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

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

May 26, 2014

Comment Letter: General Order WDRs for Recycled Water Use

Dear Ms. Townsend:

Introduction:

Russian River Watershed Protection Committee (RRWPC) is a nonprofit, public benefit corporation founded in 1980. For about the last ten 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 been especially concerned about irrigation wastewater runoff in urban areas. We appreciate the opportunity to comment on these Waste Discharge Requirements 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 upstream irrigation practices, 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) is bound to get much worse in the coming months because of drought. The Anti Degradation Policy, as analyzed on page 7 of the Order, addresses maintaining high quality waters, but what about preventing impaired water bodies from getting worse? Also, how can a determination be made on compliance with this policy without a CEQA process in place?

RRWPC recently circulated a one page form letter to our supporters about this Order with our quarterly mailer that went out last week. We attach a copy of the letter to these comments. Because of the holiday weekend, we assume that many people will get letters in after the deadline, but since all letters will be the same, we request that you enter them into the record for this item and accept the ones that come in late. We understand that you will be under no obligation to respond in that circumstance, but we would like people's voices counted.

We realize that this Order is in response to the very serious drought the State is currently experiencing. Rather than focusing on much more cost effective conservation efforts however, the drum beats for potable reuse and wastewater irrigation are getting much stronger. In our area, excuses abound for not stepping up conservation programs with stringent, mandatory requirements (in ag as well as urban use), rather than the perceived easier route of developing expensive infrastructure to spray the dubious wastewater commodity on our urban landscape. (See attached letter to Board of Directors of Sonoma County Water Agency expressing our concern about a lack of mandatory conservation.) **Agencies are concerned that utility budgets will suffer and jobs will be lost if conservation is truly successful.** RRWPC has demonstrated that in our area, a well publicized voluntary conservation program has not come close to achieving its 20% savings goal because of a lack of teeth in the program. Instead, millions may be spent on infrastructure expansions for irrigation, and rates will probably go sky high because of it.

We believe that this Order represents the State's best efforts in dealing with a real crisis, yet throughout the document, uncertainty is expressed about whether the wastewater is completely safe enough for human contact and discharge into waterways since there are about 80,000 chemicals on the market, most unregulated and safety unknown. Clean Water Act regulates about 200 of them. Where human and environmental health are involved, caution should prevail.

Examples of toxic exposures causing health impacts are many:

During review of the Recycled Water Policy, RRWPC provided your Board with a great deal of information on the topic of endocrine disruption and 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. Since approval of that policy, we have learned the following, (much of it in the last year) 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;**
- **on May 21st, 2014, a report stated that millions of dead fish have been found all over the world in the past month alone;**
- **Recently, a huge (and unusual) number of baby seals and sea lions have been reported sick and dying along the California coast;**
- **We have also learned that disappearing frogs have their immune systems weakened by chemicals, and that**
- **bees are dying because of pesticides. Furthermore,**

- we are learning that Roundup is way less benign than formerly thought.

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.
- We have learned that 23 babies were born with rare birth defect (anencephaly) in Central Washington from 2010 to 2013 and no one knows the cause.
- In 2009, studies showed that declining male fertility in UK fish AND human males is linked to a wide variety of chemicals found in water pollution.
- 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, world wide there are fewer male children being born than ever before.
- Low doses of controversial insecticide may harm friendly pests. (March 2014)
- Autism, sometimes thought 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.
- Hospitals may release 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 doubled during treatment.)

(References can be provided on bold items above upon request.)

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. Does this Order change the regulatory standing (i.e., displace it?) of Santa Rosa's Reclamation Permit?

What is of great concern is that in the face of uncertainty, rather than following the Precautionary Principal, this Order allows a practice that, if perfectly carried out may or may not be somewhat safe, but inadequate monitoring and enforcement measures may still be needed to assure that occurs. **There is a need to adequately fund the Regional Boards for the ability to enforce these measures.**

Reliance on utilities to self-enforce may 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. It appears as though Santa Rosa has cut back on their successful conservation program, as they may believe that they have saturated their ability to lower

water use. They frequently claim that demand hardening has set in. In this difficult drought, funding may motivate such a comment. In our view, there is much more room for more conservation. It's just the cheap and easy methods have already been explored.

In fact, we wonder if Regional Board will be playing an adequate role in enforcement of this policy? In the specifications on page 13, neither the Clean Water Act or Porter Cologne are mentioned. The wastewater provider is placed in the position of authority over the irrigation. They stand to benefit financially from their position and have motivation for hiding compliance issues. (Monitoring and reporting seem loose. that few will know when they are out of compliance and there is no clear requirements for time and type of inspecting.) What is included in the notice of Applicability. (It would be helpful if this were more clearly described in Order.)

Need to include Precautionary Principal:

EPA requires definite proof of harm for each hazardous chemical before taking regulatory action. The burden is placed on public agencies to demonstrate harm of each chemical. Potential health and environmental impacts are not considered when designing new technologies and materials. Government must wait until an overwhelming body of evidence is accumulated before intervention takes place. Polluters interfere to slow down regulatory process of very dangerous toxins. We read with skepticism that adherence to Title 22 will assure exposures to tertiary wastewater irrigation are safe.

Four main ideas of Precautionary Principle:

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 increased (no restricting of CEQA).

(We intentionally differentiate between tertiary and further treatments such as ozonation and advanced membrane technology. The latter is expected to remove far more of toxic chemicals.)

Concern that nonpoint runoff will be greatly increased:

Incremental runoff incidences have consistently been ignored by Regional Board staff, even when repeated 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. This may be attributed to inadequate staffing at the agency.)

After RRWPC filed complaint against Santa Rosa, irrigators were encouraged to irrigate at night, so proving runoff may be impossible. In fact, 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 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 are actually regulated, at least by North Coast Regional Board. (RRWPC has provided numbers to back up these statements in our comments to Regional Board on Santa Rosa's Reclamation permit. (attached))

Also, we need to point out that Santa Rosa oversees their own system and Rohnert Park's because the latter is part of Subregional system. Santa Rosa also manages a large number of agricultural acres, **18 of which are still receiving payments (\$225,000 last year) for using the wastewater for irrigation.** While Rohnert Park will become Administrators for their own system next year, Santa Rosa will still be legally responsible for Rohnert Park spills because they are in charge of the Subregional system. We wonder if this will be a difficult administrative arrangement given Rohnert Park's propensity for over irrigation and spills.

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.** Santa Rosa's storage ponds often go way down in 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 or much wastewater available in drought, so problem is still not solved. (That is situation in Sonoma County.)

Studies on cost effectiveness of such projects must 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. All of this needs to be analyzed. By eliminating CEQA, you eliminate public input into project consideration.

Title 22 does not fully insure protection of public health (#9):

The regulatory focus of wastewater irrigation relies mostly on Title 22, overseen by California's Department of Health Services. 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. Cancer (and most chronic diseases) is 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.

It is of concern that Item # 25 on page 9 states: *"By restricting the use of recycled water to Title 22 requirements, this order ensures that recycled water is used safely."* But then goes on to qualify the circumstances. My interpretation of this section is that Title 22 is considered fully safe if used as required, but if not, these other regulations will also be enforced to provide additional protection. Yet, you will not know if Title 22 is NOT

working until you have spills that someone finds out about and Regional Board follows up with disciplinary action. **The second part of this explanation is very unclear and should be rewritten.** We believe that the practice of application at agronomic rates is alluded to here as the saving grace, and with that we mostly agree, except we do not believe that practices in place are sufficient to assure this is being and will always be implemented properly.

Certainly benefits can be provided by agronomic rates. That would assume that soil types, weather, wind, plants irrigated, impervious surfaces, etc. are all being considered, if one can assume full monitoring and reporting takes place. Unfortunately however, we have studied the situation in our area and found it to be very lacking. Also, what kind of level of safety can be assured when the vast number of chemicals in the wastewater are neither identified or removed? It cannot be assumed that all endocrine disruptors are removed unless a monitoring program takes place, which this Order refuses to do in the case of applications of tertiary water used for landscape irrigation (with particular concern for children's schools, parks, playgrounds, etc.)

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 intentionally give an image of its being totally safe.

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.

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)

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 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.

Yet 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, school yards, golf courses, pools; it can be watered on vegetables and food products, and possibly may even be used on organic produce. The basis for allowing this latter practice was based on one five year study in Monterey which determined that it was safe to eat raw food crops irrigated with tertiary wastewater. This study was published in 1987 and to our knowledge has not been replicated anywhere else. The only pollutants considered were the conventional ones monitored in NPDES permits. Endocrine disrupting chemicals and many others were not addressed.

