From: John Moore
To: commentletters
Subject: "Comment Letter-Proposed Recycled Water Amendment"
Date: Monday, June 11, 2018 6:26:15 PM
Attachments: Scan_0100.pdf
Scan_0101.pdf
Scan_0102.pdf
Scan_0104.pdf
Scan_0105.pdf
Scan_0106.pdf
Scan_0107.pdf

Attn: Jeanine Townsend, Clerk to the Board:
My name is John M. Moore. I reside at 836 2d st. Pacific Grove Ca. I am a resident within the California American Water Co, a customer and resident within the agencies that comprise Pure Water MontereyPWM), a recycling project approved and under construction. A description of the project is attached as Scan 102. PWM is in the process of initiating an EIR for an expansion in the size of the project.

I have reviewed the Proposed Recycled Water Amendment in detail and have several criticisms:

1. The proposal is unrelated to the politics that demonize the characterization of a real Ca. Recycling project and it does not require verification of the truthfulness of the sponsoring agencies. As a result, PWM, for just one example represented to the Regional Board and the Dept. of Drinking Water(DDW), that the PWM project was/is an Indirect Potable Reuse (IPR), but nothing could be further from the truth.

The only evidence about whether the project was/is an IDP or a Direct Potable Reuse (DPR) is Letter M from the EIR, attachment 101, a letter by the Technical Program Manager of the Seaside Basin Watermaster (an adjudicated basin). He is in charge of the day to day operations of the basin in accepting drinking water into the basin and permitting owners of the water to extract their share. The letter proves that the PWM project is a DPR project and it did not qualify for a permit as an IDP.

So what was the misrepresentation by PWM? It claimed that because the water was required to sit in the Basin for two months, that constituted a Barrier that qualified the project as IDP; in short, per PWM the final delivery of the treated water to a well or basin is also a barrier . While the water does obtain minimal dilution in the basin, there is no leeching thru sands, several aquifers, extreme dilution etc. for five years, like the Orange Water District IDP project. PWM says, well the two months will allow it to test the water for that time. But if it is not a barrier, the required tests are for a DPR, and those tests are a part of this process, i. e., under development.

In Exhibit M, the Technical operator, Bob Jaques, made some telling points: First, In para 1. he notes that all water injected into the basin will be extracted shortly thereafter. So it is not a cleansing barrier that could qualify as an IDP. Second, he noted in para. 8 that two of the new water sources, Blanco Drain and the Reclamation Ditch both have a high level of contamination, a broad spectrum of pesticides, as well as metals and bacterial organisms. He then said: "The design of the GWR Project Treatment Facilities should address this in order to ensure that the plant is reliably able to produce water of suitable quality for 'direct injection'(emphasis mine) into the SGWB, 'which serves as a potable water supply to the public'(emphasis mine)." But, there are no DPR tests; that is what this process is about. Mr. Jaques has just informed me that the tests required before treated water may be injected into the basin by PWM will be dictated by the DDW. But of course, as set forth above, PWM expects to apply the current tests for an IDR.

I note that the proposed definition of a Barrier set forth in the proposed regulations would

prohibit the PWM project from qualifying as an IDR.

2. The proposed Regulations do not deal with a PWM situation where two highly toxic but different water sources are mixed before treatment(human sewage from the city of Salinas and highly toxic agriculture waste). There is not even an IDR example of the recycling of agriculture waste for potable purposes, anywhere, let alone mixing it with sewage without any examination by trained toxicologists about the toxic effects of that mixing. Because PWM claims IDR status, there are no specific tests for this unique mix after treatment and before injection into the water supply. But there are several additional reasons(below) that comprehensive testing must be required before treated water from severely toxic sources (like PWM) is mixed with other drinking water.

3. Another criticism is that the proposed regulations imply that the Experts Report concluded that DPR can now be allowed on a case by case basis pursuant to the proposed regulations. A careful reading of that report implies that significant research and development must be concluded before DPR is permitted. The caveats by the experts are many and well founded.

4. If you are still reading this, you may be thinking, "yes, in fairness, the PWM project is quite challenging." Let me add to the drama and additional reasons that the project is unsafe. The Seaside Basin, the repository of the treated drinking water is located in Fort Ord a sandy, former U.S. Army base. The Basin sits below a Super Fund Toxic site that has decades of Infantry, tank and Artillery training, going back to pre WWII. I attach a few pages from Letter S(Scan 106) to the project EIR that details the toxic sources. After heavy rains, water on the two Ft. Ord golf courses disappears within a few hours. Where does it go?
The Basin is located in several earthquake faults, including the San Andreas fault. Because of the sandy soils, liquifaction of water-laden sediments(the soil turns into liquid) in the vadose zone(the soil from the basin to ground level) could contaminate the basin with Fort Ord debris, chemicals and whatnot. There is no alternate source of water.
I refer you to attachment 104, from the proposed regs. 5.2.4.8." Peak Attenuation of Short Term Pulses of Chemicals Likely to Persist Through Advanced Treatment."The section has to do with unexpected events, like an industrial spill and questions how this might (or not) work. It concludes with: "How this would Work is a research Question?" In the case of the PWM DPR project, we bloody well better get on that, or babies will die!

5. I refer you to attachment 100. It is a 2016 comment letter from the three toxicology scientist that were on the 2010 Science Advisory Panel(SAP). The comment was because the proposed regs. did not adopt Bioassays as part of the safety tests for DPR and as set forth in the letter they made compelling arguments that in vivo bioassay testing is critical if DPR is to produce safe drinking water. In vivo is expensive, because it involves assaying live organisms from live animals. It actually assays a cell and identifies discrete parts for pathogens(in vitro tests dead samples and is not as helpful).
Now that you have been exposed to real life, the PWM project, you should reconsider the omission of in vivo bioassay tests. Could any sane adult allow treated wastewater from the PWM project to be injected into the drinking water of the Seaside Basin w/o in vivo bioassay testing? I am a rate payer and I say, get those tests.We will pay for them. BTW, the credentials of the three SAP members are very impressive. Listen to them.

