few years of data entry to facilitate computation and compliance. This should be included within the educational component of the nitrate management program.
- g. The Panel's Point BB (sampling throughout watershed but not at all discharge points) would not enable practitioners to determine cause-and-effect, as location-specific source identification is essential for facilitating appropriate resolution. While it is agreed

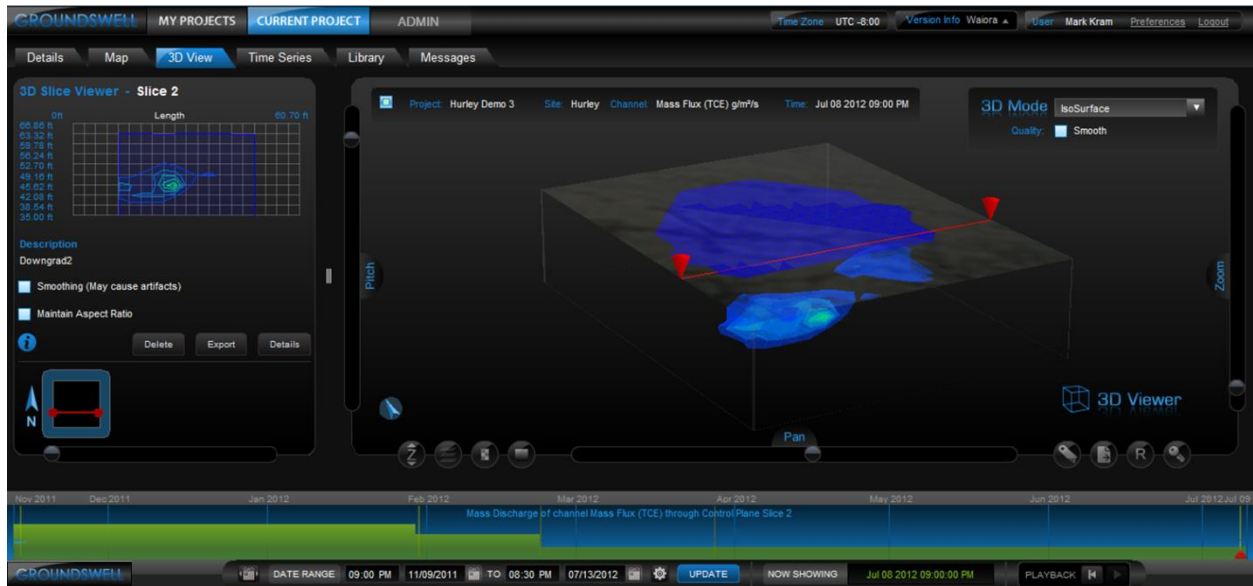
that a sampling or sensor network in key portions of the watershed is essential, it is also essential to deploy sensors or samplers at all discharge points so that the source signal can be elucidated from the data collected. Prioritization can be driven by field teams who perform near real-time watershed load assessments during runoff periods. The term “nonpoint” source is misleading. It is proposed that this should no longer apply for this type of situation. A more appropriate descriptor should be adopted (e.g., “multi-point” or “aggregated” source) to reflect how there is a direct connection between the application practice, location, amount applied, crop, nitrogen consumption potential, and environmental factors at a given time and place, and the contribution to the resulting water quality condition.

- 4) p.6 – With respect to reporting (Section 2.4), it is important to note that during the Nitrogen Tracking and Reporting Task Force’s second public meeting the group was “*urged to focus on identifying types of data that would be most useful to decision makers and provide real-time information while being practical to collect.*” There was a special emphasis on tracking mass balance that includes yield, nitrogen removed and “*on-farm, event based record keeping*”. In their data elements descriptions, the Task Force maintains the Water Board right to request and access data at the individual farm scale. Based on the expert panel comments and recommendations presented in this document, the panel opposes many of these Task Force recommended measures, while many stakeholders in the process strongly encourage the Water Board to maintain and exercise these rights when warranted. Furthermore, Water Board implementation of sensor and GIS based reporting technologies to better identify key conditions, dynamics, and to verify positive trends is highly encouraged by the public sector. Furthermore, according to the Task Force, the Regional Water Boards are responsible for ensuring the accuracy of the data. However, measures for ensuring accuracy or quality control were not described.
- 5) p.7 – We are in agreement with Panel Finding Item 1 that just collecting data does not necessarily improve or clarify the situation. However, this should not become an argument against collecting critical data along with necessary and descriptive metadata. The data collected should be aimed at answering specific questions, understanding specific processes, and must be converted to decision-support quality information.
- 6) p.7 – With respect to Panel Finding Item 2, the argument against tracking nitrogen loads makes several key points. However, without data collection to understand (as best as possible) the range in loading rates, deriving appropriate decisions regarding safe practice becomes impossible, and as such, the resulting policies will be ineffective. It is possible to employ chemical forensics, sensors, sample results, and sufficient spatial distributions of field observations and measurements to determine or estimate worst case risk scenarios (e.g., highest vertical flux, maximum surface discharge, etc.) that can then be utilized to proactively modify nitrogen amendment schedules and volumes. We agree with the comment in 2c that states “*the approach should be directed toward inducing good farm management, not merely tracking and reporting what is being done.*” However, the approach should not exclude or

minimize the value gained by tracking and reporting data collected with specific objectives that result in overall water quality improvement through appropriate nitrate application practices.

- 7) p.7 – With respect to Panel Finding Item 3, groundwater monitoring for nitrate concentration should be accompanied by water level data to determine gradient and flow direction, and in many cases, hydraulic conductivity assessment to determine groundwater flow velocity and mass flux distributions with a directional component. See Kram et al. (2011) for additional information where this was employed to evaluate performance of a USDA designed passive nitrate pollution treatment cell, and to track the discharge of solute Cr(VI) into the Columbia River. Others (Diaz et al., 2003; Suthersan et al., 2011; Christianson et al., 2013) have successfully applied and advocated for similar approaches (ITRC, 2010). While sufficient data will need to be collected for some of these types of efforts, a phased approach for selected locations suspected of high impact where groundwater is relatively shallow could consist of the following:
- a. initial determination of groundwater flow directions;
  - b. deployment of a direct push (e.g., hydraulic profiling tool [HPT] or high resolution piezocone [HRP]) sensor probe system to generate a double transect depiction of hydrogeologic characteristics in the shallow subsurface and aquifer (e.g., to 30' bgs);
  - c. installation of direct push groundwater monitoring wells along two transects oriented perpendicular to the local groundwater gradient;
  - d. installation of sensors for water level and nitrate concentration in the direct push wells;
  - e. automated tracking of water level and nitrate concentration using sensors;
  - f. with an understanding of hydraulic conductivity, water levels can be converted to Darcy velocity;
  - g. by multiplying Darcy velocity by concentration, it becomes possible to track nitrate discharge through source control planes oriented perpendicular to the direction of groundwater flow;
  - h. evaluation of subsurface nitrate discharge values over time to understand changes due to load reduction, vadose zone flushing, a combination of these, or to correlate with specific crop rotation and amendment activities.

