



RRWPC
Russian River Watershed Protection Committee

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Sent by Email to: commentletters@waterboards.ca.gov

February 21, 2016

Comment Letter: General Order for Recycled Water Use

Dear Ms. Townsend:

Introduction and review of problems with Order:

Russian River Watershed Protection Committee (RRWPC) is a nonprofit, public benefit corporation founded in 1980. For about the last twelve years, we have been tracking and commenting on the issue of tertiary wastewater irrigation to both your Board and the Regional Water Quality Control Board. We have paid special attention to wastewater runoff occurring in urban areas mainly because we can get access, although we are concerned about agricultural runoff as well. We appreciate the opportunity to comment on this *General Order for Recycled Water Use*.

RRWPC represents hundreds of lower Russian River residents, property and business owners, recreationists, etc. who are concerned about water quality and flows in the lower Russian River, one of the most popular summer vacation destinations of the Bay Area. Most of our local economy depends on tourism and any negative impacts on the river from inappropriate irrigation practices upstream, in combination with very low flows, can have a devastating effect on our river and our economy.

Furthermore, our already impaired river (temperature, sediments, pathogens) was degraded further last year because of heat and drought, low flow and nutrient overloads.

In June, a dog died from contact with toxic algae and popular lower river beaches were posted with warning signs all summer screaming **DANGER** at beach goers! (Dog was tested by County Health Department and cause of death verified.) Based on first hand experience, we have reason to believe this Order does not go far enough in requiring adequate protections in the implementation of this program. We are very concerned about the specter of toxic algae and the phosphorus pollution in our lower river that needs to be addressed. This Order calls for a Salt and Nutrient Area Management Plan but irrigation with wastewater has been going on for years without the Plan. There was a draft submitted several years ago with Santa Rosa in the lead role, but it seems to have disappeared. What happened to that? What is the time line for getting these done? How long can Regional Board authorize irrigation without it?

We are also concerned about permitting of the trucking program where individuals can get up to 300 gallons a load and as far as we know, use it anywhere they want. Yes, they are given instructions about where they can apply it, but who's to check? Who's responsible for a spill if there's an accident? When the drought 'emergency' is declared ended, if ever, will the program be rescinded?

We realize that the intent of this Order is to make more recycled water available to offset potable use for the protection of our rivers and streams, and we don't necessarily object entirely to the main goal, provided great care is taken to prevent wastewater runoff in summer time and contact with poisonous substances (pesticides, herbicides, etc.) that can make any wastewater runoff more dangerous.

Also it is critical to acknowledge the link between ground water, river underflow, and surface water. In the summer, when large amounts of groundwater are pumped up, it lowers stream levels and causes the usual assortment of problems (mentioned below) from low flow in our streams. None of this is examined or studied in this document because of the desire to 'streamline' the wastewater irrigation process, which has more appeal than the regulation of ground water. I believe I have heard the California is the only state in the USA that does not regulate ground water and does not require monitoring of wells, a situation that underlies most of our problems. While that is starting to change now, there is still a great deal of deference given to the wine industry, responsible for most groundwater overdrafts in our area.

In some ways, wastewater irrigation is better utilized on large agricultural parcels because farmers have a better understanding about agronomic application rates and may be more motivated about its use on their crops. (Note: In checking annual water application rates by Santa Rosa's irrigation contractors, namely Rohnert Park, we noted that agricultural lands generally use 1/3 to 1/2 less water per acre on high water demand crops, than small urban parcels irrigating landscapes.) We get the impression that agronomic rates in urban areas, on constrained parcels surrounded by a great deal of impervious surface and use of relatively high pressure sprays, to be a very difficult thing to accomplish. We question whether it has been used successfully as we have seen no evidence in the files.

Yet studies have shown that toxins in wastewater can bring long-range harm to the soils. It has also been demonstrated that they are absorbed into the edible plants and become

bioavailable in the food we eat. (**Attachment #1**) This is not to mention the widespread use of pesticides and herbicides, which more and more are shown to be very toxic to human health. There are more reasons now to examine organic dry farming where appropriate, as a key way to save our water supply. It is also the preference of much of the general public, who are rapidly removing their green lawns in urban areas.

We may not be alone with our concern. We have 60,000 acres of vineyards in Sonoma County and most of them don't want to irrigate with wastewater. I know that salts and nutrients are an issue, but other concerns may be underlying desire for potable water also. Some vineyard managers are using great care with water and toxins, but our impression is that most are not. The wine industry has a political stranglehold on local and State governments and seem to mostly get their way where environmental regulation is concerned, while much of our water gets transported around the world via the wine.

Number 13 on page 3 of Draft Reclamation Requirements states, *"When used in compliance with the Recycled Water Policy, the Uniform Statewide Recycling Criteria or other standards set by State Water Board and Regional Water Board for protection of Public Health, and all applicable state and federal water quality laws, the State Water Board finds that recycled water is safe for approved uses, and strongly supports recycled water as a safe alternative to raw and potable water supplies for approved uses."* There are many problems with wastewater use not covered in current regulations. **Furthermore, the Order insists that if all rules are followed, irrigation will be safe and not result in any degradation. We ask if current degradation is the result of prior laws alluded to in the Order that are not being followed and/or not being enforced? In either case, it leads one to question the validity of the assertion that recycled water is safe.**

The Order assumes that if the wastewater meets all standards at the end of the treatment chain, it is suitable and safe to use as irrigation for distant parcels without regard for any changes it may undergo on its way to the site. There can be bacterial regrowth while in storage with a large percentage consisting of the antibiotic resistant form; wildlife can add bacteria and possibly other toxins; there can be degradation of the wastewater from pipes leaching heavy metals as a result of disinfection chemical additions, and more. Then runoff from over irrigation can leach lawn chemicals into the soils and off the property into the waterways. And nutrients are similarly an important issue, especially as excessive amounts are floating in our river lately. (**Attachment #2**)

It is becoming more and more clear that everything in nature is connected and water management practices and the proliferation of unregulated toxic substances are gradually poisoning our lands and diminishing our water supplies and killing our wildlife. Perhaps it is doing the same to our citizens. This reminds us of the kid's game, pass the hot potato. The person who gets stuck with the potato when the music stops, has to leave the game. Gradually everyone is omitted until the last person is stuck with the potato. It's hard to say when the last person will be holding the potato, or what kind of potato they will be holding. Sometimes nature is resilient, but things are not looking good for our grandkids and great-grandkids at this point.

This Order fails to address these issues and does all it can to avoid discussing them. **Instead, the document lists a hodge-podge of many water laws that are antiquated and inadequate and fail to acknowledge all the new science taking place and new knowledge discovered, fails to monitor and regulate all the new toxins in our environment, and tries to assure us (while not providing means to do so) that if followed, our water supplies will be adequate and safe, when in fact, this project is necessary because that is NOT the case.**

Water Quality Impacts on Recreational Waters:

RRWPC is concerned that drought conditions provide special circumstances to which recreation is especially vulnerable. We have significant concerns that incidental runoff, even if in small amounts, will severely impact already challenged waterways with surplus nutrients (Laguna listed as impaired for nutrients, and lower Russian River has experienced severe problems also.) Flows at the Hacienda Bridge, about six miles upstream from Guerneville, are commonly under 100 cfs in summer months. The Biological Opinion wants them to go down to 70 cfs.

These low flows are not only unpleasant for recreationists, but are more likely to harbor and promote pathogens, the spread of invasive plants, excessive nutrient blooms, high water temperatures bad for many of the fish, etc. This will also have a huge impact on our local economy, not to mention the impact on public health. Allowing any kind of runoff in these circumstances could lead to disease outbreaks, proliferation of toxic algae, and many other serious problems. The lower Russian River is a Public Trust resource, and as such, it must be preserved for recreational uses. As mentioned earlier, conservation can provide as many or more water saving benefits at far less cost to ratepayers, especially in light of the possibility that there will be little summer water to irrigate anyway.

CEQA elimination causes more problems....

The General Order eliminates California Environmental Protection Act (CEQA) from consideration, thereby eliminating most of the public process. It also minimizes, through an extremely weak, and at times non-existent, inspection, monitoring and reporting program, the ability of enforcement to do its job. In fact, it seems to diminish and/or avoid any requirements that might suggest enforcement of runoff. It is hard or impossible to know if the irrigator is REALLY meeting agronomic rates on a regular and constant basis, and whether rules for incidental runoff are being met, (The definition in the Order only reflects the first part of the definition in the Recycled Water Policy and North Coast Basin Plan and eliminates the portion about poor management and repeated overspray.) Furthermore, there is a huge broadening of the irrigation 'authority' for individuals who are only minimally trained in using the wastewater.

RRWPC attended one of Santa Rosa's day-long irrigator trainings, after which wastewater irrigators could receive a license to apply wastewater on landscapes. A few landscapers in the audience asked if the wastewater was safe and were told that it meets all health criteria for drinking water and is authorized for use in swimming pools, the implication being that because they were authorized to use the wastewater, that was equivalent to a determination of safety, which couldn't be further from the truth. These

are the same assurances offered by the public opinion surveyors and this Order. The focused message is that recycled water is safe, though issues raised repeatedly, about low dose impacts of unregulated remnant toxins, have gone unaddressed. We believe this program will put human health, especially of children and pregnant women, at risk. We include two articles on the low dose effect that demonstrate the reality of the phenomena. (**Attachments #3 and #4**)

This proposed Order, perhaps because it does not follow CEQA, does not consider, let alone integrate, upcoming water decisions such as National Marine Fisheries Service (NMFS) Biological Opinion (BO), demands for a 40% reduction in lower Russian summer flows (Fish Flow Project). Clean water that becomes available with this project, will thus be retained in the reservoirs, and the dirty stuff will end up downstream in the recreation areas. In the meantime, the cities grow and add many new people with the savings, while environmental conditions get worse and emergencies become more dire because of increased demand. (Note: We refer to reclamation water as 'dirty' because there are many unidentified toxins and toxic compounds remaining in the treated sewage that are unaddressed. Runoff is a key element of water quality problems. This document gives the impression that it is of no consequence, does not cause a problem, and need not be addressed.)

Contemplated low flow regulation plus irrigation runoff equals pollution....

Sonoma County Water Agency (SCWA) will soon release the Environmental Impact Report (EIR) on that low flow project which is defined in the Biological Opinion, and prior to this has never been subject to public review. The Biological Opinion gave no consideration to water quality impacts of low flow on the river between Dry Creek confluence downstream of Healdsburg and Duncans Mills, which is a distance of 25-30 miles.

As mentioned, river flows have been greatly diminished for numerous reasons, and may be diminished even further, while at the same time we have extremely serious water quality issues including excessive sediments, temperature, bacteria, and phosphorus, which are likely to increase with this project. Runoff of recycled water can greatly exacerbate our current degraded conditions. We request an analysis of low flow water quality impacts in relation to irrigation runoff (and visa versa) during drought periods. Furthermore, we are very concerned that in declaration of an emergency, none of the impacts of either this Order or the BO or their interaction with one another, will be addressed. There will be no analysis of cumulative impacts.

Number 33e on page 14 of order states that any runoff that occurs will not be consistent with any TMDL or regional implementation plan as adopted by Regional Board. In our area, that means the badly impaired Laguna de Santa Rosa (six constituents) will not hold irrigation failures accountable for polluting runoff into our waterway. This seems to contradict #13 on page 5 where it states that, "*When used in compliance with the Recycled Water Policy, the uniform Statewide Recycling Criteria or other standards set by State Water Board and Regional Water Board for protection of public health, **and all applicable state and federal water quality laws**, the State Water Board finds the recycled water is safe for approved uses.....*" (emphasis added) This certainly seems like a legal inconsistency!

Need to include Precautionary Principal:

In regard to unregulated toxins, the Order fails to give credence to a significant body of science on endocrine disruption and low dose effects and insists that it is safe to irrigate schools and parks with tertiary wastewater on the assumption that Water Code 13050(n) is correct in defining recycled water as “...water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.”

The Precautionary Principle, adopted by the City of San Francisco a few years ago, and having widespread credibility in Europe, appears to have little weight among most California water officials. (The Precautionary Principle, as defined on the web, means: *the principle that the introduction of a new product or process whose ultimate effects are disputed or unknown should be resisted. Many more detailed versions are available.*)

Four main goals of the Precautionary Principle include....

- Preventive action must be taken in face of uncertainty.
- The burden of proof must be shifted to proponents of an activity.
- A wide range of alternatives should be explored to possibly harmful actions.
- Public participation in decision-making must be included and/or increased.

Problems with conventional toxicity determinations and standards....

EPA currently requires the establishment of conclusive proof of harm for each hazardous chemical before taking regulatory action, which can take many years, as evidenced by the legislation to update the Toxic Substances Control Act. Potential health and environmental impacts are not considered when corporations design new products. Government must wait until an overwhelming body of evidence of harm is accumulated before intervention takes place.

Polluters and their lobbyists interfere to slow down regulatory process in regard to their products' toxins. We read with great skepticism that adherence to Title 22 will assure that human exposures to tertiary wastewater irrigation are safe. Mere annual monitoring of priority pollutants (150 or so out of about 84,000 chemicals in market products) at the treatment plants of the various facilities in the District is required, and then we are not certain that the testing reflects and utilizes the most up to date equipment and methodology.

Title 22 does not fully insure protection of public health....

The regulatory focus of wastewater irrigation relies mostly on Title 22. This regulation primarily addresses human pathogens as they initiate acute diseases and does little or nothing to protect the public from chronic diseases, such as cancer. Most chronic diseases are often not diagnosed until long after the exposure(s) to agents that have caused it to occur. This makes it nearly impossible to protect people from harm from endocrine disrupting chemicals without implementing precautions before specific causation is determined.

Application of wastewater to the landscape or crop at agronomic rates is supposed to prevent over irrigation and therefore provide great safety in application. However, we

are not sure that actual practices in place are sufficient to assure this is being and will always be implemented properly. Yet appropriate applications at all times would go a long way towards making the project less risky and more acceptable to the public, especially in regards to health and safety. We would assume that soil types, weather, wind, plants irrigated, impervious surfaces, etc. would all being considered, if one can assume full monitoring and reporting takes place.

Given the equipment that is commonly used and which appears prone to over spray, we wonder to what extent agronomic rates have been successfully applied in the past? How is success determined? Are rates set automatically? How often do they change? Must they be checked daily or hourly to be implemented properly? What reports are kept on daily applications? We also wonder about spray drift in wind. The sprays we have seen did not seem to control that. In other words, the intent of the rules are admirable, but do no good if not monitored and fully applied. It appears that site monitoring is only required monthly, which would be totally inadequate for assessing full compliance with requirements. There is a double message here: irrigators have all these rules to follow, but you don't have to monitor very often so it won't be a burden. All you have to do is declare that all is okay and turn in a report.

State and Regional Boards are authorized to require standards that **really** protect the environment, along with standards applicable to water quality and wildlife. But the Order emphasizes the role of Title 22 (Uniform Statewide Recycling Criteria) throughout the document while environment laws, declared to be in force, appear to be much less defined. The existence of other powers, meant to protect wildlife, such as Water Code Section 13050, that states, "*The use of recycled water shall not cause pollution or nuisance*", are more casually mentioned, and much less specific, absent detailed specifications similar to Title 22.

While Regional Boards have the power to set further standards, specificity as to what those standards should consist of is not revealed here, especially if they appear to block facilitation of reuse. In the meantime, our Regional Board has little staff time to do much of anything regarding implementation. Right now there is one staff person to do all or most of the NPDES permits in Sonoma County, and perhaps other counties as well. In fact, most of the record keeping and oversight will be by these new authorities being set up and we are unclear as to the precise role of the Regional Boards. While there may be adequate regulatory power available, the ability to enforce seems very limited.

(Note: In our experience, the Regional Board may have taken some enforcement actions over the years behind the scenes that we don't know about. RRWPC's past complaints about Rohnert Park's irrigation runoff have not been publically addressed by the Regional Board and we have discovered that the same over-irrigation on certain sites seems to continue. Santa Rosa changed their irrigation to night time and we cannot see what is happening or photograph it although we have noticed water stains on curbs in areas where we know they irrigate.)

Examples of toxic exposures causing health impacts are many...

It is important to note some of the environmental tragedies that have occurred of late that is likely a result to some extent of environmental pollution. There is a great deal of

information available on the risks associated with low dose exposures of humans and wildlife to these substances. There are at least 800 studies pointing to the connection of chemical exposures to resulting disease and deformity in humans and wildlife. (See Attachment #5 & #6) Since approval of that policy, we have learned the following, and this is only small part of list:

- We are in the sixth major extinction of species and this is the only one to be caused by human activity;
- In 2014, millions of dead fish were found all over the world;
- A huge (and unusual) number of baby seals and sea lions were reported sick and dying along the California coast in recent years;
- Disappearing frogs with their immune systems weakened by chemicals, and many displayed the development of intersex features;
- Bees dying off the last several years from pesticide exposures,
- Starfish dying in huge numbers along the western United States Coast,
- And Roundup (Glyphosate), the most widely used pesticide has been labeled a probable carcinogen. (According to Press Democrat 3-27-15, Sonoma County used almost 69,000 pounds of Roundup in 2012, with most of that on edible crops. If you add remnant toxins in wastewater runoff, including excreted pharmaceuticals, you have a lovely mix of poisons!)

And there is more.

- Sweden is suing European Union for delay in identifying harmful chemicals in thousands of everyday products such as disinfectants, pesticides, and toiletries that have been linked to cancer, birth defects, and developmental disorders in children. Delay attributed to lobbying by chemical industry.
- 23 babies were born with rare birth defect (anencephaly) in Central Washington from 2010 to 2013 and no one knows the cause. Also the dramatic number of microcephaly cases thought to be caused by the Zika virus may be linked to pesticide exposures according to some scientists.
- In 2009, studies showed that declining male fertility in UK fish AND human males is linked to wide variety of chemicals found in water. USGS has identified significant number of cases of androgyny in fish in Northeast rivers.
- A report in 2014 indicated that Spanish male fish are being feminized on the Basque coast. Fish in most of their estuaries had been affected.
- A Canadian article in 2008 asked if men are becoming extinct since male infertility has been on the rise and more male infants born with impaired reproductive organs. Furthermore, fewer male children are being born world-wide than ever before.
- Low doses of controversial insecticide may harm friendly pests. (March 2014)
- Autism, thought by some to be induced by chemical exposures, has gone from 1 in 150 children born in 2007 to 1 in 68 children born in 2014. These statistics are from the US Center for Disease Control and Prevention. Endocrine disruption during pregnancy is suspected.
- Hospitals may discharge antibiotic-resistant bacteria (E coli), which may be resistant to common treatment processes in wastewater treatment facilities. (In studies, E coli following wastewater treatment dropped by 94% but proportion of

resistant bacteria remaining doubled during treatment.)

While all of the circumstances above were probably not caused by endocrine disrupting chemicals in wastewater irrigation runoff, they are indicators of unacknowledged problems that are most likely affected by the many toxins in our environment that are ignored by this Order (and by Scientific Panel). These toxins are everywhere, and most certainly in wastewater, which accumulates the raw waste from a multitude of sources and then contends that they disappear during waste treatment processes.

Furthermore, it has been determined that in some cases toxins affect the immune system which then causes tendency to having greater susceptibility to other disease causing organisms and/or toxins. To determine, as the Scientific Panel did, that no monitoring for Contaminants of Emerging Concern (CEC's) is necessary for urban landscape applications of tertiary wastewater, is to totally ignore most of the biological peer reviewed studies.

RRWPC has been lobbying for studies on endocrine disruption in fish in our area for a long time. In light of severe salmonid declines, it would seem important to know all factors contributing to that decline. The cases noted above are just the tip of the ice berg, RRWPC is on a list serve where we receive a multitude of similar alerts every single day.

Scientific Panel's determinations regarding toxins.....

In regard to toxins, the six-member Scientific Panel determined, based on questionable assumptions, that Contaminants of Emerging Concern (CECs) do not require monitoring when spraying urban landscapes with tertiary wastewater. It was their view, while ignoring the Precautionary Principle, that more study was needed and monitoring protocols needed to be established. We do not agree that this is a safe approach. (Note: Title 22 focuses on pathogens, and we have seen studies that indicate that the minimal number of bacteria allowed to be released into the environment from wastewater, are increasingly of the anti-biotic resistant kind, something not mentioned or dealt with in the Order.) (**Attachment #5**) And they gave little credence and no monitoring support to the low dose effect of endocrine disrupting chemicals.

