COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

123-TCP Treatment Pilot Project for Domestic Well Households in Northern Monterey County

Appendices

June 2023

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

Appendix A
123-TCP Fact Sheet

1,2,3-Trichloropropane (1,2,3-TCP)

- Legal Limit (Maximum Contaminant Level: MCL): 0.005 µg/L[a]
- Public Health Goal (PHG): 0.0007 µg/L[b]

Common sources of the contaminant in the Central Valley and Central Coast

Most 1,2,3-TCP contamination stems from the extensive application of soil fumigants manufactured by Shell Oil and Dow Chemical Company containing the unnecessary impurity 1,2,3-TCP prior to the 1980s. 1,2,3-TCP has also been used as an industrial solvent, and as a cleaning and degreasing agent.[c] Even though 1,2,3-TCP is no longer being applied to fields as a pesticide ingredient, it is extremely persistent and remains in groundwater a very long time.[d]

Significant health risks of long-term exposure in drinking water[e]

- Cancer

At-risk populations

Communities in agricultural regions (even many urban areas that were former agricultural regions) frequently have 1,2,3-TCP in their groundwater from its historic application as a pesticide byproduct.[f] Communities at locations that manufactured the chemical or near hazardous waste sites where 1,2,3-TCP was improperly stored or disposed, are also at risk.[c]

Pathways of exposure[g]

Exposure can occur through inhalation (usually from steam produced from 1,2,3-TCP contaminated water), ingestion of contaminated water (by drinking, cooking, showering, etc.), or dermal (skin) exposure.

Tips for reducing exposure at home

- Buy bottled water for drinking, cooking, making ice cubes, and brushing teeth.
- Avoid bathing, showering, or washing dishes and produce with hot water that produces excess steam.
- Take cooler temperature showers and limit the length of your showers to minimize exposure.

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1,2,3-TCP References

a. Cal Code of Regulations, "Maximum Contaminant Levels - Organic Chemicals," available at https://www.law.cornell.edu/regulations/california/22-CCR-64444 (last visited June 2023).

b. OEHHA (website), "1,2,3-Trichloropropane," available at https://oehha.ca.gov/chemicals/123-trichloropropane (last visited June 2023).

c. SWRCB (2017), "Groundwater Information Sheet," available at www.waterboards.ca.gov/gama/docs/coc_tcp123.pdf (last visited June 2023).

d. US Environmental Protection Agency(2017), "Technical Fact Sheet – 1,2,3-Trichloropropane (TCP)," available at https://www.epa.gov/sites/production/files/2017-10/documents/ffrrofactsheet_contaminants_tcp_9-15-17_508.pdf (last visited June 2023).

e. California Water Boards (website) "1,2,3, -Trichloropropane (1,2,3 - TCP)," available at www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/123TCP.html (last visited June 2023).

f. Central Coast Regional Water Quality Control Board Irrigated Lands Program, "1,2,3-Trichloropropane (1,2,3-TCP) Health Information," available at https://www.waterboards.ca.gov/centralcoast/water_issues/programs/ilp/docs/123tcp_factsheet_2022.pdf (last visited June 2023).

g. National Toxicology Program, Department of Health and Human Services (2016), "Report on Carcinogens, 14th Edition, 1,2,3-Trichloropropane," available at http://ntp.niehs.nih.gov/ntp/roc/content/profiles/trichloropropane.pdf (last visited June 2023).

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Appendix B
TAC Members and Meeting Minutes

TAC Members and Contributors
Michael Adelman, Stantec Consulting Services, Inc.
Mark Bartson, *(retired)* State Water Board (Division of Drinking Water - DDW, Technical Operations)
Kevin Berryhill, Provost & Pritchard Consulting Group
Paul Boyer, *(retired)* Self-Help Enterprises (SHE)
Guadalupe Gonzalez, (*formerly)* State Water Board (DDW, Northern Engagement Unit)
Kyle Graff, State Water Board (DDW, Monterey District)
Tarrah Henrie, California Water Service
Alex Huang, State Water Board (Division of Financial Assistance)
Brian Kidwell, State Water Board (DDW, Northern Engagement Unit)
Tori Klug, P.E., Stantec Consulting Services, Inc.
Eugune Leung, State Water Board (DDW, Technical Operations)
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Zane Mortenson, (*formerly*) Rural Community Assistance Corporation (RCAC)
Cheryl Sandoval, Monterey County Environmental Health Bureau
Laura Satterlee, SHE
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Allie Sherris, University of Washington
Dave Wallis, RCAC

Additional Participants in and Contributors to TAC Meetings
Tamara Anderson, Central Coast Regional Water Quality Control Board (CCRWQCB)
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123-TCP Treatment Pilot Project for DAC Households in the Northern Monterey County Area
Technical Advisory Committee
October 27, 2020 Meeting Minutes
12:00-2:00 PM

Meeting Format: This meeting took place in the form of an online webinar where participants joined via video and audio. During part of the meeting, participants followed a live powerpoint presentation.

Meeting Minutes Format: The information covered during the presentation as well as the group discussion is captured in these notes. At times, minutes are paraphrased and abbreviated to try to capture the intent of what was said. A recording of the TAC meeting is also available upon request. Some sections of the discussion were rearranged to group similar items together.

Attendance:
Mark Bartson, State Water Board (Division of Drinking Water - DDW, Technical Operations)
Kevin Berryhill, Provost & Pritchard Consulting Group
Brandon Bollinger, Community Water Center (CWC)
Paul Boyer, Self-Help Enterprises (SHE)
Tim Bushman, Culligan QWE Commercial Systems
Craig B. Drizin, Weber, Hayes, and Associates
Kyle Graff, State Water Board (DDW, Monterey District)
Daisy Gonzalez, CWC
Guadalupe Gonzalez, State Water Board (DDW, Northern Engagement Unit)
Tarrah Henrie, Corona Environmental Consulting
Mayra Hernandez, CWC
Harrison Hucks, Weber, Hayes, and Associates
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Heather Lukacs, CWC
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David Okita, CWC
Laura Satterlee, SHE
Allie Sherris, Stanford University
Cecilia Vela, SHE
Dave Wallis, RCAC

I. Introduction

Heather from Community Water Center (CWC) welcomed all attendees to the first TAC meeting for the 123-TCP Point of Entry (POE) Treatment Pilot Project and reiterated that each TAC member was invited because they are a regulatory and/or technical expert and that all input is important and will support this project being a success. Each attendee introduced themselves and shared what inspires them about this project. Many attendees acknowledged a personal connection to this work, shared their experiences related to 123-TCP treatment and device registration, recognized the scale of the problem statewide, and shared interest in working together on collaborative, cost-effective solutions. Attendees also discussed an awareness of the technical challenges related to 123-TCP treatment for private wells and the importance of this project in identifying actual costs of 123-TCP POE treatment for domestic wells.

Today's Meeting: Heather reviewed the agenda, TAC member list, key CWC staff working on this project, and emphasized the goal of the meeting which is to share project updates and to engage the TAC in the design and implementation of the first pilot treatment system. Our goal is for this project to inform state-wide efforts to provide safe drinking water for all Californians specific to 123-TCP.

II. CWC Background & Motivation for this Project

CWC is a Californai based non-profit organization with offices in Visalia, Watsonville, and Sacramento. CWC was co-founded by Susana De Anda who is CWC's executive director. CWC has been building the movement for water justice in California alongside impacted community members and many other organizations and agency partners (including many meeting attendees) for more just and sustainable water policies and projects for over 13 years. CWC's vision is that all Californians have access to safe and affordable drinking water. CWC's mission is to act as a catalyst for community driven solutions through organizing, education, and advocacy.

CWC's Executive Director, Susana, facilitates the AGUA coalition which currently includes members from 26 impacted communities and 12 non-profit organizations working for safe and affordable drinking water for the San Joaquin Valley. AGUA is an acronym in Spanish which stands for the Association of People United for Water. AGUA is in the process of expanding to include members from the Central Coast.

Heather shared a map showing the location of public water systems serving over 1 Million people impacted by unsafe drinking water in California. This map does not include systems serving less than 15 households or those dependent on private wells like those in this project. CWC works in environmental justice communities where drinking water contamination impacts low-income populations in the San Joaquin Valley and Central Coast.

CWC also engages in advocacy with community partners and other organizations, and supported the Human Right to Water Law (2012) and the Safe and Affordable Drinking Water Fund (2019). CWC experience with point-of-use treatment pilot projects in Kern County (schools, arsenic, project led by RCAC) and Tulare County (residential, nitrate, project with SHE).

Mayra from CWC then shared CWC's approach to community organizing which led to the development of this project. CWC started organizing in the area north of Moss Landing in north Monterey County because of known nitrate contamination. By connecting residents to the Central Coast Water Board's well testing program, CWC learned that 11 of the 17 wells tested had high levels of both 123-TCP and nitrate. CWC supported community members in forming a community-based organization - *El Comité Para Tener Agua Sana Limpia Y Económica* (*El Comité)* or the *Committee for Safe, Clean, and Affordable Drinking Water* - to advocate for both interim and long-term drinking water solutions. They were successful in securing a grant for bottled water delivery for their community in May 2019. Community members' concerns around exposure to 123-TCP while showering led to this project being a priority for El Comité and CWC's involvement.

In 2021, CWC will also be conducting an alternatives analysis to explore long-term solution options for households in the area north of Moss Landing (e.g. consolidation, treatment, or new groundwater source). This 123-TCP Treatment Pilot Project will inform the cost estimates for the treatment alternative in the alternatives analysis, and will provide an interim solution through July 2023 as long-term solutions are being developed.

Next, Heather shared CWC's approach and recommendations regarding point-of-use (POU) and POE treatment. CWC does not endorse particular technologies or companies and relies on State Water Board guidance and certification for residential treatment systems.[1] POU/ POE Treatment Regulations in California for public water systems have many requirements including a performance indicator device, monthly monitoring (on a rotating basis), and a maintenance plan.[2] CWC reinforces state regulations and guidance in communities - for example, we support community education and understanding that residential treatment systems are certified to remove specific contaminants. CWC recommends POE treatment for contaminants - like 123-TCP - where there are health risks due to inhalation of steam or dermal exposure.

For private domestic wells, where there is limited source water data and/or no management structure, CWC recommends the following:

- *Test source water for multiple contaminants* - CWC learned about the 123-TCP in this area because of the well testing program for multiple contaminants and also just recently learned of a well that also has perchlorate contamination during the site assessments.
- *State funding for a master contract for operation, maintenance, and monitoring* - it can be difficult to ensure POU/POE devices continue to function properly on unregulated drinking water sources.
- *Follow draft Monterey County POU/POE treatment ordinance*, which was based on State regulations and applies to wells serving 2-14 connections

[1] https://www.waterboards.ca.gov/drinking_water/certlic/device/watertreatmentdevices.html
[2] https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/regulations/

CWC has not able to recommend state-certified devices ("off-the-shelf" devices) under certain circumstances, including:

- Bacteria is present
- More than one contaminant present
- High levels of nitrate (greater than State's certification/registration limit)[3]
- No certified devices for 123-TCP
- No performance indicator device

CWC recognizes the work by State Water Board staff, including some on this call, to address these challenges to POU/POE treatment of domestic wells.

CWC uses evaluation criteria related to the Human Right to Water Law to evaluate interim solutions like POE/POU including water safety, affordability, accessibility, and adequacy. CWC prioritizes public health and seeks solutions that ensure safe water with good operation, maintenance, and monitoring that does not put the burden of determining whether water is safe on local residents. This project was motivated by the community need and designed to address some of the challenges to POU/POE treatment of domestic wells.

III. Project Overview

Heather then presented an overview of information shared in advance of this meeting in the "Project Overview for Technical Advisory Committee: 123-TCP Treatment Pilot Project for DAC Households in the Northern Monterey County Area (October 21, 2020)." This overview is provided as an attachment to these meeting minutes.

Project Goals

- To effectively treat 123-TCP to levels below the Maximum Contaminant Level and reduce exposure to 123-TCP for all project participants.
- To provide transparent documentation of costs, outcomes and lessons learned to inform state-wide efforts to provide safe drinking water for all Californians specific to 123-TCP.

