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June 16, 2019

Dear Director Ghilarducci and Director Sobeck:

On June 14, 2019, the California State Water Resources Control Board (SWRCB) issued plumbing testing guidance to persons affected by the Camp Fire. I ask that the SWRCB please retract and revise the guidance as I believe there are critical flaws. For reasons described below and attached, that guidance is not adequately protective of public health. Improved guidance can be issued by considering the implications of plumbing design, operation, materials, sampling, and exposure.

After repeated requests that I have received from those affected by the Camp Fire, my colleagues and I created the enclosed plumbing testing considerations document. We were going to provide it to the Camp Fire Water Task Force before publicly releasing it. Our intent was that you could consider this input from several experts who have been involved in investigating and responding to *building drinking water* contamination incidents in the development of your own guidance. But, CalOES, SWRCB, USEPA, and the health department never responded to my email on June 7 and SWRCB issued their guidance document on June 14.

There are several clear and important differences from what SWRCB made public to what we believe is more appropriate that maximizes protections to public health and is based on our respective experiences investigating and conducting building water testing. For clarity, the 7 individuals who helped to create the attached plumbing testing considerations document are engineering faculty and staff at multiple universities across the U.S. They, like myself, have specialized expertise for building drinking water sampling, chemical analysis, and decontamination. These individuals are accomplished engineers and researchers in this exact domain – which is why I sought out their input for you and citizens affected by the Camp Fire. As you know, I currently lead a national plumbing safety research program at Purdue University (*funded by the USEPA) to help the USEPA and the water and public health sectors better understand plumbing safety* (www.PlumbingSafety.org).

For review, my Purdue University / Manhattan College team volunteered to help county, state, and federal agencies on the Camp Fire Water Task Force conference calls with plumbing testing guidance since February. We offered this again to CalOES while we visited Sacramento, CA in March 2019. I reached out as recent as last week to CalOES, the SWRCB, USEPA, and health department to provide help but received no response.

My concern for the safety and well-being of those impacted by the Camp Fire and the specialized expertise needed to respond has prompted this document. The people affected by the Camp Fire have been through enough and any guidance issued should adequately identify contaminated plumbing and protect public health. Please contact me if you have any questions or want assistance. You can reach me at awhelton@purdue.edu and (765) 494-2160.

Respectfully,
Andrew Whelton, Ph.D.

cc: Jason Blumenfeld, Secretary for Environmental Protection, CalEPA
cc: Director Zeise, Ph.D. CA Officer of Environmental Health Hazard Assessment
cc: Andrew Miller, MD, Health Officer, Butte County Health Department
cc: Ann O'Leary, Chief of Staff, State of California Governor's Office
cc: Michael Stoker, Administrator USEPA Region 9

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The following concerns exist with the SWRCB document entitled "Information to Water Customers Regarding Water Quality in Buildings Located in Areas Damaged by Wildfire (6.14.2019)" and issued publicly June 14, 2019. The experts and I have provided recommendations here and in the attached file.

1. The SWRCB has proposed *"evidence strongly suggests that benzene is an appropriate indicator of the presence or absence of other contaminants that could pose adverse health risks."*

   Recommendation herein: As supported by available evidence, including building water testing data from the Town of Paradise in the Camp Fire area, testing is needed for VOCs other than benzene. This evidence includes:

   - May 2019 indoor water testing from buildings in the Town of Paradise, California indicates that other VOCs can be present *in the absence of benzene* at levels that exceed their State of California regulated maximum contaminant level (MCL) (e.g., methylene chloride) and/or California notification level (e.g., *tert*-butyl alcohol or TBA). To date, it is unknown if the occurrence of these contaminants is or is not associated with the Camp Fire since barely any credible testing has been conducted in affected buildings. However, only testing benzene would have determined this water to meet California drinking water standards, when in fact methylene chloride and TBA exceeded allowable California limits. [Methylene chloride levels have exceeded the California drinking water standard in the Paradise Irrigation District water distribution system after the Camp Fire and City of Santa Rosa water distribution system after the Tubbs Fire.]

   - Evidence from water distribution system testing conducted by the Paradise Irrigation District indicates that other VOCs than benzene have been present in their buried piping system and that the levels of these other VOCs have exceeded their 1-day USEPA health advisory level (e.g., naphthalene), California MCL (e.g., methylene chloride, styrene, vinyl chloride), and California notification level (e.g., TBA). This was noted in a March 11, 2019 letter to the SWRCB Division of Drinking Water: https://engineering.purdue.edu/PlumbingSafety/resources/Opinion-About-Drinking-Water-Safety-2019-03-11.pdf.

   - Evidence from the City of Santa Rosa's water distribution testing revealed TBA exceeded its California notification level in samples where benzene was not detected. This was noted in a March 11, 2019 letter to the SWRCB Division of Drinking Water: https://engineering.purdue.edu/PlumbingSafety/resources/Opinion-About-Drinking-Water-Safety-2019-03-11.pdf.