Some impacts of endocrine disruption and toxic exposures:

In the meantime, burgeoning science had been coming forth nonstop on endocrine disruption to humans and wildlife caused by a group of approximately 1000 chemicals in our everyday world. (list keeps growing)

During the public comment process for the Recycled Water Policy Amendment, RRWPC approached lead author Dr. Laura Vandenberg of the recent study entitled: "**Hormones and Endocrine-Disrupting Chemicals: Low-Dose Effects and Nonmonotonic Dose Responses**" By Laura N. Vandenberg, Theo Colborn, Tyrone B. Hayes, Jerrold J. Heindel, David R. Jacobs, Jr., Duk-Hee Lee, Toshi Shioda, Ana M. Soto, Frederick S. vom Saal, Wade V. Welshons, R. Thomas Zoeller, and John Peterson Myers (Endocrine Reviews: March 14, 2012) to request that she write a letter to submit to State Water Board on the Amendment. (**Attachment #6: Letter and Attachment #7: Study**)

In her June 27, 2012 letter, lead study author, Laura Vandenberg stated: *The concept of low dose effects and non-monotonic dose responses is not at the fringe of science. The Endocrine Society, the world's largest professional association of clinical and research endocrinologists, has released two recent statements regarding EDCs, and has repeatedly reiterated the conclusion that low doses of EDCs are harmful to humans and wildlife [3, 4]. This conclusion has widespread acceptance in the field of endocrinology due to the strength of the published data. Additionally, following the publication of our review [2], Dr. Linda Birnbaum, Director of the National Institutes of Environmental Health Science (NIH) and one of the world's leading toxicologists wrote an editorial stating: "the question is no longer whether nonmonotonic dose responses are 'real' and occur frequently enough to be a concern; clearly these are common phenomena with well-understood mechanisms...It is time to start the conversation between environmental health scientists, toxicologists, and risk assessors to determine how our understanding of low-dose effects and nonmonotonic dose responses influence the way risk assessments are performed for chemicals with endocrine-disrupting activities. Together, we can take appropriate actions to protect human and wildlife populations from these harmful chemicals and facilitate better regulatory decision making."* [5]

This study demonstrates that many endocrine disrupting chemicals have been found to cause significant health impacts to humans and wildlife at extremely low doses (approximately 1000 identified so far). Those impacts are erratic and unpredictable. The twelve highly credentialed scientists connected with this study examined 800 studies on endocrine disruption that described low dose impacts causing many serious diseases and developmental problems in humans and wildlife. Yet the State's Scientific Panel established to determine if endocrine disrupting chemicals needed to be monitored, determined that it was not necessary.

Linda Sheehan formerly of California Coastkeeper, is very informed on the topic of endocrine disruption and knows an enormous amount about State and Regional Water Boards and the rules that govern them. (**Attachment #8**) She expressed the following important concerns about the Panel's CEC report:

- Extremely limited set of monitoring proxies
- Concern about deference to CDPH
- Public's relative ignorance about far reaching impacts of these chemicals
- Monitoring major focus on human health impacts

Ms. Sheehan calls for development of standardized interim list of CECs to be monitored that includes treatment plant efforts to identify appropriate CECs for freshwater ecotoxicological concerns. In regard to the monitoring recommended in the Study, she states on page 4 of her comments,

"However, the final Panel recommendations are completely inappropriate in light of the data and fail to meet the requirements or goals of the Recycled Water Policy. For example, the Panel did not expressly acknowledge the fact that discharge of recycled water to receiving waters occurs on a daily basis,or that many northern California streams that may receive recycled water effluent interact regularly and closely with groundwater. As such, the importance of including monitoring recommendations for those CECs that potentially pose a risk to aquatic life and ecosystems is absolutely critical. By failing to recommend a robust monitoring program even in the short-term in light of this dearth of data, the Report will only delay the increased, safe use of

recycled water that California needs to ensure a sustainable water future.” RRWPC totally agrees!

The Order makes the statement, (page 13 #e) *“Monitoring of health-based CECs or performance indicator CECs is not required for recycled water used for landscape irrigation due to the low risk of ingestion of the water.”* We question that conclusion since so much of the irrigating is done in schools, parks, and fields where children, who are most vulnerable to these chemicals, play. Furthermore, they place their bare hands on the ground, on features in the park, etc. and then often put their hands to their mouth without thought. We all know this happens, so the statement is patently untrue.

Then on the same page in #f, it states that: *“Perchlorate is an endocrine disrupting chemical that may be present in hypochlorite solutions, which is a type of disinfectant used for wastewater...The blending of sources of irrigation water will further reduce any concentration of perchlorate present in recycled water and will unlikely to affect beneficial uses or degrade groundwater quality.”* (exact quote)

This quotation assumes that perchlorate remains intact in entire process, but is only diminished by an increase of volume of water and other substances when discharged. This ignores well accepted theory that many chemicals are altered by the ones they come in contact with and wastewater is a blend of many different substances that have unknown capability of merging to produce more toxic substances. This has not been considered in this document at all. (**Attachment #9:** Note: We can't immediately find our articles on this but know they exist and will try to find them in the next day or two. If you can't accept them after the deadline, that's okay.)

Is definition of 'incidental runoff' changed?

There is a general acknowledgement in the Order that wastewater discharge requirements should apply, with the possible exception of incidental runoff that is defined as, *“...unintended small amounts of runoff from recycled water use areas where agronomic rates and appropriate best management practices are being implemented. Examples of incidental runoff include unintended, minimal over-spray from sprinklers that escapes the recycled water use area is not considered incidental if it is due to negligent maintenance or poor design of the facility infrastructure, if it is due to excessive application, if it is due to intentional overflow or application or if it is due to negligence. Incidental runoff events are typically infrequent, low volume, accidental, not due to a pattern of neglect, or lack of oversight, and are promptly addressed.”* (Santa Rosa's Reclamation Permit based on State's Recycled Water Policy and North Coast Basin Plan)

In contrast, the definition of 'incidental runoff' in the Order states (page D-3) *“Unintended small amounts (volume) of runoff from recycled water use areas, such as unintended, minimal over-spray from sprinklers that escapes the recycled water use area.”* **Does the Order actually change the extent of the definition by not including a substantial portion of the original?**

Does past performance say something about the future?

This Order is not looking at the whole picture. Most of the water laws referenced in the

first part of the Order have been around a long time. *We wonder why summer water quality is so impaired if clean water laws are working well?* This Order's stated goal is to make second hand water much easier to authorize in order to leave potable supplies in streams. (Most water experts admit that even the most highly treated wastewater has remnant chemical waste in it. Numerous studies have focused on pharmaceuticals getting into our water supply as well. This is a serious problem that is not being adequately addressed. See article "Drugging the Environment" from "The Scientist". **Attachment #10**)

The monitoring and enforcement language does not support meaningful enforcement of this Order. What is left unclear is the means with which certain uses of wastewater are considered safe and others are not, especially in light of the burgeoning scientific evidence that many of the laws were written at a time when the scientific information was not available. Now that it is, there should be an obligation for the State to be truthful with citizens about potential harm.

Wastewater treatment lexicon misleading.....

Utilities departments in the past mislead the public by changing wastewater lexicon from *treated sewage (1985)* to *treated effluent (1990)*, to *recycled wastewater (1995)* to *water reuse (after 2000)*, etc., while making only a few changes in the quality of the product. By referring to tertiary treatment as 'reused water', they give the public an image of its being totally safe. Now the term of choice is 'purified water'.

Furthermore, misrepresentations often occur when presenting information to irrigators and the public. For instance, the North Marin Water District has on their website a statement referring to their irrigation wastewater as being of highest quality, "*Of the three quality standards of recycled water in California, NMWD supply will be of the highest quality, and comply with requirements set by the County of Marin and the state---second only to drinking water in purity.*" When asked if they are using ozone and membrane filtration treatment, staff of the utility replied that they use tertiary. We have never heard that tertiary is a higher quality than wastewater treated with ozone and membrane filtration so it appears as though they are deliberately misleading. These misimpressions seem common with many utility departments. (We spoke to North Marin water officials about this and got the run around.)

In a packet used for training site supervisors of wastewater irrigation areas, Santa Rosa Subregional Treatment Plant staff identified Recycled Water as "*...wastewater that is treated to a high level and then reused for non-potable purposes*". They go on to state that **Recycled Water is not wastewater**. They define tertiary treatment process as having four stages, the same four stages that had always been known to characterize tertiary treatment. It is never mentioned that only a very small number of about 80,000 chemicals in existence are even monitored. They merely state that, "*There has never been a documented illness from appropriate recycled water use.*" How would they know if such a case ever occurred?

Furthermore, recycled water in summer receives the exact same treatment as the wastewater discharged from their storage ponds in winter, for which they have a 200 page NPDES Permit to comply with. What's the difference? If the assumption is that no

discharge will occur, there's plenty of evidence to the contrary. (namely, 200 photos at the Regional Board showing runoff in Santa Rosa and Rohnert Park). We think the main difference is that in winter the wastewater discharge comes under an NPDES Permit, and in summer it comes under Title 22, which only deals with certain aspects of public health and not toxins.

So in summer, the point discharge becomes a nonpoint discharge and the emphasis is changed from compliance with NPDES Permit to compliance with Title 22, at a time of year when runoff into shallow, or even non-flowing streams can be most damaging because of unregulated remnant toxins and nutrients from the wastewater itself, or the products running off with it from the soils, such as pesticides, herbicides, soil amendments, etc. (Title 22 does not cover runoff.)

Title 22 goes to great lengths to assure there are no cross connections between potable water pipes and purple wastewater pipes. To further assure no contact, they also require backflow devices. Many pages of the regulations are devoted to assuring that there is no contact between pipes. They don't mention anything about chemicals in the disinfection process however, that cause leaching of metals (lead for instance) into the drinking water.

And once the wastewater leaves the pipes in the irrigation process, almost anything goes with tertiary per Title 22. The water can be used on playgrounds, parks, schoolyards, golf courses, pools; it can be watered on organic vegetables and other food products. (Studies have shown that remnant toxins in wastewater end up in edible portion of plant and can contaminate soils. See Attachment #1) The basis for allowing this latter practice was based on one five year study in Monterey in 1987, which determined that it was safe to eat raw food crops irrigated with tertiary wastewater even though subsequent studies prove the opposite. The only pollutants considered were the conventional ones monitored in NPDES permits. Endocrine disrupting chemicals and many others were not addressed.

Hired wordsmith consultants reframe terminology....

Water utilities, WateReuse, and the State Water Board itself hired public perception consultants recently to persuade the public that PURIFIED water is almost like potable. The following quote appeared in a WateReuse document entitled "*Marketing Nonpotable Recycled Water*". After a workshop participant expressed concerns about having her children play in fields that have been irrigated with wastewater, citizens were told, (p. 51):

"Recycled water is treated and cleaned to water quality standards far higher than its intended use; in fact, it is cleaned to a level that is safe for humans to swim in. Recycled water is always carried in separate pipes and signs are posted wherever it is used. As an added precaution, laws prohibit spraying recycled water on drinking water fountains, picnic tables, and benches. The use of recycled water is strictly monitored by the California Environmental Protection Agency, the California Department of Health Services, and other public health agencies. In over 75 years of use in California, there has never been a documented case of sickness from contact with recycled water."

No mention is made here about the various treatment levels of recycled water and how, even at the highest level, remnant toxins remain. Yes, the Department of Health has stated that recycled water is safe to swim in, but that is related to their concern for pathogens and does not relate to toxins. In fact, (and ironically) chemicals required to keep the water safe for swimming are considered highly toxic and legally prohibited from running off into streams by the Regional Water Board, even though remnant chlorine in the water treatment process is very low. Here what came up on the web about "chlorine toxicity": *"Chlorine is a chemical that prevents bacteria from growing. Chlorine poisoning occurs when someone swallows or breathes in (inhales) chlorine..... Chlorine, which reacts with water in and out of the body to form hydrochloric acid and hypochlorous acid. Both are extremely poisonous."*

Furthermore, a recent article that came our way entitled *"Chloramine plus Lead Pipes plus Fluoride Equals Contaminated tap water"* (**Attachment #11**) indicates that wastewater with chloramine (considered a safe alternative to chlorine) in contact with lead pipes contributes to toxicity. This is never discussed when looking at impacts of these projects. It states, *"Chloramine itself has been associated with severe respiratory toxicity and skin sensitivity. Overall, despite ongoing research, water treatment chemistry is still insufficiently understood by scientists and specific water quality outcomes depend on the particular chemical interactions found in each water treatment and distribution system."* This is amazing that with all the specificity about protecting drinking water, it turns out that the chemicals that protect water from bacterial contamination, also cause leaching of toxic metals into the supply.

And then another non sequitur, while wastewater in the pipes is very highly regulated by health departments and State law is very specific about its protection, nevertheless, as soon as the wastewater leaves the pipe, it is deemed entirely safe for most human contact. While direct contact with the mouth is not approved, there is an assumption that children will not be harmed when playgrounds, parks, schools, and other areas habited by small children, 'incidentally' over-irrigate. One explanation might be that these regulations are so out-of-date, they don't keep up with current scientific knowledge. This is a serious problem for human and environmental health!

Regarding reference to the signs warning about recycled water in our area (above quote), they are half the size of a piece of notebook paper and often colored in muted tones and barely visible. Anyway, why would the signs matter if *"...the water is treated to a standard far higher than its intended use"*? Either this statement is untrue or based on false assumptions and inadequate regulations.

We've taken photos of bus stops and benches saturated with wastewater, contrary to the statement above. (We have pictures of the same bus stop taken before and after we reported problem to the Regional Board. The last two years or so, we have not seen the problem again, but the first picture was taken about six years ago.) A few years after authorities were shown photographs, the drenching of bus stops appeared to cease. Regarding the claim of no reported illnesses, the types of illness, such as cancer, developmental disabilities, and chronic diseases initiated by toxic chemical exposures are often slow to reveal

themselves and thereby usually impossible to clearly identify initial cause. And as for the strict monitoring by CAL EPA, it's my understanding that they don't have resources or staff for monitoring and rely on the Regional Board, which is also short on enforcement staff.

Stanford official finds treated wastewater delicious to drink.....

I was recently notified of a Legislative Hearing in Sacramento by the *Assembly Select Committee on Water Consumption and Alternative Sources*, Richard Gordon: Chair, on *Urban Water Recycling and Reuse in California*, that took place on Wed. Jan. 20th, 2016, at the CA State Capital. Speaker Dr. Newsha Ajami, Director of Urban Water Policy at Stanford University, stated at the workshop that she had tasted the recycled wastewater and it was delicious, and she couldn't wait to taste the wastewater they will be putting directly into her own drinking water supply. According to the Agenda, at the end of the meeting, they had a 'tasting' of purified water from Santa Clara Valley Water District's Advanced Recycled Water Treatment Facility. We were not present.

While we realize that this draft Order applies to the entire State, from our perspective, it emphasizes the need for water quantity over quality. While there is a lot happening in our area on the conservation front, there are also concerns that agriculture is using much more than its fair share and that antiquated water laws need to be changed. We realize that the State is starting to go in the direction of making agriculture accountable for the water they use, but in the meantime, our experience with irrigation practices in the urban areas (We can't go on large agricultural parcels to check their irrigation practices.) indicates many problems exist. We are very concerned about irrigation practices and the probability that monitoring, recording, and enforcing irrigation runoff has not been adequately addressed.

The Anti Degradation Policy addresses maintaining high quality waters, but what about preventing already impaired water bodies from getting worse? The Russian River has been touted on many occasions as having very high water quality. That may be true with some water perimeters, but serious impairments such as excessive phosphorus on lower river beaches for the entire 2014 summer recreation season, along with impairment listings for temperature, bacteria, and excessive sediments, have not been adequately addressed. (Mercury is also excessive in places, especially in Laguna tributary according to USGS studies and should be studied further.) Also, the Regional Board has not taken any action so far as we know, to place the lower river on the 303(d) list for nutrients (mistakenly we believe). Nevertheless, all care should be taken to not make the situation worse, especially with high recreational use in summer. Furthermore, there appears to be a dearth of information on sediment toxicity.

Focus on saving water and less on water quality....

The goal and focus of this Order is to save potable water by using recycled wastewater for many uses.

Based on the many studies by United States Geological Survey (USGS) on toxins in waterways and endocrine disruptions and other examples of harm to wildlife and fish, uncertainty about whether the wastewater is safe enough for human contact and its

discharge into waterways is a most reasonable consideration. Health departments fail to consider toxic and endocrine disrupting exposures in setting health standards. There are currently about 80,000 chemicals on the market, mostly unregulated and safety unknown. Where human and environmental health, are at stake, caution should prevail. Furthermore, aquatic life is more seriously affected and we may be destroying the food chain for higher species that serve humans as a source of nourishment. Now we can't be sure whether seafood is safe. This became especially clear when the recent crab season was cancelled. (**Attachment # 12**) But this Order does little but give a sales pitch for reuse.

Background information skewed...

The Background Information portion of this document focuses on drought and is very weak, for reasons we give throughout this comment letter, on addressing the complexity of actual conditions in waterways. Instead, the document provides information and regulations that supposedly demonstrate the 'safety' of recycled water. For instance, there is no discussion of remnant toxins in wastewater and their potential impacts at very low doses. There is no discussion of possible outcomes from irrigation runoff and the definition of incidental runoff is greatly watered down from that which occurs in the State's Recycled Water Policy. It is usually the case where the law is unclear, vague, duplicative, contradictory, etc. and simply inadequate to address the complexity of the world we live in.

The truth is, when you poison one species, you ultimately poison us all. The use of massive amounts of pesticides ends up in waterways and works its way up the food chain. In fact, many of the pests being poisoned have developed resistance and newer and stronger poisons need to be created to do the job. In the meantime they have unintended consequences such as the death of the butterflies. They are in our soils, our water, our aquatic life, and probably our fish, our frogs, our birds, and much more. When babies are born with microcephaly, we don't know if it's the carrier of the Zika virus or the chemicals used to destroy the mosquito that caused this birth defect.

In fact, the Order appears to white wash the problems inherent in this action. The sentence (page 2) in #7 states, "*Recycled water*" means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource". There is an unproven assumption in this statement that does not hold up scientifically. While this sentence may appear in the Water Code, as it stands, it tells us nothing about the safety of the water for the purposes proposed. Instead, this Order relies on Title 22 to assert the safety of the recycled water even though totally inadequate for assessing the water quality needs of the environment. (There is loose referral to other regulations that apply to recycled water where discharge occurs, but we have found that our Regional Board is most reluctant to, and has almost never, imposed fines for any but the most excessive and extensive spills. The incremental amounts of pollutants, even when significant, appear to be mostly unaddressed.

Reclamation Permits: Inadequate monitoring and enforcement:

The North Coast Board wrote extensive regulations into Reclamation Permits, but their

monitoring and reporting requirements are so limited, it will be extremely difficult to know when compliance occurs and even more difficult to prove when it does not. Because this State Order turns what is normally a point source discharge into a non-point through allowance of incidental runoff, the monitoring and reporting requirements need to be more tightly monitored and enforced. **There is a need to adequately fund the Regional Boards for the ability to enforce measures that still exist.** Reliance on utilities to self-enforce while requiring limited inspections and monitoring will result in compliance problems. Since the utilities will be selling this water (Santa Rosa charges 95% of the cost of potable water.), it gives them a monetary motivation to cut costs wherever possible and assure maximization of water applications.

Concern that nonpoint runoff will be greatly increased:

Incremental runoff incidences consistently appear to be ignored by Regional Board staff, even when occurring frequently. (When formal complaints were filed, Cease and Desist actions took place, but never Administrative Civil Liability action and fines have NEVER been imposed, even where multiple incidents occur at same location.)

When runoff complaint was filed against Santa Rosa, irrigators decided to irrigate at night, so proving runoff would be very difficult. Those in charge of irrigation projects are not required to inspect when system is operating. They can go on site many hours after spigot has been turned off, and claim they do not see runoff. They can see a wet sidewalk and not call it runoff. As long as they don't see it actually going into a drain, they can claim there is no runoff. Or in some cases, they can claim very small amounts such as 5-10 gallons when millions are being irrigated over the season and it is likely that much more is being spilled. And then these incremental spills from over-watered sites, accumulate in the low flow creeks, with the result that none actually get regulated.

Anyone can be an Administrator or user in charge of wastewater applications....

Anyone can fill out a form saying they will comply with irrigation rules, pay a fee, and Voila! They are an administrator. Although they pledge to adhere to the Basin Plan, probably no one will ever know how the irrigator actually uses the wastewater, just so they say the right things on the form, such as compliance with Title 22 and Basin Plan. There will probably be little or no enforcement because of inadequate funding, and we may ultimately have to say good-bye to recreation and fish and wildlife and the lower river economy. Without adequate staff funding, we don't see how Regional Board will enforce what has been turned into more indirect discharges. (Only very large spills of about 100,000 gallons or more get enforced now.)

Prohibitions...

The Prohibitions on page 18 would be meaningless without enforcement. In any case, this Order waters down requirements such that there's not much to enforce anyway. #5 states that, *".....incidental runoff of recycled water shall not result in water quality less than that prescribed in water quality control plans or policies unless authorized...."* And #8 states, *"The use of recycled water in violation of the applicable Regional Water Board's Basin Plan is prohibited."* It would have to be a pretty gross violation for anyone to notice. *It appears that 'incidental runoff' has come to mean anything less than a major spill that is visible to*

the general public.

Specifications...

After focusing mostly on specifics of meeting Title 22 water regulations, on pages 19-20 there are a list of specifications which lists just about all the water law in the codes. One lawyer who has expertise on water law, said he didn't know all of the laws mentioned. To us it seemed totally un-thought out and disorganized. A double message comes through this Order to on the one hand to make compliance easier, and the very weak Title 22 is used to justify doing that, but then this half a page of specifications brings in all kinds of other regulations whose role is not fully explained. This includes (#g-page 20) which states, "*Any applicable water quality related CEQA mitigation measure.*" How can this be possible if they have thrown out CEQA from this process?