Heather explained that this pilot project is only addressing 123-TCP contamination at the point-of-entry (POE). It is not addressing additional contaminants like nitrate that may be present. The project findings will be relevant for the following scenarios:

1) Public water systems that only have 123-TCP (over 500,000 people statewide are in this category),
2) Private domestic wells that only have 123-TCP,
3) Private domestic wells with 123-TCP plus POU treatment for an additional contaminant with a state certified device (e.g. If the co-contaminant is nitrate at levels lower than 20

[3] The California State Water Board registers devices for nitrate treatment at levels less than 108 mg/L of nitrate (measured as NO3), or 24 mg/L nitrate (measured as N). There are currently no devices registered to remove nitrate at higher levels.
https://www.waterboards.ca.gov/drinking_water/certlic/device/watertreatmentdevices.html

mg/L nitrate as N, then the 123-TCP POE system could be complemented by a POU treatment system for nitrate),

4) Private domestic wells with both 123-TCP and another contaminant with no state certified POU device or when nitrate levels are greater than 20 mg/L, the interim solution would be POE for 123-TCP and bottled water for all consumptive uses. This is the case for many of the wells that are candidates for this project.

Heather then reviewed slides with the location and water quality data for private domestic wells that are candidates for this study. See table and maps in Project Overview (Pgs 5 and 6). Wells that are candidates for this study have a range of 123-TCP levels ranging from 0.007 ug/L to 0.165 ug/L (with the Maximum Contaminant Level of 0.005 ug/L).

Project tasks and timeline were briefly discussed including an emphasis on the role of the TAC in advising on the design and implementation of the study and also sharing findings of the study with a wider audience. TAC meetings will be held throughout the project to receive feedback at key project stages. Weber Hayes and Associates has been contracted to complete the first phase of this project which includes site assessments and the installation of one treatment system this Fall.

Questions and Answers on Project Overview

Alex Huang: Many of the wells shown on the map are currently covered under a bottled water agreement with the State Water Board currently managed by Pajaro Sunny Mesa Community Services District. Do you know if 123-TCP is the only contaminant?

Heather Lukacs: No, for all wells located in the Moss Landing area covered by that grant, they also have nitrate contamination as well as Total Dissolved Solids. See Table: Private Domestic Wells with High 123-TCP in the Pilot Project Area (Project Overview, Page 6). All households that could potentially be part of this project are already receiving bottled water through state grants. This project will focus on the 123-TCP contamination and dermal and inhalation exposure.

Tori Klug: Helpful to see paired interim solutions for bottled water and point-of-entry 123-TCP treatment. How will this study inform the alternatives analysis of long-term solution options?

Heather: POE/POU treatment will be one of the alternatives which will be considered in the alternatives analysis. This pilot project will inform the costs used for this alternative in the alternatives analysis. Current Monterey County regulations for state and local small water systems do not allow POE/POU treatment as a strategy to come into compliance. The State Water Board has advised us to include POE/POU as an alternative. CWC views the 123-TCP treatment pilot project as an interim solution. However, for some households that are part of this project, there may be no other long-term solution options so POE/POU could become the default long-term solution.

IV. Project Updates

Heather (CWC) provided project updates and community considerations from conducting site assessments with Weber, Hayes, and Associates and also from conversations with property owners and residents in the project area.

Heather shared a photo of a cracked well seal at a potential pilot project location where the well also tested positive for total coliform bacteria. This well was one of the three wells where site assessments have been completed. In addition, at least one potential project participant does not have access to the well on their property (they own the land and lease it to a grower that restricts access to the well). Property owners have also raised questions and concerns regarding possible property modifications, the size and appearance of the treatment systems, and have requested to have the option to uninstall the system at the end of the project if they are unable to afford operation and maintenance costs. Another project finding so far is that some households will require additional plumbing in order to separate water used indoors from water used outdoors (some houses are plumbed such that irrigation/outdoor water first enters the household). This may result in an additional project cost.

Questions and Answers on Project Updates

Could POU systems for additional contaminants be tested as part of an add-on to this project?

<u>Summary</u>: Eugene Leung inquired into the possibility of exploring POU treatment of additional contaminants as an add-on to this pilot project for 123-TCP. The TAC discussed different strategies and examples of other pilot projects that address nitrate contamination at high levels and also pros and cons of anion exchange for nitrate treatment. Given technology and budget limitations, this pilot project is focused on point-of-entry treatment for TCP only. CWC is open to exploring funding opportunities for add-ons to this pilot project.

Eugene Leung: Would it be possible, as part of the pilot, to install a Point-of-Entry (POU) treatment system with a booster pump to see how well it works for other contaminants in the source water? It would be helpful to get data on POU treatment system performance with real well water like what was presented earlier and to not only focus on 123-TCP. Units could be run for a month or so at one site and then moved from site to site. The goal would be to test the POU system for data gathering purposes not as a solution (the POU treated water would not be used for drinking). It's a golden opportunity to broaden the scope of solutions available [for those reliant on private wells]. The pilot project offers a rare opportunity to use real groundwater that has TCP to see how well POU systems are able to reduce other contaminants on household level. It may motivate manufacturers to do something new.

Heather: We did receive quotes during the proposal phase of this project to include nitrate treatment but it was determined to be beyond the scope of this project due to the cost and extremely high levels of nitrate (more than 6 times the Maximum Contaminant Level). We are open for a follow-up discussion on this topic and to exploring potential funding opportunities.

Under-the-sink RO pilot project for high nitrate well source water in Monterey County

Tim Bushman: Culligan piloted an under-the-sink RO system (registered by the State of California) in south Monterey County on source water with 45 ppm nitrate as nitrogen.[4] This system had a booster pump and permeate pump (that is an energy recovery system that decreases back pressure) and was very successful. We used the booster pump because every house has different pressures and pressure determines rejection factor. Monterey County monitored and approved this pilot system with a booster pump and permeate pump. The system includes a pre and post TDS meter, faucet monitor, rejection monitor, and a totalizing meter. These are all add-ons to the Culligan system.

Need for more research on scalable, standard systems certified through NSF
Eugene Leung: For broader, more scalable applications, the goal is to use a standard package system that is certified through NSF standards for high nitrate so that we do not have to custom engineering solutions for each site. Regarding a POU nitrate system that may be done in tandem with a POE for 123 TCP, there are two questions that we need to answer:

- What the best you can get with a standard booster pump setup?
- How much water is wasted during RO treatment? Use a totalizer to determine. If there is too much water wasted, a well could run out of water.

Anion exchange for nitrate treatment of private wells (in addition to GAC for 123-TCP)
Tori Klug: Did you consider using anion exchange for nitrate removal at the same point of entry as the GAC?

Tim Bushman: For anion exchange, TDS has a big effect on capacity and the bleed of nitrates. The amount of sulfates, a competing ion, and the percentage of sulfates compared to nitrate, also influences treatment capacity. In the previous slide, it indicates high levels of sulphate as compared to nitrate. Typically, we give the sulfate and nitrate data to chemical engineers at the media manufacturers who can give us projections for nitrate leakage through the system, capacity, salt dosage, and wastewater. There are times when nitrate-selective anion exchange is not feasible because capacity is too low or dosage of salt is too high (in order to get low leakages). It does generate less waste than an RO system would and at a lower capital cost for whole house systems, but there are limitations to it.

Eugene Leung: Another problem with anion exchange, is that shallow domestic wells have nitrate levels that fluctuate during the year. It is really difficult to determine treatment capacity because having an online nitrate analyzer is cost prohibitive ($16K minimum). Ion Exchange is cost prohibitive because of unpredictability and the potential of providing a false sense of security. Using POU RO is more robust for nitrate if you have a pressure booster. It is a difficult problem.

Heather Lukacs: We did not consider anion exchange or other nitrate treatments for the reasons noted. Because nitrate poses acute public health risk, the complexity of source water in the

[4] The Maximum Contaminant Level (MCL) for Nitrate as Nitrogen (or Nitrate as N) is 10 mg/L. Thus, 45 mg/L nitrogen as N is 4.5 times higher than the MCL for nitrate. Heather confirmed this value with Tim Bushman after the meeting. The source water is 45 ppm nitrate as nitrogen or 200 nitrate as nitrate.

pilot project area, and the lack of state-certified devices for nitrate at this high of level, households in this pilot project area are already receiving bottled water for consumptive uses. The focus of this pilot project is on 123-TCP treatment at the point-of-entry and to address dermal and inhalation exposure risks to public health.

V. Review Draft 123-TCP POE Treatment System Design & Monitoring Plan

Heather reviewed design requirements provided to Weber, Hayes, and Associates for the first pilot system:

- Point of Entry Treatment for 123-TCP only (This system will be used in combination with bottled water delivery, for reasons previously discussed.)
- Must use Best Available Technology for 123-TCP treatment of Granular Activated Carbon, according to CA Drinking Water Regulations (Table 64447.4-A)
- Must use a lead / lag design and have a flow meter and temperature sensor.

Craig Drizin from Weber, Hayes, and Associates shared the diagram of a system designed with Tim Bushman from Culligan Salinas. Craig shared that this design is the probably the best point -of-entry system from the logistical standpoint of installing it and running it. The driving design force was to make it simple. The biggest design question was whether to backwash the filters, and the design team decided not to. Weber, Hayes, and Associates plans to install the system, run the system, and monitor for 123-TCP removal in order to see how long the media lasts and to what extent it matches the protections from the carbon manufacturers. They will also identify any problems with the installation, other questions or issues the property owner or tenant might have, and document observations while operating the system. They think the system can be sized properly to effectively remove 123-TCP, which is the focus of this pilot.

Questions & Answers Related to Draft Treatment System Design

How common is bacterial contamination of private wells in this study area and statewide? How will this study approach the issue of bacterial contamination?

Mark Bartson: You had a statistic in the presentation that 1 out of 3 wells had a positive bacteria test. How many wells have you been able to test? Globally, it would be good to better understand [the prevalence of bacterial contamination of private wells]. We may want to talk about how we are going to approach this issue more broadly. This would be a good topic to discuss this at the next meeting.

Allie Sherris: Followed up on Mark's question, did you find total coliform bacteria or E. coli?

Heather: Good suggestion - we will put this topic on the next agenda. We have sampled three wells so far in this project, with one of them testing positive for total coliform bacteria and all were negative for E.Coli. We should have the complete results before the next TAC meeting in December. We have chosen to install the first treatment system in a location without bacteria contamination. As we do more testing we expect to find more bacterial problems, and we do expect this pilot project to need to address bacteria in some homes. In the Central Valley, Community Water Center has found that ~50% of wells have bacterial problems.[5] When we consider the applicability of this pilot project to statewide issues, it will be important to consider bacteria.

Follow-up:

- *Heather to add discussion of bacteria to next TAC agenda*
- *TAC members to share any information they have related to the incidence of total coliform bacteria in private domestic wells*
- *Mark Bartson will follow-up to see how the State Water Board is taking bacteria into account in their Needs Assessment*

Total Coliform Bacteria Pre-Treatment, Potential Impacts to GAC, and Other Considerations

Eugene Leung: Because influent water quality might be total coliform positive, are there solutions available to make sure the water is bacteriologically safe?

Craig Drizin: The solution would require chlorine or some type of disinfectant. Chlorine would impact absorption in the carbon so we have chosen to start with the first installation at a well that does not have bacterial problems. Total coliform bacteria was found at one well out of three that we have tested so far, and the bacteria was associated with visible damage to the well seal. Although we are not conducting a complete well examination, there is a high likelihood that some wells are not designed to modern well standards which include a 50 foot sanitary seal. At the other two sites where there is no bacteria, the wellhead looks intact and we do not think bacteria will be an issue there. For pilot study, we should look at sites without bacteria issues especially because it is possible the bacteria is a hardware issue and not chronic. If the bacteria is chronic, then that well really needs to be replaced or at least evaluated.

Eugene Leung: Does Culligan have any disinfection systems that could be used downstream of the POE systems?

Tim Bushman: This system was designed assuming no bacteria in the water. Options for bacteria treatment include chlorine, UV sterilization, ozone, and hydrogen peroxide. One problem in using UV sterilization before the GAC system is that you can have issues with scaling that can trigger the system to automatically shut off which would then require a service visit. You could install UV sterilization after the POE system if the source water has low hardness, but the carbon

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[5] Update/correction from CWC after TAC Meeting: In reviewing well testing results from two different CWC studies in the San Joaquin Valley, we found that 48% (15 of 31 wells) tested positive for total coliform bacteria in a 2015/2016 study and 59% (13 of 22 wells) tested positive in another 2019 study. During the TAC meeting, Heather had said she thought the percentage of wells with bacteria problems was closer to 30-40%.
This GAMA study of six CA counties found 26% of private domestic wells were positive for Total Coliform Bacteria:
https://www.waterboards.ca.gov/water_issues/programs/gama/docs/dwprjct_tstng_smmry.pdf

itself can become a breeding ground for the bacteria. Ozone is another option, but it can be expensive. Hydrogen peroxide could be considered as it is not as hard on the carbon filter media as chlorine, and residuals are easier to address. In order to protect the carbon in the GAC, a roughing carbon filter could be added to remove the oxidizer (either chlorine or peroxide) before the 123 TCP treatment system. The oxidizer requires adequate contact time to work. At 10 gpm, a polishing filter with backwash could be used for pre-treatment to extend the carbon life even further. These are ideas that can be discussed to develop a standardized workable solution.