Below is an example whereby TCE solute discharge was tracked to determine the extent of remediation attributed to a bioamendment injected into the subsurface at an industrial facility:



The three dimensional image represents the distribution of mobile solute for the selected time step. The cross-section represents the distribution of the mobile solute through a source control plane for that time step. The histogram represents the mass discharge through the control plane over time. Notice how a reduction in discharge can be readily observed, quantified, and can be processed in an intuitive format. Deeper groundwater zones can prove to be more expensive for this type of approach, but since the lithology is generally unconsolidated in the regions of interest, these types of monitoring systems can be installed using the same tooling and equipment described above.

- 8) p.13 – Panel Item #6 is very important, and we are in agreement. As such, it is recommended that more thorough characterization of site specific and regional hydrogeology be determined, that flux and discharge assessments be performed and tracked over time and space, and that a localized and regional understanding of this information continuously improve through support by USGS, USDA, NSF and other funding programs. Fortunately, tremendous progress has been made in the contaminant assessment and remediation industry, and as such, high-resolution expedited characterization (ITRC, 2006; Kram et al., 2008) and automated real-time monitoring and reporting technologies have become cost-effective, accurate, and readily available.
- 9) p. 14 – Panel Items #7 and #8 point to challenges in understanding key nitrogen fluxes and mass balance criteria. We are in agreement, which is why we are advocating for more appropriate data collection activities to help better understand key factors contributing to the issues at a local level so that correct decisions can be derived and implemented, and metrics employed to continuously improve water quality. The Harter study cited may have resulted in unanswered questions and uncertainties. However, had a data collection network and appropriate infrastructure been in place at the time the study was commissioned, it is highly probable that many of the shortcomings and uncertainties discussed would have been resolved. Given the state of our technology, and the direction of industry (e.g., precision agriculture, smart grid, sensor breakthroughs, DOE/EPA funding for similar endeavors, etc.), we are optimistic that currently available tools and those that are in development will enable stakeholders to derive



solutions to these challenges. However, advocating for less data because past investigations were challenged by lack of data represents a circular argument and will not enable stakeholders to meet the collective water quality objectives. Technologies developed for energy extraction and optimization, remediation, and even security industries can be directly applied to the challenges associated with nitrate water contamination and effective management strategies.

- 10) p.15 – Panel Item #12 is very important, as understanding the amount of nitrogen removed via crop harvest is a key component required to derive a mass balance. It appears that for some crops, this information is easier to estimate than for others. It is recommended that estimates be derived (as best as possible) by comparing the load to the soil and groundwater to the amount added to the crop where uncertainties exist. Innovative approaches (e.g., optically based remote sensing technologies and data visualization and processing; Quemada et al., 2014) can be explored as well. While this may be a new parameter for farmers to begin to track, it is essential that this be done so that resource managers can readily derive appropriate nitrogen requirements. To-date, these requirements have been over-estimated or applied incorrectly, which is why the groundwater and surface water resources have been impaired. Reporting nitrogen removed via crop harvest together with soil characterization and nitrogen applied will eventually lead to a comprehensive database that will allow for identification of outlier areas requiring additional attention and action.
- 11) p. 16 – Panel Item #13 is key, as the methods employed to-date are insufficient because appropriate types of monitoring have not yet been required. However, we do not agree with the panel’s disregard for data collection activities as proposed by the California State Water Board. More specifically, it is absolutely possible to understand cause-and-effect relationships when appropriate data is collected and transformed into actionable information. For instance, key measurements such as nitrate added to a field, nitrate distributions in the rhizosphere, vadose zone profile, and shallow groundwater, when assimilated and processed in a geospatial and temporal context can yield exceptional information. While some of the sensing technologies are innovative, this is not a new approach to developing site conceptual models, determining fluxes, and responding accordingly with high resolution (both spatial and temporal) refinement of the assessment, and then subsequent responses. The Interstate Technology Regulatory Council (a different ITRC), the American Society of Testing and Materials (ASTM), EPA, and the California Department of Toxic Substances Control (DTSC) have produced consensus-based guidance documents over the past 30 years addressing effective assessment and response strategies for many types of soil and water pollutants. While these efforts will require funding, much can be gained from incorporating similar (and even identical) processes into the nitrate monitoring and management program. At a minimum, when an appropriate monitoring network has been deployed, relative changes over time (e.g., dynamic tracking of mass discharge through aquifer transects) can enable practitioners to understand critical cause-and-effect relationships at local and regional scales. With respect to the panel’s proposed paradigm shift, there is a fundamental difference of opinion in that the objective is to restore and protect drinking water resources while burdening the farmer as little as possible. There is a minimum sustainability threshold that is achievable, and anything less will be at the expense of the public at large (e.g., increased taxes to restore impaired resources damaged by private activities). To-date, management practices

have been insufficient. As such, while certain components of the suggestion are warranted, we support an alternative paradigm shift that would emphasize exploitation of technology to simultaneously meet regulatory and public welfare needs while optimizing operations for increased revenues (e.g., reduction in the volume of amendments purchased and applied to the land, fewer notices of violation, penalties and legal expenses, etc.).