Incidental runoff reporting concerns:

We wonder what will change in terms of monitoring and reporting under the new Order? RRWPC has had the following concerns with irrigation reports provided by City of Santa Rosa and Rohnert Park: (we have 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 is 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. Inches and 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 ww 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 they may not be followed at all.

MOST OF THESE ISSUES COULD BE EFFECTIVELY ADDRESSED BY ENCOURAGING DRIP IRRIGATION!

Some impacts of endocrine disruption and toxic exposures:

Burgeoning science has 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) EPA and the State's response thus far has been to insist that problem needs further study to determine the level at which a chemical is believed to cause a health problem. Most endocrinologists believe that the dose no longer determines the poison and that, in an erratic and unpredictable fashion, minute amounts of a toxin can cause significant impacts to the endocrine systems of humans and wildlife, which can result in developmental problems and disabilities, reproductive impairments, cancer, heart disease, autism, obesity, feminization and masculinization, diabetes, etc.

A recent article (*Chemical Regulation Reporter* 5-5-'14) draws attention to the fact that there are disagreements among scientists and between scientists and EPA about the issue of endocrine disruption. EPA had been persuaded to do special studies on the issue as a precursor to moving forward on regulatory action. They released their report in December, 2013. Since then, the National Academy of Sciences responded and their comments were since reported.

The National Academy of Sciences responded to the EPA report with a lengthy analysis of its findings. They stated that the report failed to demonstrate that the strategy to detect harm from endocrine disrupting chemicals that mimic, block or alter the function of hormones in the endocrine system, is flawed. The NAS report called on the EPA to further analyze testing strategies, explain what they are, and clearly describe how it

reaches its conclusions. The report focused on procedures used by EPA and scientific rationale for its conclusions. Apparently, EPA studies do not consider low dose impacts of these chemicals. Furthermore, EPA had been previously criticized for not examining scientific studies consistently and to transparently explain how it reaches its conclusions.

A six person Scientific Panel was set up under the Recycled Water Policy. They produced their report on CEC's and recommended that no monitoring for endocrine disrupting chemicals was necessary for tertiary wastewater used on landscapes. Based on the following information, we respectfully disagree.

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. (attached)

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 such chemicals have been 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 need to be monitored, determined that it was not necessary.

Yet on the other hand, only one study done in 1987 (peer reviewed?) has determined that no harm will come from irrigating raw vegetables with wastewater. Agencies use this as justification for practice of wastewater irrigation of vegetable crops. There is a unexplained conflicting contradiction here.

In our comments to the State Board on the RWP Amendment, we quoted from Linda Sheehan formerly of California Coastkeeper, on this topic. 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."

Repeated irrigation runoff happens year after year:

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, I commented extensively to this issue in our comments on Santa Rosa's NPDES and Reclamation Permit, authorized in December of 2013.

In our July 22nd comments (attached), I made the case that numbers presented in the quarterly, annual, and other reports, 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 Water User's Guide says that shutting off repeat offenders would only be done as a last resort, we believe that Santa Rosa has never cut anyone off. We have

heard them state that they probably never will. 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 were 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 the Guide calls for a designated staff person 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, has 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. I once went looking and couldn't find them; someone had to show me.)

Often the amounts of runoff identified 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 rates utilized in urban areas? (From RRWPC Comments on Reclamation Permit)

Were agronomic rates developed on individual parcels? Reclamation Permit calls 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 the Guide is adequate.

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. RRWPC had filed a complaint on Santa Rosa's runoff during freezing weather in early

2012. After that, the City started irrigating at night and since we live a considerable distance away, we were unable to track runoff any longer.

There is a list of all irrigators and the amount they irrigate at the back of Attachment G in the current permit. 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.

It was stated that technical reports were required to be approved to demonstrate water is being applied in a manner to protect water quality. (E.O.'s summary report on page 3 states that Regional Board relies heavily on the Recycled Water User's Guide to implement agronomic rates and minimize runoff.) Santa Rosa complained that over regulation discourages uses of wastewater for irrigation. Most oversight has been left in the hands of the irrigators and Regional Board staff play too minimal a role.

The Guide is vague on environmental protection while more focused on Title 22 requirements. The requirements listed in Attachment G are vague enough to allow for weak enforcement which accommodates Santa Rosa's concern about regulatory overload. There is a need for a monitoring program that identifies the true amount of runoff. There is a need for enforcement against repeat offenders, including turning off the irrigation spout! There is a need for specific agronomic application reporting and enforcement that indicates amount to be applied next to amount actually applied. When a irrigator applies one or two million gallons per acre, there needs to be full justification for that amount.

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.) Right now, flows at the Hacienda Bridge, about six miles upstream from Guerneville, are under 100 cfs, an unusually low level for this time of year. We may be looking at extremely low flows all summer, even though Lake Sonoma water pool, from which contractor water is provided, is at 74%.

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, formation 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.

Prohibitions: Comments (pages 14-16):

- #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.

To end on a positive note, here are some 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 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.

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

ATTACHED DOCUMENTS:

1. RRWPC form letter from supporters (1 page)
2. RRWPC letter to SCWA Board of Directors on Drought
3. RRWPC July and December Comments on Santa Rosa's Reclamation Permit
4. Laura Vandenberg's letter to State Board regarding Recycled Water Policy Amendment, including her article on low dose exposures to endocrine disrupting chemicals
5. RRWPC Complaint to Regional Board (1-30-2012) on Santa Rosa's irrigation violations

(Name: Please Print)

(Street Address)

(Town)

(Zip Code)

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
1001 I St., 24th Floor
Sacramento, CA 95814
commentletters@waterboards.ca.gov
Mailed by May 23, 2014

Dear Ms. Townsend:

I am a supporter of Russian River Watershed Protection Committee, a river advocacy group that has been protecting the lower Russian River for 35 years. I wish to express my concern about the possible **Adoption of a General Order for Recycled Water Use** by the State Water Board.

Dept. of Health Services' Title 22 is the designated authority for wastewater irrigation, even though it does not address potential harm to aquatic life, recreationists and their pets from unregulated chemicals such as pesticides, pharmaceuticals, etc. getting into streams as a result of over irrigation. Regional Boards have been entrusted with adopting regulations to protect the environment, but it is unclear to what extent that will be followed in light of the Governor's emergency declaration to expedite irrigation in this water supply crisis. This concerns us.

Title 22 does not consider burgeoning scientific research in the last 20 years indicating that low dose exposures to endocrine disrupting chemicals has been associated with numerous and significant health impacts, both to humans and wildlife. Most pesticides and herbicides are endocrine disruptors. When unintentional overspray commonly occurs, it sends wastewater into creeks and streams, bringing with it not only the unregulated remnant chemicals in the tertiary wastewater, but also the chemical applications to landscapes running off with it.

By not integrating this scientific knowledge into Title 22, it fails to adequately protect the health of humans and aquatic life. Furthermore, as evidenced by irrigation practices in Sonoma County, use of tertiary wastewater is not monitored and reported in a way that protects against runoff into creeks and streams, resulting in impacts to fish and other aquatic life, and otherwise degrades our water supply. Stringent requirements must be enforced to assure that irrigation will occur in a totally safe manner, especially with the use of tertiary wastewater.

While I do not recommend the total cessation of tertiary wastewater irrigation on urban landscapes, I request that the following best management practices be required:

- 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 if any water is in gutter heading to drain.
- No irrigation should occur on narrow vegetation strips between impervious surfaces.
- All wastewater used for irrigation should be tested for endocrine disrupting chemicals .

Sincerely,

(Signature)

(Date)

RRWPC

Russian River Watershed Protection Committee

P.O. Box 501
Guerneville, CA 95446
rrwpc@comcast.net

July 22, 2013

Matt St. John: Executive Officer
North Coast Regional Water Quality Control Board
5550 Skylane Blvd. #A
Santa Rosa, CA 95403

Attention: Charles Reed
Delivered by Email: CReed@waterboards.ca.gov

RRWPC Comments on:

Waste Discharge Requirements and Master Reclamation Permit for the City of Santa Rosa Subregional Water Reclamation System: Sonoma County

ORDER NO. R1-2013-0001
NPDES NO. CA0022764
WDID NO. 1B830990SON

Dear Mr. St. John, Mr. Reed, Chair Noren and Regional Board Members:

INTRODUCTION:

The introduction to our original comments submitted on December 3, 2012, contained information about our group, our history of involvement with Santa Rosa's permit issues, our concerns about endocrine disruption and the possible contribution of wastewater as it is irrigated on the local land, and more. We see no need to repeat introductory information here, but please be aware that none of our concerns have changed, and if anything, they have increased.

We also want to mention that at the time of writing these comments, we have not seen staff's response to our original comments, but understand they will be released sometime in mid-August, before the August 22nd Board meeting.