Paul Boyer: Have you ever tested bacteria coming out of GAC filters?

Tim Bushman: For the system previously mentioned in south Monterey County, quarterly or monthly monitoring has shown that there are not any bacteria issues. If bacteria is not coming into the system and the system has been sanitized when it was installed, it should not be an issue. But if bacteria comes in, the granular activated carbon can be a bacteria breeding ground and result in bacteria proliferating. It is important to take into account.

Paul Boyer: Is this one reason why you try not to locate it in sunny areas?

Tim Bushman: We have seen photosynthesis happening in the tank. We use opaque black tanks and try to keep them out of the sun in order to reduce or stop photosynthesis. All components have UV inhibitors in the manufacturing of the plastics, but they are not UV proof. So keeping them out of the weather is also helpful, but the main concern is photosynthesis happening inside the tank.

What are the water system pressures and will there be a pressure drop in the system causing low flow into the house?

Kevin Berryhill: What kinds of pressures do these water systems have? Will there be a pressure drop with the system causing low flow into the house due to pre and post filters and the lead/lag treatment system? Will this affect the functioning of household plumbing?

Harrison Hucks: I conducted the site assessments for the first three sites and reported pressure ranges of approximately 40-60 psi, 50-60 psi, and 35-55 psi for each well.

Tim Bushman: The system was designed with parts in series and in parallel to minimize head loss and reduce maintenance requirements of having to frequently replace pre filters. We expect a 5-7 psi drop in pressure through the system. The pre-filter is 1.5 inches which could accommodate up to 100 gallons[6] per minute of flow. The post-filter was added as a safeguard to capture carbon fines, and is not expected to reduce pressure. The system was designed to get 10 minute empty bed contact time, and the vessels are oversized for 10 gpm (Typically these size vessels could be used for 50-60 gpm if you had large enough inlet and outlet piping).

[6] There was some discussion whether it was 100 gallons or 200 gallons per minute of flow.

Follow-up: Tim will double-check expected pressure drop data and provide an update to the TAC.

Why did you not include the option of backwash in this study? Could the system be designed to have the option of backwash, if needed, in the future? What experience do TAC members have with backwash of systems at the household level?

Kevin Berryhill: Have you used these systems where there is very high hardness like in this area - 1000 mg/l?[7] Why did you not include an option to backwash in the case of scaling and potential pressure loss?

Tim Bushman: We predict that the hardness measured in this pilot project will not be high enough to case scaling and impact the functioning of the GAC systems. We are mostly concerned about organic compounds plugging the carbon. The surface area and the internal pore structure of the carbon determines the capacity of GAC, and organic compounds can reduce the surface area. Backwashing re-exposes the sites by friction. The problem with backwash is that you have liquid waste, and it is difficult to get a treatment system approved in Monterey County if there is liquid waste. Hauling waste is very expensive. This is why we chose good pre-filtration to protect the carbon from organics or any big particles. Backwashing can also potentially stratify the carbon media which could have an effect on the adsorption although a recent study showed that this was not an issue.

Heather Lukacs: We would like to get more perspectives on pros and cons of backwash. This topic has been raised previously by TAC members and others involved in this project. One advantage to backwash is that there is a lot of uncertainty around how these systems will respond to the complex water quality in the wells in this area, and backwash could provide an option to refresh the carbon, which could potentially be helpful. One challenge to the backwash, is that it can be difficult to permit discharges for backwash, if needed, at a private residence with a septic system. We also understand that backwash systems can be designed in a way that does not have a discharge. Backwash systems also require additional space and other requirements, which add to the overall system cost and complexity. Does anyone have experience with installing a backwash system for 123-TCP treatment at an individual household level?

Kevin Berryhill: Do we know what bed life we are anticipating? How long will these treatment systems be online before being backwashed? I agree you do not want to backwash regularly (or voluntarily), but the option to backwash could be added as a contingency measure, something you do only if you have to if you have head loss buildup. Even if the beds will last a long time with all the scaling compounds in the water (hardness, iron, etc), you may want to design to allow backwash as a future option in case you need it.

[7] The Table of Private Domestic Wells with High 123-TCP (Page 5 of the Pilot Project Area in the TAC Pilot Project Overview) shows TDS levels greater than 1000 mg/L for the majority of wells that are candidates for this study.

Tim Bushman: If we backwash, we would need much larger vessels with 40 percent more volume for the media to expand. This would require a much larger footprint for the system. If there is iron in water, we would definitely need to backwash. These systems are designed assuming no iron in water or that the iron has been removed. Iron, manganese, and any heavy organics can all require backwash. That was another consideration in the design of the system. The 10 minute contact time for 10 gpm means you really need a lot of carbon. We chose two parallel lead-lag tanks because otherwise you are dealing with tanks that are difficult to move. Small tanks are much easier to service.

Eugene Leung: Agrees that it is a good idea for the first pilot system to design plumbing with the option to backwash in the future. Concern here is that these are private wells that could have fines that are passing through the pre-filter and cause a head loss in the system. Having the flexibility of backwash can be useful as a diagnostic tool. If there is no backwash capability, you would have to disconnect the system and bring it back to your facility to see what is causing the problem. It would be good to have the flexibility of backwash to discharge into a tank that you could haul away.

Tim Bushman: You can effectively backwash by just reversing the flow direction, could be manually backwashed if needed, but need to increase the vessel size to have more volume for expansion. If the tank is too full of carbon, you will not get as much benefit of backwash unless we can lift it up and expand it, but that can be done. In fact, the first system we did (in the photo in the presentation) was designed to be manually backwashed, if needed.

Eugene Leung: Backwash could be helpful if the heterotrophic plate count or coliform gets really bad and we have to figure out a way to disinfect the media (which could be done using chlorine). I know it can be challenging for larger water systems using continuous GAC treatment - almost all use chlorination downstream of it and they have to mitigate this problem sometimes. So as we scale down for this project, it can be helpful to consider how larger water systems deal with this.

Follow-up with Tarrah Henrie about feedback related to Cal Water's experience with GAC treatment (Eugune asked but Tarrah had already dropped from call.)

Craig Drizin: Weber Hayes' initial plan was to have the backwash option in place and will probably size the tanks accordingly. But the design we looked at that included backwash was much more complicated. We considered: Where are we going to backwash to? What volume or flow rate do we want to backwash with? The anticipated volume and flow rate might be difficult to meet with the existing onsite pumps. We also considered a separate backwash pump and separate tank to recycle the backwash water into. Considering the whole constellation of factors, we believe the no backwash option will be a lot simpler and easier to maintain, if it works. It will also be a lot less expensive to maintain and more cost effective if not more effective overall.

Eugene Leung: I agree that the intent is not a continuous backwash system like a surface water treatment plant that backwashes once a week and then the water is recycled. My suggestion is to have the piping available to occasionally backwash (once every couple of months) if you encounter operational issues and the system clogs. You could bring in a temporary backwash system to push water backwards in the system. The valving should be flexible enough to backwash and have some room for expansion in case you run into trouble.

Tim Bushman: Culligan has a regeneration plant in Salinas where we backwash carbon along with ion exchange media. One option would be to remove the tank for a couple of hours, take to their facility to backwash, and then return it. Another option might be to put carbon in another vessel on site and to wash and replace (put it back in the tanks). It would be a good idea to have that capability.

Kevin Berryhill: If you do have to backwash frequently, it may be a dealbreaker for your average homeowner.

Heather Lukacs: We agree with what has been raised about backwash. When considering the design, we are interested to compare the cost of backwash and no backwash systems including waste disposal costs of backwash. We are also interested to learn more about the estimated time until breakthrough - five years is pretty different from a few months. If frequent maintenance is needed, we agree this may be cost prohibitive to some homeowners.

How do we preserve and lengthen the life of that carbon? If GAC vessel size is larger to allow backwashing, will this result in channeling (e.g. decreased performance for the same volume of carbon)?

Tim Bushman: In a pilot system at a commercial property, we just replaced carbon in the lead tank because of a pressure drop. We had estimated 3 years until media replacement and got only 2 years because of the organics, not the TCP. We designed the pre-filters on this [POE residential treatment] pilot project to be larger than those on the commercial system. Three years would be a good starting point to budget for the media, but that would vary from site to site.

Harrison Hucks: How do we preserve and lengthen the life of that carbon? One way is through backwashing it but it comes with additional costs both short term and long-term versus not backwashing - we save a lot but we will be switching out the carbon more often. How long will the carbon last? 2-3 years is a good estimate, but this pilot project will provide a better idea based upon the TCP concentration and the concentration of other constituents in the source water.

Kevin Berryhill: Do we know the TOC (Total Organic Carbon) of the water being tested? If not, it should be tested before the start of the study.

Follow-up: CWC and Weber Hayes and Associates added TOC to the parameters to be tested during the initial site assessments.

Eugene Leung: You should consider purposefully over sizing some systems and and under sizing other systems for the pilot to determine the right size. I have dealt with treatment systems at schools (these were resin systems not GAC) in which oversizing the system caused in channeling which resulted in a shorter life of the carbon (despite there being more carbon in the system). It is possible that GAC systems could be plagued with the same issue. If the majority of the time you have low flow and then just occasional surges of high flow, it could become very challenging to get a predictable result.

Craig Drizin: Resetting the bed and preventing channelling is a good reason to consider backwashing. One reason we did not consider oversizing was due to potential channelling. We believe the filters have been correctly sized for 10 gpm. We will get data out of this pilot study that is reliable and that will answer these questions.

Harrison Hucks: As an operator, I consider long-term costs. For this pilot, it is important to have the capabilities to backwash, but from a long-term perspective having additional pumps and having additional backwash results in additional costs upfront and additional O&M costs down the road. For the pilot project, it is an important opportunity to have that capability but from a long-term perspective, if this is going to be a viable option for homeowners, we will need to make sure this is a system that is cost effective.

Sampling Protocol Recommendation: Sample at the typical maximum flow rate not at the rate when only the sample tap is being used.

Kevin Berryhill: You can have a highly variable flow through these canisters so if you open up the sample tap, you will get a very small flow rate which will not be representative of when someone is taking a shower and running the dishwasher at the same time. When you collect samples you need to determine what flow rate you would like to see for treated water, and I would suggest that it is something higher than what is coming out of the sample taps.

Craig Drizin: Our plan is to sample at the maximum flow rate. The plan would be to open up a flushing valve or a full size hose bib on the outlet. We will have a flow meter, and we understand a trickle out of a quarter inch sample tap under static head is not a representative sample and we want to sample at the maximum flow rate. We will definitely have that written down so everyone can understand that.

Self-Help Enterprises Pilot Treatment System for 123-TCP POE and Nitrate POU - Success Story

Tami McVay shared a success story from a Self Help Enterprises project in Tulare County. The source water for this system has 123-TCP and also nitrate (39.6 mg/L). After 7 months of working on this well, they found a successful resolution of a major issue they were having. They worked very closely with Culligan R&D. It will be a success for that family and it will not be a burden or cost.

Heather thanked Tami for sharing this example, and also emphasized that SHE's pilot project using POE treatment for 123-TCP and nitrate for POU in the Central Valley informed CWC's seeking funding for this pilot project for 123-TCP POE treatment for households on private wells. CWC would like to continue to learn from SHE and others who are conducting pilot projects.

VI. Meeting Closing & Exit Survey

Heather thanked everyone for attending and for the great discussion and questions, and encouraged everyone to add additional comments and questions in the exit survey. Harrison also thanked everyone for participating and encouraged suggestions in the exit survey related to additional information to include in the site assessments that will be conducting this and next week.

Link to brief Exit Survey: https://forms.gle/vdpRQuZtYfkiWEUJ8 .

Responses from TAC members who responded are attached separately and are available here.

VII. Next Steps

- **Next Meeting: 12/8, 12-2pm**
    - Heather to include an agenda item on bacteria prevalence in private domestic wells and pre-treatment options.
- TAC members to share any information they have related to the incidence of total coliform bacteria in private domestic wells. Mark Bartson will talk with the SAFER team about this issue.
- Heather will follow-up with Eugene about potential add ons to this project related to POU treatment of nitrate at high levels.
- CWC and Weber Hayes and Associates added TOC to the parameters to be tested during the initial site assessments.
- Tim will double-check expected pressure drop data and provide an update to the TAC. (During the meeting, Tim estimated a 5-7 psi drop in pressure through the system.)