Wastewater irrigation not always cost effective & sometimes not available...

No consideration is given to issue that recycling infrastructure is very expensive and **during drought, there is often little to recycle**. Local wastewater storage ponds go down considerably in a drought summer, depending on whether there were late spring rains. If extensive funds are spent on irrigation infrastructure and the wastewater is not there, it's a double whammy cost wise. Wastewater is counted on to offset water use, but there is neither water nor much wastewater available in drought, so problem is still not solved. Californians are pigs with water and we need to get used to using much less, especially with agriculture using the major supply.

We need to think twice about growing water intense crops and we need to do more to foster and support innovative thinking about ways to stretch our supplies much better than we do. And we need to come down hard on rich people who think their money will buy them all the water they want for their decorative gardens and swimming pools.

Studies on cost effectiveness of such projects need to be developed (for both utility AND customer). A related issue is that utilities lose money when conservation succeeds. **On the other hand, with recycled water, they can raise rates to pay for infrastructure, and then sell back the wastewater at 95% of the cost of potable water.** This situation pits the customer against the utility in some areas cost wise. There may be huge variables in situations of different communities around the State. This situation calls for analysis. By eliminating CEQA, you eliminate public input into project consideration.

Finally, writing these comments has been a major effort. This document is filled with inconsistencies and appears to be a hodge-podge of requirements while also appearing to facilitate more recycling. Site monitoring will be required once a month to determine if overwatering is occurring. How can one know if runoff is occurring if site inspections are once a month?

My over all impression is that it won't accomplish what it intends; there is so much here, with few enforcement mechanisms, limited and ambiguous enforcement capabilities by agencies, may possibly result in greater pollution of our waterways than we have now. Administrators are expected to operate their irrigation so as to not pollute waterways, but especially in the case of a single operator who is an administrator, other than self-

reporting, there does not appear to be much enforcement.

Thank you for the opportunity to comment on this General Order. We hope the issues raised in this letter will be noticed and addressed.

Sincerely,



Brenda Adelman

PS: As we are near the deadline, we will send this letter in now and then work on the list of 12 attachments. We hope to have a complete list by the 12:00 noon deadline today (February 22, 2016).

ADDENDUM:

Real world examples of irrigation problems....

What follows below is the result of our study of wastewater irrigation in our local area. It illustrates our concerns about real world irrigation practices. We believe the 'devil is in the details' and that this Order eviscerates many of the protections while pretending they are still in force. There is no question in our minds that the implementation of this program using this Order, will result in extensive additional and devastating pollution to our waterways. It demonstrates a lack of concern for and knowledge about natural water systems and disregards their functions.

Incidental runoff reporting concerns:

RRWPC has had the following concerns with irrigation reports provided by City of Santa Rosa and Rohnert Park: (we inspected files)

- Reclamation permits are vague about how irrigation will be monitored and relies on SR's Recycled Water Guide which is not specific regarding individual sites;
- Guide not specific on reporting
- The files contain no details on the determination of agronomic rates and it is totally unclear whether they are being followed. Number of inches and gallon amounts of water applied to some parcels seems to indicate they are not.
- Report forms inadequate:
 - Irrigation takes place at night, but inspections occur in morning. No wastewater use amounts reported nor whether irrigation even occurred the day the report was made. Therefore you don't know if they irrigated, but had no spills OR whether they just didn't irrigate that day.

- Neither exact time of inspection noted on report, nor hours of irrigation. Report can be made on runoff many hours after irrigation occurred.
- Where there is overflow, no report on amount of wastewater irrigated that day and no way of knowing how much may have run off.
- cursory exam of runoff, small amounts reported (5-10 gallons) and not even clear on HOW they make inspection. In other words, do they examine entire site or just do a drive by?
- Spray irrigation allowed next to and in-between impervious surfaces and on swales near storm drains. There is probably no way there would NOT be runoff.
- No regulation of repeat runoff year after year by certain irrigators. Many of these occur at schools, parks, and playgrounds where young children can have contact.
- No ACLs by Regional Board on entities having multiple runoff incidents over many years.
- Numerous irrigators report the use of gigantic amounts of wastewater on small urban parcels with a great deal of impervious surfaces and on clay soils (I believe). As much as 50" or more per acre application has been reported, far more than what is usually estimated for landscape (30"?)
- Reports note that irrigation overflows are reported to someone in charge, but nothing in files give follow up report on what was done. Subsequent reports often indicate repeat runoff events.
- Nothing in files about how agronomic rates are determined and it appears that some irrigators may not follow them at all.

Repeated irrigation runoff happens year after year....

We include the following information to give examples of problems identified.

RRWPC had noted many irrigation overflows in Rohnert Park in 2009 and filed a complaint. There are approximately 200 photos of runoff in North Coast Regional Water Board files. Furthermore, RRWPC submitted extensive comments on this issue in comments to North Coast Regional Board on Santa Rosa's NPDES and Reclamation Permit, authorized in December of 2013.

Irrigation amounts presented in quarterly, annual, and other reports on irrigation practices, provide evidence that numerous urban landscape irrigators are repeatedly cited for multiple and even frequent incidents of irrigation runoff. There is no indication in any of these reports of what action may have been taken to stop these violations which we just learned have been going on at least since 2005. (Some irrigators have been cited for irrigation runoff as a result of citizen complaints, but none, to our knowledge, cited as a result of official investigations.)

Two examples found in annual reports covering 2010 through 2012. The Spreckles Community Center in Rohnert Park had 27 runoff incidents in 2010, 20 incidents in 2011, and 10 incidents in 2012. Prior years had spills as well although they are not listed here.

Redwood Creek Apartments, also in Rohnert Park, had a significant number of repeated spills. In 2010 they had 19 spills, 18 in 2011, and 12 in 2012.

While the City promised that shutting off repeat offenders would only occur as a last resort, they have never cut anyone off. We have heard them state that they probably never will. It would seem like this Order should identify the types of situations where cut offs would be appropriate. Furthermore, while these numbers appeared in annual reports, neither Santa Rosa nor the Regional Board, to the best of our knowledge, ever penalized anyone for multiple instances of over irrigation and runoff into waterways.

Spill amounts impossible to identify accurately:

While the number of reported gallons spilled was not significant, there is no way to ascertain whether those numbers are accurate and to what extent flows may have involved discharge to a waterway. Irrigation takes place at night, visual inspections occur once a week at the most, and it is not known what efforts were made to determine the length of time the spill had been taking place. It is also possible that visual inspections are cursory (drive by?) and spills may have occurred prior or subsequent to the inspection.

While designated staff persons are to be available 24/7 to deal with all emergencies, in most cases the staff person is responsible for multiple sites. In fact, 2/3 of Rohnert Park irrigation sites are separate public facilities and we believe, only one supervisor and two employees to cover about 20 parcels throughout the City. It is unclear how compliance is met at ALL times, when sites are inspected no more than once a week. In some circumstances, a leak can go on for days because no one is inspecting frequently enough and the general public thinks its potable water (Signs are half the size of a piece of notebook paper and usually very hard to see.)

Usually the amounts of reported runoff identified and reported are in the under-ten-gallon range on small parcels that may irrigate a million plus gallons per acre a season to as much as 50 inches application (far too great to be agronomic). This is suspiciously low amount and causes us to believe that these amounts are estimates based on a very brief surveillance of the immediate situation. Furthermore, irrigators are required to look to Landscape Irrigation Guide for guidance on preventing runoff, but the Guide is usually vague and definitely not site specific. Special attention should be given to repeat offenders.

Are agronomic application rates utilized in urban areas?

It's unclear whether agronomic rates were developed for individual parcels in our area. Reclamation Permit called for operations and management plan to be developed (not sure when) describing proper irrigation amounts and applications. We have not seen any specific rules for individual parcels to develop. In either case, a more detailed plan is needed to spell out how excessive and repeated runoff will be avoided. We don't think this Order gives adequate guidance on what should be included before any of the various irrigation applications can be commenced.

We requested and studied City files at Regional Board offices of the largest wastewater irrigation users, and never saw agronomic analyses for individual parcels. Water user contracts appear to say nothing about calculating and/or utilizing agronomic rates. We saw nothing about agronomic applications in Recycled Water User's Guide (Guide) either. After Reclamation Permit adopted by Regional Board, we spent time looking at files and saw almost nothing about how they were being calculated and controlled. (We had been told they were implementing agronomic rates.)

RRWPC filed a complaint on Santa Rosa's runoff during freezing weather in early 2012. After that, the City started irrigating at night and we were unable to track runoff any longer. We do wonder how agronomic rates would change and how much less wastewater can be applied, when irrigation occurs at night. To what extent is project even viable if too little water application is allowed at night? Furthermore, we question to what extent people will follow all the complex rules if no one appears to be watching?

There is a list of all irrigators and the amount they irrigate at the back of Attachment G in Santa Rosa's current permit (rules apply to Rohnert Park as well). We assume these allocated amounts were based on studies of agronomic rates for individual properties. **Large agricultural parcels growing pasture or fodder crops use far less water per acre (in some cases half as much) than the urban landscape irrigators use.** We had been under the impression that fodder crops use large amounts of water. Furthermore, much of the urban landscape borders on impervious surfaces and wherever we have viewed urban runoff, it has involved water running over those surfaces, and into streets and storm drains.

Newly required stream setback designations in new permits for irrigation applications that will protect water quality, should be applied to all permits. If this is not feasible, at a minimum they should be applied to renewed permits as well.

Prohibitions:

- #2: If irrigation occurs at night, how will administrator know if wastewater is being applied to saturated soils?
- #3: How will administrator assure that no wastewater is escaping if irrigation is at night and inspections don't occur when system is operating?
- #4: Airborne spray has been equated to incidental runoff and considered by Santa Rosa to be authorized under the Basin Plan and Recycled Water Policy. RRWPC disagrees with this interpretation. Who is right? Also, this appears it might contradict #7.
- #5: Concerned that children will play on damp grass at schools, playgrounds, play fields, etc. and have direct contact on skin and possibly mouth. This is not healthy!!!
- #7: Concerned that even small spills/sprays into greatly impaired creeks during hot, dry summer, will cause further impairment and have health impacts on humans and pets using water ways for recreation.

Here are some of our recommendations for best management practices that would make

irrigation, particularly on small parcels in urban areas, much safer.

- Irrigation inspections should take place daily and only when system is operating.
- No irrigation should take place 100' from any creek or waterway.
- System should be temporarily turned off until problem is addressed if any water is in gutter heading to drain.
- No irrigation should occur on narrow vegetation strips between impervious surfaces.
- Tertiary wastewater used for landscape and agricultural irrigation should be tested for endocrine disrupting chemicals.
- Reports should note time of inspection and times and amounts of irrigation.
- Irrigators should be actively encouraged and incentivized to use drip irrigation.
- Signs informing people irrigation with treated wastewater is used should be at least 8.5"x11" and in contrasting colors that are easily visible.
- Very high water users should be tracked and inspected more carefully for compliance.
- Whenever there are signs of runoff (such as wet pavement), inspections should be more frequent and detailed until the situation is addressed and corrected.
- Regional Board staff should investigate sites where repeated incidents occur.

Comment Letter: General Order for Recycled Water Use

List of Attachments

Notes:

- While not noted in the body of my comments, I meant to include my list of resources on Endocrine Disruption, which I attach to the email. It's titled "*Endocrine Disruption Reference List*"
- I also will add a few pictures of over-irrigation of wastewater.
- Where there are live links on this attachment, I will not attach whole document to email.

1. Nikita Naik, *Wastewater Irrigation on Farms Contaminates Food, Pesticides and You*, Vol. 34, #3, Fall 2014 p.19-p.23,

<http://www.beyondpesticides.org/infoservices/pesticidesandyou/documents/WastewaterFall2014.pdf>

2. Sonoma County Water Agency, Jeff Church, Water Quality Data for 5 lower Russian River Beaches, 2014 & 2015: Email Attachment for 2015 and link for 2014:

http://www.scwa.ca.gov/files/docs/projects/rrifr/11-18-2014_Estuary_GS_Provisional.pdf

3. Pete Myers Ph.D. and Wendy Hessler, "*Does the Dose Make the Poison?*" Environmental Health News, April 30, 2007

<http://www.ourstolenfuture.org/newscience/lowdose/2007/2007-0525nmdrc.html>

4. Marla Cone, "*Low doses, big effects, Scientists Seek 'fundamental changes' in testing regulation of hormone-like chemicals*", Environmental Health News, March 15, 2012

<http://www.environmentalhealthnews.org/ehs/news/2012/low-doses-big-effects>

5. I couldn't find this one although I know I had it recently.

6. Laura Vandenberg, *Comment Letter: Amendment to Recycled Water Policy to State Water Board*, June 27, 2012

7. Vandenberg, L.N., et al., *Hormones and endocrine disrupting chemicals: low dose effects and non-monotonic dose responses*. Endocrine Reviews, 2012. 33(3): p. 378- 455,

<http://www.ncbi.nlm.nih.gov/pubmed/22419778>

8. California Coastkeeper Alliance, *Proposed Amendment to the Recycled Water Policy to Incorporate Monitoring Requirements for Constituents of Emerging Concern*, July 3, 2012
Note: This document is a rewritten version of the quote I put on page 9 of our comments and doesn't match exactly in wording, but the essence is the same, which calls for a strong monitoring program for CECs in surface waters. (I couldn't find original version.)

9. I couldn't find this one, although I know I had it recently.

10. Megan Scudellari, "*Drugging the Environment*", The Scientist Aug.1, 2015

<http://www.the-scientist.com/?articles.view/articleNo/43615/title/Drugging-the-Environment/>

11. Olga Naidenko, EWG Senior Scientist, "*Chloramine + Lead Pipes + Fluoride = Contaminated Tap Water*", EWG Enviroblog/7-13-2009

12. Mary Callahan, "*Fishermen signal wish to wait for all-clear on Dungeness crab before any catch*" Press Democrat, Feb. 16, 2016

List of References on Endocrine Disruption

Websites & List Serves:

- The Endocrine Disruption Exchange (TEDX):
<http://endocrinedisruption.org/>
 - TEDX: Endocrine Disruption: Overview:
<http://endocrinedisruption.org/endocrine-disruption/introduction/overview>
 - List of Potential Endocrine Disruptors:
<http://endocrinedisruption.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/overview>
 - Prenatal Origins of Endocrine Disruption:
<http://endocrinedisruption.org/prenatal-origins-of-endocrine-disruption/introduction>
 - Pesticides:
<http://endocrinedisruption.org/pesticides/introduction>
- San Francisco Medical Society Journal:
<http://www.sfms.org/NewsPublication/SanFranciscoMedicine.aspx>
- Collaborative on Health and the Environment (CHE):
<http://www.healthandenvironment.org/>
(talks and articles on health and the environment)
- Environmental Health Perspectives: National Institute of Environmental Health Sciences: <http://ehp.niehs.nih.gov/>
- *Above the Fold*: free daily list serve of nationwide articles on environmental health: Contact following to be put on list:
Compiled by Environmental Health News: A project of *Environmental Health Sciences* 421 Park Street, Suite 4 Charlottesville, VA 22902
EnvironmentalHealthNews.org feedback@EnvironmentalHealthNews.org
you may [subscribe here](#)

Studies:

- Vandenberg, L.N., et al., *Hormones and endocrine disrupting chemicals: low dose effects and non-monotonic dose responses*. *Endocrine Reviews*, 2012. **33**(3): p. 378- 455, <http://www.ncbi.nlm.nih.gov/pubmed/22419778>
- Pharmaceuticals in the Environment: A growing threat to our tap water and wildlife, <http://www.chemtrust.org.uk/wp-content/uploads/CHEM-Trust-Pharma-Dec14.pdf>

- Anway, Matthew D., and Michael K. Skinner, *Epigenetic Transgenerational Actions of Endocrine Disruptors*, Endocrinology: The Endocrine Society may 11, 2006, <http://press.endocrine.org/doi/abs/10.1210/en.2005-1058>

Articles & Publications:

- Edited by Ake Bergman et. al., *State of the Science of Endocrine Disrupting Chemicals-2012*, World Health Organization: ISBN: 978 92 4 150503 1)
Link to report and summary:
<http://www.who.int/ceh/publications/endocrine/en/>
- World Health Organization: *Endocrine disruptors and child health*: 2012 ISBN: 978 92 4 150376 1,
http://www.who.int/ceh/publications/endocrine_disrupters_child/en/
- **CHEMTrust:**
 - [CHEMTrust overview of Key Scientific Statements on Endocrine Disrupting Chemicals \(EDCs\) 1991-2013, as of January 2014.](#)
(This document contains about 35 major scientific reports and statements over 22 years that each contain many references and resources on endocrine disruption.)
- Endocrine Society: *Endocrine-Disrupting Chemicals: An Endocrine Society Scientific Statement*; Apr. 17, 2009 (also in CHEMTrust list above)
- Zoeller, R.T., et al., *Endocrine-disrupting chemicals and public health protection: a statement of principles from the Endocrine Society*. Endocrinology, 2012. **Epub June 25, 2012**: p. en.2012-1422, <http://www.ncbi.nlm.nih.gov/pubmed/22733974>
- Melnick, R., et al., *Summary of the National Toxicology Program's report of the endocrine disruptors low-dose peer review*. Environ Health Perspectives, 2002. **110**(4): p. 427-31, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240807/>
- Birnbaum, L.S., *Environmental chemicals: evaluating low-dose effects*. Environ Health Perspect, 2012. **120**(4): p. A143-4 online 14 March 2012
<http://ehp.niehs.nih.gov/1205179/>
- Birnbaum, Linda S., *Endocrine Disrupting Chemicals in Drinking Water: Risks to Human Health and the Environment* before Committee on Energy and Commerce, Feb. 25, 2010, <http://www.hhs.gov/asl/testify/2010/02/t20100225a.html>
- Charles W. Schmidt, *Uncertain Inheritance: Transgenerational Effects of Environmental Exposures*, Environmental Health Perspectives, Vol. 121, #10, October 2013, <http://ehp.niehs.nih.gov/121-a298/>
- Maria Hegstad, *Condemning EPA Endocrine Review, NAS Urges Redo of Draft Risk Paper*, Inside Washington Publishers, 5-3-14
- Janet Raloff, *Weed Killer in the Crosshairs*, Science News, Feb. 27, 2010 (atrazine), <http://onlinelibrary.wiley.com/doi/10.1002/scin.5591770520/>
- Nikita Naik, *Wastewater Irrigation on Farms Contaminates Food, Pesticides and You*, Vol. 34, #3, Fall 2014 p.19-p.23,

<http://www.beyondpesticides.org/infoservices/pesticidesandyou/documents/WastewaterFall2014.pdf>