6.I refer you to attachment 105. It is the face page of the DDW acceptance of the Final Engineering Report for the PWM project. para, 1. confirms that approval was granted on the assumption that the project was in fact an IPR project in fact, not one just based on a trick,

claiming that a repository of treated drinking water was an IPR qualifying barrier.

7. The wealth of opinions from the experts that study the Toxicology of recycled wastewater is that neither IPR nor DPR is safe. I could attach dozens of examples, but will limit it to Scan 107, which is typical. Can you imagine how such experts would react to the PWM project. But of course the agencies pursuing such dangerous projects never hire honest qualified experts. The safety expert for the PWM EIR prepared a written report that based her opinion on asserted examples of projects and studies that she argued showed that the PWM process was safe. Not a single existing project had source water as toxic as the PWM sources. As for studies, she cited the Rand study which showed a 73% increase in liver cancer by those that drank recycled water as an article positive to the PWM project. I checked her company out in Dun and Bradstreet: at the time of her EIR report she had two employees, she and her mother.

8. There is a very critical factor missing from the proposed regs. The standards in the Regs must be so secure about the recycled water's safety for potable purposes that forced users like me do not need to worry about the safety of the water. They are not close. At this time very few of the forced users of the PWM mix are even faintly aware of the dangerous PWM project. Cal Am has informed me that there will not be a source of water free from the PWM mix. There was no vote and when the true nature of the project becomes public, chaos should result. What adds to the insult is the the human waste and agriculture wastewater sources come from areas out side the Cal Am water district, so their residents will not be forced to drink the worrisome mix. WE ARE ENTITLED TO KNOW THAT OUR DRINKING WATER IS SAFE !
As Dr. Oppenheimer stated, it may be years before the toxicity is discovered. A recent report about the Michigan contamination of the seventies, indicates that even three generations after actual exposure to the public in the seventies, the toxic effects continue to show in the subsequent generations, tho they were not actually exposed to the contaminants.

I have had this home for about twenty years. Unless the PWM project is made safe, I will be forced to move. John M. Moore

- Provide additional water to the Regional Treatment Plant that could be used for crop irrigation through the Salinas Valley Reclamation Plant and Castroville Seawater Intrusion Project system;
- Develop a drought reserve to allow the increased use of Proposed Project source waters as crop irrigation within the area served by the Castroville Seawater Intrusion Project during dry years
- Assist in preventing seawater intrusion in the Seaside Groundwater Basin;
- Assist in diversifying Monterey County's water supply portfolio.

S.3 SUMMARY OF THE PROPOSED PROJECT

The Pure Water Monterey Groundwater Replenishment Project is a water supply project that will serve northern Monterey County. The project will provide purified recycled water for recharge of a groundwater basin that serves as drinking water supply, and recycled water to augment the existing Castroville Seawater Intrusion Project's crop irrigation supply. The project is jointly sponsored by the Monterey Regional Water Pollution Control Agency (MRWPCA) and the Monterey Peninsula Water Management District (Water Management District), and also includes participation by the City of Salinas, the Marina Coast Water District, and the Monterey County Water Resources Agency. The Proposed Project location and facilities are shown in **Figure S-1**.

The project includes the collection of a variety of new source waters and conveyance of that water to the Regional Wastewater Treatment Plant (Regional Plant) for treatment and recycling. The water would then be used for two purposes: replenishment of the Seaside Groundwater Basin[2] with purified recycled water to replace some of CalAm's existing drinking water supplies; and provision of additional recycled water supply for agricultural irrigation in northern Salinas Valley (both described below).

The Regional Plant is located two miles north of the City of Marina and operated by MRWPCA. The Regional Plant currently collects wastewater and some stormwater from its eleven member service area, and treats a large portion of this incoming flow to a tertiary treatment standard that enables it to be used for unrestricted agricultural irrigation purposes in the northern Salinas Valley. Flow that is not sent to the tertiary treatment system is discharged through an outfall to Monterey Bay after receiving secondary treatment.

The new source waters would supplement the existing incoming wastewater flows, and would include the following: 1) water from the City of Salinas agricultural wash water system, 2) stormwater flows from the southern part of Salinas and the Lake El Estero facility in Monterey, 3) surface water and agricultural tile drain water that is captured in the Reclamation Ditch and Tembladero Slough, and 4) surface water and agricultural tile drain water that flows in the Blanco Drain. Most of these new source waters would be combined within the existing wastewater collection system before arriving at the Regional Plant; water from Blanco Drain would be conveyed on its own directly to the Regional Plant. A conceptual flow schematic of the existing and proposed systems to bring source water to the Regional Treatment Plant is shown in **Figure S-2**. The combined flow would be treated

[2] A portion of the Seaside Area Subbasin of the Salinas Valley Groundwater Basin as defined by the Department of Water Resources (DWR) that is referred to herein as Seaside Groundwater Basin or Seaside Basin.

using the existing Regional Plant processes and then further treated to recycle it for the following two purposes:

- **Replenishment of the Seaside Groundwater Basin.** The project would enable California American Water Company (CalAm) to reduce its diversions from the Carmel River system by up to 3,500 acre-feet per year by injecting the same amount of highly-treated water into the Seaside Basin. This purified recycled water would be produced from a new advanced water treatment facility that would be constructed at the Regional Plant. This new facility would treat some of the new blend of source waters described above. The "product water" from the advanced treatment plant would be conveyed to and injected into the Seaside Basin via a new pipeline and new well facilities. The purified recycled water would then mix with the existing groundwater and be stored for future urban use by CalAm, thus enabling a reduction in Carmel River system diversions by the same amount.