COMMUNITY WATER CENTER

EL CENTRO COMUNITARIO POR EL AGUA

Technical Advisory Committee Meeting October 27, 2020: 1,2,3-TCP Point-of-Entry Treatment Pilot Project in North Monterey County Area

“Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.”

- California Assembly Bill (AB) 685 signed into law in 2012

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

Technical Advisory Committee Meeting October 27, 2020: 1,2,3-TCP Point-of-Entry Treatment Pilot Project in North Monterey County Area

Heather Lukacs, Director of Community Solutions



Technical Advisory Committee Meeting Agenda

1. Introductions (Noon-12:20pm)
2. CWC Background & Motivation for this Project (12:20-12:35)
3. Project Overview (12:35-12:50)
4. Project Updates (12:50-1:10)
   - Water Quality Data
   - Community Considerations
5. Review Draft 1,2,3-TCP POE Treatment System Design & Monitoring Plan (1:10-1:40)
6. Schedule Next Meeting
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7. Exit Survey (1:45-1:55)

Attendees at a groundwater workshop at San Jerardo Cooperative in October 2019 hosted by Community Water Center. (We wish we could all gather with you in person, but for now, this TAC will be all virtual.)

Technical Advisory Committee Members 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area		
Name	**Company / Agency / Organization**	**Title / Position**
Mark Bartson, P.E.	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Kevin Berryhill, P.E.	Provost & Pritchard Consulting Group	Principal Engineer
Paul Boyer	Self-Help Enterprises	Program Director - Community Development
Guadalupe Gonzalez	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Kyle Graff	State Water Resources Control Board (DDW)	Northern California Drinking Water Field Operations
Tarrah Henrie	Corona Environmental Consulting	Senior Scientist
Alex Huang, P.G.	State Water Resources Control Board (DFA)	Office of Sustainable Water Solutions Branch
Brian Kidwell, P.E.	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Tori Klug, P.E.	Stantec Consulting Services, Inc.	Project Manager
Eugene Leung	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Edwin B. (Ned) Lofink, P.E.	Axiom Engineers	Senior Project Engineer
Zane Mortenson	Rural Community Assistance Corporation	Rural Development Specialist | Central Coast
Allie Sherris	Stanford University	PhD Candidate, Emmett Interdisc. Prog. in Env & Res.
Dave Wallis	Rural Community Assistance Corporation	Rural Development Specialist III - Environmental

COMMUNITY WATER CENTER
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Heather Lukacs, Director of Community Solutions


David Okita, Senior Fellow


Mayra Hernandez, Community Organizer


Brandon Bollinger, Organizing Manager


Daisy Gonzalez, Community Solutions Coordinator


Ryan Jensen, Community Solutions Senior Manager


Reyna Gabriel-Peralta, Community Organizer


Susana De Anda, E.D. & Co-Founder

Community Water Center Mission

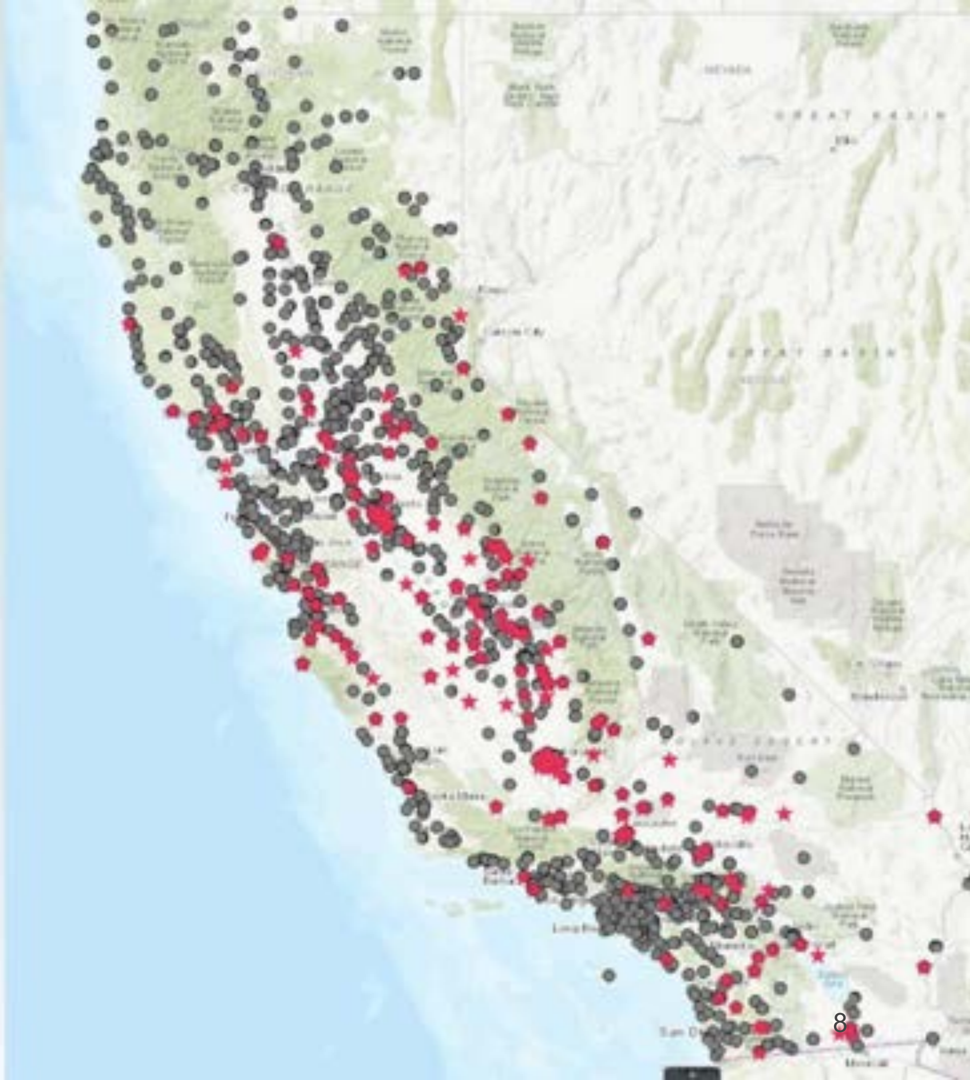
Act as a catalyst for community water solutions through organizing, education and advocacy in California.

Our Vision

Ensure that ALL Californians have access to safe, clean and affordable water.

AGUA Coalition

Over 1M people in CA are impacted by unsafe drinking water each year



Public water systems out of compliance with drinking water standards (as of Feb 2019) are denoted by a star.

Source: Human Right to Water Portal, CA State Water Resources Control Board


Many residents spend up to 10% of their household income on drinking water.
Pacific Institute 2011
Arsenic and nitrate drinking water contamination disproportionately impacts **low-income and Latino communities**
Balazs et al. 2011

Community Water Center

- Act as a catalyst for community-driven drinking water solutions through education, organizing, and advocacy in California
- Human Right to Water Law (2012)
- Safe and Affordable Drinking Water Fund (SB 200, now the SAFER program) - $1.4 billion over 10 years (2019)
- Experience with point-of-use treatment pilot projects in Kern County (schools, arsenic) and Tulare County (residential, nitrate) (2015/2016)
- Point-of-entry residential pilot project for 1,2,3-TCP (2020/2021)

CWC supported the installation and community education for over 70 POU arsenic treatment systems in Arvin, CA in schools, health clinic, parks, and other community locations in 2015 as part of a State Water Resources Control Board funded pilot project. RCAC (Dave Wallis) was lead for this project.

Community-Driven Drinking Water Solutions

1. Started community organizing in area with known contamination
2. Learned about water issues from community members
3. Connected residents to free Central Coast regional water board well testing program.
    - Found very high nitrate, 123-TCP, and TDS.
    - In one area, 75% (13 of 17) wells over MCL
        - Nitrate and 1,2,3-TCP (11)
        - Arsenic and nitrate (1)

CWC has facilitated the testing of ~70 private wells Monterey County and nearby areas through a free well testing program. Photo: Regional Water Board staff, Community Member, CWC staff, and Tetra Tech staff testing well in January 2019.

Community-Driven Drinking Water Solutions

4. Monthly community meetings to discuss results and solutions led to formation of a community-based organization or *El Comité* (Feb. 2019)
5. *El Comité* was successful in advocating for a grant for bottled water delivery for their community (May 2019)
6. Due to continued concern about 1,2,3-TCP exposure, CWC secured funding for this point-of-entry treatment pilot project (July 2020)

Community members of the Community Based Organization, *El Comité para tener agua sana, limpia y económica.* (Feb. 2019)

Community-Driven Drinking Water Solutions

7. CWC will be exploring all long-term solution options through an alternatives analysis for households in the area north of Moss Landing (2021)

Proposed pipeline construction from Local Entity Formation Grant report from several years ago in area north of Moss Landing.

Point-of-use and Point-of-Entry Treatment

CWC recommendations for communities where we work:

- State certified devices for a particular contaminant
- If public water system, must comply with state regulations
    - Performance Indicator Device
    - Monthly Monitoring
    - Maintenance
    - Interim solution
- Use POE if health impacts through inhalation of steam and/or dermal

POU/POE Recommendations for Private Wells

- Test source water for multiple contaminants
- Funding for master contract for O&M and monitoring
- Follow draft Monterey County ordinance (based on State's for wells serving 2-14 households)
- Not able to recommend state-certified device when:
    - Bacteria is present
    - More than one contaminant present
    - High levels of nitrate (greater than certified devices can treat)
    - No certified devices for 1,2,3-TCP
    - No performance indicator device

Community meeting in north Monterey County private well area during which residents learned about state resources for emergency bottled water deliveries (June 2019)

Interim Solutions Evaluation

- Water Safety
  - Need guaranteed safe water
  - Need to know water quality first (before treatment)
  - Community conversations about how to limit exposure
  - Monitoring frequency needs to correspond to health risk posed
  - Need automatic shut-off if water not safe
- Affordability
  - Opportunity cost of impacted residents time
  - Cost estimates should include professional service, not place burden on residents

First day of water delivery in Monterey Co. to each household (July 2019)

Interim Solutions Evaluation

- Accessibility
  - In CA, access should be in one's home.
  - (International development debates about whether access is inside home, yard, community, or within 1 km)
- Adequacy (or sufficiency)
  - Should consider route of exposure for each contaminant
  - Might require two different interim solutions (e.g. bottled water for nitrate, POE for 123-TCP)

Press conference in East Porterville when first household received piped water from Porterville water system.

CWC Approach to Community-Driven Solutions

1. Work directly with impacted residents
2. Evaluate potential solutions based on water safety, accessibility, affordability, and adequacy
3. Prioritize public health

*"Every human being has the right to **safe**, **clean**, **affordable**, and **accessible** water **adequate** for human consumption, cooking, and sanitary purposes."*

AGUA (Association of People United for Water) is comprised of members from 26 impacted communities and 12 non-profit organizations working to secure safe and affordable drinking water in the San Joaquin Valley.

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Any Questions or Comments?

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Project Goals: 1,2,3-TCP POE Treatment Pilot

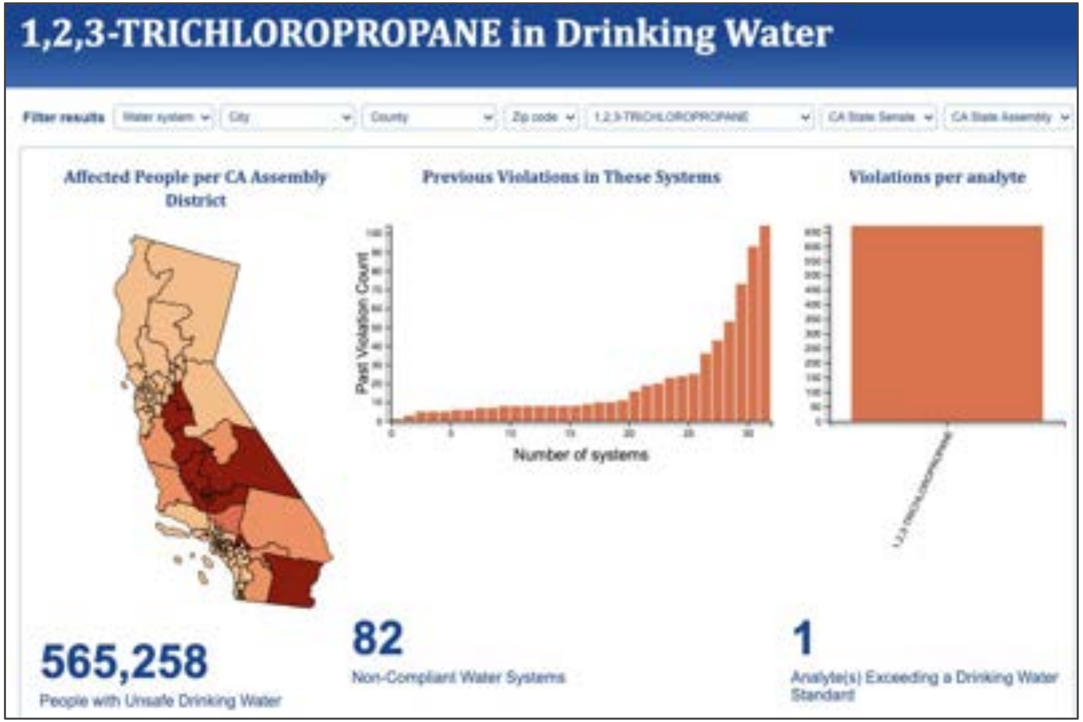
1. To effectively treat 1,2,3-TCP to levels below the Maximum Contaminant Level and reduce exposure to 1,2,3-TCP for all project participants.