RRWPC is pleased with many of the changes in this new draft. We want to commend staff for the thoroughness with which they approached this complex challenge. We have to admit that the implications of this effort are not always easy for the layperson to comprehend and we hope our comments will contribute positively to the effort. While we address several issues, our main concern involves the problems with monitoring and

enforcing irrigation practices in order to avoid incidental runoff and potential exposures to endocrine disrupting chemicals. Most of our comments are intended to provide evidence that monitoring, reporting, and enforcing irrigation applications, (Rohnert Park's being most obvious), are inadequate, and allows what we believe is excessive wastewater applications to the land at a time when the ability of the Laguna to assimilate wastewater toxins is minimal, and potential for human and aquatic life exposure is great.

Effluent limitation for Total Nitrogen:

This revised permit allows a mass emission rate limit of nitrogen of 42,000 lbs. in discharge season; and thereby eliminates the stated limit in the prior permit of *no net discharge* of nitrogen. Staff provided detailed explanations for this change in the new draft permit.

The Fact Sheet (pg. F-58) justifies this change by arguing that although the limit of no net loading of nitrogen was imposed by the last permit, it was never implemented due to extensions of time limits through the Nutrient Offset Program. This is characterized as a scheduling snafu, leaving unclear what the environmental effects were during the term of the permit. While it states that the nitrogen discharge won't actually be increased over the last permit, the intent of the former permit is nonetheless being altered.

This limit appears to apply only to winter discharge, but we have some further questions about what was considered in setting this limit. Was the nitrogen contribution in urban storm water runoff considered in arriving at the 42,000 lbs. mass loading limit? Furthermore, was summer loadings from irrigation runoff considered? What about consideration of seepage into creeks through the ground with irrigation water that contains nitrogen?

Another question we have about this discharge is whether the nitrogen can convert to nitrates as it seeps underground. I know this is an issue for the SNMP, but I have not been able to study the recently released document yet. If this is the case, then it should put another important constraint on irrigation use.

Nevertheless, while it feels like back sliding, 42,000 lbs. doesn't seem a huge amount to discharge during winter flows and staff gives a lengthy justification whereby phosphorus is touted as the limiting nutrient and no harm would come from allowing the 42,000 lbs. of nitrogen to be discharged. At this point, we feel we don't have sufficient expertise to argue that point and leave it for others to debate at this time. Nonetheless, until a TMDL is complete, it does seem that any addition may have unknown consequences to nutrient pollution in Laguna area creeks and streams receiving these discharges in one form or another. Our main concern is that staff appears to base this decision on limited and possibly inadequate information.

Finally, we are very concerned that the issue of nutrient discharge resulting from irrigation spills is being ignored on the assumption that spills will be so negligible, they will cause no harm. In the rest of the comments we attempt to argue otherwise. If you investigate the true amount of irrigation runoff in the Laguna area, you might discover the cause of constant proliferation of algae and invasive species. We believe a significant amount of the over 2 billion gallons irrigated in the summer, supposedly on land, ends up

in the Laguna, either through runoff or through seepage through the soils. That may be where most nitrogen AND phosphorus is coming from in that impaired water body. **(Special nutrient studies should be done upstream and downstream of Rohnert Park creeks during summer irrigation season as well as any Santa Rosa creeks traversing similar areas to discover extent of the impacts.)**

The State Board had such a concern about nitrogen loadings from wastewater irrigated lands, that they required a salt and nutrient management plan to be developed as a requirement for increasing this use. While such a plan was recently released by the City of Santa Rosa, there has been absolutely no public review, let alone review by Regional Board staff and Board members. There is concern about the impact of extensive increased irrigation with wastewater that may exacerbate nitrate levels in existing wells and aquifers. RRWPC believes this change may be back sliding, but we won't know for sure until there has been adequate Board and public review. Therefore we believe the change is premature.

We understand that others who know far more than myself will be challenging this change in regulation. I will not add anything further her now, except to say that with the SNMP process soon to begin, the recent release of the USGS Groundwater Report, the Nutrient Trading Program in possible development, and the TMDL's in the works over the next year or two, it's a shame we couldn't be safe rather than sorry and continue the No Net Loading of Nitrogen as stated in the last permit (even though not implemented at the time).

Reclamation Operation: *Discharge Management Plan*: (page 13)

Draft Permit states that recycled storage and distribution shall be operated as described in *Discharge Management Plan*, submitted in May, 2011 by the City of Santa Rosa and approved by the Regional Board's Executive Officer. RRWPC was not confident we received the entire document since our version was only 14 pages, and other than a paragraph on irrigation storage, did not describe the operation of the recycled irrigation water component. For instance, what controls the amount of water that goes to Rohnert Park? How are priorities set for recycled water distribution when a "dry year" or "critical dry year" is declared by the State Water Board?

In any case, in checking with RB1 staff we learned that Santa Rosa did not consider irrigation a discharge. Since we thought this was something to be determined by Regional Board, we ask that you declare this document inadequate. (Merritt Smith's Report covers only Geysers discharge, storage capacity, Windsor usage of Geysers' pipeline, receiving water quality, monitoring, and river discharge.)

Within the permit, the problem may lie in the definition of terms. The term 'reclamation' is used in the title of this section and in this document and can apply to either river discharge, Geysers reclamation or irrigation reclamation. Over the years, we have been aware that the common terms to describe wastewater started with *treated sewage*, went to *treated wastewater* and then *effluent*, then to *recycled water*, and now reclaimed water or reclamation. While there have been vast improvements to the treatment of the 'used' water, this change in verbiage has really seemed like a campaign to get people to accept

the application of this used wastewater all over the land, even though only about 125 of approximately 80,000 existing chemicals are regulated, and what is regulated is mostly monitored, and seldom enforced.

In any case, we wonder if this change is meant to only apply to winter discharge and not summer irrigation? If so, the intent needs to be made more clear. (We assume that in the City's eyes, the assumption is that only very minimal amounts of runoff occurs, and therefore sees the nutrient issue as insignificant.)

Reclamation Capacity:

Increased capacity will require an engineering report detailing modifications to the system. RRWPC requests that detailed analysis of urban irrigation wastewater applications be fully analyzed to assure that all reclamation requirements are followed, monitored, and enforced. We also request that the definition of 'acres' on urban irrigation sites NOT include buildings and impervious surfaces as part of the irrigation area. We would like agronomic rates defined for each parcel and parcel maps showing specific areas to be irrigated to avoid impervious surfaces and consequent runoff. We believe that in constrained urban areas, only drip irrigation and very low pressure spray be used to apply wastewater. We believe it essential that conditions for cutting off water delivery of repeat runoff offenders be spelled out clearly, etc.

Later in these comments, we will provide evidence that indicates that Rohnert Park urban irrigators may be consistently violating requirements clearly defined in the *Water Reclamation Requirements and Provisions* section of the permit. In the meantime, Santa Rosa is withdrawing from managing their system, even though they retain responsibility for its failures to function properly. Rohnert Park is planning to greatly expand irrigation opportunities by the possible addition of 4000 new residential homes. We will give more details later in these comments. (Please see attachment # 1 Press Democrat article from 7-1-13 entitled "*Rohnert Park: City invests in sewers: \$13M line expected to clear way for 4,000 homes, with resultant \$88M in fees*" by Jeremy Hay.)

Monitoring Program:

In Table E-7 on page E-21, footnote #6, it states that visual observations of recycled water applications should be conducted monthly instead of weekly. RRWPC believes this change accommodates back sliding. Frequent observations of actual irrigation would allow more opportunities to note and correct problems. In fact, irrigators are supposed to report spills within 24 hours of discovering them. Yet in RP, relatively few spills are reported and those that are, indicate very small amounts that may reflect the lack of attentive monitoring of the system. It seems as though at least weekly monitoring would be a check for that problem. We would suggest, at a minimum, triggers be set where high applications on urban parcels are monitored more frequently and low users monitored less. For those who have consistently shown responsibility for their irrigation applications and care for their equipment, the monthly monitoring may be fine. Since

inches per acre are tracked, those with high applications (say, over 18") should have weekly inspections.

In Rohnert Park many instances of over-irrigation have been photographed and are stored on disk in Regional Board files. Most of these occurred in 2010 when complaints were filed on Sonoma State and several Rohnert Park irrigation properties (RRWPC was one of them). Incidents were documented on multiple days in the same location. Where there is a history of problems, it is problematic to be loosening monitoring regulations.

We also believe that water application charts submitted with these comments (see below), indicates that, judging from very high applications of wastewater on modest sized parcels, RP is probably continuing to over-irrigate on a regular basis, causing multiple and possibly extensive spills. Photos showed water being applied indiscriminately and spilling into driveways, parking lots, sidewalks, and of course into storm drains. These conditions have been documented repeatedly on the same parcels. The amounts of water used per acre appears to be much greater than that used on agricultural parcels when, depending on the crop, the reverse should be true.

