

Central Valley Regional Water Quality Control Board

Meeting Summary

**FOOD SAFETY
EXPERT PANEL - WORKING MEETING
September 20, 2017
10:00 a.m. to 3:00 p.m.**

Attendees

Panel Member	Title & Affiliation
Dr. Stephen Beam	Branch Chief, California Department of Food Agriculture (CDFA)
Dr. Gabriele Ludwig (by phone)	Associate Director, Environmental Affairs - Almond Board
Dr. Barbara Petersen (by phone)	Principal Scientist, Chemical Regulation and Food Safety, Exponent
Mark Jones	Toxicologist, US Army Corps of Engineers
Dr. Ken Kloc	Staff Toxicologist, California Office of Environmental Health Hazards Assessment
Dr. Andrew Gordus	Staff Toxicologist, Department of Fish and Wildlife (DFW)
Affiliated Parties	Title & Affiliation
Dr. Karl Longley	Chair, Central Valley Regional Water Quality Control Board (Water Board)
Clay Rodgers	Assistance Executive Officer, Water Board
W. Dale Harvey	Supervising Engineer, Water Board
Josh Mahoney	Water Resource Control Engineer, Water Board
Rebecca T. Asami	Engineering-Geologist, Water Board
Dr. William Stringfellow	Science/Technical Advisor, University of the Pacific, Lawrence Berkeley National Lab (LBNL)
Dave Ceppos	Associate Director, Center for Collaborative Policy (CCP)
Alex Cole-Weiss	Assistant Facilitator, CCP

Note: Panel members Bruce Macler, Seth Shonkoff, and David Mazzera were unable to attend the meeting.

Action Items

1. Josh and Will to discuss historical flow path data needs.
2. **CCP** to follow up with Rebecca about Mercury and Naturally Occurring Radioactive Materials (NORMs) presentation for the public meeting.
3. **CCP** to follow up with Water Board and Panel about alignment meeting on the Duke/RTI/CSUB/PI study ASAP.
4. **Panel members** to provide feedback on proposed water isotope analysis by October 6.
5. Will and Clay to discuss details of water isotope sampling (to address with Cawelo Water District).
6. **Dave** to summarize conversation with Seth about long-term public outreach on sampling and distribute to the Panel.

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Introductions and Agenda Review

CCP facilitator Dave Ceppos opened the meeting with introductions from Food Safety Expert Panel (Panel) members, Water Board staff, and CCP staff. He reviewed the agenda.

Materials List

The following items were distributed to Panel members in advance of the meeting:

- Draft Analysis Report (for internal Panel review; final draft to be shared publicly)
- Letter from California Certified Organic Farmers (CCOF) on long-term soil health concerns
- Emerging methods paper
- Duke/RTI International (RTI)/California State University Bakersfield (CSUB)/Pacific Institute (PI)
Study materials
 - Response Memo
 - Risk Assessment Model Summary

Hard copies of Water Board draft field notes from March, April, and August were made available to Panel members at the meeting.

Review of June Public Meeting

Panel members approved and adopted the final version of the June meeting summary. CCP assistant facilitator Alex Cole-Weiss provided a status update on action items from the June public meeting.

Project Update –Memorandum of Understanding (MOU) Partners Implementation Progress

Clay Rodgers, Central Valley Regional Water Quality Control Board (Water Board), updated Panel members on the MOU signatory group's (group) progress to implement the tasks outlined in the MOU. Initial meetings with the signatories began in November 2016 and the final MOU was signed in July 2017. The Water Board provided the scopes of work for Tasks 1, 2, and 3 to the signatories over the summer for their review and received a few comments. As of September 2017, the signatory group had not indicated that they were finished commenting on the scopes. David Ansolabehere of Cawelo Water District is in charge of coordinating the signatory group. The Water Board will share the comments received from signatories with Panel members for their input. The group of MOU signatories are responsible in the future to hire an entity to conduct sampling, analysis, and the preparation of sampling reports; the Water Board reserves the right of refusal on the group's selection.