Community members provide public comment at the Pajaro Sunny Mesa CSD meeting in May 2019 requesting bottled water service.

Project Goals: 1,2,3-TCP POE Treatment Pilot

1. To effectively treat 1,2,3-TCP to levels below the Maximum Contaminant Level and reduce exposure to 1,2,3-TCP for all project participants.

2. To provide transparent documentation of costs, outcomes and lessons learned to inform state-wide efforts to provide safe drinking water for all Californians specific to 1,2,3-TCP.

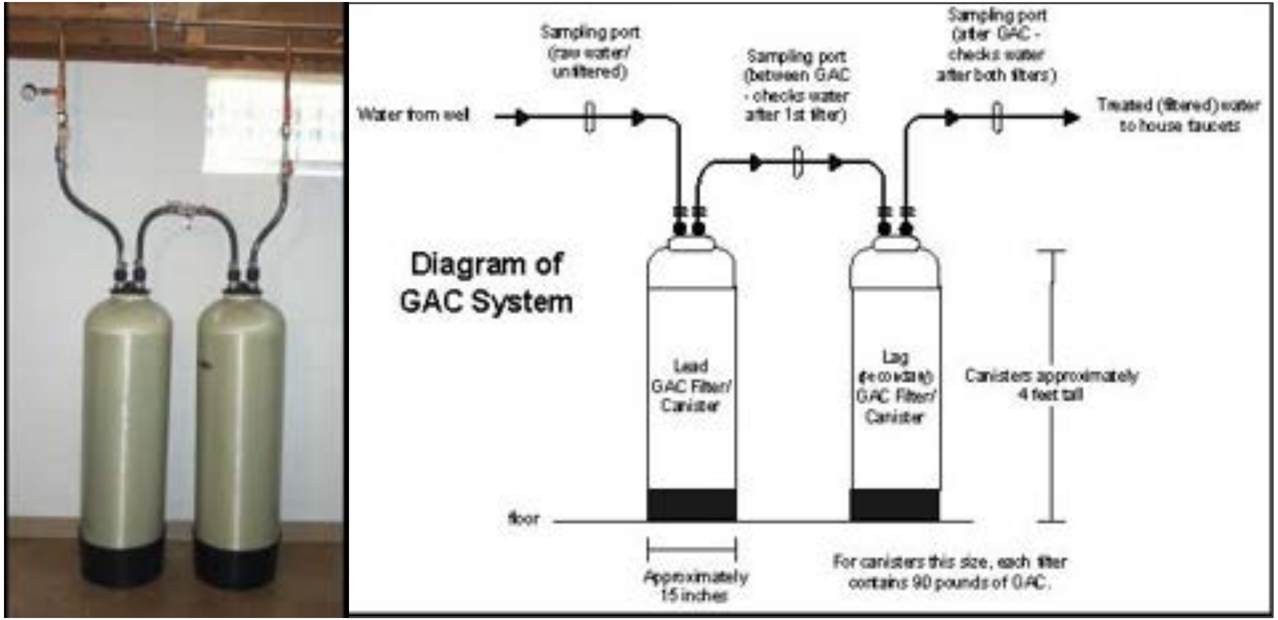


According to the Open Oakland Tool (water.openoakland.org/), 565,258 people are served by community water systems, schools, and daycares with current exceedance/compliance issues related to 1,2,3-TCP. Information based on the State Water Board's Human Right to Water Portal.

Project Goals: 1,2,3-TCP POE Treatment Pilot

Relevance for:

1. Public water systems with only 1,23-TCP
2. Private domestic wells with only 1,2,3-TCP
3. Private domestic wells that have 1,2,3-TCP plus additional contamination:
    - If nitrate < 20 mg/L, add nitrate POU
    - If nitrate > 20 mg/L, add bottled water



Whole-House or Point-of-Entry Granular Activated Carbon Treatment System. Canisters are about 4 ft tall and 15 inches in diameter. Source: Minnesota Department of Health. https://www.health.state.mn.us/communities/environment/hazardous/topics/gac.html#GACuse

Project Goals: 1,2,3-TCP POE Treatment Pilot

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1. Public water systems with only 1,23-TCP
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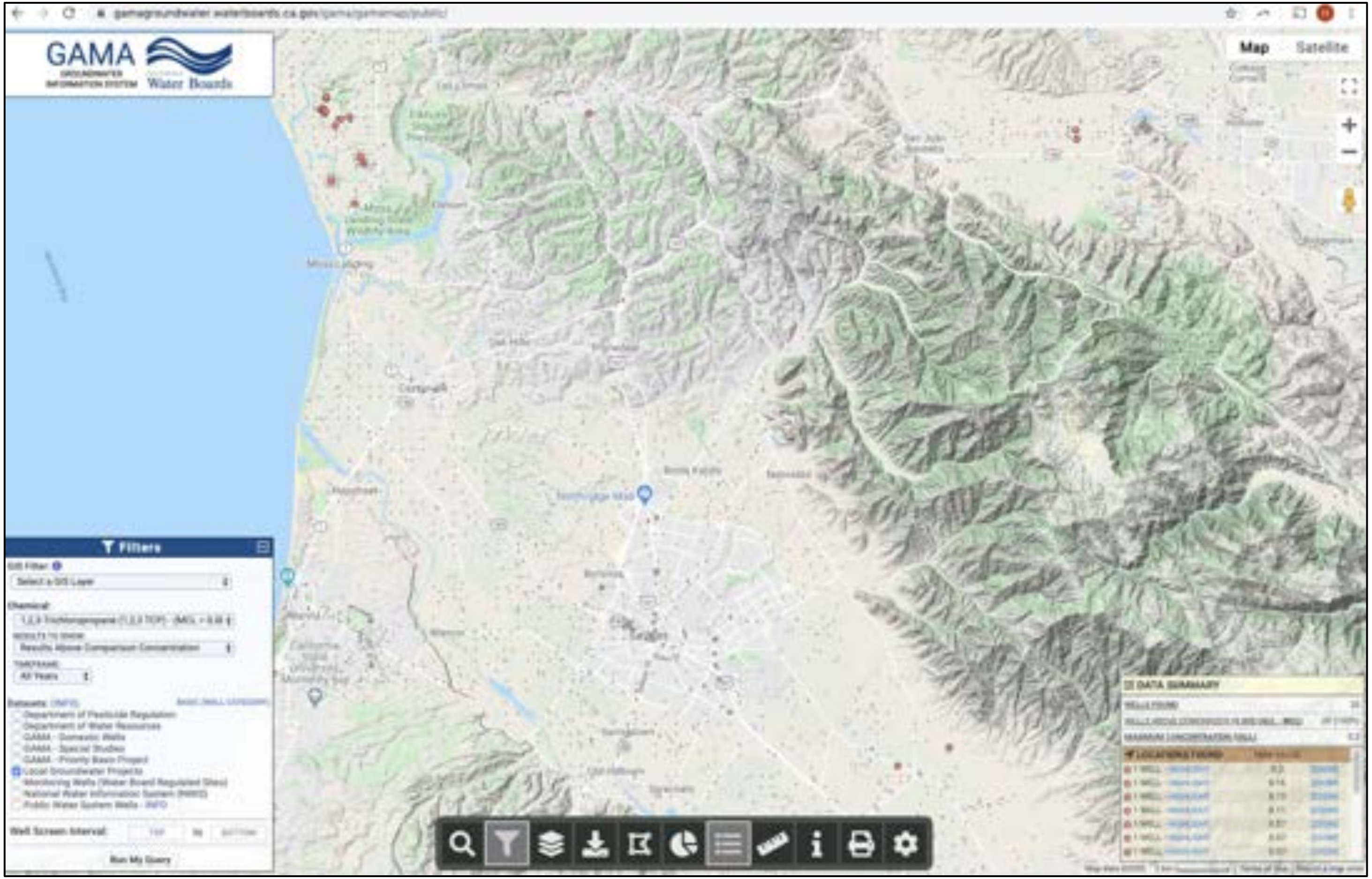
3. **Private domestic wells that have 1,2,3-TCP plus additional contamination:**
    - If nitrate < 20 mg/L, add nitrate POU
    - **If nitrate > 20 mg/L, add bottled water***

+

*POU and POE Nitrate Treatment is beyond this scope of this pilot project due to very high levels of nitrate, acute health risk posed by nitrate (need for frequent monitoring), potential need for off site waste disposal, and overall cost of nitrate treatment

Project Location: 1,2,3-TCP POE Treatment Pilot



Private Domestic Wells with High 1,2,3-TCP

	Sample Date		Location		Arsenic	Hexavalent Chromium	Nitrate (as N)	Perchlorate	Chloride	Sulfate	Total Dissolved Solids (TDS)	1,2,3-TCP
				MCL	10	10	10	6	500	500	1000	0.005
				PHG	0.004	0.02	10	1				0.0007
				Units	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L	mg/L	ug/L
1	12/13/2018	CCDW017	Moss Landing		2.26	5.5	37.7	ND	153	165	1040	0.0642
2	1/22/2019	CCDW042	Moss Landing		2.87	1.28	54.7	ND	191	172	1090	0.022
3	1/22/2019	CCDW043	Moss Landing		3.96	1.39	62.8	ND	194	217	1230	0.0663
4	1/22/2019	CCDW045	Moss Landing		5.51	1.12	60.1	ND	251	256	1390	0.159
5	1/22/2019	CCDW046	Moss Landing		5.48	9.77	67.3	ND	119	262	1130	0.109
6	3/27/2019	CCDW068	Moss Landing		6.41	7.98	51	1.95	177	429	1280	0.0276
7	3/27/2019	CCDW069	Moss Landing		4.32	2.87	56	1.64	432	309	1620	0.017
8	7/30/2019	CCDW130	Salinas		1.67	2.91	66	1.92	101	71.2	870	0.0741
9	7/30/2019	CCDW133	Moss Landing		28.8	ND	8.9	ND	7190	960	14600	0.00742
10	8/1/2019	CCDW135	Moss Landing		5.18	1.67	64.8	3.28	195	211	1120	0.00702
11	8/1/2019	CCDW138	Moss Landing		2.68	5.89	51.4	ND	230	223	1130	0.0471
12	8/15/2019	CCDW144	Moss Landing		2.48	1.35	24.1	1.47	79.1	137	658	0.165
13	10/17/2019	CCDW237	Moss Landing		1.56	1.74	52.6	ND	265	319	1400	0.0303
14	12/10/2019	CCDW276	Moss Landing		1.71	1.2	17.8	0.898	71	129	608	0.0645
15	2/5/2020	CCDW301	San Juan Bautista		2.12	2.82	8.6	ND	235	305	1360	0.0107
16	2/5/2020	CCDW303	San Juan Bautista		1.89	1.15	5.2	ND	264	294	1360	0.0122
17	12/13/2018	CCDW019	Royal Oaks		3.14	7.04	18.8	ND	96.9	103	530	0.0149
18	8/13/2019	CCDW127	Salinas		2.4	0.908	65.7	1.79	102	59.2	784	0.128
19	5/2/2019	SV015	Moss Landing		ND	5.1	50	4.4	290	180	1100	0.07

Project Overview: 1,2,3-TCP POE Treatment Pilot

1. Project Outreach, Education and Enrollment - CWC
2. Site Assessments & First POE Treatment System Installed - Weber, Hayes and Associates
3. Up to 20 Treatment Systems Installed, Monitored, and Maintained until July 2023
4. Lessons Learned and Recommendations - CWC/TAC
5. Sharing Results - CWC/TAC

Community members of the Community Based Organization, *El Comité para tener agua sana, limpia y económica.* (Feb. 2019)

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Questions?