- **Additional recycled water for agricultural irrigation in northern Salinas Valley.** Currently, the only sources of supply for the existing water recycling facility at the Regional Plant (called the Salinas Valley Reclamation Plant) are municipal wastewater and small amounts of urban dry weather runoff. Municipal wastewater flows have declined in recent years due to aggressive water conservation efforts by the MRWPCA member entities. By increasing the amount and type of source waters entering the existing wastewater collection system, additional recycled water can be provided for use in the Castroville Seawater Intrusion Project's agricultural irrigation system. It is anticipated that during normal and wet years approximately 4,500 to 4,750 acre-feet per year of additional recycled water supply could be created for irrigation purposes. During drought years, as much as 5,900 AFY could be created for crop irrigation. Some modifications would be made to the water recycling facility to optimize and enhance the delivery of recycled water to growers.

A conceptual process flow schematic for the Proposed Project flows at the Regional Treatment Plant is provided in **Figure S-3**.

The project would also include a drought reserve component to support use of the new supply for crop irrigation during dry years. The project provides for an additional 200 acre-feet per year of purified recycled water that would be injected in the Seaside Basin in wet and normal years for up to five consecutive years. This will result in a "banked" drought reserve totaling up to 1,000 acre feet. During dry years, the Proposed Project could provide less than 3,500 acre feet of water to the Seaside Basin; however, CalAm would be able to extract the banked water to make up the difference to its supplies, such that its extractions and deliveries would not fall below 3,500 acre-feet per year. The source waters that are not sent to the advanced treatment facility during dry years would be sent to the Salinas Valley Reclamation Plant to increase crop irrigation supplies for the Castroville Seawater Intrusion Project.

The Pure Water Monterey Groundwater Replenishment Project would require modifications to existing facilities and construction of new physical facilities, briefly listed below.

- **Source water diversion and storage.** New facilities would be required to divert and convey the new source waters through the existing municipal wastewater collection system and to the Regional Plant.

- **Treatment facilities at Regional Plant.** A new advanced water treatment plant would be constructed at the Regional Plant site. This facility would include a state-of-the-art treatment system that uses multiple membrane "barriers" to purify the water, product water stabilization to prevent pipe corrosion due to water purity, a pump station, and a brine and wastewater mixing facility. There would also be modifications to the Salinas Valley Reclamation Plant to optimize and enhance the delivery of recycled water to growers.
- **Product water conveyance.** New pipelines, a pump station and appurtenant facilities would be constructed to move the product water from the Regional Plant to the Seaside Groundwater Basin for injection.
- **Injection well facilities.** The injection facilities would include new wells (in the shallow and deep aquifers), back-flush facilities, pipelines, electricity/ power distribution facilities, and electrical/motor control buildings.
- **Distribution of groundwater from Seaside Basin.** Two new CalAm water distribution system pipelines would be needed to deliver the extracted groundwater to CalAm customers.

Construction of the Proposed Project is anticipated to require approximately 18 months, plus three months of testing and start-up, and the project is currently planned for initial operation by late 2017. MRWPCA is evaluating the use of alternative construction approaches, such as design-build, to expedite the construction schedule.

S.4 Summary of Impacts and Mitigation Measures

Table S-1 summarizes the impacts of the Proposed Project. A summary of the cumulative impacts and the Proposed Project contribution to those impacts, as applicable, is presented in **Table S-2**. For each impact considered to be significant or potentially significant, the table summarizes the recommended mitigations. **Tables S-1** and **S-2** are intended to provide a summary of the Proposed Project impacts and mitigation measures that are described in detail in **Chapter 4, Environmental Impacts and Mitigation Measures**; please refer to that section for complete discussion.

S.5 Alternatives to the Proposed Project

This chapter presents the alternatives analysis for the Proposed Pure Water Monterey Groundwater Replenishment Project. This section sets forth the objectives of the Proposed Project, summarizes its significant impacts, discusses the alternatives considered but eliminated from further analysis, describes the range of alternatives considered, and compares the impacts of the alternatives evaluated to the impacts of the Proposed Project.

The State CEQA Guidelines, Section 15126.6(a), state that an EIR must describe and evaluate a reasonable range of alternatives to the Proposed Project, or to the location of the project, that would feasibly attain most of the project's basic objectives, but that would avoid or substantially lessen any significant adverse effects of the project. An EIR is not required to consider every conceivable alternative to a Proposed Project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. The CEQA Guidelines further state that the specific alternative of "no project" shall also be evaluated. The EIR must evaluate the comparative merits of the

Seaside Basin Watermaster
2600 Garden Road
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July 1, 2013

Mr. Bob Holden
Monterey Regional Water Pollution Control Agency
5 Harris Court, Building D
Monterey, CA 93940

Subject: Notice of Preparation of Environmental Impact Report for the Monterey Peninsula Groundwater Replenishment Project, May 30, 2013

Dear Mr. Holden:

The Seaside Basin Watermaster submits the following comments on the Subject document:

1. There are numerous statements in the NOP that the GWR Project will "replenish" the Seaside Groundwater Basin (SGWB). These occur on pages 2, 9, 10, 16, and 17. As noted on page 10, since all of the GWR Project water currently being contemplated for injection into the SGWB will be pumped back out by existing municipal supply extraction wells not long after it has been injected, the GWR Project water will not provide long-term replenishment of the SGWB. The SGWB, as described in the NOP, will simply serve as an interim storage basin for this water. This should be clarified in the EIR. M-1