- 12) p. 16 – We are in complete agreement with Panel Item #14, which is why aggregation of fields or crops via consortia or coalition (while appropriate for a component of the management program from an analytical perspective) is not sufficient, as it will preclude resource managers and farmers from identifying specific areas and conditions that may cause impairment on a relative or even absolute scale. In the hazardous waste and groundwater remediation industries, which have many features in common with the challenges posed by nitrogen management, site-specificity is well accepted, and as such, project managers are encouraged to develop and test and continually monitor and revise site conceptual models based on a developed understanding over time and space. This approach has been effective and could directly apply to this situation.
- 13) p.17 – Section 3.2.1 discusses risks and vulnerability. The panel makes several good points regarding specific hydrogeologic conditions (e.g., exclusion of the Concoran Clay region, where groundwater above this can be impaired; pesticide applications may cover different areas than nitrogen application areas). As such, it is recommended that clarifications be derived by State Water Board representatives such that appropriate locations are accurately represented based on the potential for groundwater impairment either through direct application or via runoff and discharge to groundwater in areas remote from the initial application.
- 14) p.18 – Section 3.2.1.i presents a solid argument regarding the definition of vulnerability. Since most of the region has undergone extremely limited quantitative data collection activities, it is proposed that the initial zonation as derived be used as a first step, and that as more site-specific data relating to nitrogen sources and transport is compiled, revisions be derived. It is also recommended that this zonation be revised to more accurately reflect observations that exhibit vulnerability as defined in way that incorporates the following: “a weighted measure or index that reflects the susceptibility of an aquifer located below a specific field to become impaired by standard nitrogen amendment practices”. While this could be adjusted, it may be a good starting position, as it suggests that some practices and crops may not be appropriate for certain areas (or that specific crops in these areas warrant additional attention) and leaves open the possibility of incorporating minimum residence time, maximum velocity/imbibition/infiltration, attenuation capacity, and other factors that can be used as metrics to be ranked in a geospatial context and then used as a basis for decision making. With respect to criticisms of extraction well solute data and how this may not always reflect applications to the surface, this is true to a certain extent – particularly when no previous monitoring has been performed to understand the amount of materials introduced into the environment or fate and transport specifics resulting in discharge via the extraction well. There are certainly examples where practices on the surface have impacted groundwater conditions immediately below. These facts argue for installation of monitoring wells (preferably in transects and grid patterns) so that a greater understanding of upgradient sources and most recent vadose zone releases and changes over time can be developed. The data derived from

extraction wells can sometimes be helpful for determining subsurface flow regimes and for model calibration, so it will be important to continue monitoring and remain cognizant of key well construction parameters such as screen depth ranges, extraction rates, and pumping test results. There will undoubtedly be cost considerations when it comes to monitoring well installations. However, in general, installation of direct push monitoring wells in unconsolidated soils is far less expensive than the amounts currently being invested in supply well installations throughout the region.

- 15) p.19 – When establishing areas of priority for action/attention based on risk, the panel recognizes challenges associated with farmer constraints such as soil and crop type and irrigation source, and recommends that the risk assessment tools proposed by the regulatory community be applied at basin, regional, and coalition-wide scales. While this could help alleviate some of the farmer’s burden with respect to monitoring and risk classification, implementing the panel’s recommended strategy will prohibit stakeholders from meeting key water quality improvement objectives, as risk classifications need to be established at the scale of nitrate application practices – which is at the field scale. Attribute variabilities and dynamics occur at the field scale. Expanding assessment units to include basins, crop-specific conglomerates, or coalitions will preclude stakeholders from being able to develop dependable references or indices, produce meaningful recommendations, or to gauge progress over time and space. An analogy can be drawn from the hazardous waste and groundwater remediation industries. For instance, if all leaking underground fuel tanks in an urban setting were addressed as an aggregated unit using limited groundwater quality monitoring and hydrogeologic data collection efforts, it would be very difficult to determine source locations or to derive and implement remedial strategies. Implementing the panel’s recommendations in this regard would prove to be even more challenging from a source identification perspective, as nitrogen amendment practices occurring in rural settings can be even more spatially dense than leaking fuel storage tanks in an urban environment. As such, it behooves the Water Board to continue to advocate for site-specific cause-and-effect and quality improvement related monitoring endeavors.
- 16) p.20 – When addressing the probability of nitrate MCL exceedance in drinking water wells, the panel maintains that this should not be the responsibility of the regulated community. If it is discovered that water resources are contaminated by releases of pollutants, the Resource Conservation Recovery Act (RCRA) requires the responsible party to pay for the assessment, remediation and ongoing protection of the receptor community through groundwater monitoring. RCRA describes very specific situations where a waiver or exemption from groundwater monitoring can be issued. However, the owner-operator of the facility must demonstrate that there is very low potential for nitrate reaching the upper aquifer and subsequently migrating to a supply well. A comprehensive report is required, and this needs to be prepared and certified by a qualified geologist or geotechnical engineer. Given the current general lack of information required to make such an assessment at the field scale, and the cost requirements associated with performing such an assessment, it is understandable that the grower community would be concerned about these and related requirements. In the future, once additional information is collected and compiled, it may be easier for specific entities to

obtain waivers from this requirement. However, at present, these types of requirements are consistent with policies administered for hazardous waste releases. One pragmatic approach to minimizing costs would be to incorporate nitrate and other types of sensors in a flow-through configuration attached to the extraction well, and reporting the information automatically on a continuous basis, as the per-analysis costs would become negligible.