Community members of the Community Based Organization, *El Comité para tener agua sana, limpia y económica.* (Feb. 2019)

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals, motivation, background, and overview. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring plan.
December 2020	Phase 2 scope of work
February 2021	Cost documentation methodology
July 2021	Review monitoring results, Draft recommendations for POE/POU treatment for private wells
July 2022	Review monitoring results
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

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Attendees at a groundwater workshop at San Jerardo Cooperative in October 2019 hosted by Community Water Center. (We wish we could all gather with you in person, but for now, this TAC will be all virtual.)

Project Updates: 1,2,3-TCP POE Treatment Pilot

Community Considerations

- Bacteria found in 1 of 3 wells so far
- Resident does not have access to well
- Questions/concerns from property owners
    - Property modifications
    - Size and appearance
    - Request for option to uninstall system at end of project, if unable to afford continued O&M
- Additional cost of plumbing to separate out indoor water use from irrigation

Cracked well seal at potential pilot project location. Photo by Weber Hayes and Associates.

Project Updates: 1,2,3-TCP POE Treatment Pilot

Design Requirements for First Pilot System

- Point-of-Entry Treatment for 1,2,3-TCP Only
- Must use Best Available Technology for 1,2,3-TCP treatment of Granular Activated Carbon, according to CA Regulations Related to Drinking Water (Table 64447.4-A)
- Lead/Lag Design
- Flow meter
- Temperature sensor

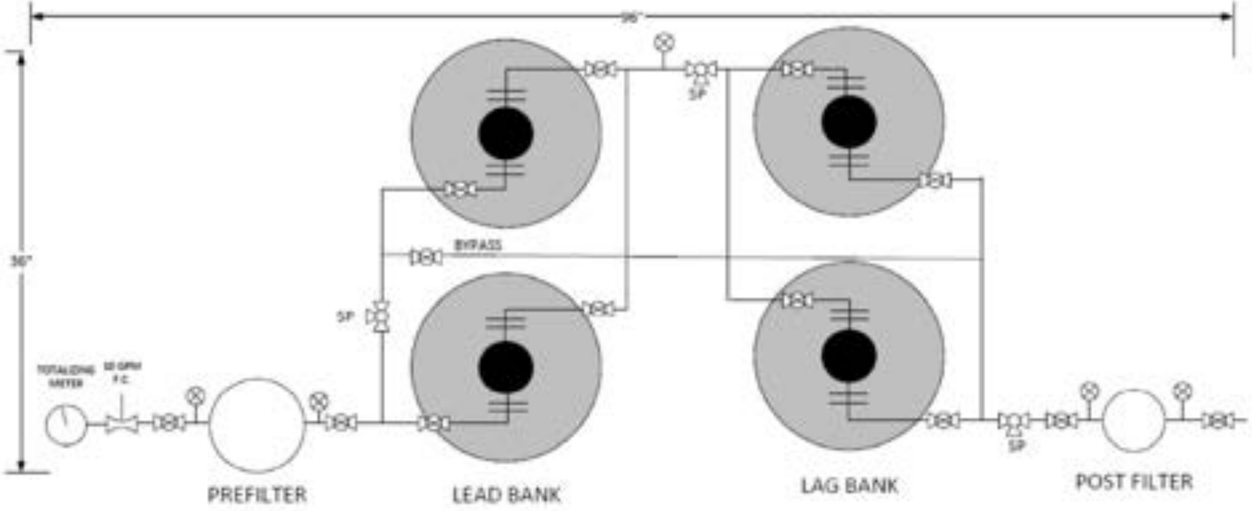
System designed by Culligan

+

Technical Advisory Committee Meeting Agenda

1. Introductions (Noon-12:20pm)
2. CWC Background & Motivation for this Project (12:20-12:35)
3. Project Overview (12:35-12:50)
4. Project Updates (12:50-1:10)
   - Water Quality Data
   - Community Considerations
5. **Review Draft 1,2,3-TCP POE Treatment System Design & Monitoring Plan (1:10-1:40)**
6. Schedule Next Meeting
   - 12/8, 12-1:30pm or 12/9, 3-4:30pm
7. Exit Survey (1:45-1:55)

Attendees at a groundwater workshop at San Jerardo Cooperative in October 2019 hosted by Community Water Center. (We wish we could all gather with you in person, but for now, this TAC will be all virtual.)



Culligan. QWE COMMERCIAL SERVICES	COMMUNITY WATER			
	10 GPM 1,2,3 TCP REDUCTION SYSTEM SCHEMATIC			
625 WEST MARKET ST. SALINAS, CA 93901 831.755.0500	SIZE 8511	FSCM NO	DWG NO 93020.01	REV
	SCALE NONE	TIM BUSHMAN MWSVI	SHEET 85	

Explanation

- Union
- SP Sample Point
- Valve
- Pressure Gauge

Draft schematic produced by Culligan (QWE Commercial Services) based on a 10 GPM Flow Rate

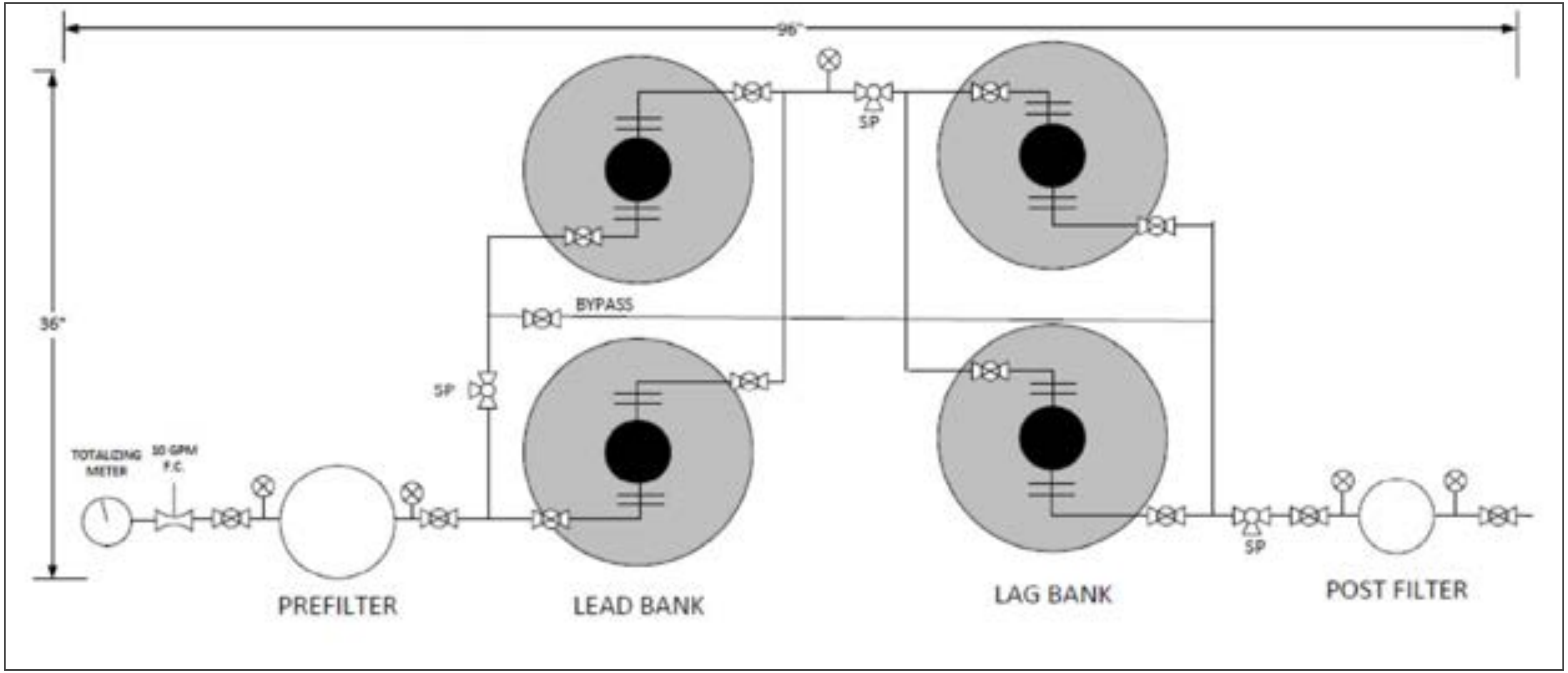
Weber, Hayes & Associates
Hydrogeology and Environmental Engineering

Draft 1,2,3 TCP Treatment System
CWC - North Monterey County
Site: CWC - TAC
Address: Moss Landing, CA

Date: October 2020

Revisions/Notes:

Figure 2
Project 27046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PREFILTER
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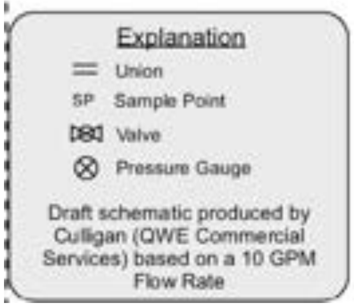
LAG BANK
POST FILTER


Explanation
Union
SP Sample Point
Valve
Pressure Gauge
Draft schematic produced by Culligan (QWE Commercial Services) based on a 10 GPM Flow Rate

Project Updates: 1,2,3-TCP POE Treatment Pilot

Design Requirements for First Pilot System

- Point-of-Entry Treatment for 1,2,3-TCP Only
- Must use Best Available Technology for 1,2,3-TCP treatment of Granular Activated Carbon, according to CA Regulations Related to Drinking Water (Table 64447.4-A).
- Lead/Lag Design
- Flow meter
- Temperature sensor

Design Considerations

- Backwash or no backwash
  - Waste disposal
- Contact Time
- Shed, covering, or locate out of direct sunlight (e.g. Temperature changes could cause rolloff of nitrate)
- Estimated time until breakthrough

Technical Advisory Committee Meeting Agenda

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7. Exit Survey (1:45-1:55)

Attendees at a groundwater workshop at San Jerardo Cooperative in October 2019 hosted by Community Water Center. (We wish we could all gather with you in person, but for now, this TAC will be all virtual.)

Exit Survey

1. Short exit survey (see chat box in zoom)
2. Please spend 5 minutes now jotting down your thoughts.
3. We will share results along with meeting minutes with the TAC

Communitywatercenter.org

Heather.Lukacs@ communitywatercenter.org

L·MNĚ ÅĢ Ì ŦŅKÚŔ ŅŔÚĢŌŌŖÚĢŦŖŦŅŅÚÔŖŦ ÆÄÅ DŖÛŲŅŎŔŖŎŅŲŌŔ ÚŎŅ Ē ŖŦÚŎŅŦŔ Ë ŖŔÚŅŦŅV ÅŖÛŔÚV AŦŅK
Ì ŅŅÖŔŌŅKŎŅŇŮŌŌŖŦV ÅŖR R ŌŌÚŅŅ
ÆŅŅŅR MŅF ŅĄML ML Ë ŅŅÚŌŔÕ Ë ŌŔÛÚŅU
L·MÆŁĚMÆŁ ĢË

Ë ŅŅÚŌŔÕ ĊŖŦR KÚÆ Ë ÖŌŌR ŅŅÚŌŔÕ ÚŖŖÞ TŌŅŅ ŌŔ ÚŎŅ ÔŖŦR ŖÔKŔ ŖŔŌŖŅ Ű ŅMŌŔKŦ Ű ÖŅŦŅ TKŦÚŌŌ TKŔÚU ŦŖŌŔŅŇ ŮŌK ŮŌŅŅR KŔŇ KÛŇŌŖBÆÛŦŌŔÕ TKŦÚŖÔÚŎŅ R ŅŅÚŌŔÕĄ TKŦÚŌŌ TKŔÚU ÔŖŌŌŰ ŅŇ K ŌŌŮŅ TŖŰ ŅŦ TŖŌŔÚ TŦŅUŅŔÚKÚŌŖŔB