Mr. Rodgers expressed his desire to move forward quickly on next steps to complete the MOU tasks; the most time sensitive being the selection of a contractor to conduct the next round of crop sampling (i.e. citrus in January). He explained that since the signatories did not complete their review of the scopes of work in time for the selection of a contractor over the summer, Dr. Stringfellow and his team provided sampling and analysis support for summer crop sampling. The Water Board wants to ensure that in the future however, the science advisor role is separate from the crop sampling activities. The Water Board is using money made available by the State, but the need and requirement is to have the irrigators, users, and producers assume financial responsibility for the sampling. The Water Board's primary interest in the selection of a contractor is that the entity is qualified to do the work and is unbiased. He also informed the Panel that Water Board staff and the Board Chairperson will be conducting a site visit to Cawelo Water District to discuss implementation issues.

Mr. Ceppos asked if Panel members had any thoughts about what if anything the Panel can do to address this situation. Panel members agreed that the time to review the scopes of work seemed

adequate, and that the Water Board was the entity to address the timeliness of the implementation of MOU tasks.

Other discussion points and comments are summarized below.

- One Panel member commented that they were under the impression that the Water Board will ultimately decide what and how to direct sampling activities (with Panel input), and asked for clarification on the comment/review process by the MOU signatories.
 - Mr. Rodgers explained the Water Board allowed the signatories an opportunity to comment on the scopes since they will be responsible for implementing them; it is still within the Water Board's purview to make the final decision on how to sample.
- One Panel member expressed concern that delay in the project negatively impacts agricultural producers who use the water, and suggested encouraging the producer groups to write a letter.
- Mr. Rodgers commented that the MOU signatory group includes irrigators. Chevron and California Resources Production Corporation have both indicated they will not be commenting on the scopes of work.
- Dr. Stringfellow emphasized the need to establish a timeline for completion of MOU Tasks 1 through 3, with deadlines, deliverables, and clear expected outcomes.
- One Panel member asked the Water Board to clarify if the MOU process was purely voluntary.
 - Mr. Rodgers explained that it is voluntary, but there are regulatory steps the Board can take.
- Mr. Ceppos shared comments he had received from Panel member Seth Shonkoff. Dr. Shonkoff's opinion is that analytical rigor and a peer-review approach needs to be applied to the project to show the public that this is a robust process. Also, so that the findings can inform policy, which is critical given that it is a big and emergent policy issue.
- Dr. Stringfellow suggested adding a standing agenda item to the public meetings for the signatory group to report on the progress they are making. This would set an expectation about the timely progress that is needed and will put the responsibility of such reporting on the signatories, rather than Water Board staff.
- Regarding the selection of a contractor/consultant, Dr. Stringfellow commented that there is pressure from non-governmental organizations and advocacy and scientific communities to conduct a more integrated ecological/environmental study (i.e. include soils and trees; address accumulation of toxins). The NGO community may not be satisfied with just an analysis of the fruit.
- One Panel member commented that the group of signatories are likely considering three potential outcomes or decisions from the Water Board— 1) the practice can continue as is, 2) standards are needed, or 3) the practice needs to end. From the signatories' perspective, there may not be an interest in completing the process in a timely manner.
- One Panel member said they would reach out to agricultural producers in the area to communicate the need to move forward more quickly.

Review of Draft Report on Citrus Sampling Analysis

Dr. Stringfellow reviewed the draft report on the results from the March-April 2017 citrus sampling events. He requested Panel member feedback on the communication of results, particularly suggestions for appropriate additional context, data presentation, and readability. He reviewed several results in more detail:

- 1,2,4, Trimethylbenzene—This chemical is very similar to limonene, a naturally occurring compound in citrus. The molecular weights of the two compounds are very close. The reference spectrum for 1,2,4-trimethylbenzene indicates the compound only weighs up to 120 grams/mole, while the reference spectrum for limonene has a peak at 136 g/mol. The mass spectrum analysis for the sample showed molecular weight peaks above the molecular weight of 1,2,4-trimethylbenzene, but within the molecular weight range of limonene. This result is a false positive.
- Copper—the results indicate there is copper in both treated and control areas, with slightly higher levels in the control areas. There is no sign of accumulation, but the issue of determining an acceptable level of copper for food safety concerns remains, as does establishing the optimal detection limit.
- Strontium—the confidence interval is 0.05. Strontium levels are marginally higher in the treated group, at the very edge of being statistically significant. The results are well within the normal range of strontium in fruit, but the results could also indicate something about accumulation in soils. It could also be that the plants are grown in soils with naturally higher levels of strontium.