2. There have been recent discussions with MRWPCA staff regarding the potential for the GWR Project to provide additional water that could truly be beneficial to the SGWB by injecting it and leaving it in the aquifers, rather than pumping it back out. A quantity of 1,000 AFY had been proposed by MRWPCA as recently as May 2013. Apparently the project proponents decided not to include this additional water in the scope of the project for which the NOP was prepared. The Watermaster strongly urges that, if at all possible, the GWR Project be designed and configured such that it could provide additional water to replenish the SGWB. While the Watermaster does not currently have funds that could be used to purchase such additional water, if additional water could be made available once the GWR Project is operational, and if funds to purchase additional water became available, the additional water could be used to help raise groundwater levels to protective elevations to protect the SGWB from seawater intrusion. Accordingly, this potential to provide additional water via future expansion of the GWR Project should be addressed in the EIR. M-2

3. The map in Figure 1 does not clearly show where the GWR Project facilities are located. The "Monterey Peninsula Groundwater Replenishment Area" balloon is so large that it is really not helpful in understanding where the facilities described in the NOP will be located. M-3

4. It is very difficult to see exactly where the proposed Recharge Facilities are located in the map in Figure 2. Two detailed maps with a larger scale, one for each site, would be preferable. M-3 cont

5. On page 7 it states that Cal Am owns 12 wells in the SGWB. It would be more accurate to indicate that Cal-Am *currently operates* 12 production wells in the SGWB. M-4

6. On page 7 the sentence in the third paragraph pertaining to the makeup of the Watermaster should be corrected to read "The Watermaster Board of Directors consists of nine entities, one representative from each:..." The next-to-last sentence in this paragraph should be revised to read "Water levels were found to be below sea level in portions of both...". M-5

7. On page 10 the statement is made that one of the secondary objectives of the project will be to "Assist in preventing seawater intrusion in the Seaside Basin." As noted in Comment No. 1, since all of the GWR Project water will be pumped out after it is injected into the SGWB, it does not appear that the GWR Project, as described in the NOP, will assist in preventing seawater intrusion in the SGWB. This statement should be removed or clarified. M-6

8. A number of water sources for the GWR Project are listed on pages 12-14. Two of the source waters proposed for the GWR Project on pages 12 and 14 are the Blanco Drain and the Reclamation Ditch. Both of these sources have historically shown high levels of contamination, such as a broad spectrum of pesticides, as well as metals and bacterial organisms. The design of the GWR Project Treatment Facilities should address this in order to ensure that the plant is able to reliably produce water of suitable quality for direct injection into the SGWB, which serves as a potable water supply to the public. M-7

9. The first sentence on page 17 should be revised to read "With groundwater levels currently below sea level in portions of both..." M-8

10. Table 1 on page 20 lists a "Permit for Injection/Extraction" that will be needed from the Watermaster. The Watermaster's term for this permit is "Agreement for Storage and Recovery of Non-Native Water from the Seaside Groundwater Basin." The Watermaster adopted a formal process for applicants wishing to obtain such a permit to use, as well as specific requirements the Watermaster will impose if such an agreement were to be prepared for the GWR Project. Details on this can be obtained by contacting the Watermaster's office. M-9

Thank you for the opportunity to submit these comments so they can be addressed in the EIR.

Sincerely,

Robert Jaques
Technical Program Manager
(831) 375-0517
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Fort Ord Community Advisory Group (FOCAG)
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The "Fort Ord Community Advisory Group is a public interest group formed to review, comment and advise on the remediation (cleanup) of the Fort Ord Army Base, Superfund Site, to ensure that human health, safety and the environment are protected to the greatest extent possible." - Mission Statement.

Monterey Regional Water Pollution Control Agency (MRWPCA)
ATTN: Bob Holden
5 Harris Court, Bldg D
Monterey, CA 93940
Via E-mail: GWR@mrwcpa.com, hard copy to follow via U.S. Mail

Re: Notice of Preparation, Scoping Comments
Monterey Peninsula Groundwater Replenishment Project Environmental Impact Report

July 2, 2013

Dear Bob Holden,

The Fort Ord Community Advisory Group (FOCAG) offers the following comments on the scope of environmental issues. The scope should include existing hazards to drinking water and potential increasing hazards to the drinking water supply due to the migration and leaching of toxic chemicals from former Army training ranges. These would include proposed ground disturbing activities including a horse park. The Seaside Aquifer lies directly beneath the Army Training Ranges, known as Site #39 of former Fort Ord. This area includes the area known as Parker Flats that had, among other uses, Army tank training areas. S-1

Fort Ord is a National Superfund Site, first put on the National Superfund Priority List because of discovered contamination of area groundwater. S-2

There have been multiple issues with the Upper 180, the Lower 180, and the 400-foot aquifers beneath areas of former Fort Ord. Site #39, perhaps the largest munitions impact/training area in the country, sits over the Seaside Groundwater Basin. This should be of concern to MRWPCA and others for the possibility of leaching and migration of chemicals into underground aquifers.

S-2 cont

It is understood residual munitions chemicals from 77-years of munitions use, remain in Fort Ord training areas, including Site 39. The cleanup thus far, has concentrated on remaining unexploded munitions, but failed to identify many munitions constituents even though numerous munitions chemistry books were and are readily available. How can the extent of contamination be known unless all known munitions constituents are looked for? The cleanup has used a sampling rationale of looking for a few constituents but only reporting levels above a certain threshold. There potentially are hundreds of chemicals below threshold levels. For example, hypothetically, if there are two hundred chemicals each at 2 ppm, well below the reporting level, there potentially could be a toxic chemical brew of 200-400 ppm. Could the cumulative, low levels of chemicals potentially be a health hazard? Are the human health risks known for this level of exposure? What are the synergistic effects of munitions chemicals and pesticides on organisms? Are there studies available on the effects of low-level exposure to these chemicals?