- 17) p.20 – When addressing deep percolation nitrate considerations and recommended methods for assessment, the panel offers a quote from Aristotle that suggests that they are advocating for limited data collection activities. We are not in concurrence with the panel in this regard. Alternatively, an “approximation of truth”, as used in the selected quote, can be far superior when utilizing innovative technologies such as automated continuous monitoring, spatiotemporal analyses and appropriate empirically-based estimates (e.g., conservative/buffered estimates of maximum vertical migration rates, etc.) relative to the use of traditional data collection approaches, or even limited or no data.
- 18) p.21 – The panel’s summary regarding vulnerability and risk cover key points addressed above. While many exceptional points are made, the general theme suggests that the panel believes that the nitrate pollution issues can be resolved by not collecting critical data, and by not investigating key factors at the field scale sufficient to identify location-specific sources. There is not concurrence, as it is believed that supporting the panel’s position would result in continued resource impairment. The panel’s arguments suggest that because of limited resources, the panel’s preferred pathway is to focus on education. While there is agreement that education should be a key component, it would behoove the regulatory community to consider implementing innovative and cost-effective technologies that can help answer key questions related to local and regional water and nitrate flows, water quality changes over time and space, and to use this data to develop relationships that will result in the identification of unsustainable management practices at the field level, where changes can be recommended for the good of all communities involved. While complex and challenging (and imperfect but always subject to improvements), implementation of this type of approach is not impossible (as implied by the panel comments). On the contrary, many of the tools used to manage landfills and hazardous waste sites are readily applicable and available. For instance, nitrate sensors have been developed specifically for agricultural applications (see <http://suprasensor.com/about/>). When combined with groundwater level information, mass flux and mass discharge renderings can be automatically determined (Kram et al., 2011) to both identify “hot spots” as well as evaluate whether activities are resulting in improvements. Similar applications are about to be initiated in New Zealand (personal communication, Dr. Hugh Canard, Environmental Group Manager, Lincoln Agritech Ltd).
- 19) p.22 – With respect to management practices, the panel recommends that lists of best management practices be framed within the context of heightened awareness and education, and not be used to derive requirements. While awareness and education are clearly important, we recommend that specific practices also be tied directly to actions that can be implemented at the field level. For example, for a given crop and soil type, an assessment of the nitrate residing in the soil should be performed to gain a general understanding of the pre-application condition, an estimated understanding of the worst case risk scenario (e.g., maximum nitrogen

infiltration rate and minimum residence time) be derived from field measurements at the site or from similar nearby regimes, and then the sustainable volumetric application of nitrogen should be determined. The primary objective should be to reduce the amount of nitrate reaching groundwater or surface water bodies. If after some time of monitoring (depending upon site specific factors), improvements are not observed (terms to be negotiated), then additional restrictions should be considered. At a minimum, a tracking system should be established whereby a set of crop-specific and hydrogeologic condition-specific decision tools could be employed to determine the maximum amount of amendment allowed for each application at each site. Nutrient loads could be carefully tracked and amounts reported to minimize excess nitrate amendment. Since many growers currently use commercially available management information systems (MISs) already, this should not represent an additional or prohibitive burden. However, MIS vendors should be immediately encouraged to amend their platforms to incorporate key features related to soil permeability, maximum vertical transport velocity, climatic information and dynamics, and other features that are directly linked to the issues at hand. The good news is that some of the features (e.g., maximum vertical velocity) will either only need to be measured a limited amount of times (which could also be obtained through shared coalition results from the collective fields in a region), and much of the information can be gleaned from strategically placed sensors (e.g., soil moisture and conversion to saturated/unsaturated hydraulic conductivity, and nitrate concentration distributions). California is the high-tech capital of the world. Sensors, software, and intuitive business practices have already been incorporated into many irrigation practices. As such, much of the communication and software infrastructure is in place or at least somewhat familiar to key field managers who are adept at implementing efficiency strategies. Furthermore, entrepreneurial pursuits at the university level could be encouraged (e.g., prizes or start-up support) to develop specific niche technologies to bridge technology gaps identified through the regulatory process.

20) p.23 – The panel advocates for development and implementation of irrigation and nutrient management plans specific to each grower and similar management unit as well as educational programs. This is an exceptional recommendation and a solid starting point. The panel also recommends using the data only for management purposes, and not for reporting. This is not supported by the environmental community members, as the extent and complexity of groundwater impairment has reached a point where difficult decisions and pragmatic remediation strategies based on localized information need to be implemented. The steps advocated by the concerned communities are not intended to be punitive, as the benefits derived from a vibrant agricultural system are greatly appreciated and recognized as essential. However, a common objective must be to remediate the damaged water supply in a surgical manner within the shortest timeframe possible using the most efficient and effective tools currently available. The Water Board’s stated mission reads as follows, “***The State Water Board’s mission is to preserve, enhance and restore the quality of California’s water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.***” Furthermore, “***The mission of the Regional Boards is to develop and enforce water quality objectives and implementation plans that will best protect the State’s waters, recognizing local differences in climate, topography, geology and hydrology.***” If the State and

Regional Water Boards do not have access to scale-appropriate decision-quality data that can be rapidly converted to actionable information, water quality will not improve in the foreseeable future. Self-regulation has rarely worked in the past, and given the complexities associated with this challenge, it is highly unlikely that implementing the panel's recommendation will result in meeting critical water quality objectives. In addition, industry has a very different mission, which is to generate as much profit as possible. This mission is not always in concert with the Water Board's mission. While there are exceptional examples of good stewardship, and this should be rewarded, it has been demonstrated that private industry will pursue the management pathway that meets the minimum level of requirement to reach compliance. This is not intended to be perceived as a negative statement, but only as a reflection of the economic system that persists in our society. This has been demonstrated in the hazardous waste and groundwater remediation industries, and directly applies to this situation. As such, GeoTracker (<http://geotracker.waterboards.ca.gov/>) was developed by California regulators to track site-specific assessment and remedial activities, to derive trend analyses, and to archive all reports, communications, and chemical information derived by Responsible Parties and their consultants. GeoTracker is discharge-specific, has been proven to be one of the most effective tools in the world for addressing impaired soil and groundwater challenges, and could be utilized for this situation. The data, information, and plans identified by the panel could be incorporated into the GeoTracker system as part of a new module tailored to meet the needs of the agricultural community. In addition, key performance metrics can be derived and used to help decision makers determine how effectively the plans and adjustments are performing. By maintaining monitoring data on the public-side of GeoTracker, key stakeholders and the public at-large will have the ability see site specific information pertinent to their own interests, and to drill down into the data as they see appropriate.

- 21) p.25 – The panel describes several vital components of a good grower/farmer education program. This is exceptional information. It is recommended that this list be expanded to include at least a cursory understanding of how to determine vadose zone flow characteristics, how to use nitrate, salinity and water level sensors and information, and how to recognize when nutrient applications exceed sustainable attenuation or uptake capacities. Where possible, the focus on these additional topics should be empirically based and tied to specific measurements that can be made through sensors or analysis of samples. Field trips for technology demonstrations should be part of the required curricula. Key metrics should be developed to help the growers determine whether the management practices they are implementing are still resulting in environmental impairment. The worst possible outcome would be where growers/consultants attend training, and then continue to implement practices that do not result in environmental improvement. The panel acknowledges this in follow-on discussions regarding material retention.
- 22) p.26 – The panel describes and emphasizes the need for several educational/awareness components that are very helpful. When describing the farmer's documentation obligations, we recommend that automated tracking and reporting be considered. The costs for some of this equipment (e.g., sensors, telemetry, software, etc.) could be reasonable when compared to the time and labor required for this type of tracking. This would significantly reduce the farmer's

burden while ensuring that critical data is not lost or that an important event (e.g., precipitation) is not missed. As such, the farmer and consultant should be trained to determine when the system requires maintenance or component replacement. Some of this information could also be included in the GeoTracker system.