Dr. Stringfellow said he performed preliminary calculations based on standards from European and American ABCs (i.e. amounts, biology, and chemistry) for toxics which include standards for no-effect levels. He suggested basing the minimum detection limit (standard) on the no-effect level, and explained the data might be only partially known because of the detection limits. He suggested requiring the labs to provide supporting information (e.g. quality assurance and detection limits) automatically with the delivery of analytical results.

Discussion

Panel members, Water Board staff, and Dr. Stringfellow discussed various issues associated with the citrus sampling. These included:

- Detection levels.
- Handling of non-detect values in assessment calculations.
- The potential use of a free software program provided by U.S. EPA called ProUCL which uses different methodologies to address detection limits.
- Toxicological threshold levels.
- Extracting oral reference dose numbers from drinking water standards.
- Assessing the detection level used by Weck Laboratories, Inc.
- The potential for the copper data to be bi-modal, and the possibility of using nonparametric methods to analyze the collected data.
- Chemical additives are still missing from the analyses.
- Dr. Stringfellow described why he believes 1,2,4-trimethylbenzene is a false positive.

Update – Duke/RTI/CSUB/PI Study

Jennifer Redmond, Elisabetta Lambertini (RTI), Luis Cabrales (CSUB), and Laura Feinstein (PI) gave a brief update on the Oilfield Produced Water Study. In advance of the meeting, CCP distributed a response memo drafted by the Study team (made up of these organizations and Duke University) addressing questions raised during the public meeting in June, and a summary of the risk assessment model. Dr. Feinstein expressed interest to find an opportunity for Panel members to meet with Dr. Avner Vengosh of Duke University in the future.

Dr. Feinstein reviewed several select responses to questions from the June meeting, details on sample size, benefits of cooperation, reasons for focus on particular compounds, and the collection of information on crop inputs. She also reviewed the risk assessment model summary and described model components and outcomes. The primary goal is to focus on soil crops, and also look at potential migration of constituents into groundwater. The Study will focus on three key crops (tangerines, grapes, tree nut) and look at two exposure routes (consumption of fruit and ingestion of potentially impacted groundwater). She reviewed the call for participants, criteria for inclusion in the Study, and the process for involvement.

Discussion Comments and Questions

Panel members reflected on the different research questions around food safety and the use of produced water on crops for human consumption. The questions are important and have different implications. There are fundamental questions to address about whether current practices are causing problems or pose a food safety risk. Beyond that, there are larger policy questions about when it is ok or not to use produced water. The question about whether the food is safe in the specific area is what the Panel is charged with exploring. The second question about other water and standards in future application would be benefitted by modeling.

Dr. Stringfellow encouraged Panel members to consider splitting samples with the project. Some of the added expertise (e.g., Dr. Vengosh) could be very valuable. The Study team indicated they would be supportive of split samples and amendable to discussing this idea further. Panel members commented that there is wisdom in joint sample collection and controls from a practical and scientific perspective. However, there are market and regulatory issues to consider.

Regarding the proposed modeling of potential migration of produced water into groundwater, Panel members emphasized the need to understand unique local conditions and to draw upon local expertise within the Water Board. The modeling needs to account for the specific hydrogeological system. Modeling tools that do not reflect the unique hydrogeological characteristics of this part of California would not produce representative results.

Water Board staff emphasized that despite being a small part of the project, the groundwater modeling could be very problematic if the model assumptions and data are not sound. Without understanding the specific hydrology and hydrogeology, the predictions will not be accurate. The proposal says the team's expertise is with high salinity waters, which is not the case with the water being used for irrigation in Kern County. The Water Board has a lot of water quality data that could be shared that might be useful to the model. They requested that the Study team think very carefully about modeling and assumptions to increase the likelihood of defensible results. A participant added that there are other potential regulatory and policy implications of the research (e.g. Sustainable Groundwater Management Act and drinking water standards) that should be kept in mind. Study team members indicated that given the sensitivity of the issue, they would consider whether it is worthwhile to include the groundwater modeling and are open to removing it from the study.