For instance, Cotati/RP School District irrigated 47,660,146 gallons in 2012 on 77 acres (618,963 gallons per acre) and reported only 4 spills for a total of 20 gallons. The Denner property irrigated 485,418 gallons per acre that same year and Denner has been one of the worst offenders over the years in terms of spills and accidents. **He was also paid about \$37,000 a year to use the wastewater**, yet he applied significantly less wastewater per acre than the school district. It's hard to imagine that Rohnert Park school sites (clay soils?) can absorb 25% more water per acre than an agricultural field.

In our visiting many of the school sites, it appeared that about 20% to 25% of the acreage is used for parking, driveways, playgrounds, and sidewalks. Another percentage is utilized for the school structures themselves. So in this case, let's guess that there is really only 50 of 77 acres to be irrigated which would mean that they were applying roughly about a million gallons an acre. And they are reporting only 20 gallons in spills? Based on what we have seen occurring and the number of gallons applied this is difficult to believe. Other years saw similar amounts of water applied to this location and in one case, a much greater amount (almost 56 MG).

Years ago my granddaughter attended an RP school and I used to see water running all over the place. At the time, I didn't realize it was wastewater that I was walking in. I don't recall seeing signs. Has anyone at RB1 checked for those signs, especially at schools and parks where children spend great amounts of time? We would be very concerned about possible exposure to endocrine disrupting chemicals including pesticides if the kids come in contact with the wastewater. In fact, it is outrageous that Department of Health Services considers full contact with tertiary water to be safe. Children are especially vulnerable to possible effects from even small amounts of these chemicals.

In the urban areas there is far greater risk to the public from contact with the recycled wastewater. When the water runs off into the creeks, it likely does far more harm than winter discharges as the creeks either have no natural flow or very little in summer and are unable to absorb any of the unregulated toxins in the wastewater or carried off from treated landscapes.

Regional Board files on this and other irrigated properties should have pictures of each urban site and the amount of water that can be applied to the landscape without watering the playground, the sidewalk, the street, etc. In fact, when acreage is calculated for urban sites, it SHOULD NOT INCLUDE SUCH FACILITIES.

Part of the report needs to include a detailed plan to irrigate each parcel without allowing irrigation wastewater to land on impervious surfaces where it can run off. If such plans are developed now, I have never seen them. The whole assumption behind allowing this program is that only VERY minimal amounts would run off. Without significant penalties and frequent, independent monitoring, there is little motivation to comply.

RRWPC 2010 Complaint regarding Rohnert Park wastewater

When photographing RP irrigation parcels at the time our complaint was being prepared, almost every school, park, and playground visited and the Community Center had water running off in many directions, often into storm drains. And it was a recurrent problem upon revisiting sites several times.

Given the information available about low dose effects of endocrine disrupting chemicals, and the refusal of the State to study low dose impacts, what are we doing to the children? It is unacceptable that this draft permit LOWERS the amount of visual monitoring from weekly to monthly, as if weekly was even enough. It should be at least two times a week on some of these parcels. In fact, Santa Rosa was so busy tracking RP's runoff that they are withdrawing from the task of monitoring their operations! (described in more detail below.)

Mountain Shadows Apartments in Rohnert Park irrigates two acres and used from 1.14 mg to 2.76 mg to water their two acres over the last six years. (Is there a report certifying agronomic compliance on that parcel?) In 2011 they claimed 4 spills for 40 gallons. Has anyone ever investigated why a million gallons an acre was being applied to an urban parcel that we assume contains buildings, driveways, parking lots, etc. When runoff was reported, it was to claim there were only 4 spills at ten gallons each. It's very hard to believe that this is accurate.

After RRWPC filed our complaint, Feb. 22, 2010, Order # R1-2010-0027 was filed by your board against the City of Santa Rosa ordering a technical report before April 1, 2010, addressing the following:

- 1. A copy of all administrative procedures, engineering standards, rules, ordinances, inspection criteria, spill reporting guidelines and/or regulations governing the use of recycled water in Rohnert Park and SSU, including user agreements that the City of Santa Rosa has developed, established, and is enforcing to carry out the requirements of Title 22 and the Master Reclamation Permit. This is intended to demonstrate compliance with Water Reclamation Provision C.1.*
- 2. A description of how the City of Santa Rosa is holding SSU responsible for the discharge of recycled water described in the attached Notice of Violation. This is intended to demonstrate compliance with Water Reclamation Provision C.4.*

3. *A list of all Rohnert Park and SSU recycled water use areas inspected by the City in 2009, the results of the inspections, and the inspection frequency expected for each recycled water use area in 2010.*
4. *Any evidence that the City has of discharges of recycled water into the storm water system or to surface waters since July 2007, and a description of how the City is tracking discharges.*
5. *City response procedures for complaints of discharges of reclaimed water to the storm water system or surface waters.*

Included with the Order to the City was a summary of relevant Master Reclamation Permit sections. While RRWPC did not specifically ask staff for this report, we regularly go through Regional Board files and believe that we would have noted such a report if we saw it. Some reports we did see contained some of the information noted, but we don't recall seeing all of it in one document. We learned only hours before the comment deadline that there is a document in staff's possession.

Obviously we will not have time to obtain the document and comment on it. In any case, we want document included in the record. We have asked staff (Charles Reed) to prepare us a copy and we will submit comments before the August 22nd Board meeting. We realize that you have no obligation to accept these comments, but since it is at the Chair's discretion, we hope he will allow us to do that.

We did find some 2010 Rohnert Park Irrigation Check-off sheets for May through September, 2010. (Attachment #2) Each page ostensibly covered one month's worth of inspections, and it looked like they only inspected once a month. (If permit is being changed only now to monthly monitoring, does that mean that RP was out of compliance with their reporting?) The form had a list of irrigation sites and several columns with yes or no checks (irrigation observed, runoff observed, turnout closed) and one column for comments on runoff.

In May inspections were conducted when no irrigation was going on and no runoff occurred. Yet they noted that standing water was in parking lot at Benicia Park, and "little water in gutter, looks better" for Evergreen School. There was also storm drain runoff, parking lot and Golf Course Dr. for Foxtail Golf Course. If they don't go out when irrigation is occurring, or immediately afterwards, what's the point. Also, they were extremely non-specific in their observation notes.

In June there were only three sites irrigating when they went out to check, but six places where runoff was sited, all storm drain runoff. In July only three were irrigating and there were four runoff instances. It is important to note that when runoff is still occurring with no irrigation, that's a sign it's been going on awhile and the amount would have been greater. There is no evidence that the person taking down the information had any idea about how much was running off. In August, only three were irrigating and there was only one runoff observed but two notes on runoff. In September, no one was irrigating but there were two signs of runoff into storm drains. There was no attempt to determine the amount of water that may have entered storm drain, what was done to stop it, how long it may have been going on, etc.

B. Recycled Water Production and Use: (page E-21 & 22)

Total area of application of wastewater/nitrogen will be reported yearly and monitored on monthly basis. Monthly monitoring of irrigation sites is not adequate when there is a history of using large amounts of wastewater per acre. These high use urban sites need to be monitored much more frequently. Again, we request that calculations of “*area of application of wastewater*” NOT INCLUDE SIDEWALKS, DRIVEWAYS, AND PARKING LOTS on urban parcels. These calculations should be monitored from time to time by Regional Board staff or some outside party.

Water Reclamation System Reporting: (Page E-31 & 32)

While reclamation reporting requirements noted on this page appear comprehensive on the surface, it’s not clear they are adequate. One of the big problems is that there is not enough monitoring required; monthly and annual inspections are inadequate for the determination of runoff events and the amount going down the drain. Even weekly inspections are suspect if they are not done by an outside party. (We are concerned that there is too much motivation to ‘fudge’ on the spill estimates.)

Apparently, Santa Rosa, responsible for failures in the irrigation systems, is nonetheless abandoning the effort to oversee RP’s system even while they would be initially responsible for fines and penalties levied against RP. Santa Rosa City staff stated recently in a public meeting that they are withdrawing their management of RP’s system because it is too difficult to keep track of the great amount of over-irrigation occurring there. The ONLY way to assure that reclamation requirements are followed, is by regular and frequent observation of their applications. The only way these have a chance of being somewhat accurate is if they are done by a third party.

Furthermore, without consequences, such as penalties, fines, and wastewater service cutoffs in the permit, there will be only slight and superficial compliance, particularly with Rohnert Park. In this case, the Draft permit is instituting many obligations without specific consequences. Each parcel needs to be analyzed for appropriate water use levels and calculations of agronomic rates. Heavy spray usage should not occur next to impervious areas and/or near streets. High pressure sprays should not be allowed at all and especial care should be taken at schools, play grounds, and recreation centers because of the likelihood of exposure by children. There should be predetermined ranges of water use per parcel and when the upper level is reached, there should be cutoffs of the supply. Irrigation inches applied should be carefully spelled out annually with consideration of CIMIS data appropriate to the site.