Hundreds of munitions chemicals and pesticides at very low levels may be a potential toxic brew creating a health and safety hazard in the underground water aquifers. The cleanup has failed to make the public aware of the actual levels of munitions and pesticide contaminates throughout training areas.

a) What might be the justification for the cleanup failing to identify all the munitions and pesticide chemicals in Tables 3,4,5, and 6? (See Attachment 2, Tables 1-7). The Army BRAC has been asked the following questions:

b) Because the Army kept abysmal records of training ranges, training areas and specific activities, what is the justification for failing to look for all munitions chemicals and pesticides in all training areas, including Site #39?

S-3

c) What is the justification for the cleanup failing to include all the munitions and pesticide chemicals identified in Attachment 2, Tables 3,4,5, and 6?

d) What is the extent of out-gassing from munitions and pesticide chemicals

in former training areas?
e) What is the justification for failing to report the actual levels of munitions and pesticide chemicals in all training areas? S-3 cont

On 3-24-10 (fortordcleanup.com, Document BW-2532), and 2-7-11 (fortordcleanup.com, Document BW-2557), the FOCAG raised questions regarding pesticide use at Fort Ord and in training areas. The 2-7-11 FOCAG letter specifically addresses Army's failure to thoroughly investigate pesticides in training areas. Despite Army's claim that it has thoroughly investigated pesticides in training areas, our review of the cited cleanup documents did not support the Army's claim. The only sampling we have found for pesticides in the Parker Flats and Site 39 training areas was for a total of 4 sample locations that only looked for 8 organochlorine pesticides.

It is our understanding Army BRAC remains responsible for identifying and sampling for chemicals potentially used in training areas, including Site 39. However, the chemicals being looked for in former Army training sites is woefully inadequate. The FOCAG includes, with this letter, 7 Tables of munitions chemicals and pesticides potentially found in former Fort Ord including a list of Training Areas and the chemicals actually being looked for in. (See attachment 2, Tables 1-7) S-4

There are several hundred chemicals potentially leaching out of ordnance into the ground as well as residual chemicals from decades of weapons/ordnance training and pyrotechnics. Herbicides were used to keep vegetation down and minimize threats of wildfires from munitions training exercises. Attached are 6 Tables identifying munitions chemicals and pesticides used in training areas include Table 1, is the Fort Ord Cleanup 1994 list of potential Training Range chemicals. Table 2 is the Fort Ord Cleanup 2003 Sampling and Analysis list of potential Training Range chemicals. Tables 3, and 4 are lists of munitions constituents found in munitions chemistry books, many of which the cleanup has not included in its list(s). Tables 5, and 6 are lists of pesticides; known and suspected as being used at Fort Ord. Particularly alarming is Table 5 that identifies 23 munitions chemicals also known to be pesticides. This may explain why some training areas are virtually devoid of insects and birds. Not only has

peaks, which is a particular concern for DPR due to the close proximity between wastewater and drinking water.

On-line monitoring should include critical control points, alarm set points and automatic shutdown. Frequent monitoring of control systems will be required to make sure they are functioning properly.

Continuous monitoring, use of surrogates and indicators at critical control points downstream can resolve whether peaks (see below) are coming through, and whether action should be taken, such are more sampling, investigation, etc.

Monitoring can be for informational purposes (e.g., helpful to track down illegal dischargers) or used to trigger an action (e.g., used as a critical control point). If used for informational purposes, it would not be specified in criteria.

5.2.4.8 Peak Attenuation of Short-Term Pulses of Chemicals Likely to Persist Through Advanced Treatment

DPR criteria will include requirements to mitigate peaks (i.e., high concentrations of chemicals that may be released into the treatment process, as from an industrial spill). Upstream monitoring can be done to characterize peaks and can be used to determine whether the monitoring scheme used for the peak averaging mechanism is sufficient. How this would work is a research question.

October 24, 2016

To: Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
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From: Daniel Schlenk, PhD
Professor, Environmental Toxicology
University of California, Riverside

Shane Snyder, PhD
Professor, Dept. of Chemical and Environmental Engineering
University of Arizona

Nancy Denslow, PhD
Professor, Dept of Physiological Sciencs and College of Medicine
University of Florida

Re: **Evaluation of the feasibility of developing uniform water recycling criteria for direct potable reuse**

In 2010, the California State Water Resources Control Board ("Water Board") convened a Science Advisory Panel (SAP)to develop recommendations regarding monitoring of constituents of emerging concern (or CECs) in recycled water applications across the State. We, members of that SAP, are submitting these formal comments about the recent report entitled "**Evaluation of the feasibility of developing uniform water recycling criteria for direct potable reuse**" because we are concerned about both the factual basis and the conclusions reached in Chapter 5, titled Application of Bioanalytical Tools to Water Analyses.

Bioassays will improve, not replace current monitoring methods. While the report as a whole is well done, we believe Chapter 5 fails to recognize the necessity of incorporating cell-line assays into the routine testing protocols for recycled water. There is simply no way that chemical-by-chemical monitoring can keep pace with the discovery of new chemicals, either manufactured intentionally or produced unintentionally as by-products of e.g., recycled water treatment practices. We agree with the report's assertion that work remains to be done before these assays are ready for routine regulatory application, and further that the best use of the tools is to complement analytical chemistry, particularly in a non-targeted approach to help identify known and unknown agents. However, our vision is that as our knowledge of Adverse Outcome Pathways broadens, and more tools become available that allow comparison with guidelines already in place, the bioanalytical measurements will become an essential tool health protection and the State should focus on their development as rapidly as possible.

