Public Meeting Summary
FOOD SAFETY EXPERT PANEL

October 28, 2016
10:00 a.m. to 2:00 p.m.
Central Valley Water Board – Board Room
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

Attendees

Panel Member	**Title & Affiliation**
Mr. Patrick Kennelly	Chief, Food Safety Section, California Department of Public Health-Food and Drug Branch (CDPH-FDB)
Dr. Gabrielle Ludwig	Associate Director of Environmental Affairs, Almond Board
Dr. Stephen Beam	Branch Chief, California Department of Food Agriculture (CDFA)
Dr. Barbara Petersen	Principal Scientist, Chemical Regulation and Food Safety, Exponent
Dr. Bruce Macler	Toxicologist, U.S. Environmental Protection Agency (EPA)
Dr. William Stringfellow	Professor, University of the Pacific—Stockton Director, Lawrence Berkeley National Laboratory, Environmental Measurements Laboratory
Mr. Mark Jones	US Army Corps of Engineers
Affiliated Parties	**Title & Affiliation**
Ms. Pamela Creedon	Executive Officer, Central Valley Regional Water Quality Control Board (Water Board)
Dr. Karl Longley	Chair, Water Board
Mr. Clay Rodgers	Assistance Executive Officer, Water Board
Mr. Josh Mahoney	Staff, Water Board
Mr. Dave Ceppos	Associate Director, Center for Collaborative Policy (CCP)

Note: Panel member Dr. Seth Shonkoff was unable to attend.

Introduction

The facilitator (Dave Ceppos, Associate Director of the Sacramento State University, Center for Collaborative Policy [Center]) called the Public Meeting (meeting) to order. He reviewed the agenda, covered logistics for the day including web access for the meeting (NOTE: The recording of the meeting is available on Youtube here).

Mr. Ceppos asked the Food Safety Expert Panel (Panel) and Central Valley Regional Water Quality Control Board (Water Board) staff to introduce themselves (see above for Panel, and Water Board staff, and facilitation staff attendees). He then turned the meeting over to Mr. Clay Rodgers, Assistant Executive Officer of the Water Board for introductory comments.

Mr. Rodgers introduced the history of the Panel. He stated that concerns have been raised about agricultural use of oil produced water. The Water Board convened the Panel since this is not an area of existing expertise by Board staff. The Panel was convened to allow the Board to ask experts for recommendations and guidance on this water use topic. Mr. Rodgers continued discussing the importance for the safety of reused production water because food/human safety is a priority. Mr. Rodgers stated that the crop testing analysis process is on the correct path to determining chemicals of concern and potential impacts. Results so far indicate no major issues in known chemicals that the Water Board needs to be aware of. Mr. Rodgers confirmed that there are still chemicals they need to identify, categorize, and study for potential impacts. Mr. Rodgers ended the introduction by stating that thus far, there are no issues of significant concern. However, many studies must still be conducted to fully assess this water use and to ensure that water quality is not being impacted.

Presentations to the Food Safety Expert Panel

Crop Testing Analysis

David Ansolabehere, General Manager of Cawelo Water District (Cawelo) gave a presentation on a crop testing analysis conducted by Cawelo and partners (available at: http://www.waterboards.ca.gov/centralvalley/water_issues/oil_fields/food_safety/meetings/2016_1028_of_cawelo_pres.pdf).

He stated that the analysis was a voluntary process to identify any problems associated with the use of produced water. He described initial testing that was done and how it was conducted. He introduced Dr. Heriberto Robles of Enviro-Tox Services, Inc. to present the findings to-date of the testing.

Dr. Robles stated that Cawelo's mission is to provide clean, safe, irrigation water to its farmers. The crop testing analysis has included monthly testing and identified 70 constituents. Expanded quarterly testing has resulted in reporting for more than 160 constituents.

Recycled Produced Water Supply

Dr. Robles described how irrigation water samples were collected and managed. Testing was conducted for 70 chemicals of concern. They compared water screening levels of drinking water, published by the U.S. Environment Protection Agency (EPA) Region Nine and the San Francisco Regional Water Quality Control Board Environmental Screening levels. All chemical concentrations detected below or equal to minimum drinking water requirements. Dr. Robles concluded that the initial results show that the water meets standards for irrigation of agriculture.