There are criteria listed in Requirements and Provisions calling for no irrigating during rainy periods and when ground is frozen. These stipulations call for judgments that can easily lead to misunderstandings and inappropriate irrigation. It would be much clearer and easier on everyone to simply have clear dates when irrigation can and cannot occur. It would be much easier on everyone concerned if no irrigation is allowed at all on urban parcels between November and April.

RRWPC Charts Provide Irrigation Data & Show Excessive Use:

RRWPC has prepared three charts to support our allegations. These charts were compiled from self-monitoring reports on file at the Regional Board. Based on this information, it is our claim that the system of tracking irrigation applications in Rohnert Park is not working. We are hopeful that by charting some of the most egregious water uses, it will be easier to understand the scope of the problem.

The first chart is more informational and is entitled ***Total Irrigated Volume, Cost, & Distribution 2007-2012***. (Attachment #3) It shows the amounts of wastewater irrigated between 2007-2012 by the Subregional System. It indicates that river discharge has been very significantly reduced and in three of the last six years, nothing at all was discharged to the Russian River in the winter discharge season. It also indicates the amount irrigated and it is clear that the system has gone from a winter discharging facility to a Geysers/summer irrigation application/discharge, with Geysers being year round and using about 2/3 of the wastewater generated. The chart also shows how much was given out as incentives to use the wastewater (old contracts) and income from paid supply (new contracts). There are still more incentive dollars going out than income coming in, although the gap is narrowing. However, from one year to the next, the agricultural parcels are fairly consistent in their use, which is a good sign.

Chart #2 is ***High Water Use Wastewater Irrigators: 2007-2012*** (Attachment #4) and mostly shows three Rohnert Park high users, Sonoma State, and the Denner agricultural property along River Road. His property contains the confluence of the Laguna and Mark West Creek, several miles upstream of the confluence with the Russian River. Historically, Denner has been one of the highest water users and irrigates 325 acres.

The chart indicates spills into creeks/storm drains and number of gallons. The most interesting statistic is comparing water use gallons per acre. The gallons used by urban Rohnert Park sites are huge compared to the agricultural site receiving incentive dollars. Certainly these numbers should motivate greater scrutiny into the irrigation practices of Rohnert Park. It is also noteworthy, and should cause one to be suspicious that with such high water use, RP spills report very small amounts, such as 2-10 gallons for each one. This should merit investigation and motivate more stringent requirements for irrigation applications in urban areas.

Chart #3 is ***Annual Depth Applications Over 30”:*** 2007-2012 (Attachment #5)

Table IV in Santa Rosa's 2012 Annual Report on page 65 shows the total Inches per Acre applied by year by their irrigators. (number of acres indicates that RP is included in total) The total application per acre (from annual self monitoring reports) was 12.9 inches in 2012, 11.29 in 2011, 11.41 in 2010, 11.84 in 2009, 13.43 in 2008, and 13.49 in 2007. Obviously, anything over 15 inches is high. Now look at numbers for 2 acre Redwood Creek Apartments in RP. If you consider that some of those 2 acres may be structures and impervious surfaces, there is even more of a problem. They irrigated almost 77” in 2007 and their average for the six years was almost 52”. This is off the charts and should be investigated. RP and SR should be fined, penalized, and read the riot act for allowing this to go on year after year.

RRWPC examined the 2012 Urban Incidental Runoff Report (Attachment #6). There were 53 incidents (on ten parcels) reported in Rohnert Park for a total of 1160 gallons spilled during the year. Santa Rosa had 32 incidents on 16 parcels for a total of 1300 gallons. Santa Rosa's pilot project for urban irrigation had added about 20 parcels mostly along, or right near Stony Point Rd. between West College and Hwy. 12, consisting of mostly commercial and residential uses, two municipal sites and one park.

The engineering report (*Title 22 Engineering Reports for Santa Rosa's Urban Water Reuse Program*, March 12, 2011 to Catherine Kuhlman and located in Regional Board files) states that most of the irrigation systems are drip but then they state in the Engineering Report for Recycled Water Use (pg. 4) that, "Each recycled water use site is responsible for minimizing overspray and ponding and prohibit runoff from their recycled water irrigation systems. The City requires that recycled water use site conduct an inspection at least once per year while the recycled water system is in use." (emphasis added) We are thus unclear about the type of irrigation equipment used on these sites.

Furthermore, there are contradictions in the permit about frequency of monitoring of irrigation sites. (page G-5 states that methods should be utilized that allow for report of spills within 72 hours of learning of the runoff, and yet other places call for reporting runoff immediately if 50,000 gallons or more, a rather huge amount for an initial report. Furthermore, if no one has been watching, how can they tell how much as run off? Also, if sites are not being monitored but for yearly inspections, then how will anyone learn of overflow? (If yearly inspection is different from weekly or monthly inspections, please describe and define.) The same is true for 'incidental runoff'. Without regular and frequent inspections, spills can go on for many days before detection (and sometimes do). It seems like, at a minimum sites should be viewed for runoff daily, after every watering period.

The urban and agricultural parcels are merged in the *Summary of Yearly Usage* for irrigation water and the parcels are listed differently. For instance, individual parcel use in Santa Rosa's Stony Point area are all listed under West College Ave. Pump Station (I am guessing on this.) Yet on the runoff report, they are listed separately. This inconsistency makes it impossible to tell how much individual parcels are irrigating in urban Santa Rosa in order to track their progress of compliance. Santa Rosa needs to list wastewater use on urban parcels separately.

Monitoring Section: page E-33:

ii.(b)(f): We like that permit is requiring description of agronomic rate compliance. We request that this be done on a per parcel basis and that no structures or impervious surfaces on urban parcels be considered as part of the acreage.

Page E-38: on this page it states that for unauthorized discharges of 50,000 gallons or more there should be immediate notice to Regional Board. For unauthorized discharges of 1,000 gallons to 50,000 gallons as soon as possible but no longer than three days afterwards. This is very confusing as it seems to be in direct contradiction to the requirement that only incidental discharges are allowed, with the implication they should

be of very small amounts. In an urban setting, 50,000 gallons is a huge amount and should not apply in such areas. It's not good in an agricultural area either.

In Santa Rosa's *Recycled Water User's Guide* (page 20) states that the Site Supervisor shall perform 'regular' inspections. In another paragraph it states that these should happen at least once a year. But then on same page it goes on to say that, "*To assure full compliance with the rules and regulations governing the use of recycled water, regular monitoring of any recycled water system is necessary. For irrigation systems, weekly or twice-monthly inspection is recommended. Inspection should include site observation for the following types of situations....*" And then goes on to mention runoff, leaks, and other potential operational difficulties.

On page 20 they also address the need for careful maintenance of the system, but don't go into detail about how often that will occur. They just refer to 'regular' inspections of the system. If spills are to be caught quickly, we believe that weekly or twice-monthly inspections are not frequent enough.

In different parts of the Draft Permit, the same inconsistencies occur. This is very confusing. Furthermore, if inspections only happen two times a month, that means over-irrigation could be occurring over a two week period without being discovered. This would bound to cause runoff into streams. I see similar inconsistencies regarding set backs from streams, gutters and street (page G-5 of Reclamation Requirements) None of the requirements are specific about how that should be accomplished.

Comments on Fact Sheet:

There is duplication here with other sections and I may be guilty of duplicating comments I have made before.

Capacity Expansion (F-5):

I am concerned about any capacity expansion occurring before the Laguna TMDLs are complete and the Salt and Nutrient Management Plan authorized. Santa Rosa is a long way from using the capacity they have, let alone needing more. Their dry weather flows have averaged about 17 mg for ages and their current allotment, according to their General Plan could take them out past 2030. (In 1985, when the big spill occurred, they were generating about 13 mgd. They got up to about 19 mgd at one point in the late 1990's and then implemented an excellent conservation program and began going down. Since the Geysers Project came on line, they have almost become weather independent.)

They are justifying their request based on the promise that they would use the extra capacity for irrigation. That is very problematic to me, as it appears they have a ways to go before all the kinks are worked out of their reclamation system.

I am glad that the permit recommends allowing no expansion until an engineering report is submitted demonstrating that the system could accept additional flows without increasing discharges to surface waters. **WE REQUEST A PUBLIC REVIEW PROCESS BE INCLUDED WITH THIS REQUIREMENT.**

Antidegradation Policy (F-16):

I know this comment will be challenged, but I believe, based on all the observations listed above, that summer irrigation is ending up in the Laguna and tributaries and causing degradation. While the requirements to prevent this from happening are extensive, the monitoring and reporting are inadequate. The evidence of over irrigation has been extensive and we have a long way to go before asserting that no degradation is occurring as a result of this program!