SAP recommendations for bioanalytical tools were misrepresented.
Further, we feel the report significantly misinterpreted recommendations made by the SAP in reaching their conclusions. We interpret Chapter 5 as suggesting that the recommendations of the 2010 SAP were to utilize bioanalytical tools through the Adverse Outcome Pathway paradigm to set guidelines for drinking water safety. While the members of the SAP were (and remain) staunch supporters of the Adverse Outcome Pathway and Toxicology in the 21st Century recommendations for chemical safety testing, we did not believe this process could be used to set *in vivo* water safety guidelines. Rather, we adhere to the paradigm of using Adverse Outcome Pathways to identify specific molecular responses that can be used as tools to evaluate recycled water for mixtures of known and unknown compounds. Adverse endpoints of cancer or reproductive dysfunction can be inferred by measuring activation of one or more molecular initiating events, and it is this data linkage of events that warrants the use of bioanalytical tools. In contrast to what was proposed in Chapter 5, we propose use of the Pathway to move "backwards" to evaluate exposure rather than "forward" to set a guideline. The benefits of this strategy to water assessment is the identification of linkages between in vivo responses and receptor-driven molecular initiating events that can be used in conjunction with preset guidelines for screening water.

The Expert Panel is highly critical of three publications from published literature; however, a wealth of additional literature is readily available. In 1975, the World Health Organization published a report entitled, "Health effects relating to direct and indirect re-use of waste water for human consumption" (WHO, 1975). This report by the WHO advocated the use of bioassays, including in vitro techniques, for the monitoring of recycled water. In fact, a review published in 2015 provides numerous examples of the application of bioassays specifically applied to recycled water for over 50 years (Leusch and Snyder, 2015). In addition, while the Expert Panel does provide a citation for WateReuse Research Foundation Project 10-07, it seems the Expert Panel may not have connected that the manuscripts in peer-reviewed literature are highly limited by word count restrictions. Some of the criticisms raised by the Expert Panel are well explained with the WRRF 10-07 report. Regardless, the Expert Panel report could have benefited by a more comprehensive review of widely available literature on this topic (Escher and Leusch, 2012). The Expert Panel focuses primarily on the use of in vitro bioassays to detect estrogens in UK studies from the 1990s, but could have benefited by considering more recent success stories such as identification of highly potent glucocorticoid steroids in recycled water (Jia et al., 2016). In addition, the Expert Panel did not consider that the US EPA already uses in vitro bioassay data. For instance, US EPA method 4435 "Screening for Dioxin-Like Activity in Soils and Sediments Using the CALUX Bioassay and TEQ Determinations" is an approved method already (http://www3.epa.gov/epawaste/hazard/testmethods/sw846/pdfs/4435.pdf).

The case for specific, receptor-based screening bioassays. As was stated in the SAP report (Anderson et al. 2010), identification of ligands that are specific for a receptor-mediated response can be quantified via biological equivalence values (i.e. BEQs), i.e. concentrations that can be interpreted in the same way one interprets individual chemical concentrations, or more appropriately summed concentrations of chemicals that

collectively activate a specific receptor. In this capacity, a guideline for the ligand is already present. For example, the SAP report led to selection of receptor-based bioanalytical assays that targeted CECs for which risk-based estimates of compounds indicated a potential hazard (Mehinto et al. 2015). The risk-based assessments already had guidelines for that ligand in water. It was our recommendation that if the BEQ of that molecular initiating event exceeded that guideline (a risk/hazard based process), then additional testing in a tiered approach could be initiated either to confirm the response or to potentially identify the causative agent. In no way did our report (Anderson et al. 2010) suggest that the bioanalytical response could be used in a refined risk assessment strategy to set a guideline for water quality, whether it be for a potable water supply or for a receiving water application. Moreover, since the proposed tools were selected contingent on their ability to be quantified via a BEQ response, and with a documented, credible linkage to an adverse outcome based on an existing standard or guideline, "reverse toxicokinetics" to characterize exposure is not necessary. If the goal of managers is to assess the potential hazards of recycled water, then use of these tools under "worst-case" scenario exposure (assuming 100% exposure) represents the most conservative exposure assessment approach. If molecular event bioactivation is not detected under the most conservative approach, then no further testing is needed (see associated figure 1).

Non target analyses. The Expert Panel seems to condone the use of non-targeted analyses (NTAs), yet barely mentions that many of the same limitations of bioassays also apply to NTA. For instance, the Expert Panel specifically addresses the issues of false positives/negatives, extraction efficiency, and limitations of mass spectrometric techniques. In fact, most laboratories would advocate for the use of matrix spikes of cellular bioassay positive controls within the waters to be evaluated. This allows for some certainty that the a well-known agonist is actually recovered from the sample preparation methods used. NTA is also generally limited to those substances that can be extracted or purged from water samples. For instance, it is extremely unlikely that NDMA, perchlorate, or 1,4-dioxane would have been detected using the most widely applied NTA procedures. While the SAP also agreed that NTA is a valuable and necessary tool, we believe it is highly complementary to bioassay analyses. As a recent case in point, medium pressure UV advanced oxidation has been shown to result in genotoxic byproducts, yet NTA has not yet been successful to identify those substances causing the reproducibly observed mutagenicity (Martijn and Kruithof, 2012; Kolkman et al., 2015; Martijn et al., 2016). Thus, we maintain that bioassays as part of routine monitoring programs provide valuable information regarding mixture toxicity that is otherwise not possible using analytical methods currently employed for water quality monitoring.

Literature cited

Anderson P, Denslow N, Drewes J, Olivieri A, Schlenk D, Snyder S. 2010. Monitoring strategies for chemicals of emerging concern in recycled water. Final Report to the State Water Board, 220 pgs.

Escher, B., Leusch, F., 2012. Bioanaytical tools in water quality assessment. With contributions by Chapman H and Poulsen A. IWA Publishing, London, UK.