Almonds, Grapes, and Pistachios

Dr. Robles reported that there was no difference in chemical presence for almonds, grapes and pistachios collected from areas in Cawelo and a control group (samples taken from fields not irrigated by produced water). Dr. Robles concluded that the results showed the water used for irrigation is safe.

Mandarins, Oranges, and Lemons

Dr. Robles explained samples were collected from test fields by Cawelo, and a control group collected samples from fields not supported by Cawelo. Compounds that were detected in the water included acetone, benzene, toluene, ethylbenzene, xylenes, acenaphthene, fluorene, naphthalene and phenanthrene. He clarified the lab team found acetone in both the test field samples and control group, concluding acetone is naturally occurring. Since two out of three test samples showed phenanthrene in oranges, Dr. Robles retested those samples. He went back and tested the oranges and the dust from surfaces around the test fields because he had reason to believe phenanthrene was sourced from nearby dust. Results showed no phenanthrene in the three repeat samples. He stated that there will be more samples tested to determine whether the hits were false positives or not. He also stated that there are nine constituents either not found or found at similar concentrations in field test and control group samples.

Carrots and Potatoes

Samples showed low levels of acetone in both test and control groups, leading the study team to similarly conclude that acetone is naturally occurring.

Water Quality Testing

Dr. Robles compared detected chemical concentration levels to drinking water standards. Water quality testing is part of ongoing voluntary crop sampling. Currently, results show chemicals are at low levels or below drinking water standards.

This presentation is available on the Water Board's Food Safety web page.

Questions from panel members

Responses are indicated by arrow bullets below questions.

- Can you elaborate on dust sampling?
  - Polynuclear aromatic hydrocarbons (PAHs) are produced by combustion fuel and one of the sources we detected could be from the air. Dr. Robles took dust samples from nearby leaves and structures that may have concentrations of this class of contaminant.
- Was there a crew to collect the dust or a procedure you followed?
  - Dr. Robles preformed the dust sampling himself. He used moist wipe tissue and collected from areas he devised. He noted that the test did not look for concentrations but just presence.

- Did you look for higher molecular weight PAHs?
  - Results were only consistent with samples for others taken. It was negative in the dust. Samples from the first and second dust test had different outcomes of dust in terms of quantity, which could be caused by rain that fell between the two efforts.
- You focused the crop sampling on chemicals detected in the water, did you mean detected in the water going into crops?
  - Yes, chemicals we identified in the water, we tested those chemicals in the fruit.
- You went from 70 to 160 chemicals; can you give some examples of additional chemicals?
  - The complete list of chemicals we are testing for is on Cawelo's water testing web page.
- For most of the contaminants you are looking for (both lists), we don't regulate drinking water from standards at the State level or EPA. You mention you used screening levels, and that results so far show detections extremely below where we will have concern from drinking water. What list are you using?
  - For EPA we used Region Nine regional screening levels.
- From the Super Fund Program?
  - Yes
- How did you manage the fatty compounds in uncontrolled and controlled crops, especially in almonds?
  - There were two tests done. One detected oils which only analyzed oils. The second test sent samples to a food lab for natural oils. We did not analyze PAHs.
- Clarify -water sampling on original 70 chemicals, there was another sample done where you tested for 160 plus chemicals, and indicated it was after dilution. That is where your sample was collected after a dilution process?
  - It was at sample locations prior to water blending and after water blending.
- Are there any differences you saw prior to and after blending?
  - These are the highest levels detected so it would be prior to blending
- When you selected chemicals for crop analysis, did you check before or after the expanded list?
  - We checked before.
- Comment: For future analysis it would be helpful to outline a method for determining whether the PAHs present derive from air sources such as (fuel) combustion or water sources.

Questions and Comments from the Public

- Was this presentation or any other of the presentations given to Panel members before today?