- 23) p.28 – With respect to compliance, the panel recognizes that an enforcement component should be required, but does not offer a specific recommendation; only a suggestion that the purchase of nitrogen fertilizers be handled similarly to pesticide purchases. It is recommended that much more be required, as uncontrolled pesticide distributions are also prevalent in the environment, so the program has not been successful at removing these from areas they should not be; particularly where exposures in water and air can result in harm to receptors. While training and certification are supported, and training registration for nitrogen fertilizer purchases can be helpful, these steps alone will not result in remediation of the impaired groundwater resources. The growers obviously do not want to face enforcement challenges, and the environmental community aims to improve the drinking water supply and ecological conditions at local and regional scales. One possible plan could include the communities adopting a strategy in stages over the next few years described as follows:
- a) provide comprehensive training,
  - b) restrict fertilizer purchases based on certification,
  - c) implement comprehensive and properly scaled data collection programs (hydrogeologic, fate and transport, and soil and water quality),
  - d) implement a comprehensive program to determine worst case risk scenarios (e.g., maximum nitrate infiltration rates) for key settings (e.g., specific farms, crops, irrigation/precipitation scenarios, etc.),
  - e) develop comprehensive site-specific metrics and evaluations of each activity to determine whether localized management practices are improving or impairing groundwater conditions,
  - f) provide initial support for farmers who are exceeding the nitrate attenuation capacity (by contact, training, encouragement, peer-pressure, etc.), and then (perhaps in two years)
  - g) implement a progressively more strict enforcement program based on automated and other types of required field measurements to ensure that nitrate loads below the rhizosphere are being reduced.

Would the growers be amenable to this strategy? Under this scenario, once sufficient understanding of the fate and transport can be determined for specific locales, and following the flush of nitrate currently stored in the vadose zone (which will differ depending on each site-specific situation), it may be possible to observe nitrate trends in groundwater that can be attributed to activities in upgradient areas managed by multiple growers. This information can be used to exert localized peer pressure on the entities that are not implementing appropriate policies.

- 24) p.29 – The panel raises several exceptional issues regarding implementation of an effective educational and awareness plan as well as potential concern about liability. They also

recommend several great ideas, and all of these will require funding. With respect to funding, in the hazardous waste management industry, the State Water Resources Control Board oversees an underground storage tank cleanup fund

([http://www.waterboards.ca.gov/water\\_issues/programs/ustcf/](http://www.waterboards.ca.gov/water_issues/programs/ustcf/)) which *“provides a means for petroleum UST owners and operators to meet the federal and state requirements of maintaining financial responsibility to pay for any damages arising from their tank operations.”* It is recommended that something similar be developed to address the groundwater nitrate issue. For instance, funding for such a program could be derived through a surcharge attached to the sale of nitrogen amendments as has been recommended by previous nitrate panels.

- 25) p.30 – The panel presents a “Key Point Summary for Application of Management Practices”. Many exceptional recommendations are made. Point “J” states that excess complexity and data collection/reporting will likely fail. There is, in general, a consensus about this point. However, the term “excess” is where there is significant disagreement, as the panel is advocating for a level of data collection and reporting at scales and frequencies that will not resolve the problem. All hazardous material risks are comprised of source, pathway, and receptor components. The panel is advocating against understanding site-specific pathway components. It is impossible to manage what is not measured. Unlike the hazardous waste and groundwater remediation industries, the agricultural community has not yet been required to produce key site assessments or to develop monitoring programs sufficient to adequately determine cause-and-effect relationships. The panel is suggesting that since this is complex, we should not attempt to pursue this type of relationship. This does not make sense from a scientific perspective, particularly since there exist decades of historical and ongoing related efforts, thousands of experienced practitioners, and comprehensive libraries full of standards and guidance documents available from analogous industries (e.g., groundwater assessment, groundwater and soil remediation, landfill and oil and gas industries), and new and emerging technologies that will greatly facilitate compliance (e.g., sensors, automation, geospatial mapping, remote sensing, drone deployed technologies, high resolution direct push sensing and well installation, etc.). For instance, deployments of continuous monitoring nitrate sensors in a sump located at the low topographic portion of a field could rapidly help determine whether nitrogen applications are exceeding crop requirements. A time-stamped geospatial rendering of this information from every field would enable managers to know where to immediately focus their efforts, as well as identify geospatiotemporal trends. Deployment of a system like this would even enable growers to reduce their expenses by lowering their costs for nitrogen based materials they will no longer require, collecting fewer samples for analyses, and reporting. Similar types of systems can be deployed to continuously track nitrate infiltration rates in the soil profile, groundwater impacts, and to remotely evaluate performance of passive bioreactors.
- 26) p.31 – With respect to verification measures, the panel suggests that trend monitoring using existing wells will be helpful, but recommends excluding the first encountered groundwater. From a hydrogeologic and fate and transport perspective, this makes very little sense, as identification of direct causes will not be achievable using this recommended approach. Alternatively, it is recommended that the Water Boards consider deployment and expansion of a comprehensive groundwater monitoring network sufficient to be able to resolve key



uncertainties such as field application impacts on groundwater resources. Monitoring prioritization and scale will need to be carefully considered by key stakeholders, and then revisited as more information becomes available. In addition, instead of requiring samples, the deployment of newer sensor and telemetric technologies and implementation of automated geospatial processing is recommended to facilitate reporting, data analyses and geospatiotemporal processing.