Other questions, comments, and responses are summarized below:

- Did the original proposal include alfalfa as crop of interest?
 - Response: The intent is to focus on crops for human consumption. The USDA grant is focused on the study of food crops.

- The waters that are used for irrigation in California are unique when compared to other oil-producing areas. If you are basing the compound list on other areas, it will not reflect the context here.
 - Response: The Study team is aware of the uniqueness of the water situation.
- The United States Geological Survey study is collecting samples from areas that are not being used for irrigation.
 - Response: The Study team wants to do a comparative analysis on the different waters from different areas in the State. Differences in water quality are expected.
- A Panel member commented that it does not rain very much in Kern County, so there is not a lot of leaching into the groundwater. It will be very hard to differentiate which impacts are from the produced water.
 - Response: The primary focus will be on ingestion of the fruit. Given the policy implications, we generally run the models for some of these other concerns, such as impacts on groundwater. We felt that it would be prudent to include this issue in the modeling scenarios. In our modeling, we start with an initial screening of the produced water itself.
- Will the Study models be validated with existing groundwater data? If you are using a model to predict groundwater data in the Kern area, the only way to validate would be to pull groundwater data from the specific area.
 - Response: The Study team stated the models are validated with national EPA models. We know the model can predict an expected amount of leaching. We do not aim to do a full hydrological study of the groundwater, so we can only make a few estimates about the leachate. I do not know if we can get to exposure with our model.
 - Study team: We want to emphasize this is a side piece of the project. The most important aspect will be the ingestion of fruit.
- The Panel and Study team discussed whether the Study team has obtained permission from landowners to access property and take samples.
 - Response: The Study team indicated it was working on the permissions. Otherwise it will work with publically available data.
- Are the RTI studies (modeling) California wide? What percentage focus on Kern/Cawelo?
 - Response: The Study team stated that where it can sample will determine its geographic scope. The desired focus is on Kern County, but not necessarily exclude other participants.
- Does the Water Board have discharge standards for this water?
 - Water Board: There are narrative standards for surface discharges about potential impacts to beneficial uses.
- There has not been enough attention paid to the quality of the water where it starts. There are still questions about methods and detection limits. The Panel has been thinking about this for a while and it is a big task.

Next Steps: Explore Alignment and Overlap

A Study team member said the immediate next step on the Study is securing grower participation and subsequent sampling. The team is currently reaching out and has put up a blog post with CCOF. If the team does not get access within the next six months, they will be behind on project goals.

Study team members, Panel members, and Water Board staff agreed that it would be valuable to hold a discussion on areas of alignment between the Food Safety Panel project and the Study team to identify

areas of cooperation and avoid areas of conflict. Mr. Ceppos said CCP will support the Water Board and interested Panel members to convene a meeting with the Study team to discuss alignment.

Panel Only Discussion

Mr. Ceppos reviewed the three major areas of activity that the public is aware of: the MOU implementation sampling, Panel tasks, and the Duke Study. Since the MOU partner sampling is moving more slowly than anticipated, the public sees the Duke Study and has interest in the outcomes of that Study. Given the public attention to the Study and some of the concerns raised by Panel members, Mr. Ceppos asked Panel members what they wanted to do next with regard to the Duke/RTI/CSUB/PI Study.

With regard to public concern and opinion, one Panel member commented that the Panel process has already resulted in multiple rounds of sampling and relaying of information to the public. Mr. Rodgers emphasized that the importance of sharing the Panel's information and progress with the public. The Water Board has finished this year's sampling and when the report is finished, the Water Board and Panel will communicate to the public about the sampling and preliminary conclusions.