  - We had a discussion a week ago on this presentation and the Panel saw the results and formulated some thoughts. However, we did not have this exact presentation. We did not have this exact presentation until this morning.
  - I would like to make the request that materials be made available to the public prior to meetings.
- How did you conclude the food is safe to eat when you only tested for nine contaminants? There are more untested contaminants.
  - We chose the nine contaminants based on those already identified in the water.
- There may be chemicals in the water you may not be aware of, correct?
  - Yes. We are not testing for unknown chemicals.
- In the report available on the website, do you include a discussion of current irrigation water standards as compared to the results produced with respect to safe guards or above and beyond type measurement? Is there a discussion of agricultural water standards compared to the quality represented in the testing results? We would like to see an independent assessment of Cawelo's testing methods.
  - We do not include agricultural standards. Agriculture standards do not include the chemicals that we are testing for, and produced water is different from normal irrigation sources. We utilize drinking water standards because they address a greater volume of chemicals. There is a lack of data in agricultural standards, so we have been using drinking water standards as a goal. We are not saying we should continue testing against drinking water standards. However, we should use a set of standards that includes a majority of chemicals we are testing for.
- Does the State perform the same testing on imported produce from other countries who do not share our regulations?
  - Testing of produce from other countries is not done routinely for the constituents we tested for. These chemicals are not on the National Surveillance program. I am not aware of any testing, especially outside of the State. The California Department of Food and Agriculture (CDFA) and US Department of Agriculture (USDA) have programs that monitor pesticides. To my knowledge the chemicals discussed here are not a part of that testing program.
- Do we have a current record of how much of this recycled water is used to irrigate crops on organic farms?
  - No, we do not have the quantity.
- It seems critical that soil samples should be collected and analyzed for the same constituents as the water. Since this practice has been happening for decades, there are outstanding questions on potential accumulation of metals, organics, and other chemical additives. It is important to consider what additional chemicals to test for in root crops that directly contact the soil. Additionally, given the concerns that organic farmers have on the process potentially impairing soils, this data is needed.

  - Our concern with soil testing is that there are many variables and results that might have nothing to do with produced water.
- I have concerns about the dust sampling methods on tree leaves, particularly the use of commercial wipes. Usually clean room grade, cotton wipes are used to collect surface dust samples.
- A suggestion is to determine what all chemicals are in the waste water and which ones are a concern to be tested for.
- It is important to look out for potential endocrine disrupting chemicals (EDCs). Low concentration EDCs have high impacts on human biology and physiology.
- Cawelo's testing method should be assessed by an independent reviewer.
  - Testing methods for mandarins, oranges, and lemons have been submitted for review.

Preliminary Hazard Assessment of Chemical Additives used in Oil Fields that Reuse Produced Water for Irrigation

Dr. William Stringfellow introduced the hazard assessment presentation (available at http://www.waterboards.ca.gov/centralvalley/water_issues/oil_fields/food_safety/meetings/2016_1028_of_prelimhazard_pres.pdf).

He reviewed general information on produced water and water quality challenges to beneficial reuse of produced water. He stated the objectives of the assessment were to survey chemical use on oil fields where produced water is used for agriculture in California and conduct a preliminary hazard analysis. Additionally, the assessment identified data gaps and specific chemicals for further investigation.

Data

Dr. Stringfellow summarized the data collected for the assessment.

Methods

Dr. Stringfellow outlined the methods used in the assessment. These included matching chemicals in the produced water with chemicals listed in publicly available datasets. He stated that they also considered biodegradability (OECD criteria), and bioaccumulation potential (EPA EPISuite Software).

He stated the team rated chemical toxicity using the United Nations Globally Harmonized System (GHS) of Classification and Labelling of Chemicals. The results of the assessment indicated that out of 173 chemicals listed, 107 could be identified with a Chemical Abstract Services Registry Number (CASRN). The team was unable to identify 66 chemicals via CASRN and therefore further analyses were limited.

Summary/Study Limitation

Dr. Stringfellow stated that one-third of these chemicals are classified as chemicals of limited hazard and as such, should not raise concern. He stated they will not ignore these limited

hazard chemicals. However, the team focused on potential chemicals of concern, which also made up roughly a third of all chemicals. The final third included trade secret chemicals. He noted the study had several limitations, including the lack of mass data and the inability to analyze trade secret chemicals without CASRNs. Also, they did not analyze chronic toxicity data or evaluate chemical mixtures and degradation. He said this is something they will consider in the future.