- 27) p.31 – The panel presents “Key Point Summary for Verification Measures” and emphasizes that nitrogen application data should only be used to provide a multi-year picture of nitrogen use on a regional scale. They advocate for multi-year trend analysis instead of a year-to-year comparison. This recommendation is adamantly opposed by key entities for its’ lack of temporal and spatial resolution, inability to contribute much benefit with respect to groundwater quality improvements, and is most likely going to allow for far too much “business as usual”, which could result in continued environmental impairment. As an alternative to this, a far more comprehensive monitoring and metrics based evaluation system is advocated for. This would be comprised of high frequency continuous monitoring, automated processing where applicable, nitrogen loading reporting for every crop that is planted in highly sensitive regions (as determined through appropriate groundwater monitoring and other NHI screening criteria), estimates of projected crop uptake percentage for every planting event, estimates of soil attenuation capacity and maximum infiltration rates, field observations that include factors related to nitrate residence time and migration through the soil profile, measurement of local groundwater conditions and trends (including mass discharge analyses through localized control planes as well as in a regional context), measurement of nitrate in runoff, as well as estimates of total nitrate balance and geospatiotemporal trends analyses. This level of comprehensive verification will be prohibitive at first, but it is essential or it will be impossible to enact any meaningful policies that will result in achieving the stated water quality objectives.
- 28) p.32 – The panel recommends that data collection and reporting be coordinated by a third party, and that growers should not be required to report directly to the Regional Water Boards. The panel also stresses that current groundwater quality should not trigger reporting or regulation of above-ground activity. Their point is that nitrate detected in groundwater cannot be pinpointed to the specific source based on above-ground activities or nitrogen fertilizer purchases. With all due respect, the panel’s logic is flawed. The panel is advocating against reporting and monitoring because there is not currently an appropriate monitoring and reporting system in place to be able to connect source and pathway to receptor. While it is recognized that nitrate is currently stored in the vadose zone, and it will require time for the material to move through the soil column, the mature field of fate and transport of pollutants currently utilizes approaches to determine these types of relationships. As such, it behooves the regulatory community to begin collecting this essential data immediately, and to finally begin addressing this serious issue by determining these relationships. This should include an assessment and estimate of the transport and residence times for each field so that entities can anticipate when and where direct causes due to above-ground activities will be observed.

With respect to estimation of irrigation water applied to individual fields, sensors for the water distribution activities as well as soil moisture measurements will greatly facilitate the understanding of these critical parameters in a spatiotemporal context. Nitrogen cycle computations are indeed complex. However, with sensor based monitoring and reporting and automated analyses implemented at the field level, a range of estimates can be derived to at least begin to gain an understanding of the sensitivity of key attributes and the potential impacts on water quality.

The panel recommends that the data collected be used for education and development of management plans, but not for enforcement. This runs counter to a common sense strategy. Compliance should be back-stopped by potential enforcement. While not advocated for in the immediate future, eventually, enforcement must come into play. An analogy can be derived from the hazardous waste management and groundwater remediation fields, for which a tremendous amount of experience can be leveraged to resolve this challenge. If enforcement were not incorporated as a driver, some responsible parties (e.g., firms on the receiving end of regulatory enforcement efforts) would continue to exhibit poor practices with impunity, as the costs associated with compliance reduces profits. Economics is a key driver, and appropriate regulatory enforcement can be framed (and accounted for) as an economic ledger component for entities engaged in the agricultural related businesses. Since the regulatory community has avoided this issue for so long, it is agreed that the grower should not be held completely responsible for the current water quality situation. Growers were complying with minimum (or no) regulatory requirements. Note, however, that the courts have many times determined that defendants assuming this position are not insulated from fault, and they have lost cases based on this strategy due to CERCLA's delayed discovery rule. While many groups are willing to grant growers some leeway in this regard, eventually the practices must change, and as such, enforcement must be part of the strategic solution. Contrary to what the panel is advocating for, through a comprehensive monitoring, assessment (including fate and transport estimates at the field scale), reporting, education and management system, it will be possible to attribute above-ground activities to water quality. A perfect example of this is through the sensor based measurement of surface runoff sumps along the low topographic areas of each property. This component of a monitoring strategy will not require years to determine whether nitrate added to the surface is excessive, or whether appropriate controls are in place. This approach could be used to remotely monitor activities, track trends over time and space, and to initially trigger alerts when exceedances are measured. Eventually, after several years of data collection and experience, an enforcement component can be adopted based on very specific performance metrics. This information could also be used to identify where passive and active treatment systems could be installed.

29) p.33 – The panel proposes nitrogen computational variables. They also point to a few shortcomings that could at least partially be addressed by the employment of sensors to determine residual nitrate following crop harvest operations. This information can help growers determine subsequent purchases and amendment practices appropriate for the next crop planting efforts. The panel advocates for extremely limited, low frequency data collection and reporting requirements at scales that will preclude entities from reaching specific management

decisions, identifying specific sources of pollution or poor management practices, or determining appropriate action. The effort recommended by the panel *“purposefully limits data collection to basic information that can be easily obtained and all farmers need and should be knowledgeable of as part of their nutrient management....This data collection effort does not require farmers to account for nitrogen applications to individual fields....It does not necessitate mapping or farm-scale spatial analysis.”* Unfortunately, the panel’s position is unacceptable, as it represents status quo, avoids the use of commercially available management technologies for optimization and efficiency, and has an extremely low probability of resulting in improvements to groundwater quality. The panel maintains that their recommended data collection policy *“addresses the probability of nitrogen leaving the crop root zone via deep percolation.”* However, support for this claim was not provided. Without appropriate chemical, moisture, and mass transport information at the field scale, it is unlikely that the probability of deep percolation of nitrogen can be determined.