Escher, B.I., Allinson, M., Altenburger, R., Bain, P.A., Balaguer, P., Busch, W., Crago, J., Denslow, N.D., Dopp, E., Hilscherova, K., Humpage, A.R., Kumar, A., Grimaldi, M., Jayasinghe, B.S., Jarosova, B., Jia, A., Makarov, S., Maruya, K.A., Medvedev, A., Mehinto, A.C., Mendez, J.E., Poulsen, A., Prochazka, E., Richard, J., Schifferli, A., Schlenk, D., Scholz, S., Shiraishi, F., Snyder, S., Su, G., Tang, J.Y.M., Burg, B.v.d., Linden, S.C.v.d., Werner, I., Westerheide, S.D., Wong, C.K.C., Yang, M., Yeung, B.H.Y., Zhang, X., Leusch, F.D.L., 2014a. Benchmarking Organic Micropollutants in Wastewater, Recycled Water and Drinking Water with In Vitro Bioassays. Environ. Sci. Technol. 48, 1940-1956.

Escher, B.I., Tang, J.Y.M., Poulsen, A., Leusch, F.D.L., Snyder, S.A., Jia, A., 2014b. Development of Bioanalytical Techniques to Assess the Potential Human Health Impacts of Recycled Water. in: Foundation, W.R. (Ed.). WateReuse Research Foundation, p. 316.

Jia, A., Wu, S., Daniels, K.D., Snyder, S.A., 2016. Balancing the Budget: Accounting for Glucocorticoid Bioactivity and Fate during Water Treatment. Environ. Sci. Technol.

Kolkman, A., Martijn, B.J., Vughs, D., Baken, K.A., van Wezel, A.P., 2015. Tracing Nitrogenous Disinfection Byproducts after Medium Pressure UV Water Treatment by Stable Isotope Labeling and High Resolution Mass Spectrometry. Environ. Sci. Technol. 49, 4458-4465.

Leusch, F.D.L., Snyder, S.A., 2015. Bioanalytical tools: half a century of application for potable reuse. Environmental Science-Water Research & Technology 1, 606-621.

Martijn, A.J., Kruithof, J.C., 2012. UV and UV/H2O2 Treatment: The Silver Bullet for By-product and Genotoxicity Formation in Water Production. Ozone-Sci. Eng. 34, 92-100.

Martijn, B.J., Van Rompay, A.R., Penders, E.J.M., Alharbi, Y., Baggelaar, P.K., Kruithof, J.C., Rietjens, I.M.C.M., 2016. Development of a 4-NQO toxic equivalency factor (TEF) approach to enable a preliminary risk assessment of unknown genotoxic compounds detected by the Ames II test in UV/H2O2 water treatment samples. Chemosphere 144, 338-345.

Mehinto AC, Jia A, Snyder SA, Jayasinghe BS, Denslow ND, Crago J, Schlenk D, Menzie C, Westerheide SD, Leusch FDL, Maruya KA. 2015. Interlaboratory comparison

of in vitro bioassays for screening of endocrine active chemicals in recycled water. *Water Res* 83:303-309.

WHO, 1975. Health effects relating to direct and indirect re-use of waste water for human consumption. Technical Paper Series. World Health Organization The Hague, The Netherlands, p. 56.

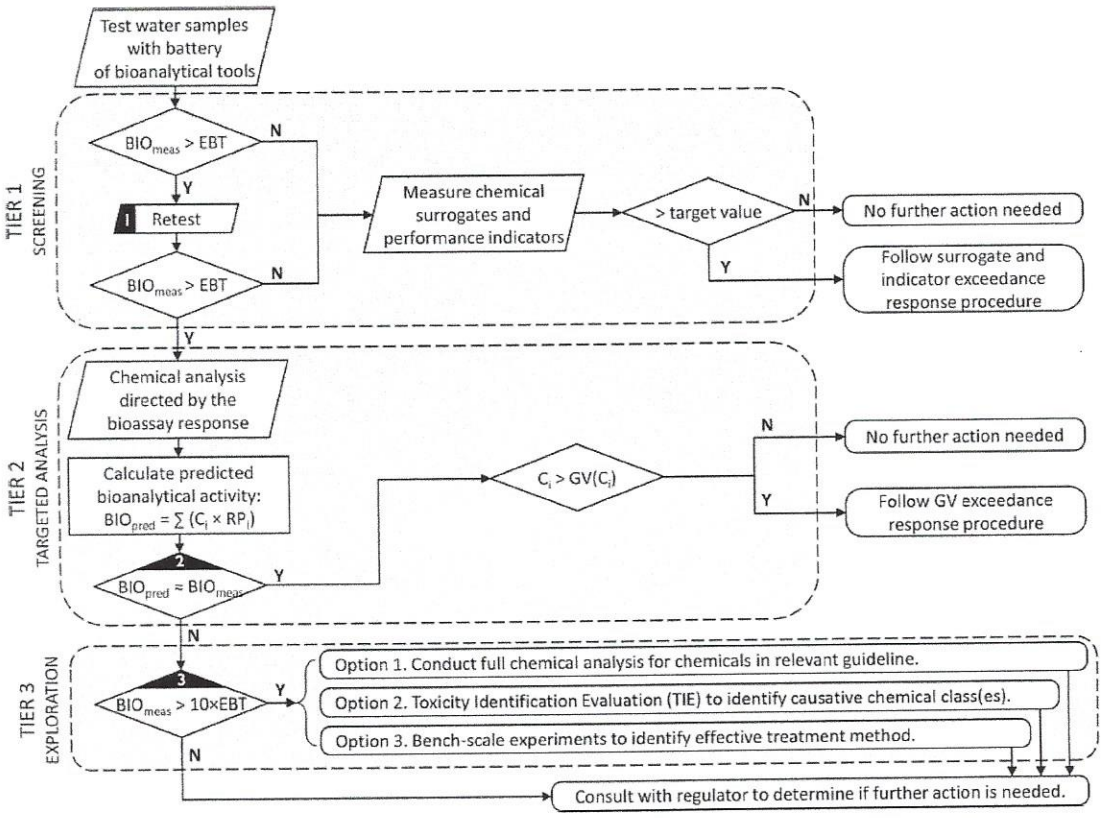

Figure 1. Proposed framework for using bioanalytical tools in water screening.
Leusch and Snyder 2015 *Environ Sci: Wat Res Technol* 1: 606-621