Patterson Point	Time	Temperature	pH	Total Organic Nitrogen	Ammonia as N	Ammonia as N Un-ionized	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Total Nitrogen**	Phosphorus, Total	Total Orthophosphate	Dissolved Organic Carbon	Total Organic Carbon	Total Dissolved Solids	turbidity	Chlorophyll-a	Total Coliforms (Collert)	Total Coliforms Diluted 1:10 (Collert)	E. coli (Collert)	E. coli Diluted 1:10 (Collert)	Enterococcus (Enterolert)	USGS 11467000 RR near Guerneville (Hacienda)***	Flow Rate**** (cfs)	Estuary Status	Jenner Gauge (ft)
MDL*				0.200	0.10	0.00010	0.030	0.030	0.10		0.020	0.020	0.0400	0.0400	4.2	0.020	0.000050	20	20	20	2	2				
Date		°C		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	mg/L	MPN/100m	MPN/100m	MPN/100m	MPN/100m	MPN/100m				
5/12/2015	10:40:00	19.5	8.2	0.28	ND	ND	0.075	ND	0.28	0.36	0.040	0.085	1.82	2.50	170	2.3	0.0011	770.1	521	4.1	10	3.1	199	Open	1.77	
5/19/2015	11:20:00	20.0	8.2	0.21	ND	ND	0.054	ND	0.21	0.26	0.031	0.066	1.71	1.82	170	0.82	0.00083	547.5	512	14.8	20	6.3	195	Open	0.59	
5/26/2015	12:00:00	20.6	8.0	0.21	ND	ND	0.051	ND	0.21	0.26	0.034	0.078	1.67	2.04	160	1.5	0.0019	770.1	1050	14.6	10	7.3	156	Open	0.97	
6/2/2015	10:40:00	20.3	8.0	ND	ND	ND	ND	ND	ND	0.18	0.035	0.084	1.68	2.13	170	1.5	0.0016	1046.2	906	26.2	10	32.7	137	Closed	4.42	
6/4/2015	10:50:00	21.0	8.2	ND	ND	ND	0.051	ND	ND	0.23	0.043	0.11	1.63	2.19	170	1.6	0.0010	1299.7	1674	32.7	10	49.6	129	Closed	5.14	
6/9/2015	11:30:00	23.6	8.2	0.21	ND	ND	0.14	0.048	0.21	0.40	0.036	0.091	1.60	2.08	160	1.3	0.00082	1732.9	2481	36.9	41	22.8	126	Closed	6.45	
6/16/2015	10:00:00	22.5	7.9	0.24	ND	ND	0.058	ND	0.24	0.30	0.064	0.15	1.78	2.49	160	1.2	0.00082	>2419.6	4352	20.1	30	20.0	118	Open	0.84	
6/23/2015	11:10:00	22.7	7.9	0.35	ND	ND	ND	ND	0.35	0.35	0.038	0.099	1.75	2.25	160	1.6	0.0021	2419.6	1722	5.2	<10	18.7	109	Open	0.76	
6/30/2015	10:50:00	23.5	7.8	ND	ND	ND	0.045	ND	ND	0.22	0.041	0.081	1.66	2.20	160	1.2	0.0018	1553.1	2603	39.9	20	16.9	116	Open	0.84	
7/7/2015	10:10:00	23.7	8.1	0.24	ND	ND	ND	ND	0.24	0.24	0.045	0.085	1.73	2.31	160	1.2	0.0022	>2419.6	2909	12.2	41	14.1	77	Open	0.76	
7/14/2015	11:00:00	23.8	7.7	0.21	ND	ND	0.049	ND	0.21	0.26	0.039	0.031	1.39	1.92	150	3.6	0.0014	1986.3	1904	37.3	31	42.5	77	Open	1.01	
7/21/2015	10:30:00	24.8	7.9	0.28	ND	ND	ND	ND	0.28	0.28	0.041	0.092	1.40	1.94	140	1.6	0.00094	1986.3	2143	6.3	10	4.1	86	Open	0.80	
7/28/2015	9:50:00	24.1	7.8	0.21	ND	ND	ND	ND	0.21	0.21	0.036	0.053	1.49	1.91	140	1.8	0.0016	1046.2	1872	52.0	52	6.3	69	Open	1.18	
8/4/2015	10:30:00	23.5	7.9	ND	ND	ND	ND	ND	ND	0.18	0.031	0.088	1.42	1.99	150	2.9	0.00091	1553.1	2187	5.2	10	12.8	102	Open	0.67	
8/11/2015	10:30:00	23.2	7.8	ND	ND	ND	ND	ND	ND	0.14	0.023	0.048	1.52	1.98	130	0.88	0.0013	1553.1	2143	6.3	<10	3.1	86	Open	1.18	
8/18/2015	10:10:00	23.2	7.8	ND	ND	ND	0.071	ND	ND	0.25	0.030	0.057	1.55	1.98	140	1.5	0.00050	1553.1	2046	4.1	10	7.4	89	Open	0.63	
8/25/2015	10:05:00	22.1	7.9	0.24	ND	ND	ND	ND	0.24	0.24	0.029	0.047	1.51	2.01	150	1.3	0.00094	920.8	1145	17.5	<10	19.9	76	Open	1.56	
9/1/2015	12:00:00	23.5	7.9	ND	ND	ND	ND	ND	ND	0.070	0.025	0.060	1.56	2.14	150	1.5	0.0011	472.1	1081	8.6	20		69	Open	1.05	
9/8/2015	11:30:00	21.9	8.0	0.21	ND	ND	ND	ND	0.21	0.21	ND	0.039	1.62	2.13	120	1.4	0.00068	770.1	749	5.2	31	10.0	62	Closed	2.61	
9/10/2015	11:30:00	22.1	8.0	ND	ND	ND	ND	ND	ND	0.18	0.029	0.037	1.54	2.12	130	1.2	0.0016	866.4	1198	9.0	<10	8.4	66	Closed	3.16	
9/15/2015	11:30:00	20.8	7.8															2419.6	2046	69.1	74	26.5	91	Closed	4.09	
9/22/2015	12:05:00	21.0	7.8															1299.7	1333	96.0	98	95.9	87	Closed	5.69	
9/24/2015	9:50:00	20.4	7.9																				77	Closed	5.94	
9/29/2015																										
10/6/2015																										
10/13/2015																										
10/20/2015																										
10/27/2015																										

* Method Detection Limit - limits can vary for individual samples depending on matrix interference and dilution factors, all results are preliminary and subject to final revision.

** Total nitrogen is calculated through the summation of the different components of total nitrogen: organic and ammoniacal nitrogen (together referred to as Total Kjeldahl Nitrogen or TKN) and nitrate/nitrite nitrogen.

*** United States Geological Survey (USGS) Continuous-Record Gaging Station

**** Flow rates are preliminary and subject to final revision by USGS.

Recommended EPA Criteria based on Aggregate Ecoregion III

Total Phosphorus: 0.02188 mg/L (21.88 ug/L) = 0.022 mg/L

Total Nitrogen: 0.38 mg/L

Chlorophyll a : 0.00178 mg/L (1.78 ug/L) = 0.0018 mg/L

Turbidity: 2.34 FTU/NTU

CDPH Draft Guidance for Fresh Water Beaches - Single Sample Values:

Beach posting is recommended when indicator organisms exceed any of the following levels:

Total coliforms: 10,000 per 100 ml

E. coli: 235 per 100 ml

Enterococcus: 61 per 100 ml

Casini Ranch		Time	Temperature	pH	Total Organic Nitrogen	Ammonia as N	Ammonia as N Un-ionized	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Total Nitrogen**	Phosphorus, Total	Total Orthophosphate	Dissolved Organic Carbon	Total Organic Carbon	Total Dissolved Solids	Turbidity	Chlorophyll-a	Total Coliforms (Colliert)	Total Coliforms Diluted 1:10 (Colliert)	E. coli (Colliert)	E. coli Diluted 1:10 (Colliert)	Enterococcus (Enterolert)	USGS 11467000 RR near Guerneville (Hacienda)***	Estuary Status	Jenner Gauge (ft)	
MDL*	Date		°C		0.200 mg/L	0.10 mg/L	0.00010 mg/L	0.030 mg/L	0.030 mg/L	0.10 mg/L	mg/L	0.020 mg/L	0.020 mg/L	0.0400 mg/L	0.0400 mg/L	4.2 mg/L	0.020 NTU	0.000050 mg/L	20 MPN/100m	20 MPN/100m	20 MPN/100m	20 MPN/100m	2 MPN/100m	Flow Rate**** (cfs)			
	5/12/2015	10:20:00	20.1	8.3	ND	ND	ND	0.066	ND	ND	0.24	0.044	0.18	1.87	2.57	180	1.6	0.0015	547.5	677	5.2	<10	2.0	199	Open	1.77	
	5/19/2015	10:50:00	20.4	8.3	0.24	ND	ND	0.21	ND	0.24	0.30	0.035	0.074	1.67	1.98	170	2.1	0.0013	816.4	749	22.8	10	5.2	195	Open	0.59	
	5/26/2015	11:30:00	20.6	8.1	ND	ND	ND	0.051	ND	ND	0.23	0.036	0.082	1.64	1.97	160	2.2	0.0027	686.7	932	6.3	<10	8.5	156	Open	0.97	
	6/2/2015	10:10:00	21.5	8.1	ND	ND	ND	0.14	ND	ND	0.32	0.040	0.099	1.67	2.18	170	2.0	0.0028	1299.7	1607	27.9	75	47.4	137	Closed	4.42	
	6/4/2015	10:30:00	21.2	8.4	0.21	ND	ND	0.053	ND	0.21	0.26	0.044	0.095	1.42	1.93	170	2.1	0.0024	1553.1	1720	47.1	98	35.5	129	Closed	5.14	
	6/9/2015	11:10:00	22.8	8.3	ND	ND	ND	ND	0.051	ND	0.19	0.036	0.091	1.57	2.04	160	1.1	0.0016	1732.9	1354	43.5	31	25.6	126	Closed	6.45	
	6/16/2015	9:30:00	22.3	7.9	0.28	ND	ND	0.053	ND	0.28	0.33	0.047	0.14	1.76	2.28	170	1.3	0.00082	>2419.6	2489	8.4	<10	2.0	118	Open	0.84	
	6/23/2015	10:50:00	22.2	7.9	0.21	ND	ND	0.040	ND	0.21	0.25	0.042	0.10	1.78	2.30	160	0.85	0.0021	2419.6	2014	6.3	10	7.3	109	Open	0.76	
	6/30/2015	10:20:00	23.6	8.0	0.28	ND	ND	0.044	ND	0.28	0.32	0.038	0.085	1.72	2.20	160	1.4	0.0012	>2419.6	7270	15.8	31	7.4	116	Open	0.84	
	7/7/2015	9:50:00	23.1	8.5	ND	ND	ND	ND	ND	ND	0.18	0.040	0.093	1.77	2.28	150	0.66	0.0014	>2419.6	11199	7.4	10	2.0	77	Open	0.76	
	7/14/2015	10:30:00	24.0	7.9	ND	ND	ND	ND	ND	ND	0.18	0.035	ND	1.50	2.00	140	0.65	0.0013	2419.6	1860	8.4	<10	16.0	77	Open	1.01	
	7/21/2015	10:10:00	24.8	8.2	0.28	ND	ND	ND	ND	0.28	0.28	0.046	0.10	1.48	2.06	140	0.66	0.0012	2419.6	1421	4.1	20	3.1	86	Open	0.80	
	7/28/2015	9:30:00	23.4	8.2	ND	ND	ND	0.049	ND	ND	0.19	0.038	0.070	1.53	2.07	120	1.0	0.0009	1119.9	960	5.1	20	9.6	69	Open	1.18	
	8/4/2015	10:00:00	22.7	7.7	0.24	ND	ND	ND	ND	0.24	0.24	0.029	0.083	1.58	2.06	140	1.0	0.0014	770.1	809	4.1	10	1.0	102	Open	0.67	
	8/11/2015	10:00:00	23.1	7.9	ND	ND	ND	ND	ND	ND	0.18	0.028	0.052	1.59	2.08	92	0.75	0.00064	1299.7	1100	6.2	<10	4.1	86	Open	1.18	
	8/18/2015	9:50:00	22.3	8.0	0.21	ND	ND	0.076	ND	0.21	0.29	0.031	0.049	1.62	2.06	140	1.4	0.00074	1119.9	767	5.2	<10	2.0	89	Open	0.63	
	8/25/2015	9:45:00	21.3	8.1	0.21	ND	ND	ND	ND	0.21	0.25	0.036	0.051	1.58	2.33	140	0.67	0.00094	816.4	851	14.6	10	3.1	76	Open	1.56	
	9/1/2015	11:30:00	23.5	7.9	ND	ND	ND	ND	ND	ND	0.21	0.027	0.078	1.67	2.27	140	0.78	0.0012	816.4	689	8.6	<10	2.0	69	Open	1.05	
	9/8/2015	11:00:00	21.5	8.1	ND	ND	ND	ND	ND	ND	0.18	ND	0.043	1.65	2.23	79	0.98	0.00096	920.8	884	7.4	10	41.0	62	Closed	2.61	
	9/10/2015	11:00:00	21.7	8.1	0.21	ND	ND	ND	ND	0.21	0.21	0.021	0.049	1.69	1.68	130	0.92	0.0011	980.4	620	13.4	20	3.1	66	Closed	3.16	
	9/15/2015	11:00:00	21.2	8.0															1413.6	1664	38.4	75	60.2	91	Closed	4.09	
	9/22/2015	11:40:00	21.7	8.0															1413.6	1354	42.2	63	45.0	87	Closed	5.69	
	9/24/2015	9:20:00	20.0	8.0																				77	Closed	5.94	
	9/29/2015																										
	10/6/2015																										
	10/13/2015																										
	10/20/2015																										
	10/27/2015																										

* Method Detection Limit - limits can vary for individual samples depending on matrix interference and dilution factors, all results are preliminary and subject to final revision.

** Total nitrogen is calculated through the summation of the different components of total nitrogen: organic and ammoniacal nitrogen (together referred to as Total Kjeldahl Nitrogen or TKN) and nitrate/nitrite nitrogen.

*** United States Geological Survey (USGS) Continuous-Record Gaging Station

**** Flow rates are preliminary and subject to final revision by USGS.

Recommended EPA Criteria based on Aggregate Ecoregion III

Total Phosphorus: 0.02188 mg/L (21.88 ug/L) = 0.022 mg/L

Total Nitrogen: 0.38 mg/L

Chlorophyll a : 0.00178 mg/L (1.78 ug/L) = 0.0018 mg/L

Turbidity: 2.34 FTU/NTU

CDPH Draft Guidance for Fresh Water Beaches - Single Sample Values:

Beach posting is recommended when indicator organisms exceed any of the following levels:

Total coliforms: 10,000 per 100 ml

E. coli: 235 per 100 ml

Enterococcus: 61 per 100 ml

Jenner Boat Ramp	Time	Temperature	pH	Total Organic Nitrogen	Ammonia as N	Ammonia as N Un-ionized	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Total Nitrogen**	Phosphorus, Total	Total Orthophosphate	Dissolved Organic Carbon	Total Organic Carbon	Total Dissolved Solids	Turbidity	Chlorophyll-a	Total Coliforms (Colliert)	Total Coliforms Diluted 1:10 (Colliert)	E. coli (Colliert)	E. coli Diluted 1:10 (Colliert)	Enterococcus (Enterolert)	USGS 11467000 RR near Guerneville (Hacienda)***	Estuary Status	Jenner Gauge (ft)
				0.200 mg/L	0.10 mg/L	0.00010 mg/L	0.030 mg/L	0.030 mg/L	0.10 mg/L	0.020 mg/L	0.020 mg/L	0.0400 mg/L	0.0400 mg/L	4.2 mg/L	0.020 NTU	0.000050 mg/L	20 MPN/100m	20 MPN/100m	20 MPN/100m	2 MPN/100m	2 MPN/100m	2 MPN/100m	Flow Rate**** (cfs)		
5/12/2015	9:50:00	16.7	8.4	0.32	ND	ND	0.063	ND	0.32	0.38	0.065	0.13	1.74	2.24	4200	1.2	0.0015	>2419.6	2481	1732.9	1956	435.2	199	Open	1.77
5/19/2015	10:30:00	17.7	8.0	0.35	ND	ND	0.26	ND	0.35	0.62	0.044	0.086	1.09	1.23	7400	2.6	0.0059	>2419.6	583	12.1	31	6.3	195	Open	0.59
5/26/2015	11:00:00	17.1	8.0	0.24	ND	ND	0.27	ND	0.24	0.52	0.050	0.086	1.32	1.20	6600	2.8	0.0074	>2419.6	2142	9.7	10	3.0	156	Open	0.97
6/2/2015	9:50:00	18.0	8.3	0.21	ND	ND	0.28	ND	0.21	0.49	0.033	0.072	2.07	2.05	2100	1.8	0.0027	>2419.6	3876	24.3	50	58.3	137	Closed	4.42
6/4/2015	10:00:00	18.1	8.3	ND	ND	ND	0.053	ND	ND	0.23	0.039	0.072	2.00	1.94	2400	1.5	0.0023	>2419.6	1789	290.9	183	98.5	129	Closed	5.14
6/9/2015	10:40:00	20.0	8.2	0.28	ND	ND	ND	ND	0.28	0.28	0.035	0.052	2.09	2.24	1600	1.3	0.011	1299.7	1539	93.3	121	24.3	126	Closed	6.45
6/16/2015	9:10:00	20.2	7.7	0.32	ND	ND	0.029	ND	0.32	0.60	0.052	0.15	1.45	1.59	7000	1.8	0.00047	>2419.6	>2419.6	2.0	10	816.4	118	Open	0.84
6/23/2015	10:30:00	17.7	7.7	0.21	ND	ND	0.59	ND	0.21	0.80	0.042	0.11	0.931	0.950	14000	1.3	0.0014	>2419.6	3076	3.0	<10	35.5	109	Open	0.76
6/30/2015	9:50:00	19.2	8.1	ND	ND	ND	0.80	ND	ND	0.94	0.032	0.056	0.849	0.852	15000	1.6	0.0022	>2419.6	>2419.6	45.9	122	290.9	116	Open	0.84
7/7/2015	9:20:00	19.4	7.9	0.32	ND	ND	ND	ND	0.32	0.32	0.036	0.059	0.623	0.731	22000	1.8	0.0044	>2419.6	>2419.6	98.3	<10	31.3	77	Open	0.76
7/14/2015	10:10:00	20.0	8.1	0.32	ND	ND	1.1	ND	0.32	1.4	0.045	0.023	0.748	0.807	19000	3.5	0.0031	>2419.6	12033	31.8	<10	261.3	77	Open	1.01
7/21/2015	9:30:00	20.3	8.0	0.35	ND	ND	ND	ND	0.35	0.35	0.043	0.048	0.702	0.718	17000	1.8	0.0024	>2419.6	17329	32.7	10	33.7	86	Open	0.80
7/28/2015	9:10:00	18.9	8.0	0.21	ND	ND	ND	ND	0.21	0.21	0.033	ND	0.785	0.742	17000	1.3	0.0058	>2419.6	>2419.6	>2419.6	20	1046.2	69	Open	1.18
8/4/2015	9:40:00	19.5	7.9	0.24	ND	ND	ND	ND	0.24	0.24	0.025	0.048	0.684	0.600	18000	1.8	0.0029	>2419.6	24196	1203.3	109	1299.7	102	Open	0.67
8/11/2015	9:30:00	19.8	8.0	0.28	ND	ND	1.1	ND	0.28	1.4	0.027	0.044	0.851	0.901	17000	1.9	0.0033	>2419.6	12033	85.1	62	1413.6	86	Open	1.18
8/18/2015	9:20:00	18.8	8.0	ND	ND	ND	1.1	ND	ND	1.2	0.027	0.033	0.746	0.670	19000	1.8	0.0021	>2419.6	19863	>2419.6	86	2419.6	89	Open	0.63
8/25/2015	9:15:00	18.2	7.8	0.28	ND	ND	0.92	ND	0.38	1.3	0.032	0.047	0.88	0.970	19000	1.6	0.0039	>2419.6	11199	>2419.6	86	920.8	76	Open	1.56
9/1/2015	11:00:00	19.3	8.0	0.28	ND	ND	ND	ND	0.28	1.0	0.038	0.06	0.820	0.899	21000	3.3	0.0024	>2419.6	6488	866.4	86	410.6	69	Open	1.05
9/8/2015	10:40:00	17.4	8.2	0.24	ND	ND	ND	ND	0.24	0.24	ND	0.020	0.833	0.851	17000	1.4	0.0060	>2419.6	2723	387.3	121	1725.0	62	Closed	2.61
9/10/2015	10:40:00	17.8	8.3	0.28	ND	ND	ND	ND	0.28	0.28	0.030	0.021	1.17	2.13	13000	1.4	0.0082	1732.9	402	290.9	10	88.6	66	Closed	3.16
9/15/2015	10:40:00	16.6	8.1															>2419.6	12033	281.2	20	178.5	91	Closed	4.09
9/22/2015	11:10:00	19.1	8.2															>2419.6	583	26.6	41	28.8	87	Closed	5.69
9/24/2015	8:50:00	18.0	8.1															>2419.6					77	Closed	5.94
9/29/2015																									
10/6/2015																									
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* Method Detection Limit - limits can vary for individual samples depending on matrix interference and dilution factors, all results are preliminary and subject to final revision.

** Total nitrogen is calculated through the summation of the different components of total nitrogen: organic and ammoniacal nitrogen (together referred to as Total Kjeldahl Nitrogen or TKN) and nitrate/nitrite nitrogen.