Panel members discussed the potential pros and cons of collaborating on the Duke Study. Key discussion points included:

- There might be value in the fact that the Duke/RTI/CSUB/PI Study looks at salts and NORMs as a complement to the Panel's interest in organics and additives.
- Panel members identified several ways to potentially cooperate intellectually on the Study—for example, share advice, provide feedback, and train graduate students.
- Two Panel members expressed that the Food Safety study led by the Water Board and the Duke/RTI/CSUB/PI Study should be independent. If the results of the two are similar, that strengthens both. The best approach is to be cooperative where possible. Even if the RTI [modeling] results come after the Board's Food Safety Project, the results from the latter will be a good balance. If the Food Safety Project's conclusions come out after the other study and has more detailed data and analysis, it will be also be a good balance.
- One Panel member was apprehensive about the approach to start with the organic farmers and suggested the Panel stay focused on whether the Study will do analyses that Panel members are interested in.
- One Panel member said they would prefer to have more of a working relationship with the Study team in order to partner with their expertise in metals and NORMs and provide the team context for potential grower concerns. The Panel could help inform the Study team on local issues.
- Dr. Stringfellow commented that from a practical project management perspective, it makes sense to encourage agencies and stakeholders to cooperate with the Study. If the Food Safety Project can split samples with Cawelo that would be great. He encouraged data sharing primarily to avoid dueling data sets, while reserving data interpretation as separate. From experience with large projects, there can be issues over different data sets. If the Food Safety Project moves forward with an environmental study—to include various ecological materials such water, soil, trees, fruit, etc.—then the Panel should consider splitting samples with the Study team. Since the Study team is not using State certified labs, its sampling may have to be redone. There is value in the NORMs analysis.
 - One Panel member clarified that NORMs data is already collected; NORMs were not included in the risk assessment.

Mr. Rodgers expressed interest in cooperating with the Duke/RTI/CSUB/PI Study team. The Water Board will be transparent with the farmers and tell them why they are cooperating. Panel members agreed that they should not engage with the Study team in such a way that might jeopardize existing relationships with stakeholders that are needed for the Food Safety Project.

Mr. Ceppos asked the Water Board to clarify whether they were interested in splitting water samples. Mr. Rodgers said the Water Board cannot share a split samples without the District's permission; if the District agrees to share a sample with the Study team, than that is different. Depending on how upcoming conversations on Food Safety Project task implementation with Cawelo Water District proceed, the Water Board will consider a request to obtain split water samples from Cawelo.

Mr. Ceppos asked Panel members if splitting samples with the Study team qualifies as "independence," as expressed by members. Panel members agreed that splitting samples is consistent with independence; independence means not telling other researchers which models to run or which questions to ask. Also, data from Water Board will become public data so the Study team will have access anyhow.

Mr. Ceppos asked the Panel about its desired course of action and suggested the Panel provide feedback, see what decision the Study team makes, and then move from there. Panel members agreed the desired approach is to continue to communicate, let the Study team obtain its own samples, and explore how to better align efforts. Mr. Ceppos proposed CCP expedite an isolated summary of the Duke/RTI/CSUB/PI discussion and circulate to the Panel quickly for feedback. CCP will help coordinate an alignment meeting and provide the list of issues for the Study team and Water Board staff to discuss.

Mercury and NORMs Data Update

Compiled Analytical Results for Irrigation with Petroleum Production Wastewater

Josh Mahoney, Water Board, gave an update on the historical data for water sampling from Chevron, Inc., Cawelo Water District, and Valley Water Management Company. The Water Board recently made a data table [publically available](#). The data table presents a summary of data from blended produced wastewater being used for irrigation. He oriented Panel members to the data table. Each row is a single constituent at a single sample location.

Questions and Comments

- What does the average represent, particularly in relation to "non-detect" results and/or "zero"?
 - Response: If one of the sampling points results in a zero as the data point, the average represents the result value of the non-detect level.
- Is there a standard blending percentage?
 - Response: It fluctuates.
- Does the new monitoring and reporting program provide a blending ratio for each month? Is flow data included?
 - Response: Not yet. We can send instructions about the data that is available.
- Is there latitudinal and longitudinal data included for the sample sites?
 - Response: No. The sample location data includes the report title, order number, operator, water type, and sample location.
 - Follow up: Can you make a look up table that has the lat-long data for the sample locations? Lat-long and flow data would be really helpful. Will-might be a job for a student to add in the flow data.