- 30) p.34 – The panel presents a Key Point Summary for Reporting. The panel repeats and emphasizes much of what has been presented earlier, including limited monitoring, reporting, and aggregation of fields into units that are not field-specific. The panel unfortunately does not acknowledge that employment of state-of-the-practice automated monitoring and geospatial analytical tools allows for continuous monitoring over more appropriate timeframes than the recommended annual or semi-annual trend analyses. As an alternative, we point to GeoTracker as a proposed initial model for reporting and data management within the agricultural community. This system can be modified to account for agricultural-specific reporting and analytical components. Amendments to include geospatial trend analyses and estimates of fate and transport related computations at the field scale will enable regulators and others within the community to identify where improvements in management practices will be required. It is not a perfect system, will require time and resources to allow for residual nitrate loads to work their way through the strata, but eventually, once this system is rolled out, it should be possible to begin performing cause-and-effect analyses. This, along with the utilization of commercially available sensor based monitoring and geospatial analytical platforms should benefit growers (e.g., less money and time allocated to nutrient amendment, reporting, and enforcement) as well as other community members who are just as concerned about water quality.
- 31) p.35 – The panel discusses monitoring logistics and recommendations for surface water discharges. The panel mentions the use of continuous sample collection equipment, which can be useful. However, new lower costs sensor based alternatives have recently been developed, and new methods for protecting from vandalism are currently available (e.g., inexpensive GPS placed on all field vehicles and on the sensor communication hardware, alerting when signal is dropped or system is moved, etc.). The panel further states *“The sampling should be of sufficient density (spatially and temporally) to identify general locations of possible pollution. For example, a single measurement point at the downstream discharge of a very large watershed would be insufficient. When/if problems are identified, sampling should move upstream with sampling to locate the source of the problem.”* Furthermore, the panel’s key point summary includes the following statement *“A network of sampling points in drains and streams throughout a watershed, with emphasis on downstream areas, is recommended*

*to identify if there are pollution problems upstream. This is recommended rather than sampling at each discharge point.”* We are in agreement to a certain extent. We agree that receiving waters should be routinely monitored and a network of telemetered sensors in receiving waters and drains will be helpful for both urban stormwater and irrigated agriculture programs. We also strongly recommend deployment of sensors at discharge points. Most environmental programs and discharge permits require discharge monitoring and reporting. As such, the irrigated lands program should not be any different, particularly when the data will be critical for monitoring the immediate discharger and evaluating the potential for the discharged water to impact the environment and migrate to surface and subsurface drinking water resources. We advocate for the use of sensors and telemetry so that continuous measurements can be recorded and sent to a Cloud based management platform, automated geospatial analyses be performed, and an immediate alert delivered to key points of contact (e.g., coalition leaders, specific growers, etc.) when water quality thresholds are exceeded. Implementation of the panel’s recommendation as described could result in a time lag between detection in the downstream location and mobilization of a sampling entity, thereby prohibiting the team from meeting source detection objectives. Limiting monitoring to only the receiving waters and then tracking back upstream is also complicated by the additional costs and lag time associated with sample collection and addressing the private property rights concerns as the investigation personnel work their way upstream.

## Summary and Conclusions

- 1) A well-functioning and environmentally sustainable agricultural community is critical for reasons related to societal benefits associated with economic, security, drinking water, energy and long-term environmental considerations.
- 2) Since agricultural practices in California have been granted exemption or leniency regarding addressing the potential nitrate contaminant issues for so long, and a comprehensive nitrate management policy has not yet been developed or implemented by the regulatory community, it is critical to understand that contamination emanating from legacy activities will need to be considered when addressing relationships between cause-and-effect for current and future agricultural practices. As such, implementation of compliance programs will need to be flexible and account for temporal, spatial, and site-specific characteristics, as a one-size-fits-all or even an aggregated (e.g., by crop, region, or common field characteristics) approach may not be appropriate.
- 3) Any solution proposed will require substantial financial resources for development of policies, integration of new practices, monitoring, education, and implementation of private sector and government programs. As such, financial support for key parties and stakeholders should be procured as soon as possible. This may require expansion of ongoing programs or development of new programs, with an analogy represented by the California UST Cleanup Fund Program. Revenues are derived by adding a surcharge for purchases of gasoline. Similarly, a California Nitrate Cleanup Fund Program could be capitalized by adding a surcharge for all purchases of

nitrogen amendment materials. Legislation may also be needed to fund expansion of the State Water Board's Groundwater Ambient Monitoring and Assessment Program, establish a regulatory framework, and to improve coordination among the various government entities (CA Water Boards, 2013).

- 4) It is in the best interest of all parties to derive a balanced approach towards managing agricultural practices that weighs public benefits against the interests of individuals or aggregated parties. For instance, if the privatization of profit overwhelmingly favors socialization of the risks (e.g., contamination of the public drinking water resources), public financial resources will need to be made available to address the unfavorable outcomes. However, as with the hazardous waste management industry, private investment to meet regulatory requirements should also be considered part of the business process. As such, a decision regarding what is a fair level of public financial burden will need to be determined.
- 5) An ideal outcome of this process should include the use of the most effective technologies and practices that would result in pragmatic policies that can meet key drinking water quality objectives with the least amount of burden endured by the grower community to ensure compliance, continual improvement, and restoration supported by defensible trend analyses. As such, this approach cannot be "business-as-usual", but must be developed with the outcomes being amenable to performance metrics for unequivocal demonstration of groundwater quality improvement.
- 6) While an enforcement component to drinking water resources management policy will eventually be required, given the complexities involved, many in the environmental community would be willing to accept an initial transitional period that emphasizes education and monitoring network deployment while acknowledging near term improvements to management practices as verified by defensible documentation (e.g., reduction in nitrate amendment exceedance and improved soil/water quality). Enforcement actions available to the regulatory community should initially be non-punitive, with an emphasis on data collection, determination of cause-and-effect, establishment of a comprehensive monitoring network and program, and continuous improvements motivated by a rewards structure. After an established amount of time has passed, an enforcement program could include more punitive components similar to what is currently employed in the NPDES and RCRA programs addressing the management of hazardous waste discharges and remediation efforts.
- 7) Given what we know about widespread contamination of our groundwater resources and what we understand about the loading already present in the vadose zone, the environmental community realizes progress will require years, even decades of effort, adding to the urgency to immediately initiate comprehensive monitoring and responses.
- 8) Low-cost denitrification bioreactors (Diaz et al., 2003; Christianson et al., 2013), engineered wetlands and other types of passive treatment systems and approaches should be considered for many of the properties to reduce nitrate releases to the environment. Monitoring of these can also be accomplished via the emerging state-of-practice automation technologies to evaluate efficiency and to determine loads that can be tracked over time (Kram et al., 2011).
- 9) All hazardous material risks are comprised of source, pathway, and receptor components. The panel is advocating against understanding site-specific pathway components. It is impossible to

manage what is not measured. Unlike the hazardous waste and groundwater remediation industries, the agricultural community has not yet been required to produce key site assessments or to develop monitoring programs sufficient to adequately determine cause-and-effect relationships. The panel is suggesting that since this is complex, we should not attempt to pursue this type of relationship. This does not make sense from a scientific perspective, particularly since there exist decades of historical and ongoing related efforts, thousands of experienced practitioners, and comprehensive libraries full of standards and guidance documents available from analogous industries (e.g., groundwater assessment, groundwater and soil remediation, landfill and oil and gas industries), and new and emerging technologies that will greatly facilitate compliance (e.g., sensors, automation, geospatial mapping, remote sensing, drone deployed technologies, high resolution direct push sensing and well installation, etc.).