The trick part of this is the reference to the ‘permitted discharge’. Since recycled water doesn’t count as a discharge, it’s not considered to come under the same requirements. Does that mean that anti-degradation isn’t enforced on irrigation projects?

Does anti-backsliding only refer to effluent limits? The change on nitrogen limit seems like a manipulation in order to claim the change is not really a change. Please see comments on pages 2-3 of this comment letter.

We continue to make the case that the incidental runoff issue is a problem. We believe that there are indications that more extensive runoff is occurring than is being reported. We believe reporting requirements are ambiguous and often inadequate and that monitoring and enforcement are very weak. Most of what has been declared in writing is probably not being carried out in real time conditions, with the result of further degradation to our streams.

CEC’s Monitoring (F-21)

Our biggest issue here, as fully described in our original comments, is that due to what we believe is the misguided judgment of the Scientific Panel, endocrine disrupting chemicals will not be monitored in irrigation water. They assumed that low doses of these chemicals are safe, where many studies have shown this is not the case. Please see our original comment letter to read our concerns.

BMPs and Self Monitoring (F-68):

Water Reclamation Requirements and Provisions:

This section states that BMPs in Santa Rosa’s Recycled Water User’s Guide are adequate to reduce severity and incidences of runoff. This may be true, but we must not forget the possibility that they may not be carried out and inadequate reporting, should it occur, might not indicate problems in a timely manner.

Santa Rosa-Rohnert Park Wholesale-Retail Recycled Water Agreement:

At the July 18th Board of Public Utilities Meeting, they had a Study Session on Santa Rosa-Rohnert Park Wholesale-Retail Recycled Water Agreement. The power point presentation (Attachment #7) states that the new agreement would take effect, if approved, on March 28th, 2015. Rohnert Park would then be considered the retailer and sell recycled water to RP customers and end users.

RP would own, operate and maintain distribution system. They would read meters and bill customers, they would conduct inspections and ensure regulatory compliance. The Subregional will provide training to Rohnert Park and Rohnert Park customers must comply with NPDES Permit, all recycled Water Rules and Regulation and Recycled Water User's Guide.

Santa Rosa staff and legal counsel agreed that Santa Rosa and Subregional system would be ultimately responsible for any failures on Rohnert Park's part, including fines and penalties. The question is whether this changes anything regarding terms of this permit?

One of the issue we see is the multi-layered approach to enforcement of recycled water requirements. The Regional Board oversees compliance with the Permit, but relies on affidavits from Santa Rosa officials to certify accuracy of reports. The responsible staff sign off based on reports from their lead staff. So far, it is not known whether any of these people actually go on site and check irrigation practices directly. Then at each site there is an authorized person in charge, who signs off on reports saying no, (or some) spills have occurred. But that person may not have been present when the problem occurred (if one did), since it was probably a workman or landscape contractor employee that actually did the work or cause the problem.

In the documents we have studied to prepare for these comments, mostly found in Regional Board files, we don't recall coming across an on-the-ground detailed explanation for how irrigation amounts would be determined and implemented for each individual parcel, and what problems might be anticipated and how they will be dealt with in order to prevent incidental runoff. We don't know how often these worker will be on site or what kind of tasks they complete when they are there. There should be detailed reports for each site with maps showing location of sidewalks, driveways, street and drains, and any other impervious surfaces available to the public. There should be standardized forms for filling out this information and most importantly, they should estimate water needs, when applications will occur, how they will be controlled, what kind of equipment will be used to irrigate, etc.

Thank you for the opportunity to comment on this document.

Sincerely,

A handwritten signature in black ink that reads "Brenda Adelman". The signature is written in a cursive, flowing style.

Brenda Adelman

List of Attachments:

1. *Rohnert Park: City 'Invests' in Sewers: \$13M Line Expected to Clear Way for 4000 Homes, with Resultant \$88M in Fees*, Jeremy Hay, Press Democrat Pg. B1, July 1, 2013
2. *2010 Rohnert Park Irrigation Checks: May, 2010 through September, 2010*
3. *Total Irrigated Volume, Cost, & Distribution 2007-2012*, Brenda Adelman
4. *High Water Use Wastewater Irrigators: 2007-2010*, Brenda Adelman
5. *Annual Depth Applications Over 30": 2007-2010*, Brenda Adelman
6. *Santa Rosa's Annual Subregional Water Reclamation System Report for 2012: Reclamation Operations Report, 2012 Urban Incidental Runoff, page 76*
7. *Santa Rosa-Rohnert Park Wholesale-Retail Recycled Water Agreement*, Board of Public Utilities Meeting, Study Session, July 18, 2013

RRWPC

Russian River Watershed Protection Committee

P.O. Box 501
Guerneville, CA 95446
rrwpc@comcast.net

November 21, 2013

Matt St. John: Executive Officer
North Coast Regional Water Quality Control Board
5550 Skylane Blvd. #A
Santa Rosa, CA 95403

Attention: Charles Reed
Delivered in person at Board Meeting

RRWPC ADDENDUM #2 on:

Waste Discharge Requirements and Master Reclamation Permit for the City of Santa Rosa Subregional Water Reclamation System: Sonoma County

ORDER NO. R1-2013-0001
NPDES NO. CA0022764
WDID NO. 1B830990SON

Dear Mr. St. John, Mr. Reed, Chair Noren and Regional Board Members:

REPEATED RUNOFF BY IRRIGATORS CONTINUES YEAR AFTER YEAR

In my July 22nd comments, I made the case that numbers presented in the quarterly, annual, and other reports, 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 complaints, but none, to our knowledge, cited as a result of official reports.)

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 Water User's Guide says that shutting off repeat offenders would only be done as a last resort, we believe that Santa Rosa has never cut anyone off. We have heard them state that they probably never will. 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 DISCHARGES.

SPILL AMOUNTS IMPOSSIBLE TO IDENTIFY CORRECTLY

While the number of reported gallons spilled were 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 and spills may have occurred prior or subsequent to the inspection.

While the Guide calls for a designated staff person 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, has one supervisor and two employees to cover about 20 parcels throughout the City. It is unclear how compliance is at ALL times, when sites are inspected no more than once a week and workers can't be everywhere at once.

Often the amounts of runoff identified are in the under ten gallon range on small parcels that irrigate a million plus gallons per acre a season. This is suspiciously low and causes us to believe that these amounts are estimates based on a very brief surveillance of the immediate situation. Furthermore, they are to look to Guide for guidance on preventing runoff, but the Guide is usually vague and definitely not site specific. These apparent contradictions need to be clarified.

ARE AGRONOMIC RATES UTILIZED IN URBAN AREAS?

Supposedly the City (Santa Rosa) controls the amount of water delivered to irrigators. We imagine that at some point a report was written to address agronomic rates on individual parcels. Attachment G calls for operations and management plan to be developed (not sure when) describing proper irrigation amounts and applications. If there is some other document, we don't know if it exists already or if it is in planning stages. In either case, a more detailed plan is needed to spell out how excessive and repeated runoff will be avoided. We don't think the Guide is adequate.

We had been through City files at Regional Board offices and never saw agronomic analyses for individual parcels at that location. 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.

There is a list of all irrigators and the amount they irrigate at the back of Attachment G in the current permit. 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 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. (One copy of pictures at bus stop submitted.)

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.

It was stated that technical reports were required to be approved to demonstrate water is being applied in a manner to protect water quality. (E.O.'s summary report on page 3 states that Regional Board relies heavily on the Recycled Water User's Guide to implement agronomic rates and minimize runoff.) Santa Rosa complained that over regulation discourages uses of wastewater for irrigation. Most oversight has been left in the hands of the irrigators and Regional Board staff play too minimal a role.

The Guide is vague on environmental protection while more focused on Title 22 requirements. The requirements listed in Attachment G are vague enough to allow for weak enforcement which accommodates Santa Rosa's concern about regulatory overload. There is a need for a monitoring program that identifies the true amount of runoff. There is a need for enforcement against repeat offenders, including turning off the irrigation spout! There is a need for specific agronomic application reporting and enforcement that indicates amount to be applied next to amount actually applied. When a irrigator applies one or two million gallons per acre, there needs to be full justification for that amount.

RECORDING BASIS FOR RUNOFF CHANGED

On page 17 (#68) of the Response to Comments, it states that, "*The permit section has been revised to require reporting of runoff incidents only when the runoff occurrence does not meet the conditions of incidental runoff, which would be a violation of permit conditions.*" This means that the reporter/investigator would need to know whether there had been prior runoff that would change the runoff incident from incidental runoff to an illegal discharge. It seems as though many instances of runoff could be mistakenly omitted if the person fails to remember what went on before. Or if the person is new and/or inadequately trained, this can cause many incidents to go unreported. We strongly believe that all runoff should be noted.