CALIFORNIA
Water Boards

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SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board
Division of Drinking Water

November 7, 2016

John M. Robertson, Executive Officer
Regional Water Quality Control Board
Central Coast Region
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401-7906

Dear Mr. Robertson

Final Engineering Report for the Pure Water Monterey Groundwater Replenishment Project (2790002-706)

This letter transmits the State Water Resources Control Board, Division of Drinking Water (DDW) acceptance of the Final Engineering Report (Final Report) for the Pure Water Monterey Groundwater Replenishment Project (Project) dated 21 October 2016. Monterey Regional Water Pollution Control Agency (MRWPCA) held a public hearing on August 22, 2016. Fifteen attendees provided oral comments and 10 submitted comment cards during the hearing. An additional 8 comment letters were received by the close of public comment period. MRWPCA provided a summary of comment responses, a copy of comments received, and a revision to the Draft Final Engineering Report based on the public comments received.

DDW recommends the Central Coast Regional Water Quality Control Board (RWQCB) include the following conditions in the permit as DDW Requirements:

1. The Pure Water Monterey Groundwater Replenishment Project (Project) shall comply with Article 5.2 – Indirect Potable Reuse: Groundwater Replenishment – Subsurface Application, Sections 60320.200 through 60320.228 of the Title 22, California Code of Regulations.
2. The Project's advanced water treatment facility (AWTF) shall conduct startup and commissioning testing that meets the requirement in §60320.201. Advanced Treatment Criteria. A test protocol must be submitted for approval prior to commencement of testing.
3. The Project AWTF shall be operated to meet the requirements in §60320.122. Operation Optimization and Plan.
4. Per §60320.122. Operation Optimization Plan, prior to operation, MRWPCA shall submit an Operation Optimization Plan for review and approval. At a minimum, the Operation Optimization Plan shall identify and describe the operations, maintenance, analytical methods, monitoring (grab and online) necessary for the Project to meet the requirements and the reporting of monitoring results.

The following is from "The Source" –a magazine by Melbourne Water March 2006 Issue 37.

In Singapore, John Poon oversaw a 3 year study of human health risks and chemical and microbial risks.

He said no single technology is foolproof, and potable reuse is not a silver bullet. It should be considered alongside other water conservation measures and alternative measures.

"When we begin to think about using recycled water for drinking, questions are raised about the longer-term health impacts from unknown contaminants at such extremely low concentrations that we are unaware of them" [27]

He said Singapore had gone to great lengths to try to address these problems.

"New compounds are being invented and discovered every day and understanding the health implications of thousands of chemicals and emerging pathogens is an enormous and ongoing scientific challenge" [27]

A U.S. cancer expert, Professor Steven B. Oppenheimer Ph.D., has warned that drinking recycled water was like playing Russian roulette as there was no way to test if it was safe.

Professor Steven B. Oppenheimer, Director of the Centre for Cancer and Developmental Biology at California State Northbridge University at Los Angeles said,

"It may be fine for years until an unknown agent makes it through the process and kills people. Anytime one deals with medical and industrial wastes in such large quantities, it is likely that such a scenario will eventually materialize."

Professor Oppenheimer has a long list of awards for his cancer research, had numerous papers published on cancer and was instrumental in stopping a project for the city of Los Angeles to top up an aquifer with recycled wastewater.

Professor Oppenheimer said,

> ***"The fact that some communities in the U.S and elsewhere have been drinking reclaimed water does not make it safe. It often takes decades to detect the damage done by such projects that tinker with public health and welfare."***

He said it had taken decades to prove that smoking caused lung cancer and smoking was now regarded as the number one cause of cancer. He said this situation with recycled water was much worse in that many people did not have a choice.

Professor Oppenheimer said while there was probably no solid documented evidence to prove that ingesting recycled water harmed health, one of the most respected research groups in the world, the U.S. National Research Council, which is a branch of the National Academy of Science, had warned against it in its study. Professor Oppenheimer said this was the most definitive report of this subject ever done.

He said,

> ***"The study found that it was highly likely that some compounds would get through, highly likely that those compounds would be toxic and highly likely that nobody would know about it because there were no tests available."***

The National Research Council also warned that just because indirect potable water reuse had been around for decades and studies had been done,

> ***"Negative results from such studies do not prove the safety of the water in question."***

As there are currently no guidelines for drinking recycled water, federal guidelines are currently being fast tracked. Professor Oppenheimer said,

> ***"The world's scientific community does not and will not know all the toxic agents and carcinogens that may be able to make it through the indirect reclaimed water process to drinking water. Also, there is simply no technology to detect them."***

and

In 1996, a Rand Corporation study found that there was an almost 100% (average of 73%) increase in rates of liver cancer in areas using reclaimed water. The authors, however, down play the finding by stating there is no evidence to associate liver cancer with reclaimed water; therefore the liver cancer is most likely explained by other factors. In my opinion, and in the opinion of others who read this statement, it is flawed reasoning. [28]

Dr. Steven Oppenheimer, Augmenting Drinking Water with Reclaimed Water, http://www.beachwoodvoice.com/WaterIssue/augmentingdrinking.htm

Because regulations for safe drinking water were not developed with reclaimed water in mind, they may not be the best standard for testing its quality, the committee said. Reclaimed water may contain sources of contamination that cannot be determined through current testing or treatment processes.

After reviewing the few studies that have examined the health implications of drinking reclaimed water, the committee said that different approaches are needed to test the safety of reclaimed water. Conventional toxicology tests developed by the food and drug industries are not appropriate for evaluating the risks from complex chemical mixtures that can be found in reclaimed water. Alternative studies, such as tests using fish in source water, should be undertaken to provide a broader range of data about possible harmful