Next Steps

Dr. Stringfellow stated that the next step is to identify data gaps and conduct a systematic scientific investigation examining the beneficial reuse of produced water in the agricultural sector. This should examine both natural and anthropogenic chemicals. Dr. Stringfellow also suggested a literature review and analysis of practice in other states and novel scientific studies.

This presentation is available on the Water Board's Food Safety web page.

Panel Questions

- Why did you include elements of acute eco-toxicity? We are talking about the use of produced water for agricultural irrigation, not into the ecosystem. What does eco-toxicity mean from a public health standpoint?
  - We included it because what we are doing is not just limited to this circumstance. We are self-funded and we are looking at questions overall and not for just one case.
- How do we sort out different compounds?
  - It was a preliminary study. If we have other criteria suggested, then we can analyze it again.

Panel Comments

Panel members discussed the value of the distinction between natural and anthropogenic chemicals. Some felt the distinction was not important, while others liked the separation as a way to determine potential future actions. They also discussed the chemical list.

- We may be able to gather more information about some of the chemicals listed.
- One Panel member emphasized to the audience that the list of chemicals does not represent what is definitely in the produced water or in the crops grown with produced water. The Panel member highlighted that the assessment and list of chemicals is the basis for and beginning component of a greater hazard assessment.

Public Questions

Q: California Fresh Fruit Association and its representatives want to know the scope and potential outcomes of the ongoing research and work of the Panel. When does the Panel anticipate completing the scope as outlined currently, which is a recommendation through a white paper or in some other form?

Response: The current scope includes a comprehensive evaluation. We are working on identifying and addressing data gaps in addition to the potentially hazardous chemicals that may be in the water. We have to issue updated orders that will require the amount of compounds used be submitted to the Water Board from the dischargers. The Water Board is committed to addressing food safety concerns, and the comprehensive evaluation will take some time and will most likely take longer than a couple of months. We are taking a systemic approach to come to an appropriate answer.

Q: Are all of the chemicals of concern mentioned in Dr. Stringfellow's presentation included in the revised monitoring list of chemicals? What else is missing? Can we devise analysis protocols to include pertinent chemicals that are not included?

Response: This is something the Water Board may consider doing.

Public Comment

- The Alliance of Nurses for a Healthy Environment (ANHE) asks the Water Board not to expand this irrigation practice, and instead end this practice until it can be proven 100% safe for human health. It is smarter to test the water comprehensively before exposing the public to potential hazards. Right now, we are releasing first and testing after.

California Certified Organic Farmers (CCOF)

CCOF is a nonprofit organization that certifies and advocates for over two thousand organic farms in the state of California. Kelly Damewood, Policy Director for CCOF, spoke on produced water related issues for organic farmers. She expressed the following concerns:

- Dischargers are not fully testing all of the potential contaminants in produced water.
- There is not enough evidence to show that mixing produced water and irrigation water is not causing long term impacts on soil quality, and not resulting in crop uptake of contaminants.
- While some studies have been completed, these have not been followed up with further research and results that are more detailed.
- Farmers are using this water although safety is yet to be evaluated. Organic agriculture is federally regulated. USDA standards require organic farmers to maintain natural resources, including soil and water. Organic farmers are also prohibited to use synthetic materials. CCOF is concerned that organic farmers may not be in compliance if they use blended water.

Ms. Damewood concluded by raising the concern that consumers will no longer trust farmers, and will blame farmers if the water is harmful. She suggested the State develop its own testing protocol so it can independently verify the safety of organic products. She noted that organic certifiers have the right to do experiments.

Panel Questions to CCOF

- Do you currently have testing methods for irrigation water?

- No, currently we do not test irrigation water.

- Is CCOF talking about the use of recycled water in general? From a variety of sources?
  - Yes, we are currently having discussions about recycled water. We recognize that there are sources that are safe for reuse, which is a benefit. We have considered testing final product, plant tissue, and water.
- Is CCOF or other organic certification agencies actively engaged in USDA on this particular topic? If so, has USDA indicated what their perspective is?
  - There has been no specific guidance from USDA on the use of produced water. Organic farmers are allowed to use water that has been approved by the State for agricultural use. However, there are groups that have requested the organic standards board ban the use of produced water for organic farmers.

Panel comment

- In an era of increased use of reused/recycled water from multiple sources (e.g. storm water), it is important that we have clear safety standards and procedures.