Thank you for the opportunity to add these comments to the record.

Sincerely,

A handwritten signature in black ink that reads "Brenda Adelman". The signature is written in a cursive, flowing style.

Brenda Adelman



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.

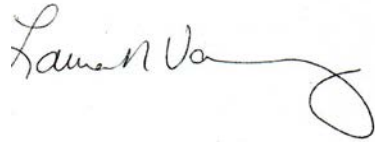
It took us three years to review over 800 published papers from the endocrinology and toxicology literature. Looking at this body of evidence as a whole, we concluded that there was clear and consistent evidence that a large number of EDCs have effects at low doses [2]. In fact, for every chemical where 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

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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-

Continued on the following page . . .

Environmental Chemicals

Continued from previous page . . .

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.

Laura N. Vandenberg, PhD, is with the Center for Regenerative and Developmental Biology and Department of Biology at Tufts University. R. Thomas Zoeller, PhD, is with the Department of Biology at the University of Massachusetts in Amherst. J.P. Myers, PhD, works for Environmental Health Sciences in Charlottesville, Virginia.

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RRWPC Report: Santa Rosa Wastewater Irrigation Runoff, February 10, 2012

RRWPC Discovers Possible Irrigated Wastewater Runoff on Stony Point Road from Santa Rosa's recycled irrigation project

February 10, 2012

Background:

Over the last several years, RRWPC provided extensive comments to the State Water Resources Control Board (SWRCB) and the North Coast Regional Board (RB1) on the issue of "incidental" runoff of irrigated wastewater. We enumerated our concerns regarding the State's [Recycled Water Policy](#) (adopted 5-14-09), the [Statewide General Permit for Landscape Irrigation Uses of Municipal Recycled Water](#) (7-09), the Regional Board's [MS4 Permit \(Municipal Separate Storm Sewer System Storm Water Permit\)](#) (7-23-09), and the [Basin Plan Amendment for "Low Threat Discharges"](#) (10-1-09) where the recycled water issue was addressed. We provided testimony before both boards on numerous occasions, along with discussing our concerns with staff.

Why is RRWPC so concerned?

Treated wastewater and potable water generally look and smell exactly alike. Unless specific signs are placed nearby, there are no warnings to tell people where that water has been. While only highly treated wastewater would be used, nevertheless treatment processes are sometimes imperfect and unreliable. Furthermore, there are many unregulated and/or seldom monitored toxins such as endocrine disruptors and other toxins, including pesticides and herbicides, organic chemicals, heavy metals, nutrients, and much more. These have been demonstrated in numerous studies to have significant negative impacts on humans and wildlife. We have especial concern for children who may play on lawns irrigated with wastewater.

(Signs are supposed to be placed in public irrigated areas informing people about the use of wastewater. The one sign we saw on our photo shoot in Santa Rosa had been saturated with the wastewater and was barely readable. We saw no signs on the grass or public areas where this is commonly used and where people are likely to congregate.)

(For an excellent source of information about endocrine disruptors and public health effects go to [TEDX](#). Or you can get the list of the possible 870 endocrine disrupting chemicals with documented scientific studies showing effects on endocrine system at: tedxlist@endocrinedisruption.org. These toxins impact many of our organ systems and can attack reproduction, fetal development, nervous systems and behavior, immune and metabolic systems, liver, bones, other glands and tissues. We also recommend viewing the [video](#) of Theo Colborn talking about the male predicament. This video explains the decrease of male sperm over time and other possible reproductive health impacts on future generations.

Finally, there is an article in the recent Mother Jones magazine (January/February 2012) called the ["Frog of War"](#), page 44. This is the story of atrazine, and the studies of well known scientist, Tyrone Hayes. Dr. Hayes's vast research chronicle the sexual alterations to frogs whereby trace amounts of atrazine (top-selling herbicide) cause changes in the biological sex of the species. Frogs are the "canary in the mine" so to speak.

In addition to unidentified constituents in the wastewater, the irrigation runoff often carries toxic chemicals and soil amendments into the drainage system from treated landscapes. Most of this occurs in the summer time, when creek flows are low, recreational use is high, and toxins tend to bio-concentrate, while chemicals interact with one another and may bio-magnify their effects. (Irrigation applications are

supposed to be applied only in amounts that can be utilized by the plants so as to avoid runoff. Therefore cold weather applications, such as ones we discovered recently, should not be allowed.)

In Santa Rosa's case recently, runoff was seen entering the storm drain system, probably exacerbating existing nutrient problems in the Laguna, which is currently listed as impaired for nitrogen, phosphorus, dissolved oxygen, temperature, sediments, and mercury. (The Basin Plan Amendment allowing "incidental runoff" should NOT have been approved BEFORE completion of the Laguna TMDL process.)

It is common for people to allow runoff during lawn watering. Even when they are educated to irrigate responsibly, it is human nature to take short cuts when no one is looking. It is difficult to follow all the rules inherent in a recycled water program. While the State acknowledged the problem and included language in their Policy to supposedly address the issue, nevertheless, both the State and Regional Boards failed to designate a specific definition of the term "incidental runoff". Do they limit runoff to 10 gallons, 100 gallons, or 1000 or more gallons? No one knows, and the result now is that Santa Rosa city staff and consultants are claiming that any amount of runoff is "incidental".

The State's Recycled Water Policy

Control of incidental runoff.

Incidental runoff is defined as unintended small amounts of runoff from recycled water use areas, such as unintended, minimal over-spray from sprinklers that escapes the recycled water use area. Water leaving a recycled water use area is not considered incidental if it is part of the facility design, if it is due to excessive application, if it is due to intentional overflow or application, or if it is due to negligence.... the project shall include, but is not limited to, the following practices:

- (1) Implementation of an operations and management plan that may apply to multiple sites and provides for detection of leaks, (for example, from broken sprinkler heads), and correction either within 72 hours of learning of the runoff, or prior to the release of 1,000 gallons, whichever occurs first,
- (2) Proper design and aim of sprinkler heads,
- (3) Refraining from application during precipitation events, etc.....

The North Coast Basin Plan provides a similar definition, but also admits: "Due to the unplanned nature of incidental discharges, this category of non-storm water discharges poses a slightly greater risk to water quality due to the potential for higher levels of pollutants and less opportunity to control the rate, volume, and timing of the discharge." Yet they don't describe the additional risk and continue to leave questions about what they are referring to. Even worse, they don't explain why this is not a violation of the Clean Water Act, which carefully regulates all waste discharges.

RRWPC and many others had consistently requested that the term "incidental" be numerically defined. It never was, and is now up for speculation. Nevertheless, the photos taken by RRWPC between December 14, 2011 and January 9, 2012, illustrate the on-going and non-incidental nature of the runoff. (We include a few photos with this email. There are 65 all together from 5 dates. Contact Brenda at rrwpc@comcast.com if you want access to more of the photos.

We might also add that the State, unable to fix its water supply problem in the Delta and other parts of the State, is resorting to toilet to tap measures to beef up the water supply. Over the years, the lexicon of wastewater has moved through numerous transformations. When we started this work in the early 1980's, wastewater was treated sewage. The common terminology then moved to treated wastewater, or simply wastewater. Wastewater then became recycled water and now it's been "cleaned up" to be simply irrigated water, even though the final product is essentially the same.

Santa Rosa's Recycled Water Project

For many years, the City of Santa Rosa had been planning a recycled water pilot project on Stony Point Rd. between West College Ave. and Highway 12. Last year they completed the project and hooked up most of

the City properties, business parks, public service buildings, shopping centers, and apartment complexes in that area.

(We do not know exactly which properties are NOT hooked up, so some of our pictures may be of potable water rather than wastewater. None the less, over-irrigating with potable water is illegal also per the North Coast Basin Plan, due to chemicals in the water. Furthermore, the runoff may carry toxins applied to the landscape into the stormdrains and waterways.)

To assure the State they would be in full compliance with the Policy, the MS4 Permit and the Basin Plan Amendment, the City authored a 106 page document called the "[Recycled Water User's Guide](#)". This guide is reader friendly with lots of pictures and good advice. The document explained that the hookup requires a City of Santa Rosa Use Permit and that specific design and installation requirements apply, including the posting of signs announcing the use of recycled water.