   - While 8,222 water samples were collected in the City of Santa Rosa's 5.2 mile water distribution system after the Tubbs Fire, limited testing of building plumbing was conducted. Therefore, practically all of the water samples tested by the City of Santa Rosa and being used to assume what's happening in buildings represent the water

quality *in the buried water distribution system*, not plumbing. Previously, Dr. Whelton has recommended that complete reliance on chemical data from the post-fire water distribution system when making decisions related to building plumbing is not advisable due to the differences of the infrastructure and fate of VOCs in plumbing: https://engineering.purdue.edu/PlumbingSafety/resources/Opinion-About-Drinking-Water-Safety-2019-03-11.pdf.

2. The SWRCB has recommended that building owners *"take a cold-water sample at the kitchen faucet, which is typically the primary location where water is obtained for consumption. Note: Do not use a faucet with a filter. Testing at the kitchen faucet should generally provide representative data about the water pipes in the house."*

   Recommendation herein: Due to the complex nature of VOC's adhering to and permeating into and out of residential plastic plumbing components and other materials, possibly to different degrees and in different parts of the plumbing system, it is recommended that *building owners consider testing all outlets where VOC exposures could occur* via ingestion, inhalation, and/or dermal contact. Because of these exposure routes, other outlets including but not limited to hot water taps, bathtub spigots and showerheads should be included in testing.

   More comprehensive testing at outlets throughout the building is necessary to fully characterize exposure risks from VOCs that have contaminated home plumbing.

   - More comprehensive sampling in post-wildfire situations adheres to precedent established by USEPA through their recent guidance to schools and childcare facilities when testing for distribution system derived contaminants, namely lead and copper. The USEPA guidance document clearly states that "schools and child care facilities *should not* use sample results from one outlet to characterize potential lead exposure from all other outlets in their facility. *This approach could miss localized lead problems that would not be identified*" (see bottom of page 31[1]). Problems with VOC contamination in household plumbing may also be highly localized, such that results from one outlet may improperly characterize potential VOC exposure from other outlets in the building.

3. The SWRCB has postulated that *"If your results come back as "non-detect (ND)," "below quantification limit," or less than 1 ug/L, then the water meets the State standard."*

   Recommendation herein: This interpretation fails to consider the dynamic situation in the affected water piping networks. Specifically, this claim is not supported according to a discussion that Dr. Whelton had in May 2019 with USEPA Region 9 which was informed by numerical modeling by USEPA ORD for benzene sorption into and desorption from plastic water pipe. Dr. Whelton was told that if a building owner only follows an 8 hour stagnation period, and there is 0.4 ppb benzene in water after 8 hours for HDPE piping, at 72 hours the level of benzene would be 1.25 ppb. This would exceed California's benzene 1 ppb MCL.

[1] US Environmental Protection Agency, Office of Water. *3Ts for Reducing Lead in Drinking Water in Schools and Child Care Facilities: A Training, Testing, and Taking Action Approach, Revised Manual.* October 2018. Washington, D.C. https://www.epa.gov/sites/production/files/2018-09/documents/final_revised_3ts_manual_508.pdf

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Also noteworthy is that the minimum detection limit for benzene is often 0.5 ppb. Therefore, the individual who found 0.4 ppb would not know benzene was leaching from their plumbing (because they would not be able to detect it). But, with a 72 hour stagnation period they would have discovered the plumbing was contaminated. Any detection of benzene during an 8 hour stagnation between 0.5 ppb to 1.0 ppb would indicate plumbing contamination, that the plumbing, if stagnated longer, may also contain unsafe water. The SWRCB guidance does not consider this. In fact, the SWRCB guidance assumes that if benzene does not exceed 1 ppb after 8 hours, the plumbing is safe, when it may or may not be.
Due to the dynamic processes of chemical desorption and multiple VOCs associated with the wildfire are present, not only benzene, a 72 hour stagnation period is recommended.

4. The basis for the SWRCB guidance is unclear. The citing of an industry trade magazine [*OPFLOW*] often used for marketing commercial products (not a peer-reviewed publication) as the only authoritative source for plumbing sampling seems insufficient. Public health recommendations are best based on the peer-reviewed literature. This provides additional checks on the quality of information provided. Further, a major assumption of the *OPFLOW* commentary is that the contaminant they considered was “nonabsorbing” – a fact that is well-known to be false associated with VOCs and plastic in plumbing post-Camp Fire. The backgrounds of the SWCRB persons who created the guidance and their qualifications in post-disaster building water testing remains undefined.

   Recommendation herein: In the interest of full transparency, we encourage SWRCB to disclose the information and sources being used to justify the recently released guidance. In particular, we urge that you reconsider the recommendations that were derived from this from this non-peer reviewed, industry magazine. We are happy to talk with you more about this and discuss different sources of evidence that could be used to provide more robust guidance to communities affected by the Camp Fire. As I recommended in March to CalOES, SWRCB, USEPA, and the health department, it would benefit people affected by the Camp Fire to have an evidence-based plan for testing plumbing. There are many experts who have been offering support. The Purdue University and Manhattan College contributors to this document again offer their assistance. The additional contributors from the University of Iowa, Virginia Tech, and University of Rhode Island to this document also offer their assistance.