- 10) While many of the panel's recommendations (e.g., education, appropriate training for key entities in specific roles, tracking of nitrogen amendments, etc.) are exceptional, and they accurately point to many of the complexities associated with the challenges at hand, unfortunately, their recommendations as presented in the report will not enable the communities involved to meet key drinking water quality objectives. As such, the panel's recommendations fall far short of objectives that include groundwater and surface water improvement in the foreseeable future. More specifically,
  - a. The panel proposes extremely limited monitoring and reporting.
  - b. The panel advocates for data collection activities at temporal and spatial scales that are not sufficient.
  - c. The panel advocates for data collection and reporting at an aggregated coalition scale and receiving surface water scale, as opposed to supporting site-specific understanding of the fate and transport of nitrate throughout the system at a granular scale sufficient to be able to eventually understand cause-and-effect, and that would allow for the identification of nitrate source areas where specific challenges persist.
  - d. The panel appears to emphasize what is not possible, characterizes the application of well-founded scientific principals and methods as futile, and does not consider the important lessons that can be learned from the hazardous waste and groundwater restoration fields as well as the associated regulatory tools already in place (e.g., GeoTracker, ITRC guidance, etc.).
  - e. The panel does not consider the many fine technologies available for expedited site characterization (e.g., high-resolution direct push characterization, well design and installation), automated sensing, analyses (temporal and spatial), and reporting that are commercially available or in beta testing. These technologies have the potential to greatly improve the understanding of conditions and trends, and could significantly alleviate the majority of the grower's site-specific assessment, monitoring and reporting burden. When properly executed, regulators and other stakeholders can immediately respond to areas of concern or even automate specific activities (e.g., when/where/how long to irrigate, fertigate, etc.).

- f. With respect to surface water considerations, while the panel advocates for monitoring in downstream areas to determine general locations of pollution sources, they also advocate against monitoring at specific discharge points. With new sensing technologies, an automated monitoring and data processing network that includes discharge points could be extremely helpful in identifying where issues persist, notifying the appropriate entities (not for punishment, but to assist with management decisions [at least initially]), and tracking trends and geospatiotemporal relationships with other factors (e.g., correlations with specific crops, climate, etc.).
- g. Beyond modification of the amounts of nitrogen based materials purchased and applied, the panel does not consider alternative nitrate pollution control and containment options such as passive wood chip denitrification bioreactors and other potential options. The USDA has been extremely active in their installation and evaluation of low cost nitrate effluent bioreactor technologies (Christianson et al., 2012; 2013), and has initiated bioreactor standards development and optimization activities (personal communication, Dr. Thomas Moorman, USDA-ARS). These systems can reduce nitrate loads by up to 90 percent. As such, these treatment options should be considered, as well as performance monitoring metrics and methods for such options.

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## **Selected Technology Vendors/Contacts**

Geoprobe Systems (<http://geoprobe.com/>)

gThrive (<http://www.gthrive.com/>)

Instrumentation Northwest (<http://inwusa.com/>)

Iowa Soybean Association Denitrification Bioreactors  
(<http://www.iasoybeans.com/environment/programs-initiatives/programs/bioreactors> )

Soilmoisture Equipment Corporation (<http://www.soilmoisture.com/>)

SupraSensor (<http://suprasensor.com/>)

TrackR (<http://stickr.thetrackr.com/>)

USDA Bioreactor Expert (Dr. Thomas Moorman,  
<http://www.ars.usda.gov/pandp/people/people.htm?personid=3940>)



## Dr. Kram's Bio

Dr. Mark Kram is an award winning Hydrogeologist/Geochemist who has worked for the US Navy, UCSB, Groundswell Technologies, as an independent consultant, and has served as an expert witness on high-profile legal cases. Dr. Kram earned his Ph.D. in Environmental Science and Management from the University of California at Santa Barbara, an M.S. degree in Geology from San Diego State University, and his B.S. degree in Chemistry from the University of California at Santa Barbara. He has over 30 years of experience using and developing innovative environmental assessment techniques, has authored articles, national standards and book chapters on the subject, and has taught graduate level courses on related topics. Dr. Kram is an internationally recognized expert in site characterization and remediation, and has been instrumental in the areas of sensor development and implementation, innovative GIS applications, DNAPL site characterization, chemical field screening, well design, mass flux/discharge based remediation performance, and groundwater basin yield and storage change assessment. Dr. Kram has patented inventions for automated sensor based contouring and multivariate analyses, automatic determination of groundwater basin storage change, water sustainability to protect from basin overdraft, seawater intrusion and stream depletion, and for in-situ measurement of groundwater contaminant flow rates and directions. Dr. Kram has been featured in Forbes (<http://www.forbes.com/sites/michaeltobias/2012/01/31/environmental-security-sensing-the-world-in-4-d/>), is an active member of the National Ground Water Association (NGWA), American Society of Testing and Materials (ASTM Subcommittees D18.21 and E50.02), and the Interstate Technology Regulatory Council (ITRC), and is currently preparing national guidance for vapor intrusion and environmental characterization applications. Dr. Kram recently co-chaired an ASTM International symposium on continuous soil vapor chemical measurements, served as Editor for the ASTM International book entitled "*Continuous Soil Gas Measurement: Worst Case Risk Parameters*" (<http://www.astm.org/BOOKSTORE/PUBS/STP1570.htm>), is the recipient of the NGWA's prestigious Technology Award (<http://www.ngwa.org/Media-Center/press/2011/Pages/Kram-wins-2011-Technology-Award-from-the-National-Ground-Water-Association2.aspx>), and received the 2014 ASTM Committee D18 Technical Editors Award.

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