*** United States Geological Survey (USGS) Continuous-Record Gaging Station

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Recommended EPA Criteria based on Aggregate Ecoregion III

Total Phosphorus: 0.02188 mg/L (21.88 ug/L) = 0.022 mg/L

Total Nitrogen: 0.38 mg/L

Chlorophyll a : 0.00178 mg/L (1.78 ug/L) = 0.0018 mg/L

Turbidity: 2.34 FTU/NTU

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Beach posting is recommended when indicator organisms exceed any of the following levels:

Total coliforms: 10,000 per 100 ml

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Enterococcus: 61 per 100 ml

Monte Rio	Time	Temperature	pH	Total Organic Nitrogen	Ammonia as N	Ammonia as N Un-ionized	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Total Nitrogen**	Phosphorus, Total	Total Orthophosphate	Dissolved Organic Carbon	Total Organic Carbon	Total Dissolved Solids	Turbidity	Chlorophyll-a	Total Coliforms (Colliert)	Total Coliforms Diluted 1:10 (Colliert)	E. coli (Colliert)	E. coli Diluted 1:10 (Colliert)	Enterococcus (Enterolert)	USGS 11467000 RR near Guerneville (Hacienda)***	Estuary Status	Jenner Gauge (ft)	
MDL*				0.200	0.10	0.00010	0.030	0.030	0.10		0.020	0.020	0.0400	0.0400	4.2	0.020	0.000050	20	20	20	2	Flow Rate****				
Date		°C		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	mg/L	MPN/100m	MPN/100m	MPN/100m	MPN/100m	MPN/100m	(cfs)			
5/12/2015	11:10:00	19.5	8.1	0.21	ND	ND	0.071	ND	0.21	0.28	0.040	0.089	1.82	2.35	170	1.8	0.0014	727	880	8.5	20	5.2	199	Open	1.77	
5/19/2015	11:40:00	20.1	8.2	ND	ND	ND	0.053	ND	ND	0.23	0.028	0.062	1.59	1.93	180	1.0	0.0012	920.8	697	14.6	<10	1.0	195	Open	0.59	
5/26/2015	12:30:00	20.8	8.0	0.24	ND	ND	0.051	ND	0.24	0.30	0.035	0.086	1.64	2.00	160	1.2	0.0019	686.7	1145	13.4	10	3.0	156	Open	0.97	
6/2/2015	11:00:00	20.4	8.1	0.24	ND	ND	ND	ND	0.24	0.24	0.035	0.080	1.60	2.07	180	1.6	0.0010	866.4	1274	22.8	10	6.3	137	Closed	4.42	
6/4/2015	11:10:00	21.3	8.2	ND	ND	ND	0.050	ND	ND	0.19	0.041	0.080	1.62	2.18	170	1.9	0.00028	913.9	2181	67.6	110	45.7	129	Closed	5.14	
6/9/2015	11:50:00	23.7	8.1	ND	ND	ND	0.14	0.048	ND	0.36	0.038	0.091	1.55	2.08	160	0.77	0.0011	>2419.6	2613	76.7	121	48.7	126	Closed	6.45	
6/16/2015	10:20:00	22.4	7.8	0.32	ND	ND	0.054	ND	0.32	0.37	0.050	0.150	1.73	2.41	180	1.5	0.00070	>2419.6	5172	43.5	20	37.3	118	Open	0.84	
6/23/2015	11:30:00	23.2	7.9	0.28	ND	ND	0.040	ND	0.28	0.32	0.036	0.110	1.75	2.28	160	2.2	0.0023	1732.9	3448	31.3	20	13.1	109	Open	0.76	
6/30/2015	11:20:00	24.5	7.9	ND	ND	ND	0.043	ND	ND	0.22	0.032	0.064	1.68	2.20	160	1.2	0.0012	1046.2	1607	20.1	10	4.1	116	Open	0.84	
7/7/2015	10:30:00	23.6	8.0	0.21	ND	ND	ND	ND	0.21	0.21	0.038	0.080	1.87	2.32	150	1.3	0.0025	1553.1	2909	18.1	98	17.4	77	Open	0.76	
7/14/2015	11:30:00	23.6	7.7	0.28	ND	ND	ND	ND	0.28	0.28	0.034	ND	1.41	1.91	140	2.2	0.0015	1732.9	2909	13.1	<10	36.8	77	Open	1.01	
7/21/2015	10:50:00	25.0	7.8	0.21	ND	ND	ND	ND	ND	0.21	0.040	0.064	1.42	1.89	130	1.3	0.0019	1413.6	2187	6.3	41	3.0	86	Open	0.80	
7/28/2015	10:10:00	23.7	7.8	0.24	ND	ND	ND	ND	0.24	0.24	0.032	0.048	1.44	1.89	140	2.2	0.0014	1553.1	1597	12.0	20	22.8	69	Open	1.18	
8/4/2015	10:50:00	23.9	7.8	ND	ND	ND	ND	ND	ND	0.18	0.030	0.083	1.49	2.01	150	1.9	0.0011	1986.3	1670	9.8	10	20.6	102	Open	0.67	
8/11/2015	10:50:00	23.5	7.9	ND	ND	ND	ND	ND	ND	0.18	0.026	0.036	1.54	2.00	120	0.88	0.0010	1299.7	1223	2.1	<10	6.2	86	Open	1.18	
8/18/2015	10:30:00	23.8	7.9	ND	ND	ND	0.072	ND	ND	0.25	0.028	0.049	1.58	1.97	150	1.6	0.00074	1986.3	1421	14.6	20	5.2	89	Open	0.63	
8/25/2015	10:25:00	22.0	7.8	ND	ND	ND	ND	ND	ND	0.17	0.024	0.047	1.49	1.97	140	1.1	0.0020	1119.9	1119	5.2	<10	5.2	76	Open	1.56	
9/1/2015	12:20:00	23.5	7.7	ND	ND	ND	ND	ND	ND	0.18	0.022	0.048	1.54	2.13	130	0.70	0.0011	980.4	882	3.1	<10	2.0	69	Open	1.05	
9/8/2015	11:50:00	21.8	7.8	0.21	ND	ND	ND	ND	0.21	0.21	ND	0.031	1.59	2.18	120	1.7	0.0014	920.8	959	7.3	20	41.0	62	Closed	2.61	
9/10/2015	12:00:00	21.6	7.8	ND	ND	ND	ND	ND	ND	0.18	0.025	0.045	1.53	1.93	150	0.77	0.0011	727.0	1198	7.5	<10	3.0	66	Closed	3.16	
9/15/2015	11:50:00	20.2	7.5															1046.2	1450	6.2	<10	7.4	91	Closed	4.09	
9/22/2015	12:30:00	21.4	7.8															1986.3	1374	58.3	62	98.7	87	Closed	5.69	
9/24/2015	10:10:00	20.3	7.6																				77	Closed	5.94	
9/29/2015																										
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Total Phosphorus: 0.02188 mg/L (21.88 ug/L) = 0.022 mg/L

Total Nitrogen: 0.38 mg/L

Chlorophyll a : 0.00178 mg/L (1.78 ug/L) = 0.0018 mg/L

Turbidity: 2.34 FTU/NTU

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Beach posting is recommended when indicator organisms exceed any of the following levels:

Total coliforms: 10,000 per 100 ml

E. coli: 235 per 100 ml

Enterococcus: 61 per 100 ml

Vacation Beach	Time	Temperature	pH	Total Organic Nitrogen	Ammonia as N	Ammonia as N Un-ionized	Nitrate as N	Nitrite as N	Total Kjeldahl Nitrogen	Total Nitrogen**	Phosphorus, Total	Total Orthophosphate	Dissolved Organic Carbon	Total Organic Carbon	Total Dissolved Solids	Turbidity	Chlorophyll-a	Total Coliforms (Coliort)	Total Coliforms Diluted 1:10 (Coliort)	E. coli (Coliort)	E. coli Diluted 1:10 (Coliort)	Enterococcus (Enterocort)	USGS 11467000 RR near Guerneville (Hacienda)***	Estuary Status	Jenner Gauge (ft)
MDL*				0.200	0.10	0.00010	0.030	0.030	0.10		0.020	0.020	0.0400	0.0400	4.2	0.020	0.000050	20	20	20	2	2	Flow Rate****		
Date		°C		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	mg/L	MPN/100m	MPN/100m	MPN/100m	MPN/100m	MPN/100m	(cfs)		
5/12/2015	11:20:00	19.5	8.2	0.21	ND	ND	0.076	ND	0.21	0.29	0.033	0.062	1.84	2.23	220	1.8	0.0015	722	789	12.1	10	<1.0	199	Open	1.77
5/19/2015	12:00:00	20.2	8.2	ND	ND	ND	0.053	ND	ND	0.23	0.028	0.062	1.65	1.91	170	0.96	0.0018	727.0	697	7.5	10	13.0	195	Open	0.59
5/26/2015	12:50:00	21.1	8.1	0.21	ND	ND	0.052	ND	0.21	0.26	0.032	0.078	1.65	2.01	160	1.0	0.0017	613.1	1019	10.9	10	8.6	156	Open	0.97
6/2/2015	11:20:00	20.8	8.2	0.24	ND	ND	ND	ND	0.24	0.24	0.029	0.080	1.63	2.10	170	1.3	0.0010	920.8	1314	21.8	10	16.1	137	Closed	4.42
6/4/2015	11:30:00	21.2	8.2	0.24	ND	ND	0.051	ND	0.24	0.30	0.036	0.084	1.61	2.18	170	2.0	0.0013	866.4	1935	27.2	10	21.3	129	Closed	5.14
6/9/2015	12:20:00	23.7	8.1	ND	ND	ND	0.14	0.047	ND	0.36	0.036	0.087	1.53	2.07	160	1.2	0.00082	1208.3	1565	10.9	10	30.8	126	Closed	6.45
6/16/2015	10:30:00	22.9	8.9	0.42	ND	ND	0.052	ND	0.42	0.47	0.041	0.11	1.81	2.43	170	1.8	0.0015	2419.6	5475	45.0	41	73.3	118	Open	0.84
6/23/2015	11:50:00	23.1	7.9	0.21	ND	ND	0.040	ND	0.21	0.25	0.034	0.075	1.80	2.28	160	1.7	0.0031	>2419.6	19863	41.4	<10	54.6	109	Open	0.76
6/30/2015	11:40:00	24.6	7.9	ND	ND	ND	0.043	ND	ND	0.22	0.032	0.064	1.70	2.18	160	1.2	0.0019	>2419.6	11199	21.8	41	22.6	116	Open	0.84
7/7/2015	10:40:00	24.0	8.0	0.21	ND	ND	ND	ND	0.21	0.21	0.042	0.050	1.86	2.43	140	1.7	0.0034	>2419.6	5475	14.6	30	52.1	77	Open	0.76
7/14/2015	11:40:00	23.7	7.8	0.24	ND	ND	ND	ND	0.24	0.24	0.037	ND	1.45	1.91	160	1.9	0.0024	2419.6	2481	24.6	10	14.6	77	Open	1.01
7/21/2015	11:00:00	25.2	7.8	ND	ND	ND	ND	ND	ND	0.14	0.037	0.060	1.47	1.88	140	1.3	0.0028	>2419.6	3448	63.7	98	47.1	86	Open	0.80
7/28/2015	10:30:00	24.5	8.0	0.24	ND	ND	0.049	ND	0.24	0.29	0.029	0.040	1.49	1.88	140	1.7	0.0016	>2419.6	2481	17.3	20	204.6	69	Open	1.18
8/4/2015	11:00:00	24.1	7.9	0.21	ND	ND	ND	ND	0.21	0.21	0.023	0.053	1.58	2.01	140	1.7	0.0016	>2419.6	4106	9.6	10	38.9	102	Open	0.67
8/11/2015	11:10:00	23.7	7.9	0.28	ND	ND	ND	ND	0.28	0.28	0.020	0.024	1.59	2.06	120	1.1	0.0010	2419.6	1860	2.0	<10	16.0	86	Open	1.18
8/18/2015	10:50:00	23.9	7.9	ND	ND	ND	0.074	ND	ND	0.25	0.026	0.033	1.60	2.02	130	1.0	0.0020	1732.9	2755	23.1	<10	45	89	Open	0.63
8/25/2015	10:40:00	22.3	7.9	0.21	ND	ND	ND	ND	0.21	0.25	0.023	0.039	1.55	2.11	140	1.1	0.0023	1413.6	1624	8.3	<10	9.5	76	Open	1.56
9/1/2015	12:40:00	23.9	7.9	0.21	ND	ND	ND	ND	0.21	0.21	ND	0.040	1.61	2.16	140	1.0	0.0020	1986.3	1872	4	10	6.3	69	Open	1.05
9/8/2015	12:10:00	21.9	7.9	0.28	ND	ND	ND	ND	0.28	0.28	ND	0.031	1.60	2.23	110	1.1	0.0015	1986.3	1723	1.0	10	63.0	62	Closed	2.61
9/10/2015	12:10:00	22.0	7.9	ND	ND	ND	ND	ND	ND	ND	0.021	0.029	1.54	1.77	140	1.1	0.0019	1732.9	2755	10.9	10	8.6	66	Closed	3.16
9/15/2015	12:00:00	20.8	7.7															2419.6	1785	48.7	41	20.1	91	Closed	4.09
9/22/2015	12:40:00	21.0	7.6															1203.3	1081	30.5	52	16.0	87	Closed	5.69
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June 27, 2012

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th floor
Sacramento, CA 95814

RE: Comment letter-Amendment to the Recycled Water Policy

Dear Members of the State Water Resources Control Board,

I am an academic scientist who has worked for nine years on issues related to endocrine disruptors, including assessments of human exposures, meta-analyses of published literature, and benchwork assessing the effects of chemicals on development, behavior, reproduction, and other endpoints in rodents and aquatic animals. My PhD is in Cell, Molecular and Developmental Biology, although my work is also well recognized in the field of Environmental Health Science. I have published more than 25 peer-reviewed studies and two book chapters and have served on expert scientific and risk assessment panels in the EU and the US. I was also the lead author on the most comprehensive review to date on low dose exposures to endocrine disrupting chemicals (EDCs; discussed in more detail below).

I am writing to challenge the assertion that “monitoring of individual CECs is not [necessary] for recycled water used for landscape irrigation.” I encourage you to consider the extensive peer-reviewed scientific literature on the effects of low doses of EDCs before making decisions about chemical safety in the water supply. Although your scientific board, and many toxicologists around the world, conclude that “the dose makes the poison” when it comes to environmental toxicants, this statement is simply not supported by fact when the chemical in question is a hormone, hormone mimic, or hormone blocker.

In 2001-2002, the National Toxicology Program (NTP) addressed whether there was sufficient evidence to conclude that EDCs act at low doses, i.e. at the doses that humans encounter in their everyday lives. As you are likely well aware, humans encounter EDCs in their food, water, air, dust, as well as household products like detergents, upholstery, solvents, etc. Although typical humans are exposed to low levels of these chemicals (often in the nanogram per kilogram body weight range), the US FDA has identified more than 1000 EDCs in current use, a significant percentage of the over 80,000 chemicals currently in commerce (see <http://www.fda.gov/scienceresearch/bioinformaticstools/endocrinedisruptorknowledgebase/default.htm>). In 2002, the NTP addressed whether there was significant support in the scientific literature for *The Low Dose Hypothesis*, the scientific hypothesis that EDCs could affect development and reproduction of animals *in the range that humans typically experience, i.e. the*

low dose range. Although the NTP was hindered at that time by a relative paucity of data, they did conclude that there was evidence for low dose effects for several EDCs including DES, genistein, nonylphenol and methoxychlor [1].

In 2009, I began working with a group of 11 experts in the fields of endocrinology, cancer biology, ecology, developmental biology, and epidemiology on re-assessing scientific support for The Low Dose Hypothesis. These experts are at the forefront of their fields, have served on expert panels around the world, testified before the US Congress, and are collectively the authors of more than 1000 papers on environmental chemicals. Most of these scientists have been working on this issue for decades.

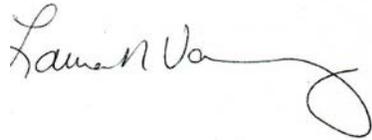
It took us three years to review over 800 published papers from the endocrinology and toxicology literature. Looking at this body of evidence as a whole, we concluded that there was clear and consistent evidence that a large number of EDCs have effects at low doses [2]. In fact, for every chemical where we could identify a low-dose cut-off and low dose studies had been performed, there were low dose effects. These chemicals include herbicides, insecticides, fungicides, preservatives, industrial chemicals, surfactants, plasticizers, pharmaceuticals, flame retardants and anti-bacterial agents, among others. We also identified hundreds of examples of non-monotonic dose response curves, i.e. those where the dose *does not* make the poison. Not only did we identify these types of responses in cultured cells and laboratory animals, but they were also observed in human populations.

Our analysis indicates that low dose effects and non-monotonic dose responses are common for EDCs, and in fact may be *the expected* type of biological response for this large class of chemicals. Most importantly, we have a great understanding of the mechanisms behind these types of effects; hormones act in the body at exceedingly low concentrations, i.e. in the part per trillion or part per billion range. The endocrine system is tuned to respond to these low doses. Thus, low doses of chemicals that mimic hormones follow the same “rules” as the natural compounds. Additionally, while these low levels of hormones can have reversible actions in adults (i.e. an adult female taking pharmaceutical estrogens [birth control pills] will have reduced fertility due to ovulation inhibition, but cessation of pharmaceutical treatment restores her fertility), hormones are known to change the development and differentiation of tissues in embryos, fetuses, and even neonates. These effects will be permanent and irreversible.

The concept of low dose effects and non-monotonic dose responses **is not at the fringe of science**. The Endocrine Society, the world’s largest professional association of clinical and research endocrinologists, has released two recent statements regarding EDCs, and has repeatedly reiterated the conclusion that low doses of EDCs are harmful to humans and wildlife [3, 4]. This conclusion has widespread acceptance in the field of endocrinology due to the strength of the published data. Additionally, following the publication of our review [2], Dr. Linda Birnbaum, Director of the National Institutes of Environmental Health Science (NIH) and one of the world’s leading toxicologists wrote an editorial stating: “the question is no longer whether nonmonotonic dose responses are ‘real’ and occur frequently enough to be a concern; clearly these are common phenomena with well-understood mechanisms...It is time to start the conversation between environmental health scientists, toxicologists, and risk assessors to determine how our understanding of low-dose effects and nonmonotonic dose responses influence the way risk assessments are performed for chemicals with endocrine-disrupting activities. Together, we can take appropriate actions to protect human and wildlife populations from these harmful chemicals and facilitate better regulatory decision making.” [5]

On page 13 of your revised policy, it is stated that “Regulatory requirements for recycled water shall be based on the best available peer-reviewed science.” The low dose literature that we reviewed in our recent analysis was all peer-reviewed science, and our analysis was peer reviewed as well. Yet this vast body of science has not been considered or addressed by the board. Thus, I respectfully ask this committee to reconsider suggestions that exposure of human and wildlife populations to EDCs, including pharmaceuticals, should not be concerning if the concentrations of these chemicals are “low”. Clearly, relying on the centuries old adage that “the dose makes the poison” is not sufficient to protect public health.

Sincerely,

A handwritten signature in black ink, appearing to read "Laura N. Vandenberg". The signature is fluid and cursive, with a large loop at the end.

Laura N. Vandenberg, Ph.D.
Tufts University Center for Regenerative & Developmental Biology

References Cited

1. Melnick, R., et al., *Summary of the National Toxicology Program's report of the endocrine disruptors low-dose peer review*. Environ Health Perspect, 2002. **110**(4): p. 427-31.
2. Vandenberg, L.N., et al., *Hormones and endocrine disrupting chemicals: low dose effects and non-monotonic dose responses*. Endocrine Reviews, 2012. **33**(3): p. 378-455.
3. Diamanti-Kandarakis, E., et al., *Endocrine-disrupting chemical: an Endocrine Society scientific statement*. Endocr Rev, 2009. **30**: p. 293-342.
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5. Birnbaum, L.S., *Environmental chemicals: evaluating low-dose effects*. Environ Health Perspect, 2012. **120**(4): p. A143-4.

ENVIRONMENTAL CHEMICALS

Large Effects from Low Doses

Laura N. Vandenberg, PhD; R. Thomas Zoeller, PhD; J.P. Myers, PhD

Virtually all safety standards for chemical exposures are determined through a process that assumes that high-dose testing will reveal relevant risks because “the dose makes the poison.” For many well-studied contaminants this is a reasonable assumption, but for compounds that behave like hormones, it is demonstrably false.¹ The public health implications of this conclusion are enormous, because it means that many—likely dozens, plausibly hundreds, possibly thousands—of today’s chemical safety standards are too weak by orders of magnitude.

The basis for this conclusion derives from endocrinology. In endocrinology, it is well established that the impacts of hormones (such as estrogen) at high doses can differ from those in the “physiological range” of normal circulating levels of hormones in serum; it is at these concentrations that hormones interact with their receptors to cause physiological and developmental changes by altering gene expression. Indeed, hormones at abnormally high doses are often overtly toxic, through mechanisms that have nothing to do with receptor action.

As research has expanded into the effects of endocrine-disrupting chemicals (EDCs), it has been shown that they follow the same rules that hormones follow.¹ Unfortunately, this runs counter to the core assumption that forms the basis for all toxicological testing done to establish regulatory standards: High-dose testing will be informative about low-dose impacts.

The EPA defines an EDC as “an exogenous agent that interferes with the synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body that are responsible for the maintenance of homeostasis, reproduction, development, and/or behavior.”² Although Rachel Carson examined the effects of many environmental chemicals on health and reproduction in her landmark book *Silent Spring*,³ work on EDCs really took shape in 1991, when a group of scientists met at the Wingspread Conference Center in Racine, Wisconsin, to discuss research on the effects of environmental chemicals on sexual development. The Wingspread attendees produced a consensus statement stating, “We are certain of the following: A large number of man-made chemicals that have been released into the environment, as well as a few natural ones, have the potential to disrupt the endocrine system of animals, including humans.”⁴

EDCs are now understood to be any chemicals that interact with the endocrine system, including chemicals that act as agonists and antagonists of hormone receptors, including estrogen, androgen, thyroid, glucocorticoid, retinoid, and others. To determine the mode of action of these chemicals, both



in vivo (animal) and in vitro (cell culture) assays have been developed. While most chemicals on the market today have never been tested for safety, much less for endocrine disruption, these assays could be used to test new chemicals for hormonal activity prior to their entry into the environment through the food supply, packaging materials, or as waste; they are also widely used to test for their hormonal activity many chemicals that are already in use. Chemicals with a wide range of uses, including detergents, plastics, cosmetics, pesticides, pharmaceuticals, and flame retardants, among others, have been shown to have endocrine-disruptor activities.

In 2002, the National Toxicology Program (NTP) examined evidence for what has been termed “the low-dose hypothesis,” i.e., the theory that EDCs could have actions at low doses.⁵ What is meant by “low doses”? Typically, these are doses in the range of what humans experience in their every-

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Environmental Chemicals

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day lives—residues on food, in the air, in dust, and in drinking water. Low doses are often within the range that traditional toxicological testing has determined to be “safe.”