Ë ŅŅÚŌŔÕ Ë ŌŔÛÚŅU ĊŖŦR KÚÆ Ë ÖŅ ŌŔÔŖŦR KÚŌŖŔ NŖŮŅŦŅŇ ŇÛŦŌŔÕ ÚŎŅ TŦŅUŅŔÚKÚŌŖŔ KUŰ ŅŌŌKUÚŎŅ ÕŦŖÛT ŇŌŅÛUUŌŖŔ ŌUKTÚŰŦŅŇ ŌŔ ÚŎŅUŅ ŔŖÚŅUB AÚÚŌR ŅUĄR ŌŔÛÚŅUKŦŅ TKŦKTÖŦKUŅŇ KŔŇ KMMŦŅŮŌKÚŅŇ ÚŖ ÚŦV ÚŖ NKTÚŰŦŅ ÚŎŅ ŌŔÚŅŔÚŖÔŰ ÖKÚŰ KULKŌŅBA ŦŅŅŖŦŇŌŔÕ ŖÔÚŎŅ Ì AÅ R ŅŅÚŌŔÕ ŌUKŌŖ KŮKŌŌKMŌŅ ÛTŖŔ ŦŅŢÛŅUÚB I ŖR Ņ UŅŅÚŌŖŔUŖÔÚŎŅ ŇŌŅÛUUŌŖŔ Ű ŅŦŅ ŦŅKŦŦKŔÕŅŇ ÚŖ ÕŦŖÛT UŌŌR ŌŌKŦ ŌŌŅR UÚŖÕŅÚŎŅŦB

AÚŅŔŇKŔŅŅÆ

Ë ŌŌÖKŅŌAŇŅŌŖ KŔĄI ÚKŔÚŅŅ ÅŖŔÚŌŌŌŔÕ I ŅŦŮŌŅŅUĄŇŔŅB
Ë KŦÞ ÅKŦÚUŖŔĄI ÚKÚŅ Ì KÚŅF ÅŖKŦŇ FÆŌŮŌŌŖŔ ŖÔÆŦŌŖÞŌŔÕ Ì KÚŅF ĚÆÆÌ Ą Ì ŅŅÖŔŌŅKŌĖ TŅFKÚŌŖŔUG
ÊŅŮŌŔ ÅŅFFVÖŌŌĄĢŦŖŮŖÚÍ ĢŦŌŅŖKŦŇ ÅŖŔÛŌŌŔÕ Ç ŦŖÛT
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ÊVŌŅ ÇŦKŌŌĄI ÚKÚŅ Ì KÚŅF ÅŖKŦŇ FÆÆÌ ĄË ŖŔÚŅŦŅV ÆŌŌŌŦŌŅG
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ÅŦŌKŔ ÊŌŅŰ ŅŌŌĄI ÚKÚŅ Ì KÚŅF ÅŖKŦŇ FÆÆÌ ĄĒ ŖŦÚŎŅFŔ BŔÕKŌŅR ŅŔÚÍ ŔŌG
Ì ŖŦŌÊŌŌÕĄI ÚKŔÚŅŅ ÅŖŔÛŌŌŔÕ I ŅFŮŌŅŅUĄŇŔŅB
BÛŌŅŔŅ ĚŅÛŔÕĄI ÚKÚŅ Ì KÚŅF ÅŖKŦŇ FÆÆÌ ĄÌ ŅŅÖŔŌŅKŌĖ TŅFKÚŌŖŔUG
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BŇŇŌŅĖ NKR TŖĄI DB
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ĚKÛŦK I KÚŅFŌŅŅĄI DB
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[1] For CWC's complete responses to the TAC comments from the previous meeting, see the linked "CWC Responses to TAC Exit Survey Oct 27 2020 Meeting."

[2] Although site assessments were conducted for 12 sites, water quality results are only presented for 11 sites, since water quality results for one site were not yet available at the time of the TAC meeting.

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Ě ÆĒŖŰ ŔŲŰŦŅĶŔ ŖÔÇ AÅÆÅĶŅŮŅŦŌĶ ŅŖŌŖŔŌŴŌŖÕ Ç AÅÅ Ì ĶŲŮŅ ĶŔŇ ŖŇŖŦÅ

ÆŌŅÛŲŲŌŖŔ ŢÛŅŲŰŌŖŔŲÆ

- *Ě Í ÖĶŰĶŦŅŲŌŅŖ ŌŦŖŊŌĶŌŲŦŅĶŰŖ ŅŔŰŲĶŔŇĶŦŇŲŌŖŦ ŇŖŖ ŅŲŰŌŅŰ ŅŌŲÅ*
- *Ě ĎŰÍ Ĭ ŰŦŅĶŰŖ ŅŔŰÔŅĶŲŌŊŅŰ ŌŌÖ ÖŌÕÖ ÖĶŦŇŔŅŲÅ*
- *Ě Ì ÖŖÛÕÖŰŲŖŔ ŦŅŌĶŰŌŅ ŅŖŲŲĄŅŖŖ ŢŌŅŲŌŴ ĄĶŔŇ ŦŅŌĶŊŌŌŴ ŖÔŇŌŌŌŅŦŅŔŰŅÖŅŖ ŌĶŌŅŌŲŌŖÔŅŅŰŌŖŔ ŖŢŰŌŖŔŲÅ*

Ì ŌŖ ÅÛŲÖŖ ĶŔÆÅĶŲŅŇ ŖŔ ŢĶŲŰŅŲŢŅŦŌŅŔŅŅĄÖŅ ŰŖÛŌŅŔŰŢÛŰĶ Í Ĭ ŰŦŅĶŰŖ ŅŔŰŲŴŲŰŅŖ ŖŔ Ķ Ű ĶŰŅŦ ŲŖÛŦŅŅ Ű ŌŌÖ ŖŮŅŦ Ŀ·Ŀ ÕŦĶŌŖŲŖÔÖĶŦŇŔŅŲŲĪ ŌŌÖ ŰÖĶŰŖ ÛŅÖ ÖĶŦŇŔŅŲŲĄŌŌŴŖÛ ÖĶŮŅ Ķ ŲŅŔŲŖŦ ŖŔ ŰŌŅ Í Ĭ ŲŴŲŰŅŖ ĄŌŌŖ ĶŴ ŊŅ ĶŌĶŦŦ ŌŖÕ ŅŖŔŲĶŔŰŲŌŴ ĶŔŇ ŰŌŌŌŊŅŅŖ Ņ Ķ ŦŅĶŌŌŲŲÛŅŅĪ AŲÔĶŦ ĶŲŇŌŲŌŖÔŅŅŰŌŖÕ ŰŌŌÖ ŅÖŌŖŦŦŌŖŅ ŖŦ ĶŔŴ ŖŲŌŅŌŴŅŦĄŖÛ ŰŌŌŌĶŌŖ ÖĶŮŅ ŖŦÕŅŔŰŲŌŅŴŌŲŰŖŮŅŦÕŔŖ ŅÖŌŖŦŦŌŖĶŰŌŖÕ ŰŌŖĶŰ ŰŌŌŌ ĶŅŅÛŖ ÛŌŌĶŰŅ ŰŌŌÖ ŅŌŖ ŰŌŅ Ç AÅ ĶŔŇ ŢŖŰŅŔŰŌĶŌŴ ŅŌŖÕ ÛŢ ŰŌŅ ŢŖŦŅŲ ĶŔŇ ŇŅŢŌŅŰŅ ŌŌŲŅĶŢĶŅŌŴĪ ĮŦŖÛ Ű ŖŮŌŇ ŰĶŔŰŲ ŖŖ Ņ ŲŴŢŅŖÔŌŌŌŌŅĶŰŌŖŔ ŊŅŖŦŅŅŅ ŰŌŅ Ç AÅĪ

ÊŅŮŌŖ ÅŅŦŦŴÖŌŌŌĖ ÖŅ ŅŖŖ ŢŌŅŲŌŴ ŖÔŌŖŖÞŌŖÕ ĶŰŰŌŌŌŲŊĶŅŮŅŦŌĶ ŢŦŦŖŊŌŅŖ ÖĶŲŲŢŌĶŌŅŇ ŰĶŴ ŖÛŰŖÔ ŅŖŰŦŖŌŌŖ ŢŦŖ ŢŖŦŰŌŖŔ ŰŖ ŰŌŅ Ç AÅ ŢŦŖŦŅŅŲĄŊŖŰŌÖ ŌŦŖŖ Ķ ŦŅÕÛŌĶŰŖŦŴ ŲĶŔŇ ŢŖŌŰŖÛŔŌ ÖĶŰŌŅ

ÆŌŌŖŌŖŖŖŔ ŖÔÆŦŌŖÞŌŖÕ Í ĶŲŦ ŌŲÕŖŌŖÕ ŰŖ ŦŅŢÛŌŅŅ ŌŖŦ ŖŢ ŅŦĶŰŌŖŔ Ķ ŲŴŲŰŅŖ ĶŔŇ Ű ŌŌÖ ŦŅŲŢŅŅŰŌŮŅŅŲ ŰŌŅ ŇŖŰ ŖŰŌŔÕŅŇŖ ŅŌŌŅŅŲŅŲĪ AÕŦŅŅŅŲŢŲŰŌĶŰ ŅŌŌŌŅŦŖ ÖŅŅŦŖŌŖ ŰŌŅ ŅŌŌŅŅŲŲ ŦŖŖŌŖŅ ŰŖ ŢŦŖŰŖŅŦŌŴ ŰŖŌŌÖŇ ŅŌŌŅŅŰĪ ŇŖŌŖŅ ÔŌŌŌ ĶŇŇŖŢŖŦŖŮŌĶŲ Ķ ÖŌŌŖŌŖŅŲŔŰŖŅŦ ĶŲŇŅŲĪ ĶŇŇ Ķ ŅŖŰŖÔŖŲŅŦŖŇŖŴ ŅŖŖŖŲŖŅŅŰ ÖŖŖÛ ĶŇŇ Ķ ŦŖÛÕÖŌŖÕ ÕŌŌŖŅŅ ŖŮŖÛŅŔ ŔŅŅŇŲ ŰŖ ŊŅ ĶŌŅŖ ŰŖ ŊŅŅŰŌŅŲŲ ŰŌÖŅŖŅŇ ŰŌŌŅ ĶŦŅŊŌŖŖ ŇŖŖŖŌŲÕŦŅŅŲ ŖÛŦŖŌŴŲŖŖ ŢŌŅ ÔŌŌ Ņ ĶŲŰŅŖŇŖ ÛŌŌŌ ĶŔ ŖÛŖŲŌŴĪ

Ë ŌŅÖĶŅŲŌĄŇŅŖŖ ĶŔÆAŌŖ ŌŖÛŖ ŇŖŲŅ ŅÖŌŖŦŦŌŖŅ ÛŢŲŰŅĶŔ ŖÔ ŰŌŅ Ç AÅ ŊŅŇĄ ŰŌŅŦŅŅ ŰŌŌŌŊŅĶ ĶŔŇ ĶŔŔÛ ŖŌŖŔŰŖŦ ŖŔŖŦŅŌŴŌŌŌŅŇ ŌŦŖŔ ĶŔŇ Ŗ ĶŔÕĶŔŅŲŅ ŅŖŔŰŦŖŌŌŖŌŲĄ ŲŰŖ ŔŅŅ Ŗ ÞŔŖŔ Ű ŖŖ Ŗ ŖÔ ŰŌŅ ŲŅ ŲŰŅŲ ŲÖĶŮŅ ÔŖŦ ĶŔŇ Ŗ ĶŖÕĶŔŅŲŅĪ

Ì ŌŖ ÆĪ ÖŅŦŅŅ ŌŲĶ ŔŅŲŰ ŅŲŅŦŅ ŢĖŢŖŰŌŌŌŅŅ ŅÖĶŦÕŅ ŇŌŖŖŖŌŅŦ ŢŦŖŅŲŲ ŰŌĶŰŌŖŔÛŰĶ ŢŦŖŮŅŇ ŅŲ Ē Í Ċ ŲŅŔŰ ŰŌĶŰ ŦŅŢŌŅŲŲ ŰŌŅ ŖĶŌŅŅŦŌĶŌ ĶŔŇ ŌŖÕŅŲŰŅŦŖÕ Ķ ŅĖŌŖ ÕŌŅŅ ŖŅŅĶĮŅŅŌŅŖŰŌŖ ÕŖŖŦ ŰŌĶŰŌŖŌŖÕŅŲŅ ÖĶŌŌŅŅŖĶŲŅŖ ŲŅ Ē Í Ċ ŲŖŖŔĄ ĶŔŇ ŅŖŰŖŢÛŌŖŴ ŰŌĶŰ ŰŖÛŌŌ ŲŖŌŖŅ ŰŌŌÛŌŖÛŲŅĪ

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ĐĶŰŌŅŦ ĔÛÞĶŅŲŅÆ ŅŖŰŅŖÔ ŰŌŅ Ŀ·Ŀ ŰŅŲŰŲŲŰŅŲŰŅŇ ŢŦŖŰŌŌŅŅ ÔŦŖ ŅŖŌŌŖŦŅ ŊĶŅŮŅŦŌĶĪ Ė ŔŅ ŰĶŲÖŖŦŖŌŖĶŰŅŇ ĶŔŇ ŦŅŲŖŌŰŅŇ ĶŔŇ ŅĶŖ ŅŖŖĶŌŅ ŔŅŌŖŰĶŲŅŦĪ AŲŲŖ ŅŦŖÕ ŰŅ ŅŖŖŌŖ ŇŖ ŰŌĶŰ ŰŌŌÖ ŰŌŅ ŦŅŖ ĶŔŦŖŦŖÕ ŰŅŲŰŲĄ ŅŖŖŌ ŰŌŅŖ ŲĶŲŖ ŰŌŅ ŲŌŌŇ ŖŦ ĶŦŅ ŖÛ ŰŖŦŦŌŅŇ ŰŌĶŰ ŰŌŅ ŊĶŅŮŅŦŌĶ ŰŖŌŖŅ ŦŅŖŌŦŅÅ

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COMMUNITY WATER CENTER

EL CENTRO COMUNITARIO POR EL AGUA

Technical Advisory Committee Meeting December 8, 2020:
1,2,3-TCP Point-of-Entry Treatment Pilot Project in North Monterey County Area

"Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes."