General Public Comments

- We appreciate the Water Board undertaking this effort. However, we have concerns about the process. We have several suggestions to improve the process:
  1. Meeting materials should be made available to the public before the presentation.
  2. Meetings should happen on a quarterly basis—attendance is better assured by scheduling ahead of time.
  3. Develop a process for the public to provide recommendations for agenda items.
  4. Communicate more regularly about the project—the public is interested in knowing what progress is being made.
  5. We understand that there are meetings between Panel members. That seems appropriate. However, please make those meeting summaries available to the public so we can stay informed.
- From my understanding, this Panel was constituted for one year. What happens with the Panel charter after one year expires?
  - The Water Board is addressing the pace of the project and has hired a facilitator to support Panel activities past one year. We plan to update the Charter so it is clearer and reflects any additional members.
- What does the Water Board think about holding quarterly meetings? And what about more communication with the public about what is going on amongst Panel members (key issues and progress)?
  - We are not opposed to the idea. However, we want each meeting to be as productive and efficient as possible. We want to address important items as needed and not have a meeting just to have a meeting.

- Agenda Item number four of today's meeting will help the public understand more about what we have done and where we are going in terms of progress.

Discussion on Future Studies: Scope of work and funding

Panel members and Water Board staff discussed the scope of work for the Panel and future studies. Mr. Rodgers explained the first two tasks include performing a detailed literature review on chemicals of concern. This helps the Water Board identify data gaps and guides next steps. The Water Board is currently identifying ways to perform and fund these tasks and future studies. The Water Board has spoken with dischargers, operators, and farming entities who receive produced water. From the Water Board's perspective, these entities have an obligation to fund future food safety studies. The Water Board will oversee and control the work to avoid potential bias. Mr. Rodgers indicated the Water Board is moving forward with the first two tasks which they hope to complete by next summer.

Panel members highlighted the value of performing a literature review to put all the relevant information into context and identifying clear questions in regards to the data gaps.

Final Public Comments and Questions

- Are there plans to take an in-depth look at all of the treatment technologies in place at the various facilities used to treat the water? In the CCST's past report that looked at various treatment technologies for treating produced water for beneficial reuse, there were concerns that no one technology could remove all contaminants from the various categories of chemical additives used by the oil and gas industry.
  - This will be addressed in the project scope. Our primary mission is to address whether the water is suitable for use in agriculture.
  - One Panel member stressed the importance of determining if there is in fact a problem before starting to manage it. The Panel member also stated that produced water is being examined beyond California and on a national level. The American Water Works Association for example, is now looking at produced water, and they may have suggestions about treatment.
- Can the public provide recommendations on agenda items?
  - Yes. Please send recommendations to Water Board staff (Clay Rodgers, Dave Ceppos, or Dale Harvey) and we will address those questions to see if they are appropriate or not appropriate.
- I am glad to hear studies are moving forward. However, I encourage the board to inform the public so we will not be concerned.
- A representative from the Kern County Farm Bureau took time to thank the Panel and Cawelo Water District. They said farmers are smart and depend on good science. They highlighted the pressure on groundwater in Kern County. They also spoke on the alternatives to growing food locally with produced water, noting there may be contamination issues with imported food as well.

- A representative from the Agricultural Council of California stated that given the drought, using recycled water to help grow local products is important. Also, they said the California Water Action Plan states there is a need to enhance and boost water for reuse. They shared their opinion that keeping produced water as a possibility for reuse is important. They thanked the Panel for their work.
- A representative from California Citrus Mutual thanked the Water Board for convening the Panel. They said they felt encouraged about the findings of the study presented by Dr. Robles during the meeting. They asked the Panel to focus on the safety issue, and not to get side tracked by other issues related to the water. If there are more questions, those should be addressed in a separate study, so the Water Board does not hold up farmers from using this water.

Closing Remarks

The Water Board acknowledged this is a learning process and stated today's comments and questions from the audience made an effort to guide us to the correct path. The Water Board stated that at this time, there will be no change in direction in regards to produced water treatment. A focus on treatment may require reconstituting the Panel. The Board Chair reminded the audience that the Water Board is interested in the quality of water and public health. He closed the Meeting by thanking the Panel and the audience.