The question is whether EDCs are safe at the doses the typical person experiences. To determine what doses are safe, regulatory toxicology usually starts by administering large doses of a chemical to animals, identifying the highest dose at which no effect is found, and then extrapolating downward to calculate a safe dose. Those “safe” doses are rarely tested. Yet EDCs, like hormones, defy the toxicological dogma: Low doses can have effects that are not expected from high-dose exposures. In fact, these effects can be observed at doses orders of magnitude beneath the highest dose that produces no effect using traditional approaches. The mechanisms by which chemicals cause high-dose effects usually are completely unrelated to mechanisms that EDCs employ at low doses, and the effects of high and low doses can be on completely different endpoints.

In our review of the EDC literature, we found hundreds of examples of these types of responses, termed nonmonotonic responses, in cultured cells, animals, and even human populations.¹ Many of these chemicals have effects at low doses, providing strong evidence that calculated “safe” doses of these chemicals are not, in fact, safe.¹

Are these chemicals adversely affecting human health? Many of the earliest epidemiology studies examining the effects of EDCs studied occupationally or accidentally exposed individuals, i.e., people who were exposed to relatively high doses, either acutely or over longer periods of time. Now a large number of epidemiology studies have focused on environmentally exposed individuals, i.e., people who are exposed to EDCs from everyday life. These studies show that many of the effects observed in cultured cells and controlled animal experiments accurately predict what epidemiologists are observing in human populations: associations between human exposures and disease endpoints consistent with the “low-dose hypothesis.”

So where do we go from here? As scientists, these findings suggest for us that EDCs, as a chemical class, act very similarly to the hormones they mimic or block: They act at low doses, with effects that are more pronounced when exposures occur during critical periods of development. Just as hormones have nonmonotonic relationships between dose and effect, nonmonotonic effects of EDCs are expected. This means that high-dose testing is insufficient to establish the safety of low doses. In our review,¹ we propose some changes to the way risk assessors determine safety of EDCs: 1) “safe” doses of chemicals, and chemicals in the range of human exposures, should be tested; 2) regulators should assume that EDCs produce nonmonotonic dose responses; 3) more sensitive endpoints should be included in chemical testing.

What can the average person, or patient, do to reduce EDC exposures? This is, of course, an important issue for health care practitioners and others invested in improving public health. Several studies suggest that making small lifestyle changes can have dramatic effects on exposure levels.⁶

Patients should be encouraged to make lifestyle choices that reduce known EDC exposures. However, the lessons learned from the published literature seem to be clear: Even low doses, including reduced exposures from changes in consumer behavior, cannot be considered safe. Thus, widespread changes to chemical safety regulations are likely to have the widest effects on human health.

We encourage physicians, nurses, public health administrators, and others working in the medical field to read our recent review and to get involved with the many scientific societies that support new approaches to chemical regulation that better reflect current scientific understanding than do standard toxicological procedures.⁷ Your expertise provides an important voice to help the risk assessment community develop new approaches to chemical risk assessment, especially as it pertains to EDCs. Hormones are important signaling molecules that dictate the health of individuals throughout the life course, and therefore the effects of EDCs simply cannot be ignored.

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July 3, 2012

Chair Charles Hoppin and Board Members
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814
Sent via email to: commentletters@waterboards.ca.gov

RE: Proposed Amendment to the Recycled Water Policy to Incorporate Monitoring Requirements for Constituents of Emerging Concern

Dear Chair Hoppin and Board Members:

On behalf of Heal the Bay and California Coastkeeper Alliance, we appreciate the opportunity to comment on the *Proposed Amendment to the Recycled Water Policy to Incorporate Monitoring Requirements for Constituents of Emerging Concern* (Amendment). Heal the Bay is an environmental organization with over 13,000 members dedicated to improving water quality in Santa Monica Bay and Southern California coastal waters for people and marine life. California Coastkeeper Alliance (CCKA) represents 12 Waterkeeper groups spanning the coast from the Oregon border to San Diego. CCKA and Heal the Bay sat on the Stakeholder Advisory Committee formed to assist with selection of the constituents of emerging concern (CECs) Ecosystems Panel (Panel) experts, and were active members of the drafting group for the State Water Resources Control Board's Recycled Water Policy (Policy). We attach and incorporate by reference our January 10, 2011 comment letter, as many of our concerns expressed therein remain the same.¹

Heal the Bay and CCKA support the State Water Resources Control Board's (Board) work to amend the Recycled Water Policy to include monitoring requirements for CECs. Given the thousands of CECs being discharged, the proposed, extremely limited set of monitoring proxies will fail to build scientific credibility and to assuage public concerns. The Staff Report recommends monitoring only eight CECs for surface application and a subgroup of six of these for subsurface application, along with nine surrogates for treatment efficiency, which are not CECs. This abbreviated list ignores the larger policy implications of a short-circuited CECs monitoring program. In order to provide our state regulatory agencies with an accurate and comprehensive CEC data set, **the list of CECs monitored should include contaminants from U.S. EPA's Candidate Contaminant List 3, and the list of CECs proposed by CDPH**, in addition to those recommended by the Expert Panel in their Final Report.² Additionally,

¹ CCKA and Heal The Bay comments dated January 10, 2011 on *Staff Report, Constituents of Emerging Concern (CEC) Monitoring for Recycled Water* (November 8, 2010) and *Final Report, Monitoring Strategies for CECs in Recycled Water: Recommendations of a Science Advisory Panel* (June 25, 2010).

² See *Final Report, Monitoring Strategies for CECs in Recycled Water: Recommendations of a Science Advisory Panel* (June 25, 2010). Pages 64,66.

Regional Water Boards should be granted discretion to add CECs to the list of constituents monitored based on region-specific considerations.

In addition to expanding the list of CECs monitored, we provide the following recommendations to strengthen the Board's monitoring of CECs in recycled water:

- Effluent dominated surface water should be monitored, in addition to groundwater.
- Surrogate parameters should not be used in lieu of CEC monitoring.
- CEC testing should not be limited to currently approved analytic methods.

I. The list of CECs monitored should be expanded to reflect U.S. EPA and Department of Public Health recommendations.

We support the proposal for a phased monitoring approach with a one-year initial assessment monitoring phase followed by a three-year baseline monitoring phase. However, the proposed list of monitoring proxies for this initial phase is extremely limited. An initial screening period with comprehensive monitoring is necessary to build the foundational baseline to determine which CECs need to be further monitored and regulated – and, importantly, to build public confidence that the science behind CEC monitoring is sound.

It is critical that the monitoring proposed in the Amendment be as thorough and comprehensive as possible to address CEC impacts to human health and aquatic life in order to protect all beneficial uses of California's inland and coastal waters.³ It has been our direct experience that members of the public care significantly about CECs. They are concerned that regulatory agencies appear to be unaware of the full range of public health and environmental dangers associated with CECs, and that there has been little meaningful action to redress these informational and regulatory gaps.⁴ The Draft Amendment is a critical component of providing the public with confidence that the proper data are being provided to regulatory agencies in order to appropriately regulate CECs. Lack of data is no excuse to exclude an appropriate constituent at this early stage of CEC monitoring programs. Further, any analysis completed to develop a final list of CECs may prove to be of value for determining which CECs should be looked at more carefully for regulation in the future.

Heal the Bay and California Coastkeeper Alliance invested heavily in the development of the Policy with the goal of increasing recycled water use consistent with state and federal water quality laws. We urge the Board to include an initial screening period of monitoring, over three years, that includes the full list of CECs in Table 1,⁵ and any additional appropriate contaminants from the USEPA's CCL3 List.⁶

³ It is our understanding from Staff that the Recycled Water Policy will be further revised to include the recommendations of the Aquatic Ecosystems Panel in the near future.

⁴ House Committee on Energy and Commerce Subcommittee on Energy and Environment, "Endocrine Disrupting Chemicals in Drinking Water: Risks to Human Health and the Environment" (Hearing Feb. 25, 2010), information available at: <http://energycommerce.house.gov/hearings/hearingdetail.aspx?NewsID=7673>. See also Bergeson and Campbell, "House Subcommittee Holds Hearing on Endocrine Disrupting Chemicals in Drinking Water" (March 1, 2010), available at: <http://www.lawbc.com/news/2010/03/house-subcommittee-holds-hearing-on-endocrinedisrupting-chemicals-in-drinking-water/> (noting that at the 2010 hearing, the "Subcommittee members criticized the slow pace of EPA's Endocrine Disruptor Screening Program").

⁵ Attachment A, Page 4, Table 1.

Monitoring for this list will far better ensure the protection of both human health and the environment, as envisioned by the Policy. Also, it will provide the public with the confidence they need to embrace indirect potable reuse on a statewide basis.

In addition, a survey of the CEC monitoring sections of all of the NPDES permits in the state would be useful in developing a standardized interim list of CECs to be monitored. The State Board should give the Regional Boards discretion to include additional constituents from this list. The Region 4 Los Angeles Regional Water Quality Control Board has proposed CEC special studies in recent water reclamation plant NPDES permits. The list required by the Board for ocean monitoring for ambient waters is much more comprehensive than those proposed in this report; the list includes 24 different monitoring proxies, many that have been inappropriately excluded from the list in this Amendment. Thus as proposed, the recommendations of the report will lead to the elimination of monitoring required by these special studies, and therefore severely limit the Regional Board's ability to acquire this data.

The Amendment should also include the list of constituents recommended by CDPH. The current proposed language regarding this list is weak and will likely not result in the monitoring of these constituents. For instance, the Amendment states, "The California Department of Public Health (CDPH) shall be consulted for any additional monitoring requirements for recycled water use found necessary by CDPH to protect human health." This is a major step backwards from the November 2010 Staff Report, which proposed to accept the list of CECs recommended by CDPH outright. Furthermore, it is unclear why staff changed this initial proposal. We support the addition of the CDPH-recommended monitoring parameters. Recycled Water Policy Section 10(a)(1) states that "all uses of recycled water must meet conditions set by CDPH." Thus the proposal to defer on the CDPH list appears to be in conflict with the intent of the Recycled Water Policy. While we would welcome additional CDPH information on the reasoning for the monitoring parameters it recommends, we would oppose eliminating recommendations that will ensure better safeguard of public health.

If California is going to advance recycled water use, the potential impacts of CECs must be tackled assertively. This will not be accomplished by brushing aside the recommendations of CDPH. Indeed, this runs the risk of setting the state back in its use of recycled water, which is critical to the state's water supply future. Investment in monitoring now will reap significant dividends in both scientific understanding of CECs and public good toward recycled water use in the future. For consistency and ease of regulation, we encourage the State Board to broaden the list of monitoring proxies to a similar list for each.

The list of CECs should be revisited on a biennial basis.

The full CEC monitoring list itself should be revisited on a biennial basis initially, since the science and number of new chemicals and pharmaceuticals coming on the market are changing so rapidly. Adequate monitoring during the initial assessment and baseline monitoring phases, along with periodic updates to the CEC list will reassure the public that the science is being developed fully, and it will

⁶ Science Advisory Panel Final Report June 25, 2010 Appendix D, Table D-1

produce the information necessary to make a more informed decision about which parameters to include and exclude in a longer-term monitoring and regulatory framework.

II. The impacts of CECs in surface water must be addressed.

The monitoring program needs to adequately cover both groundwater and surface water systems. The Amendment does not provide recommendations for monitoring receiving water other than groundwater, which is a major short-coming. Monitoring should be required for all designated constituents both in the effluent and in the receiving waters. Including such requirements would build the database that the CEC Advisory Panel recognized is needed to “predict likely environmental concentrations of CECs based on production, use and environmental fate, as a means for prioritizing chemicals on which to focus method development and toxicological investigation.”

In neglecting to address surface water in the Amendment, Staff did not acknowledge the fact that discharge of effluent to receiving waters occurs on a daily basis. Many streams in southern California are effluent-dominated streams with 80-95% of dry weather flows coming from recycled water discharges. Further, many California streams receive recycled water effluent and interact regularly and closely with groundwater. In fact, state law requires the development of regulations to allow for indirect potable reuse through surface water augmentation. SB 918 requires the Department of Environmental Health to develop regulations to allow indirect potable reuse through surface water replenishment by 2016. For these reasons, it is critical to include monitoring requirements for CECs in surface waters. Monitoring for additional constituents that pose a risk to surface water applied to groundwater will provide Water Boards with better information regarding CEC impacts. Receiving water monitoring should be conducted at least annually, with a trigger of increased frequency to quarterly if any CECs on the list are detected in the effluent more than once in a 90-day period. As a side note, it is unclear why the policy proposes differing monitoring requirements for groundwater recharge reuse through surface and subsurface application.

III. Surrogate parameters should not be used in lieu of CEC monitoring.

The Amendment permits certain dischargers to monitor only surrogate parameters. In cases where the Amendment requires both surrogates and health-relevant CECs to be monitored, more frequent monitoring for the surrogates is required. We strongly oppose such a direction, which is inappropriate and would reduce, rather than encourage, consumer confidence in the use of recycled water. The Amendment should clearly state that under no circumstances should surrogate monitoring replace CEC monitoring for groundwater recharge.

The Amendment requires the monitoring of surrogates only for landscape irrigation. It is unclear whether landscape irrigation is meant to include agricultural irrigation. The Board should clarify this point, and identify distinct requirements for each activity, as appropriate. Additionally, the Board should strictly limit the use of surrogates for landscape irrigation, which can impact surface and groundwater supplies. Recycled water used for irrigation can lead to groundwater recharge. Further, contaminants can remain in the soil until a rain event flushes them into surface waters or groundwater basins. For example, in the Russian River watershed, poor soils for attenuation and shallow groundwater can cause water

soluble organic compounds to reach groundwater or surface waters and affect salmon and other aquatic life.

Severely limiting recommended monitoring as proposed in the Panel Report will reduce, rather than encourage, consumer confidence in the use of recycled water. It also will delay effective action to prevent potential public health and ecological impacts, contrary to the goals of the Recycled Water Policy. A monitoring program, particularly when used as a shorter-term regulatory screening tool, necessarily must err on the side of comprehensiveness rather than relying on surrogates to indicate potential for CEC contamination.

IV. CEC testing should not be limited to currently approved analytic methods.

The CEC monitoring list should be based solely on the need for monitoring, not the current availability of analytical methods. State Board staff should ensure that research on analytical methods moves forward concurrently. The Staff Report lists the CEC Advisory Panel's recommendations for additional research, including the development of robust and reproducible analytical methods to measure CECs in recycled water. However, it states that these research topics may be funded at the discretion of the State Board. Discounting the CEC list based solely on the fact that they are currently unavailable will assuredly continue the status quo of their unavailability. Requiring necessary contaminant monitoring and a reasonable timeframe for method development is a sounder course to achieve the Policy's goals and directions.

We respectfully request that the Board consider the above-described recommendations in order to protect aquatic ecosystem health from the ever-increasing threat of CECs. In brief, because Heal the Bay and California Coastkeeper Alliance support the increased, safe use of recycled water consistent with state and federal water quality controls, we oppose broad implementation of a recycled water program based on monitoring for an extremely circumscribed set of potential proxies for human health and aquatic life impacts. The proposed program of CEC monitoring for recycled water must be expanded in order to support the state's need to increase recycled water use.

Thank you for your commitment to establishing a monitoring framework for CECs in California's waterbodies. If you have any questions, please do not hesitate to contact us.

Sincerely,



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Environmental Engineer in Water Quality
Heal the Bay



Kirsten James, MESMW
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January 10, 2011

Charlie Hoppin, Chair and Board Members
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814
c/o Jeanine Townsend, Clerk to the Board
Via Electronic Mail: commentletters@waterboards.ca.gov

Re: Comment Letter: CEC Monitoring for Recycled Water

Dear Chair Hoppin and Members of the Board:

The California Coastkeeper Alliance (CCKA), which represents California's 12 Waterkeeper organizations, and Heal the Bay are Stakeholder Advisors to the "Advisory Panel for CECs in Recycled Water," and were active members of the drafting group for the State Water Resources Control Board's Recycled Water Policy (Policy). On behalf of CCKA and Heal the Bay, we welcome the opportunity to provide these comments on the State Water Resources Control Board's *Staff Report, Constituents of Emerging Concern (CECs) Monitoring for Recycled Water* (November 8, 2010) (Staff Report). Many of these comments also relate the Panel's *Final Report, Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water: Recommendations of a Science Advisory Panel* (June 25, 2010) (Panel Report). We also incorporate by reference our letter submitted to the State Board on May 14, 2010 on the previous draft of the CEC Advisory Panel's Recommendations, (*Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water: Recommendations of a Science Advisory Panel* (April 15, 2010)).

In brief, we disagree with the proposed, extremely limited set of monitoring proxies, which will fail to build the database of information needed to develop sound CEC standards that protect water quality and advance public acceptance of the increased use of recycled water. The Staff Report recommends only four health-based CECs and four different performance-based indicator CECs. While the Panel makes scientific arguments in support of this abbreviated list (as compared with the thousands of CECs potentially being discharged), it ignores the larger policy implications of a short-circuited monitoring program in terms of retarding public good will toward the safe use of recycled water. The list should be expanded, as we have argued consistently, to build scientific credibility and to assuage public concerns.¹

¹ For example, at least one water district scientist raised questions about the selection of caffeine as a tracer since it is comparatively ubiquitous. (Personal conversation with OCWD Laboratory Director, September 27, 2010.) It was noted that some of the anti-epilepsy medications such as carbamazepine and primidone are particularly stable molecules that do not wax and wane like other markers, and would likely be better selections. *Id.* Gadolinium was also mentioned as a potentially useful tracer for these reasons. *Id.* See also Guo, Y. C. and Krasner, S. W. (2009), "Occurrence of Primidone, Carbamazepine, Caffeine, and Precursors for *N*-Nitrosodimethylamine in Drinking Water Sources Impacted by Wastewater," *JAWRA Journal of the American Water Resources Association*, 45: 58–67. doi: 10.1111/j.1752-1688.2008.00289.x, abstract and full article available at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2008.00289.x/abstract>. In this study "[w]astewater impact on drinking water sources was assessed using several approaches, including analysis of three pharmaceuticals and

The Staff Report does propose to accept the list of CECs recommended by CDPH; we support the addition of these monitoring parameters. Recycled Water Policy Section 10.(a)(1) states that “all uses of recycled water must meet conditions set by CDPH.” It is our understanding that the commenters at the December 15th raised questions with regard to CDPH support for these additional parameters, and urged that the CDPH-recommended compounds be revisited through the Panel’s risk-based framework. We would argue that the Recycled Water Policy’s deference to CDPH places the burden on those who would weaken the CDPH requirements to provide clear and convincing evidence that such weakening is unsupported by science or policy.

As Recycled Water Policy Section 10.(a)(4) states, “[r]egulating most CECs will require significant work to develop test methods and more specific determinations as to how and at what level CECs impact public health or our environment.” It has been our direct experience that many members of the public care significantly about this issue. They are concerned about the fact that their regulatory agencies appear to be still unaware of the risks of CECs, and that they have been taking little meaningful action to redress these informational and regulatory gaps.² While we would of course support additional CDPH information on the reasoning for the choices of the monitoring parameters it recommends, we would oppose eliminating recommendations that better safeguard public health simply on this process issue. If California is to advance recycled water use, the potential impacts of CECs must be tackled assertively. This will not be accomplished by brushing aside the recommendations of CDPH for failure to follow the Panel’s lead, where the CDPH recommendations may be more protective of public health, and more representative of treatment efficacy. Indeed, this runs the risk of moving the state *backward* in its use of recycled water, which is critical to the state’s water supply future. Investment in monitoring now will reap significant dividends in both scientific understanding of CECs and public good will toward recycled water use in the future.

As we have stated repeatedly in the past, we also strongly disagree with the Report’s focus on monitoring solely for the purpose of assessing human health impacts. This approach directly contradicts the Recycled Water Policy’s clear direction to include ecological assessments.³ The initial list of compounds to be monitored should be expanded to include, at a minimum, those CECs for which ecotoxicity data is currently available. It also contradicts the Policy’s goal of increasing the use of recycled water significantly beyond the current environmental conditions examined by the Panel, making foundational monitoring all the more important.

Severely limiting recommended monitoring as proposed in the Panel Report will reduce, rather than encourage, Californians’ confidence in the use of recycled water. It also will delay effective action to prevent potential public health and ecological impacts, contrary to the goals of the Recycled Water

personal care products (PPCPs) – primidone, carbamazepine, and caffeine – as indicators,” with the results showing that “measurement of the two pharmaceuticals and NDMAFP tests can be used to evaluate wastewater impact in different watersheds, whereas caffeine results were more variable.” *Id.* (emphasis added).

² House Committee on Energy and Commerce Subcommittee on Energy and Environment, “Endocrine Disrupting Chemicals in Drinking Water: Risks to Human Health and the Environment” (Hearing Feb. 25, 2010), information available at: <http://energycommerce.house.gov/hearings/hearingdetail.aspx?NewsID=7673>. See also Bergeson and Campbell, “House Subcommittee Holds Hearing on Endocrine Disrupting Chemicals in Drinking Water” (March 1, 2010), available at: <http://www.lawbc.com/news/2010/03/house-subcommittee-holds-hearing-on-endocrine-disrupting-chemicals-in-drinking-water/> (noting that at the 2010 hearing, the “Subcommittee members criticized the slow pace of EPA’s Endocrine Disruptor Screening Program”).