We cite one page here to give a sample of the detailed requirements for administering the system:
Annual Self Inspection Report and regular monitoring

.....To assure full compliance with the rules and regulations governing the use of recycled water, regular monitoring of any recycled water system is necessary. For irrigation systems, weekly or twice-monthly inspection is recommended. inspection should include site observation for the following types of situations:

1. is there evidence of recycled water runoff from the site? if so note location and nature of the problem.
2. is there evidence of recycled water ponding, and/or evidence of mosquitoes breeding within the irrigation area due to ponded water?
3. are warning signs, tags, stickers, and above ground pipe markings properly posted to inform the public that irrigation water is recycled water, which is not suitable for drinking?
4. is there evidence of leaks or breaks in the irrigation system piping, or tubing?
5. is there evidence of broken or otherwise faulty drip irrigation system emitters or spray irrigation sprinklers?

Recycled Wastewater Runoff Pictures and Report

On December 5, 2011 at 10:30 AM I was coming out of a meeting at 35 Stony Point (SR Service Center) and saw about 6-8 irrigation sprinklers irrigating the lawn directly across Stony Point Rd. at the back of the Finley Center. All sprinklers were fairly close to the street and one of them was pointed towards the street. It is our belief that wastewater was going into the street and probably into the storm drain. I could not stop to take photos. I had no way of knowing how long it had been going on or when it stopped. I believe that site is irrigated with wastewater.

Two days later I attended a City of Santa Rosa meeting where I informed Santa Rosa staff of what I saw. They denied it was wastewater irrigation and stated something about PG&E boxes being flushed out. A few days later, I also informed Regional Board Staff of what I saw.

Wastewater Irrigation Runoff Photographs

Santa Rosa's Pilot Recycled Water Project was constructed along Stony Point Road between West College and Highway 12. I visited the area between 8 and 9:30 AM on December 13th and 21st and January 4th, 6th, and 9th. The temperature was between 32 and 40 degrees at all of those times. I didn't get many pictures on Dec. 21st because it had been drizzling a little and it was hard to differentiate runoff. On a few mornings, you could see frost on the grass. At no time did I ever see the sprinklers going again, but I did photograph plenty of evidence of irrigation runoff. On the way to and from the Stony Point Rd. area, I looked to see if irrigation was occurring on other city streets. I saw no evidence of irrigation runoff anywhere else. The sites I photographed included:

1. City Bus Stop at corner of West College and Stony Point Rd.
2. Front sidewalk & street (W. College) of Finley Community Center (no evidence of runoff in parking lot)
3. Stony Point Lake (front and back) including 100, 110, and 120 Stony Point addresses.
4. West Ninth Bus Stop (by Pizza Hut, very near Stony Point Rd.)
5. Back of Finley Community Center
6. Stony Creek Apartments (150 Stony Creek Rd.)

In addition, I had seen runoff at the apartment complex directly across the street from Oliver's Market, but could not find a safe parking spot to take pictures. The site of each photo is identified with the number corresponding to the location number described above. SITES 3 AND 4 ARE RIGHT ACROSS THE STREET FROM SANTA ROSA'S UTILITIES BUILDING!

Most locations photographed each of the dates we went out were repeat offenders. It is especially telling to note the sign at the City's main bus stop informing the public about the wastewater project. The sign was probably up less than six months and was already badly damaged from wastewater exposure. Parked cars in front of the Stony Creek Apartments were regularly sprayed and saturated by what I believe is wastewater. Bus stop benches were saturated with wastewater. Furthermore, I included many photos of wastewater going down the street a long way (next to curb) and going down the drainage opening leading into the creek.

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Addendum

Dave Smith, of Merritt Smith Consulting, has worn many hats for the City of Santa Rosa over the last 25 years, including water and wastewater master planning, CEQA compliance, financial analysis, project permitting, water resource planning and operations, watershed assessment, reservoir management, point and nonpoint source discharge effects studies, laboratory and field toxicity effluent toxicity characterization, wildlife risk assessment, and fisheries studies. He has played a central role as instigator of the following changes affecting the Russian River over the years:

After the big spill of 1985 and the big flood of 1986, Dave was part of the team that helped the City upgrade the treatment system to "advanced secondary" in exchange for lowering discharge requirements by the Regional Board. His continual assurances that no environmental harm would result from increased discharges was a tune played throughout all of his contractual work, no matter what evidence was presented to the contrary.

He played a lead role through four major project proposals that focused on greatly increased wastewater discharges into the Russian River, wanting to increase discharges up to 26 million gallons a day, even while the treatment plant was only producing 15 mgd. The 1997 EIR, completed as the three fish species were being listed by the Feds as threatened, was 24 volumes and cost at least \$16 million dollars, with a significant amount of that going to Dr. Smith and his firm.

He helped justify elimination of the 1000 cfs flow requirement before winter discharges could commence;

He helped persuade the Regional Board to increase discharge limits for the City from 1% to 5% and sustained compliance measurements 12 miles downstream (Hacienda) until 2006;

He helped fight the listing of phosphorus on the 303(d) list in the Laguna, convincing the State Board rescinding the recommended listing of the Regional Board, but whose decision was then overturned by the EPA in 2002;

He developed fish studies in Santa Rosa Creek "proving" that fish swam through wastewater (ignoring the fact that they mostly migrated through the high flows when dilution was greatest) and concluded, because they spawned, that wastewater discharges caused no harm to the fish;

He helped the City (unsuccessfully) challenge the legality of the ruling by the Regional Board that discharges must have no net increase of nutrients into the creek;

And now Dave is working with Dave Richardson, another long time consultant for the City of Santa Rosa, on the Regional Salt and Nutrient Study required by the State Board in order for the City to continue their Recycled Water Program. Dave has convinced the Regional Board that Santa Rosa's copper and other pollutant discharges are not a problem for the fish, and will no doubt continue to look for ways to demonstrate that nutrients in Santa Rosa's wastewater will not exacerbate that impairment in the Laguna. He is fighting for wide mixing zones for wastewater pollutants and we have been informed that he is now attempting to get the Regional Board to eliminate the concept of "incidental runoff" from the City's new permit coming up the end of this year;

Dr. Dave (as he is frequently called) also played a role in helping to influence the findings of the State Scientific Panel alleging that there is no need for monitoring tertiary treated wastewater for endocrine disrupting chemicals before irrigation occurs.

The list could go on....

But Dave wears another hat as Managing Director of WateReUse California, and the interview sent around at the beginning of February includes some of the following ideas.

10 Minutes with Dave Smith

This interview began with the following introduction:

"Dave Smith, Ph.D., serves as the managing director of WateReuse California. He recently sat down with Cindy Paulson, senior vice president at Brown and Caldwell, to talk about how the organization has evolved, where it's headed and the challenges both it and the industry face. This interview is available exclusively to BC Water News readers....."

In Dave's own words, we quote the following:

WateReuse California has 180 members and about 10 are water or wastewater utilities involved in water recycling, responsible for 85 percent to 90 percent of recycling in the state. We provide legislative and regulatory advocacy and educational opportunities for our members.

Our first priority is groundwater recharge regulations. We break the issues into three major issues — travel time, dilution and treatment technology, essentially relating the first two to the level of treatment. We also want to push forward on the feasibility of direct potable reuse. Finally, we want to initiate a California statutory rewrite process – taking all statutes related to water recycling and consolidating them into one code. In its current form of multiple codes, it is difficult to understand and comply. One suggested reform would redefine recycled water as a resource rather than a waste.

Localized water supply development is key. That 3.5MAF of wastewater is a huge resource just waiting to be tapped. This is why we need reuse regulations that are more flexible to enable a broader array of options.

For those that we can measure, recycled wastewater is not the primary source of this class of contaminants. Treatment technologies are effective in removing endocrine disruptors. Human exposures due to other pathways, like food and inhalation, are orders of magnitude higher than water. Humans are challenged to put risk into perspective. Simple things you do everyday, like taking a receipt from a gas pump, provides much greater exposure.

(Note: We urge you to visit the TEDX website above for instruction as to all the harm evidenced in hundreds of scientific studies regarding exposure to endocrine disruptors. Also, Dr. Smith refers to human harm here, but fails to address the significant harm to wildlife and aquatic life, often far more sensitive to its effects. Water quality, by law, must be protected to serve all life forms.)

Salt and nutrient management planning shouldn't reside in a recycled water policy. It implies that recycled water is the reason that we need to do such planning, but there are so many other salt and nutrient sources. (Note: wastewater is a major contributor!)

You can draw your own conclusion as to the safety of allowing wastewater to be fully irrigated in the summer time and whether you trust it to be done in a way that will not affect our creeks and streams, summer recreation, the health of all species that call the Russian River home, and more. Santa Rosa will be getting a new discharge permit by the end of the year, and it's bound to be at least 100 pages of requirements for discharging wastewater. We believe the requirements for "incidental" runoff should be even more stringent for summer discharge because the likelihood of harm is much greater.





01/06/2012