- Response: We can look into making that. Flow data will take some time to add to the table; that information is in monitoring reports that are submitted with the Waste Discharge Requirements.

Mercury & NORMs Data Update

Rebecca Asami, Water Board, gave an update on the historical data on mercury and NORMs. The Water Board will present on this data at the fall public meeting as well, as was requested at the June 2017 public meeting.

With regard to mercury, the discharge quality, location, and flow path has changed over time. Dale Harvey, Water Board, explained that the original data points the public highlighted were coming directly from Station 36. Now the water is diluted through Reservoir B. The District (Cawelo) adds surface water and groundwater—everything is now blended. The historic detects for mercury were from before the flow path changed in 2007; the new discharge path has not resulted in any mercury detects. Prior to 2007, the discharge path went straight into the canal and during those conditions, there were two detect results for mercury (detection levels in micrograms/liter). None of the detects were above the primary maximum contaminant level (MCL). Another discharger in the area is Hathaway, which sends produced water to a pond and then blends primarily with pumped groundwater, and other water from Kern Tulare Water District. Hathaway has not been sampled for mercury for very long. The results so far have been non-detect for mercury. With regard to NORMs, according to data there is no uranium being detected from Chevron. There is some data that shows uranium in Reservoir B, but nothing above an MCL. For gross alpha and gross beta, there is some detection at very low levels and does not raise the Water Board's concern.

Discussion

Dr. Stringfellow commented that mercury was not on the analytical list for the fruit because his team was not sure about the lab's capacity to analyze for mercury. The Panel and Water Board still need to think about whether we need to include mercury on the analyte list.

Mr. Harvey commented that from a surface water management practices perspective, there is mercury everywhere and it is hard to get accurate mercury results. It is important to be careful about sampling methodology so as not to contaminate samples.

Panel members commented that based on the data so far, there is not a lot of mercury in the produced water. Also, the Panel is interested in methyl mercury, which we do not find in fruit, and there are multiple sources of mercury in the Central Valley which makes analysis difficult.

Dr. Stringfellow and Panel members suggested providing more background information on regular levels of NORMs in California water and emphasized the need to put the data in context for the public. It might be useful to include other water quality standards or database information in the discussion for context. There might be comparable data in other drinking water sources in the Kern County area as well.

Discussion – Water Isotopes Sampling

Dr. Stringfellow proposed the Water Board consider asking the District to allow water isotope analysis be done on the citrus fruit collected in March/April. There are multiple oxygen isotopes and the ratio of those isotopes changes depending on the water source. He explained that theoretically, the stable

isotope lab at Lawrence Berkeley National Laboratories can extract the water from the fruit and assess how much water is likely to come from the different sources (produced water, groundwater, surface water). Currently there is no independent method for validating the information from Cawelo about which fields receive produced water—these measurements could be a tool to validate between control and treated sites. He shared a graph with data characterizing the isotope composition of California produced waters. The data that exists on produced waters indicates that some of the produced water is similar to meteoric water with regard to isotope ratios.

Panel members discussed some of the potential pros and cons of performing water isotope analysis. Panel members present agreed that independent validation would be valuable to the project. One concern was the potential challenge in communicating results to the public—people may not be familiar with isotopes and the process and information could complicate, rather than clarify data results. Water Board staff indicated they would be open to a “phased approach”—first test the water itself and then depending on results, decide whether or not to test the fruit.

Questions and Comments

- Water Board: Most of the water produced in Kern goes through a recycled steam injection process. We would need to know the cost.
- Can the analysis distinguish between groundwater and produced water?
 - Dr. Stringfellow: The method would be to sample the sources and then compare.
 - Mr. Rodgers: The ratio changes—older waters are more enriched with heavier oxygen isotopes. Lighter water is evaporated over time.
- Performing isotope sampling has merit, but the costs need to be considered. We need to make sure we are ready to explain what it means if we were to go to the public with the results.
- Dr. Stringfellow: Isotope studies should be included in an environmental/ecological study.

Closing

Mr. Rodgers thanked the Panel members for their valuable comments and input. Mr. Ceppos adjourned the meeting.