³ See, e.g., Recycled Water Policy, Sec. 10(b)(2) (“The panel shall review the scientific literature and, within one year from its appointment, shall submit a report to the State Water Board and CDPH describing the current state of scientific knowledge regarding the risks of emerging constituents to public health *and the environment*”) (emphasis added). See also Recycled Water Policy, Sec. 10(a)(4) (“Regulating most CECs will require significant work to develop test methods and more specific determinations as to how and at what level CECs impact public health or our environment”).

Policy. A monitoring program, particularly when used as a shorter-term regulatory screening tool, necessarily must err on the side of comprehensiveness. The lack of data is no excuse to not include an appropriate constituent at this early stage of CEC monitoring programs. It is the follow-up regulatory effort, and associated longer-term monitoring program, that may be more circumscribed, *if* called for based on sufficiently comprehensive initial monitoring and analysis.

Given that our organizations invested heavily in the development of the Policy with the goal of increasing recycled water use *consistent with state and federal water quality laws*, we urge that the Staff Report be revised to recommend an initial screening period of monitoring, over three years, that includes the full list of CECs in Tables 8.1 and 8.2 of the Panel Report (Panel Report at 64, 66), and any additional appropriate contaminants from Table D-1. Monitoring for this list will far better ensure the protection of both human health and the environment, as envisioned by the Policy. Also, it will provide the public with the confidence they need to begin to embrace indirect potable reuse on a statewide basis. Alternatively, a survey of the CEC monitoring sections of all of the NPDES permits in the state would be useful in developing a standardized interim list of CECs to be monitored. These interim lists should be required for both freshwater *and* marine discharges, as the efforts to create a marine CEC monitoring program will not be completed for at least a year,⁴ and there are no current plant efforts to identify appropriate CECs for freshwater eco-toxicological concerns. Again, this is flatly inconsistent with the Recycled Water Policy.

These comments are discussed further below, along with additional points.

The Recycled Water Policy Calls for Broad Consideration of Monitoring Needs in the Context of Protecting Human Health and the Environment

The Recycled Water Policy established the CEC Advisory Panel for the purpose of “describing the current state of scientific knowledge regarding the risks of emerging constituents *to public health and the environment*.” (Emphasis added.) The Recycled Water Policy further called on the Panel’s Report to “recommend actions that the State of California should take to improve our understanding of emerging constituents” because “[r]egulating most CECs will require . . . more specific determinations as to how and at what level CECs impact public health or our environment.” This mandate was directed at an expert Panel because, as the Report notes, “[t]here needs to be additional research . . . to determine *potential environmental and public health impacts*.” (Emphasis added.) This research is further needed to implement the Recycled Water Policy’s direction to agencies to “minimize the likelihood of CECs impacting *human health and the environment* by means of source control and/or pollution prevention programs.” (Emphasis added.)

In the context of these overarching mandates to ensure protection of both human health and the environment, the Recycled Water Policy directed the Panel as follows:

- (4) The panel report shall answer the following questions: What are the appropriate constituents to be monitored in recycled water, including analytical methods and method detection limits? What is the known toxicological information for the above constituents? Would the above lists change based on level of treatment and use? If so, how? What are possible indicators that

⁴ SCCWRP, “Project: Advisory Panel for CECs in Coastal and Marine Ecosystems,” available at: <http://www.sccwrp.org/ResearchAreas/Contaminants/ContaminantsOfEmergingConcern/EcosystemsAdvisoryPanel.aspx> (given that, according to the public schedule, the Panel is scheduled to complete a Final Report by mid-June, widespread state adoption of some or all of its recommendations will take months more, as the current process is demonstrating).

represent a suite of CECs? What levels of CECs should trigger enhanced monitoring of CECs in recycled water, groundwater and/or surface waters?

As noted above, the Panel was charged with answering each of these questions for both human health *and* environmental perspectives, keeping in mind the overarching goal of increased use of recycled water consistent with water quality laws. The dearth of monitoring data to date and lack of consumer confidence in recycled water quality have been impediments to moving forward on recycled water use and development of the associated CEC standards.

The process that the Panel went through to look at the current information on CECs – examining existing monitoring data, analytical methods and risk (toxicity and exposure) in a systematic manner – is a logical approach. The Panel Report serves as a good reference on the state of CEC regulation, human health (though not environmental) risks, and effluent monitoring. Further, the analysis that was completed to develop the final list of CECs may prove to be of value for determining which CECs should be looked at more carefully for regulation in the future.

However, the final Panel recommendations are completely inappropriate in light of the data and fail to meet the requirements or goals of the Recycled Water Policy. For example, the Panel did not expressly acknowledge the fact that discharge of recycled water to receiving waters occurs on a daily basis, that many streams in southern California are effluent-dominated streams with 80-95% of dry weather flows coming from recycled water discharges, or that many northern California streams that may receive recycled water effluent interact regularly and closely with groundwater. As such, the importance of including monitoring recommendations for those CECs that potentially pose a risk to aquatic life and ecosystems is absolutely critical. By failing to recommend a robust monitoring program even in the short-term in light of this dearth of data, the Report will only delay the increased, safe use of recycled water that California needs to ensure a sustainable water future. The State Board should supplement the interim list of CECs to be monitored by looking at available eco-toxicity data. Those constituents that are toxic to aquatic life should be included on an interim CEC monitoring list. These additions will provide water boards with essential new information to better understand the potential aquatic life impacts of CECs. For instance, pyrethroids are notably absent from the Table 1 of the Staff Report, yet they have been shown by SCCWRP to be a predominant cause of toxicity in waterbodies such as Ballona Creek.

The State Board Must Provide a Comprehensive Monitoring Strategy That Will Help Guide Future Regulatory Efforts That Protect Both Human and Environmental Health

The Recycled Water Policy recognized the need for further research to determine “how and at what level CECs impact public health or our environment,” in order to guide future regulation of CECs. The Recycled Water Policy in fact created the Panel with this uncertainty in mind. Given that the Panel reviewed existing information based on ongoing, relatively limited use of recycled water, we strongly disagree with the recommended monitoring regime of only a small set of CECs, particularly given that they were selected based on human health concerns, rather than considering *both* human and ecological health concerns. Such an extremely limited monitoring regime will fail to satisfy the research needs of the regulatory effort referenced in the Policy, will fail to provide the public confidence in the use of recycled water needed to ensure a reliable water supply statewide, and will fail to protect the health of the environment in the event that recycled water is used in the surrounding environment more extensively than examined by the Panel.

As has been repeatedly articulated by our organizations and supported in the scientific literature, CECs are a growing problem in aquatic environments, and will only increase in significance if recycled water is used more widely *unless* appropriate safeguards are put in place. The Panel itself acknowledged that “reuse practices engage conventional and advanced water treatment processes that result in very

different effluent water qualities” (Panel Report at 37), results that could have markedly varying environmental impacts that would go unexamined under the monitoring framework recommended in the Report. Moreover, the Panel acknowledged that it had ignored “[o]ther reuse practices that could result in discharge of recycled water to surface water, estuaries, and the ocean.” (Panel Report at 2.) The Panel Report noted, possibly by way of explanation, that “the SWRCB, in collaboration with the Packard Foundation, established another Science Advisory Panel in January 2010 that was charged to address CEC discharge” in ocean and coastal ecosystems. However, the release of future reports related to environmental impacts of CECs is not relevant to the immediate mandate before the Panel and the Water Board to assess the “current state of scientific knowledge regarding the risks of emerging constituents to public health and the environment,” and to answer monitoring-related questions that will further such scientific knowledge. Also, the ocean CEC panel’s recommendations may not be finalized for another year, and there are no current plans to determine a CEC list for CECs posing toxicological risks to freshwater aquatic life. In the meantime, Regional Water Boards will continue issuing NPDES permits for recycled water discharges to rivers, lakes and coastal waters without needed safeguard. At a minimum, an interim CEC monitoring list for freshwater and marine discharges must accompany the Water Board’s “CEC Monitoring for Recycled Water package.”

As noted above, the Recycled Water Policy established the Panel to “recommend actions that the State of California should take to improve our understanding of emerging constituents” because “[r]egulating most CECs will require . . . more specific determinations as to how and at what level CECs impact public health or our environment.” Increased use of recycled water, which is important to California’s water sustainability, requires expedited development of this understanding of the impacts of CECs on public health and the environment, and an appropriate regulatory program based on such information. An initial screening period of three years of comprehensive monitoring is needed to build the foundational baseline to determine which CECs need to be further monitored and regulated – and, importantly, to build public confidence that the science behind recycled water use is sound.

This last point cannot be over-emphasized; the many years of difficulty in increasing the use of recycled water in the face of public concern about its overall safety must be faced with comprehensive and transparent monitoring programs that lead to protective standards. The example of recycled water projects like the LADWP East Valley Project being mothballed because of “toilet to tap” concerns illustrate the importance of consumer confidence. Without the baseline data created by a comprehensive initial screening period, the extremely limited monitoring framework being recommended by the Panel will fail to reassure a concerned public that the health and environmental impacts widely reported as resulting from CECs are being sufficiently studied and, as needed, regulated. More limited monitoring may be instituted after the initial screening period, based on the results of the initial monitoring and in light of the state’s recycled water use objectives and environmental and public health protection goals.

The Panel Report itself appears to recognize the limitations of the recommended monitoring framework, noting that “there are a number of activities the State can undertake to improve the quality of future monitoring and toxicological information that feeds into the process that the Panel has identified for this inaugural CEC monitoring effort.” (Panel Report at 74.) The inaugural monitoring effort, in fact, should be a baseline, comprehensive monitoring program, not the circumscribed program in the Staff Report, to set up the foundation for later regulation as needed. The Panel Report further notes that the state should “[d]evelop a process to predict likely environmental concentrations of CECs based on production, use, and environmental fate, as a means for prioritizing chemicals on which to focus method development and toxicological investigation.” (Panel Report at vi.) Again, this cannot be done without a robust set of initial monitoring information.

We urge the State Board to revise the Staff Report to recommend an initial screening period of monthly effluent monitoring, and at least annual receiving water monitoring, over three years, that

includes the CDPH list, the list of CECs in Tables 8.1 and 8.2 (Panel Report at 64, 66), and any additional appropriate contaminants from Table D-1. These lists are far from a comprehensive compilation of CECs, but we are willing to support them based on the research done to date in developing them. Moreover, we oppose the Staff Report's insistence that "the process for selecting additional health-based CECs for monitoring *would have to be consistent with* the Panel's exposure screening approach (i.e., evaluation of MEX/MTL)" (Page 3, emphasis added). While the Panel's approach could be a floor, we do not view it as a ceiling. The Panel simply has not made the case for eliminating the authority of CDPH or a Regional Board to determine that more protective (from a public health or environmental perspective) monitoring is necessary to ensure that beneficial uses and other standards are met.

As an alternative to the above monitoring recommendation, the State Board could obtain the list of CECs that are being monitored by dischargers in all the regions and develop an interim list with appropriate detection limits. Throughout the state, NPDES permits have moved forward that include monitoring requirements for a variety of different CECs. For instance the Tapia Water Reclamation Facility NPDES Permit adopted on September 2, 2010 includes a special study for CEC monitoring of 26 constituents. The bottom line is that California needs meaningful CEC monitoring for all permits moving forward. Currently, some Regional Boards require CEC monitoring while others do not, and there is no consistency on the CEC lists or the minimum detection limits. In addition, the full CEC monitoring list itself should be revisited on a biennial basis initially, since the science and number of new chemicals and pharmaceuticals coming on the market are changing so rapidly. Review of the monitoring list can move as appropriate to a triennial basis.

With respect to timing, the Staff Report recommends quarterly monitoring of CECs for the first year and biannual monitoring for baseline operations. This is too infrequent. Instead, we urge the State Board to recommend initial monthly monitoring. Although some may argue that monthly monitoring may be cost prohibitive, the State Board must not lose sight of one of the main purposes of the screening effort: to provide consumer confidence that recycled water poses negligible human and aquatic life health risks. A monthly monitoring program for three years would capture any variability in plant performance and seasonal influent water quality and provide a more solid base of information to present to the public. The state needs to build a robust database on the issue quickly, and it needs to provide adequate information to the public on the effluent water quality discharged from various different levels of water recycling treatment. Some technologies like MF/RO may do a good job of removing many CECs to below detection levels, and other treatment technologies will hopefully be effective at CEC removal as well. But the state needs to collect and publicly present this data to a skeptical public, *and* demonstrate its understanding of the impacts of the discharges to receiving waters, in order to make the scientific and policy case for a larger strategy to increase statewide water recycling. Again, effluent monitoring can be reduced in the longer term based on the results of this initial screening process, but this must be done consistent with an initial, comprehensive review of effluent concentrations and receiving water impacts.

Adequate monitoring during this initial period will reassure the public that the science is being developed fully, and it will produce the information necessary to make a more informed decision about which parameters to include and exclude in a longer-term monitoring and regulatory framework. Monitoring should be required for all constituents both in the effluent and in the receiving waters, to build the database that the CEC Advisory Panel recognized is needed to "predict likely environmental concentrations of CECs based on production, use and environmental fate, as a means for prioritizing chemicals on which to focus method development and toxicological investigation." Of note, the Staff Report does not provide recommendations for receiving water monitoring other than for groundwater recharge/reuse, which is a major short-coming. To ensure fate and transport is readily understood, receiving water monitoring should be conducted at least annually, with a trigger of increased frequency to quarterly if any CECs on the list are detected in the effluent more than once in a 90-day period.

Finally, the State Board should ensure that recommendations are made based on the need for monitoring, not the current availability of analytical methods, and that research on analytical methods moves forward. The Staff Report lists the CEC Advisory Panel's recommendations for additional research, including the development of robust and reproducible analytical methods to measure CECs in recycled water. However, it states that these research topics may be funded at the discretion of the State Board. This research is critical. Discounting the need for analytical methods based solely on the fact that they are currently unavailable will assuredly continue the status quo of their unavailability. Requiring necessary contaminant monitoring and a reasonable timeframe for method development is a sounder course to achieve the Policy's goals and directions.

Surrogate Parameters Should Not Be Used in Lieu of CEC Monitoring

The Staff Report proposes "...monitoring for the presence of selected CECs *and/or* monitoring operational surrogate parameters and constituents to evaluate treatment unit and overall treatment process performance" (Page 4, emphasis added). It appears from this language that the State Board is proposing that certain dischargers may only monitor surrogate parameters. We would strongly oppose such a direction, which is inappropriate and would reduce, rather than encourage, consumer confidence in the use of recycled water. Under no circumstances should surrogate monitoring replace CEC monitoring.

* * *

Consistent with our organizations' support for the increased, safe use of recycled water consistent with state and federal water quality controls, we must oppose broad implementation of a recycled water program based solely on monitoring for an extremely circumscribed set of potential proxies for human health impacts, and *no* consideration of ecological impacts. The proposed program of CEC Monitoring for Recycled Water must be expanded to be consistent with the Recycled Water Policy and with the state's need to increase recycled water use safely.

Thank you for the opportunity to provide these comments on an issue critical to the health and well-being of Californians and their environment. If you have any questions, please do not hesitate to contact us.

Regards,



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Chloramine + Lead Pipes + Fluoride = Contaminated tap water

By Olga Naidenko, EWG Senior Scientist (7/13/2009)

Environmental Working Group (EWG) Enviroblog: Environmental connections to public health

<http://www.ewg.org/enviroblog/2009/07/chloramine-lead-pipes-fluoride-contaminated-tap-water>

The lead pollution crisis of the Washington, D.C. water supply - and the culprit that caused it, the water disinfection chemical chloramine - is a powerful example of how things can go terribly wrong when water quality problems are considered and tackled in isolation.

Earlier this year, Virginia Polytechnic Institute and State University (Virginia Tech) scientists reported the shockingly high lead levels in the blood of young Washington, D.C. children tested between 2001 and 2004, when the District of Columbia's drinking water was being contaminated with lead from aging pipes.

<http://www.ewg.org/enviroblog/2009/01/study-links-tap-water-high-lead-levels-washington-children>

Unfortunately, this situation is not unique: similar results have been reported in Greenville, North Carolina, according to studies by the Duke University researchers.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817676/?tool=pubmed>

Chloramines and lead pipes: Not so good together. American water utilities are increasingly switching to chloramines, a mixture of chlorine and ammonia, for final disinfection of drinking water. Chloramine was supposed to be a "safer" water disinfectant than chlorine because it reduces formation of toxic chlorination byproducts. A 2005 survey by the American Water Works Association found that approximately a third of all utilities now use chloramines.

Water disinfection byproducts are associated with increased risk of cancer and possibly adverse effects on the development of the fetus, so minimizing their levels in drinking water is a good thing. Yet, chloramines drastically increase the leaching of lead from pipes. And here is a real challenge: there are tens of thousands of lead service lines in the water system administered by the DC Water and Sewer Authority. Add to these lines the lead based solder used to join copper pipe, brass and chrome plated faucets, and water fixtures, and the opportunities for lead to leach into the drinking water multiply.

We all accept that water disinfection is a public health necessity. However, we need to thoroughly consider the full impact of any chemical added to drinking water *given the current water distribution infrastructure in place*, not in some theoretical vacuum. As described by Duke researchers, chloramine-induced lead leaching might be lessened by the addition of anticorrosivity agents during the water treatment process. Is that sufficient for protection of public health? We really don't know! Chloramine itself has been associated with severe respiratory toxicity and skin sensitivity. Overall, despite ongoing research, water treatment chemistry is still insufficiently understood by scientists and specific water quality outcomes depend on the particular chemical interactions found in each water treatment and distribution system.

And now add fluoride. In addition to disinfection chemicals, other additives are commonly mixed with the finished drinking water before it leaves the water treatment plant. Of them, fluoride is possibly the most known. Two thirds of the U.S. municipal water supply is artificially fluoridated in an effort to prevent tooth decay. But fluoridation additives in tap water are not the same form of fluoride as found in toothpaste. Typically, water is fluoridated with fluorosilicic acid (FSA) or its salt, sodium fluosilicate, collectively referred to as fluorosilicates. In contrast, fluoride in toothpaste is usually in form of simple sodium fluoride salt, NaF.

Here comes a second unpleasant "surprise" for those in lead-piped locations: fluorosilicates have a unique affinity for lead. In fact, lead fluorosilicate is one of the most water-soluble forms of lead. In fact, fluorosilicic acid has been used *as a solvent* for lead and other heavy metals in metallurgy. In industrial applications, chemical engineers rely on this acid to remove surface lead from leaded-brass machine parts.

Research shows what happens when we mix it all up. What happens when fluorosilicates in water pass through lead-containing pipes and metal fixtures? Not surprisingly, the fluorosilicates extract high levels of soluble lead from leaded-brass metal parts (researchers from the Environmental Quality Institute of the University of North Carolina-Asheville performed this actual experiment).

In research published in the scientific journal *Neurotoxicology*, researchers found that the mixture of the two chemicals: disinfectant (whether chlorine or chloramine) with fluorosilicic acid has a drastically increased potency, leaching amazingly high quantities of lead.

<http://www.sciencedirect.com/science/article/pii/S0161813X07001404>

Where does this lead go? Into our drinking water and right on into our bodies, where they wreak havoc by poisoning our heart, kidneys and blood, causing irreversible neurological damage and impairing reproductive function.

North Carolina researchers concluded that the supposedly innocuous - and purportedly beneficial - quantities of fluoride added to drinking water may, in fact, precipitate a cascade of serious health problems, especially when chloramines and lead pipes are added into the mix.

Do we even need fluoride in tap water? The mixture of chloramine and fluorosilicates in drinking water causes extensive leaching of lead. We cannot dispense with water disinfection - everybody acknowledges this. Thus, chlorine and chloramine are probably here to stay for some time. On the other hand, fluoride, or, specifically, water fluoridation with fluorosilicates, is quite dispensable.

But wait - isn't fluoride the miracle chemical that improves dental health?

Well, yes and no. Much of what is publicized today in caries prevention programs worldwide is derived from the theories generated in the 1950s and '60s, when water fluoridation was actively promoted. As we now know, the main benefits of fluoride for dental health are derived from *surface* application on the teeth, not from ingestion.

In fact, ingestion of fluoride causes dental fluorosis, a range of adverse health effects that includes mottling, pitting, and weakening of the teeth. These risks are especially significant for infants and young children. In the U.S. and worldwide, about 30 percent of children who drink fluoridated water experience dental fluorosis. In 2006, the American Dental Association (ADA) issued an "Interim Guidance on Fluoride Intake for Infants and Young Children." ADA recommended that in areas where fluoride is added to tap water, parents should consider using fluoride-free bottled water to reconstitute concentrated or powdered infant formula to avoid excess fluoride.

According to the latest research, the anti-caries activity of fluoride is due to topical effects, which supports the value of fluoride-containing toothpaste to dental health. There is clear evidence that fluoride dental products significantly reduce the incidence of cavities. In contrast, a substantial and growing body of peer-reviewed science suggests that ingesting fluoride in tap water does not provide any additional dental benefits other than those offered by fluoride toothpaste and may present serious health risks.

The message: Don't assess chemicals in isolation. The lesson here is straightforward: it is completely unscientific to simply toss any chemical into the drinking water on the premises that this chemical might provide some benefits. **The real question is:** what would be the effect of this chemical given what else is going on with the water system? In case of fluoridation and chloramines, what emerges at the end of the pipe (our faucets!) is a potentially highly hazardous mixture of fluorosilicates, lead, and residual levels of disinfectants.

To protect the health of my family today, I can buy a water filter to remove heavy metals and disinfection byproducts from my drinking water with a simple pitcher filter. But **to protect the health of the entire nation**, we really need to consider if our current methods of water treatment can withstand scientific scrutiny, or whether they should be re-assessed so as to provide safe, healthy tap water to all Americans.

Fishermen signal wish to wait for all-clear on Dungeness crab before any catch

MARY CALLAHAN

THE PRESS DEMOCRAT | February 16, 2016, 7:55PM

| Updated 0 minutes ago.

A debate among state wildlife officials about a partial opening of the stalled commercial crab season has inflamed tensions among fishermen up and down the California coast but nowhere more so than Bodega Bay, where members of the local fleet say they have the most at stake.

A move to reopen waters south of nearby Point Reyes to commercial crabbing not only would put a dangerously high volume of fishing gear in a concentrated area, it would provide large, northern vessels an opportunity to clean out the Dungeness stocks which Bodega Bay skippers might otherwise fish at a later date, opponents say.

Other grievances have added to the dispute, including concerns among fisherman that heavy harvest activity so late in the crab season would encroach on Dungeness breeding and whale migration. Consumer confidence in the industry also could be sunk if the newly harvested crab results any human health issues, fishermen said.

“This is the worst — the worst — attempt to manage a fishery in my 60 years, ever, ever, ever,” said Stan Carpenter, president of the Fishermens Marketing Association of Bodega Bay. “You know that it’s horrible when you’ve got a fleet of, I don’t know, 400 to 500 boats, and 90 percent of them don’t want to go.

“When a fisherman asks not to open a fishery up, it’s got to be screwed up,” he said. “It is terrible.”

Crabbers have been idled for the past three months because a persistent algae bloom tainted some shellfish, including crab, with excessive levels of a neurotoxin called domoic acid.

Until now, commercial crab vessels up and down the coast were all in the same position: tied up at dock.

But last week, as federal officials considered a request for disaster assistance for the industry, state health agencies declared that Dungeness crab caught south of Point Reyes no longer posed a risk to human health. Sport anglers were allowed to harvest the crustaceans south of the Marin County landmark immediately.

Commercial crabbers, however, thought it had long been settled that any commercial fishery would only be reopened when the entire coast tested clean, as had been requested last winter by the California Dungeness Crab Task Force, which provides guidance to state regulators.

In a departure from that position, state Fish and Wildlife officials made clear late last week they were moving to reopen the commercial waters south of Point Reyes.

But rather than jump at the prospect of getting back on the water, most commercial fishermen say the chance to scrape together a few dollars after months of sitting idle carries too many long-term risks for the fleet and the fishery’s future. Recent annual harvests have been worth more than \$60 million.

For starters, they worry that consumers, informed that only some crab are safe, will not have the necessary confidence in the product to sustain a market. The migration of just one tainted crab from closed waters into the open fishery could pose risks that couldn't be detected by anglers, retailers or consumers, fishermen said.

But they are also worried about drawing the state's entire commercial crab fleet, or much of it, into an area stretching from Point Reyes to Half Moon Bay, throwing tons of gear and rope in the water when the breeding season is about to start and putting the smallest boats up against behemoth shrimp vessels from further north without enough real estate to share.

Bodega Bay crabbers are especially frustrated because the partial fishery would split the usually unified District 10 management zone that runs north to the Mendocino County line, giving large vessels and other outsiders a toehold in their territory without the competitive protections that would usually be in place.

Carpenter and others said it would be unprecedented to put so much gear and pressure on the Dungeness crab population during breeding, or what's known as "the clutch."

Related Stories

[Sport season for Dungeness crab opened south of Point Reyes](#)

[Grim ocean outlook seen for state's fishing fleet](#)

[Dungeness crab closure pushes North Coast fishermen to breaking point](#)

"I don't know any fishery that is open at a time when the entity you're fishing for is in the spawn," said Bodega Bay fisherman Dick Ogg. "These crabs are going to start clutching here, and they're probably clutching down by that point."

Crabbers up and down the coast have made similar arguments in recent days, in meetings and conference calls. The aim was to try to reach consensus in advance of a public meeting Tuesday of the executive committee for the Dungeness crab task force.

Some crabbers, mostly from further south, near Half Moon Bay, did support a piecemeal opening of the commercial fishery.

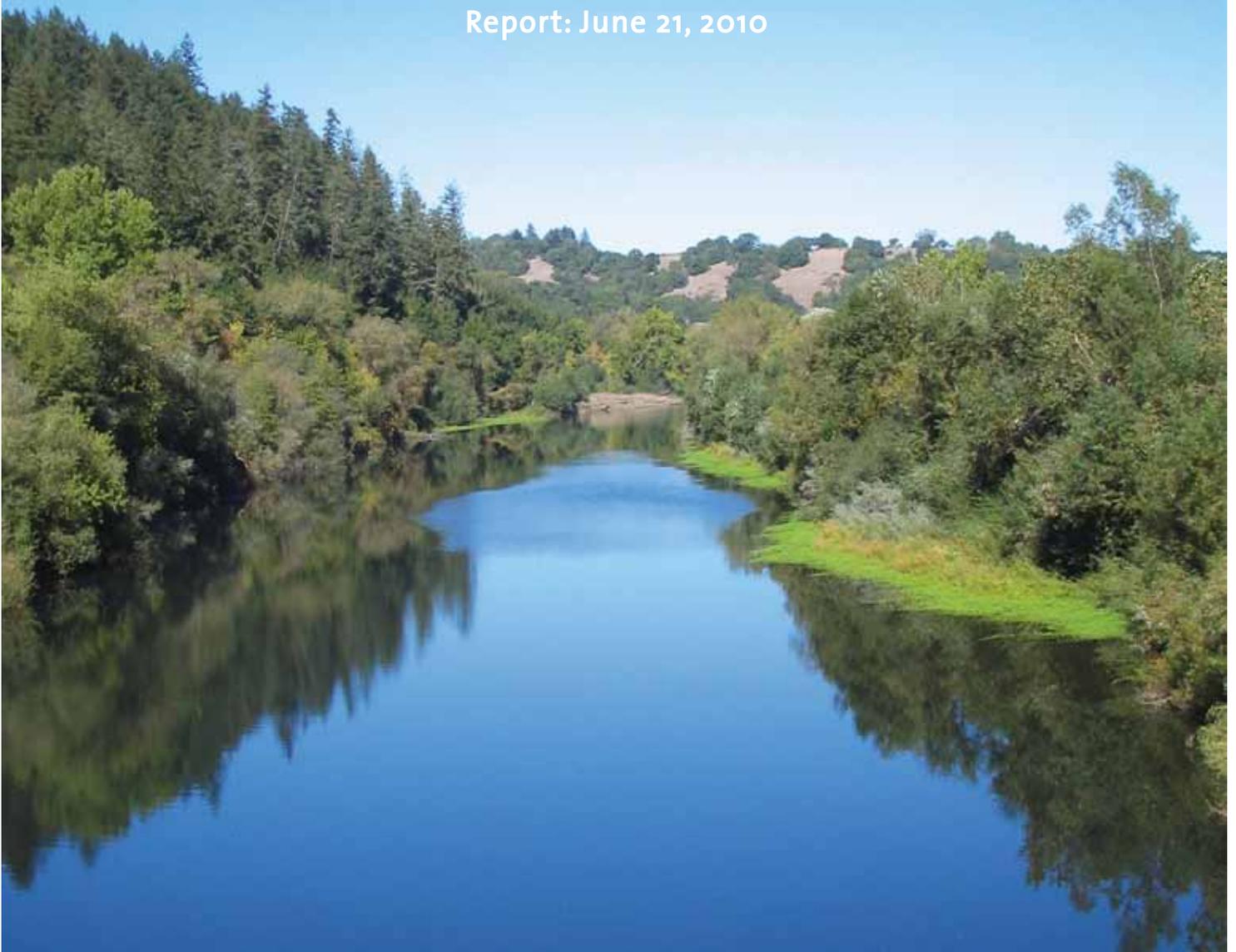
But the committee unanimously approved a request that Fish and Wildlife wait to lift the ban on commercial crabbing until it was cleared to do so on a statewide basis or, at the least, only open areas by management district, rather than introduce new arbitrary boundaries.

"Make no mistake, fishermen here are ready to go fishing, want to go fishing and need to go fishing," said Eureka fisherman Mike Cunningham, a member of the executive committee. "But I think we're looking at the bigger picture here. We want a rational opening, and we don't want to put any port in a bind, especially Bodega Bay."

You can reach Staff Writer Mary Callahan at 521-5249 or mary.callahan@pressdemocrat.com. On Twitter [@MaryCallahanB](#).

Russian River Watershed Protection Committee 2009 Photo Project

Report: June 21, 2010



By Brenda Adelman for RRWPC

Photographic Report on 2009 Water Quality Conditions in Lower Russian River: Response to proposed 45% cut in summer flows.

By Brenda Adelman for RRWPC

I. INTRODUCTION

In late May, 2009, in anticipation of very low summer flows as measured at the Hacienda Bridge, I started taking photographs from the Hacienda Bridge, the Guerneville (Old) Bridge, and the Monte Rio Bridge and Beach every week until early October, but for one week. Several other photographers assisted, including Laurie Ross, Larry Hanson, Shula Zuckerman, Kim Pistey, Tom Meldau, Shane McColgin, and Community Clean Water Institute volunteers.

Photographs were taken between the end of May and the end of September between Steelhead Beach and Monte Rio Beach. We also received a few photos from supporters and have included one picture from the Duncans Mills area as well. We ended up with thousands of photos and this report offers just a sample of representative scenes we shot.

Our goal was to photograph water quality problems, mostly in the form of nuisance algae and *Ludwigia* and also to show the water levels as the summer progressed. The two dams at Guerneville and Vacation Beach kept waters consistently high in that area all summer. The area where flow changes were most visible was the Kid's Beach in Monte Rio, which is east of the bridge. That was also the area with some of the worst algae. Over the course of the summer we saw many different kinds of attached and unattached algae and offer a representative sample in the pictures. We don't know the names of what we found, but hope some more knowledgeable than ourselves will be able to identify them.

We also tracked water quality monitoring reports as well as pathogen exceedances and beach postings. Furthermore, we include flow data as measured at Hacienda. There are no other flow gauges for the lower river that we know about. Unfortunately, the nutrient data for the entire year included inappropriate protocols and is very inadequate for scientifically determining the extent of the problem. Hopefully this will be corrected in 2010.

This report is divided into several sections including, algae, *Ludwigia*, water levels and impact on beaches, both by flow control and opening of mouth. We include two sets of before and after pictures, upstream and downstream of the Monte Rio Bridge showing the impact of opening the mouth of the river. Two of the pictures were taken on October 5th just as the mouth was being opened, and two were taken the very next day. The difference is profound.

After the breaching, when the water went way down, the beaches where the water had been were covered with algae. I talked to Regional Board staff about the algae and was told they would take samples. I was later informed that toxic blue-green algae had been found in the area of the Kids' beach at Monte Rio.

We include Hacienda flow data here, which we obtained from Sonoma County Water Agency. All of the flows through Sept. 30, 2009, had been verified by USGS. The October flows had not yet been verified. Over the course of the summer, of the 130 days total, 57 days the flow was under 85 cfs, and 31 days were under 70 cfs. The lowest flow was 47 cfs on August 17, 2009.

A few of the pictures state "pathogen exceedance". This means that weekly monitoring at Monte Rio Beach for pathogens was out of compliance on that date. The temperature data came from Hacienda or Johnson's Beach monitoring sites and averaged about 20 to 25 Celsius, which is far too high for salmonids. Temperatures diminish considerably in the fall however.

RRWPC requests that the enclosed photographs not be used for any purpose other than as evidence for consideration of changes to Decision 1610, either Temporary or Permanent. They may also be used by North Coast Regional Board staff for scientific evidence of water quality impairment of the lower Russian River. We do not allow these photos to be used for any commercial purpose without written permission. Where no photo credits are given, pictures were taken by Brenda Adelman.

II. MOUTH BREACHING & FLOW IMPACTS

Breaching of Mouth: impacts on Monte Rio Beach: looking west....



Photo 0145 was taken from the Monte Rio Bridge in the afternoon on Oct. 5, 2009 around 4 pm. looking west. Notice signs on mid-right of photo, far into the water. On far left notice accentuated plant on cement structure and plants submerged behind it. The water here was much higher than I had seen all summer at this location.

Hacienda flow: 92 cfs (not yet verified by USGS)



Photo 0228 was taken one day later (Oct. 6, 2009) of the same scene (magnification a bit different however.) In this picture you can see flat rectangular cement structure with plant behind it and beach all exposed behind.

On the right you can see the sand bar jutting way out with signs that had been far into the water on Oct. 5th, now far back on the sand. The line in the sand behind the signs is where the water had been the day before. Also, you can see sand bar jutting way out beyond bushes in upper right of photo. Although you can't see it in this picture, that beach is covered in algae where the water had been.

Hacienda flow: 102 cfs (not verified by USGS)

Breaching of Mouth: impacts on Monte Rio Beach: looking east....



Photo 0165: This picture was taken about 4 pm on Oct. 5th. The water line is right behind white wood platform. Bushes along the bank and Ludwigia go far out beyond water line.



Photo 0239: This was taken around 2:30 pm on Oct. 6th after breaching of the mouth. You can see white platform far back on sand and sand bar juts out beyond Ludwigia.

Low flow impacts on Monte Rio Beach:



Photo 5845: This is another comparison of the same beach scene looking east. This picture was taken earlier in the season on July 11, 2009. Water levels are more than October 6th but less than October 5th when the mouth was closed. The mouth was open when this picture was taken.

Hacienda Flow: 112 cfs

Temperature: (Johnson's Beach) 23 Celsius



Photo 7924: This picture contrasts with 5845 in that you can see that the river level is much lower (mouth open in both pictures). This was the most visible bridge location where we can see the impact of flow levels on the river. It was taken on Aug. 15, 2009

Hacienda Flow: 50 cfs

Temperature: (Johnson's Beach) 25 Celsius

III. ALGAE:



Photo 0329: This is essentially a blow up of photo 0228 on page 3 (upper right of photo) and taken Oct. 6, 2009 at Monte Rio Beach looking west. It shows prevalent algae in water and on beach AFTER opening of the mouth of the river. You can also see water line from prior day in bottom right corner.



Photo 0387: taken by Bill Clark behind his Duncans Mills vacation home on July 31, 2009 in the morning.

Hacienda flow: 76 cfs

Monte Rio Pathogen exceedence



Photo 4752: This photo was taken from the Monte Rio Bridge looking west on June 22, 2009. The whole water column seems to be subject to a large algal bloom. In subsequent visits, it was not nearly so iridescent green.

Hacienda flow: 157 cfs

Temperature:



Photo 0326: This picture was taken on Aug. 22nd from the Monte Rio Bridge looking east towards the Kid's Beach. As I looked down into the water in the middle of the bridge, the floating algae could be seen going by.

Hacienda flow: 64 cfs

Temperature: (Johnson's Beach) 23.63 Celsius



Photo 0407: This was taken at the Monte Rio Kid's Beach while down at the beach, also on Aug. 22nd. I believe that this is a different kind of algae than what was seen in the prior picture.

Hacienda flow: 64 cfs

Temperature: (Johnson's Beach) 23.64 Celsius



Photos 6814 and 7239: These photos were both taken at the Kid's Beach (from the beach) in Monte Rio. 6814 was taken on Aug. 2, 2009 and 7239 was taken on Aug. 8th. They were both from the same area.

Hacienda flow: 71 cfs and 64 cfs

Temperature: (Johnson's Beach) 23.35 Celsius



Temperature: (Johnson's Beach) 23 Celsius

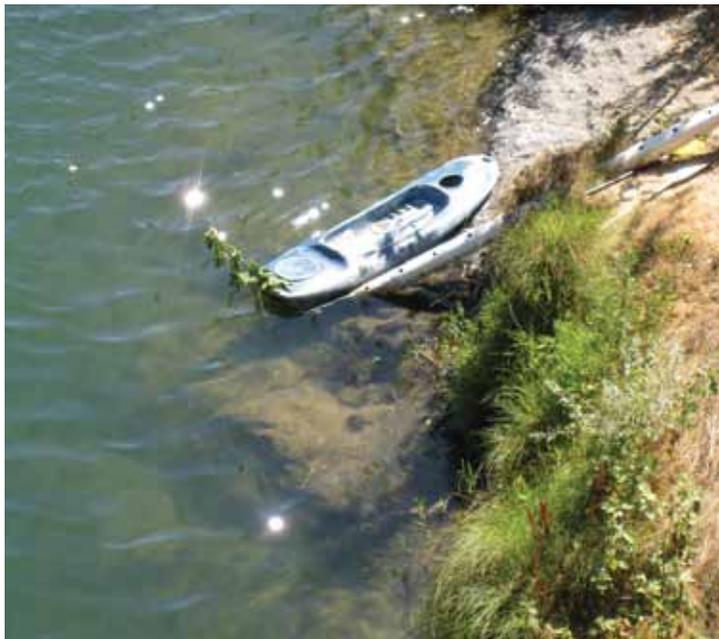


Photo 6980: This picture was taken from Hacienda Bridge on Aug. 2, 2009 Looking west (downstream), the hill on the right is where the pipe is located and the algae is right down below.

Hacienda flow: 71 cfs

Temperature: 22 C



Photo 0369: This was taken at the footings of the Vacation Beach Dam (from the road) soon after it was taken down. The picture was taken on Oct. 6, 2009. The algae are very bright green as you can see, but we don't know what it is. Regional Board staff verified that it is not blue-green algae.

Hacienda flow: 102 cfs



Photo 8100: This picture was taken from the Hacienda Bridge on the North side and looking over to the right. There is a huge outcropping of Ludwigia on this bend and immediately downstream is the large mat of attached algae. This picture was taken on Aug. 16, 2009.

Hacienda flow: 51 cfs

Temperature: 23 C



Johnson's Beach algae photographed by Shula Zuckerman on September 27, 2009. The picture speaks for itself.

Hacienda flow: 69 cfs

Temperature: 21 C



Photo 3542: Picture of floating and submerged algae taken by Laurie Ross in the Steelhead Beach area on August 18, 2009

Hacienda flow: 51 cfs

Temperature: 23 C



Photo 3552: Steelhead Beach algae taken by Laurie Ross on August 16, 2009

Hacienda flow: 51 cfs

Temperature: 23 C



Photo 3311: taken by Laurie Ross in the Steelhead Beach area. This picture shows both Ludwigia and the attached floating and attached tubular algal plant under the water's surface. July 20, 2009 at west Steelhead Beach area, I found the same kind of growth at Hacienda looking south from the bridge on the right bank. **Photo 6327** was taken July 19, 2009.

Hacienda flow: 69 cfs

Temperature: 23 C

IV. LUDWIGIA

This invasive plant has overrun much of the Laguna and is now evident throughout the entire lower Russian River watershed. The Laguna Foundation eradicated it fairly successfully a few years ago in one area (near Stony Point west of Cotati), but it rapidly came back full force when not maintained. It now fills the entire channel.

Ludwigia is found in outgrowths from the bank along the whole lower river. We photographed downstream of SCWA facilities, but we know it occurs upstream as well, although not as prevalent as the lower section of the river. We include representative photos here going down the river from Mirabel (Steelhead Beach) to Monte Rio.



Steelhead Beach: Photo 7-31c looking downstream on July 31, 2009. You can see seven outcroppings in this picture along the bank. Hacienda flow on that date was 76 cfs. Picture taken by Tom Meldau and Shane McColgin.

Sunset Sunset Beach Ludwigia pictures taken by Larry Hanson (Photos 0098, 0024, 0026).



Photos 0024 and 0026 were taken west of the main Sunset Beach on July 25, 2009

Hacienda flow: 71 cfs



Photo 0098 was taken on July 4, 2009 in about the same location

Hacienda flow: 128 cfs

Hacienda Beach:



Photo 8091 was taken on August 16, 2009 (**Hacienda flow:** 51 cfs) and shows a large outcropping just north of the Hacienda Bridge looking down to the right.



Photo 8384 was taken looking south on the Hacienda Bridge towards the right bank on August 22, 2009.

Hacienda flow: 64 cfs



Photo 6684: Hacienda Bridge looking downstream at the left bank. Picture taken July 26, 2009 This is an outcropping of Ludwigia right next to outcropping of submerged attached algae.

Hacienda flow: 74 cfs.



Oddfellow's Bridge:

Photo 3002 taken by Kim Pistey, I believe at the Oddfellow's Bridge. (I was unable to contact her to verify.) The picture was taken in late August.



North bank between Russian River County Sanitation District and Monte Rio Beach:

Photo 3200: taken by CCWI volunteer. Not sure of date, but I had noticed area and it had been pretty consistently the same all summer.



Old Guerneville Bridge: (looking east):

Photo 6246: taken July 18, 2009.

Hacienda Flow: 81 cfs.



Monte Rio Kid's Beach:

Photo 6591 taken July 25, 2009.

Hacienda Flow: 71 cfs



Dubrava Beach:

Photo (#8) taken September 5, 2009 by Shula Zuckerman.



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