- California Assembly Bill (AB) 685 signed into law in 2012

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

Technical Advisory Committee Meeting December 8, 2020:
1,2,3-TCP Point-of-Entry Treatment Pilot Project in North Monterey County Area

Heather Lukacs, Director of Community Solutions

Technical Advisory Committee Meeting Agenda

1. TAC Roll Call (Noon-12:10pm)
2. Discussion of TAC Feedback (12:10-12:20)
3. Project Updates and Discussion (12:20-12:45)
4. Backwash Procedures (12:45-1:00)
5. Carbon Sourcing and Disposal (1:00-1:15)
6. Bacteria Pre-Treatment (1:15-1:30)
7. Implementation Recommendations (1:30-1:50)
8. Exit Survey & Next Steps (1:50-2:00)

Technical Advisory Committee Members
1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area

Name	Company / Agency / Organization	Title / Position
Mark Bartson, P.E.	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Kevin Berryhill, P.E.	Provost & Pritchard Consulting Group	Principal Engineer
Paul Boyer	Self-Help Enterprises	Program Director - Community Development
Guadalupe Gonzalez	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Kyle Graff	State Water Resources Control Board (DDW)	Northern California Drinking Water Field Operations
Tarrah Henrie	Corona Environmental Consulting	Senior Scientist
Alex Huang, P.G.	State Water Resources Control Board (DFA)	Office of Sustainable Water Solutions Branch
Brian Kidwell, P.E.	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Tori Klug, P.E.	Stantec Consulting Services, Inc.	Project Manager
Eugene Leung	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Edwin B. (Ned) Lofink, P.E.	Axiom Engineers	Senior Project Engineer
Tami McVay	Self-Help Enterprises	
Zane Mortenson	Rural Community Assistance Corporation	Rural Development Specialist | Central Coast
Laura Satterlee	Self-Help Enterprises	
Allie Sherris	Stanford University	PhD Candidate, Emmett Interdisc. Prog. in Env & Res.
Dave Wallis	Rural Community Assistance Corporation	Rural Development Specialist III - Environmental

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	**Phase 2 scope of work**
February 2021	Cost documentation methodology
July 2021	Review monitoring results, Draft recommendations for POE/POU treatment for private wells
July 2022	Review monitoring results
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

Community Member Motivations (Nov. 2020)

" For my children's health, they can't shower comfortably. It would relieve my stress to get it treated."

"To help this study and help elevate [the need] and make the machines less expensive so that people can afford it."

" I am tired of it, I lived here for the last 40 years, I am 67 years old now, I cannot do anything else to make this right. It's hard! It's hard living here."

"It scares me that its in such high concentrations in my water and the steam."

"Because our health and the health of our kids and grandkids matters greatly to us."

"To try to make things better for everyone and to improve the water system."

*16 households that are candidates for this study completed water use surveys and were asked why they are interested in participating in this study

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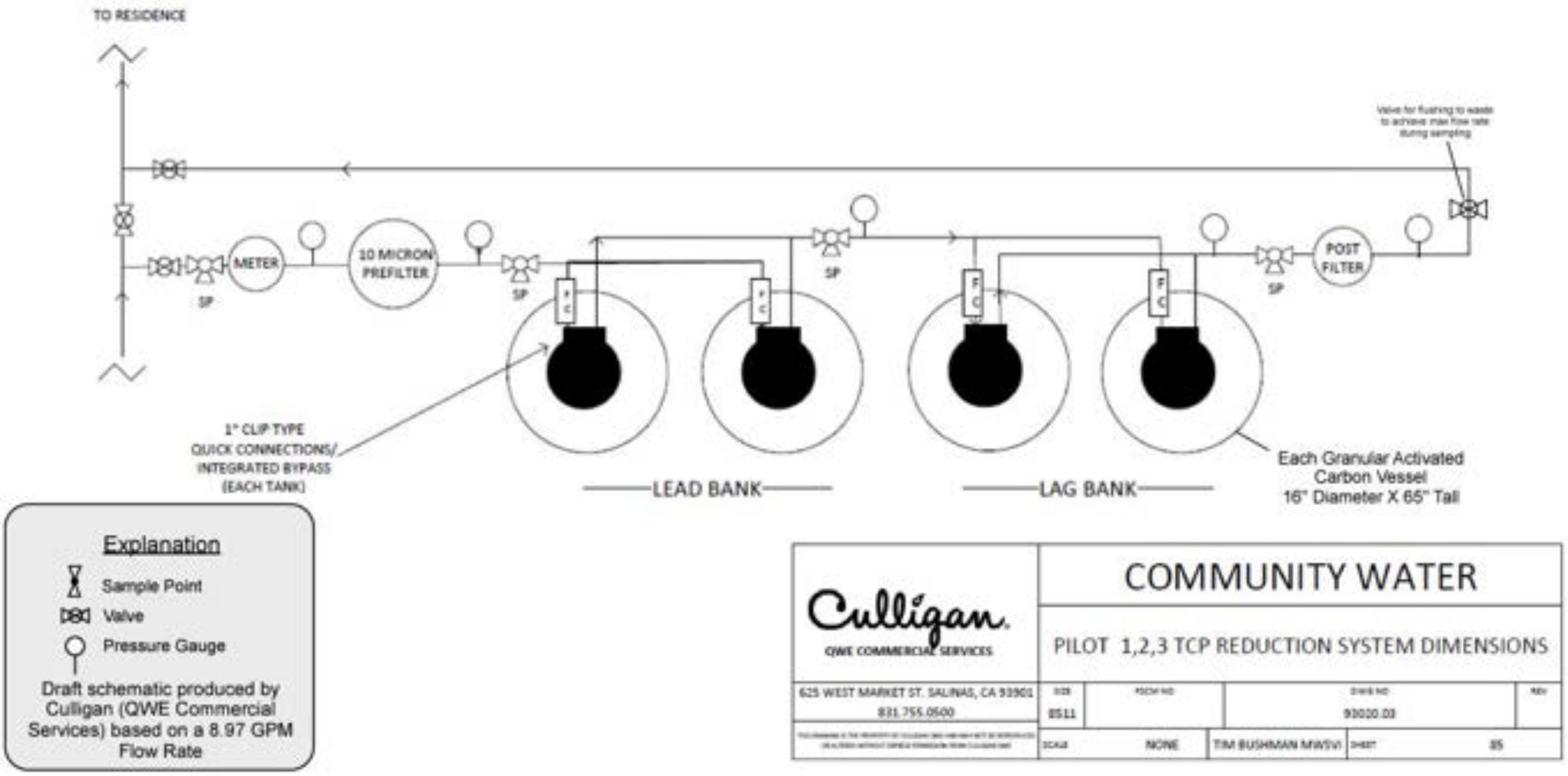
Schematic of First 123-TCP Treatment System



CULLIGAN® NON-BACKWASHING FILTER SYSTEMS

Product Specifications

Benefits
- Simple design with no moving parts
- No backwash or rinse cycles saves water
- Non-electric saves energy
- System options to improve water quality by reducing*: *Chlorine, *Chloramine, *Disinfection Byproducts (DBPs)
- Activated carbon models prolong life of softening resins
- pH Neutralization for acidic water (Upflow models only)

Features
- Different sized models to accommodate a wide range of flow rates
- Bypass Valve included
- Downflow and Upflow system options
- Built-in metal reinforced 1/4" ports for:
  - Sampling Valves
  - Pressure Gauges

Quadra-Hull® Tank System

Fiberglass Tank System

Culligan Non-Backwashing Filter System Models	CULLAR D+	CULLAR S	CENTAUR NDS	CULLNEU	WITHOUT MEDIA
FIBERGLASS TANKS	GPM	GPM	GPM	GPM	Y/N
8" x 44"	3.75	1.75		3.0	Y
9" x 48"	5.5	2.75	1.0	5.0	Y
10" x 54"	7.5	3.75	2.0	7.0	Y
12" x 52"	10.0	5.0	3.0		Y
QUADRA-HULL® TANKS	GPM	GPM	GPM	GPM	Y/N
9" x 48"	5.5	2.75	1.0	5.0	Y
10" x 54"	7.5	3.75	2.0	7.0	Y
12" x 52"	10.0	5.0	3.0		Y
14" x 65"	16.7	8.5	5.0		Y
16" x 65"	22.5	11.0	6.5		Y

123-TCP Treatment System

Tank Volume: *16" D x 65" D*

(49 gallons, 6.55 cubic feet per tank)

Design Flow: 8.97 gpm

Empty Bed Contact Time (EBCT):
10 minute @ 8.97 GPM

Carbon: FILTRASORB® 400

- 100% acid-treated virgin (not regenerated)
- *NSF/ANSI 61 - Drinking Water System Components - Health Effects Standard*

3/4" x 1" Totalizing Water Meter

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123-TCP Treatment System - Carbon Backwash Procedure

- Plan to remove lead tanks, bypass will allow lag tanks to be online during backwash
- Transport to Culligan facility in Salinas
- Media is lifted into backwash funnel, manually backwashed and then returned to tank
- Backwash water is chlorinated
- Estimated cost of process: $475
- Pros: Do not need larger tank, no onsite waste

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Project Updates: 1,2,3-TCP POE Treatment Pilot

Household Selected for First Installation

- 123-TCP Level = 0.017 ug/L
- Well ID: DWMC02
- Located north of Moss Landing
- Community partner
- Member of Committee for Safe, Clean, and Affordable Drinking Water
- Has been working to get a long-term solution for her community for many years, including hosting community meetings outside her home

Community meeting in area north of Moss Landing in pre-COVID times.

Project Updates: 1,2,3-TCP POE Treatment Pilot

TCP Pilot Project Bacteria Results

- 36% (4 of 11) for pilot project tested positive for total coliform bacteria, one for E. Coli
  - Re-tested DWSB02 after disinfection

Well ID	Total Coliform Bacteria	E. Coli
DWMC01	133.4	<1.0
DWMC05	150	2
DWMC09	3.1	<1.0
DWSB02	71.2 (re-test <1.0)	<1.0

Cracked well seal at potential pilot project location. Photo by Weber Hayes and Associates.

Project Updates: 1,2,3-TCP POE Treatment Pilot

TCP Pilot Project Bacteria Results

- 36% (4 of 11) for pilot project tested positive for total coliform bacteria, one for E. Coli
  - Re-tested DWSB02 after disinfection

Other Studies - Positive Total Coliform

- 48% (15 of 31 wells)
  - CWC 2015/2016
- 59% (13 of 22 wells)
  - CWC 2019
- 26% (300 of 1126), 33% in Tulare County
  - GAMA 2002-2011*

*https://www.waterboards.ca.gov/water_issues/programs/gama/docs/dwprjct_tstng_smmry.pdf

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    - GAMA 2002-2011*

*https://www.waterboards.ca.gov/water_issues/programs/gama/docs/dwprjct_tstng_smmry.pdf

Discussion Question: Do TAC members have any experiences or studies to share on percentages of private wells with total coliform bacteria and/or E. Coli?

Cracked well seal at potential pilot project location. Photo by Weber Hayes and Associates.

Project Updates: 1,2,3-TCP POE Treatment Pilot

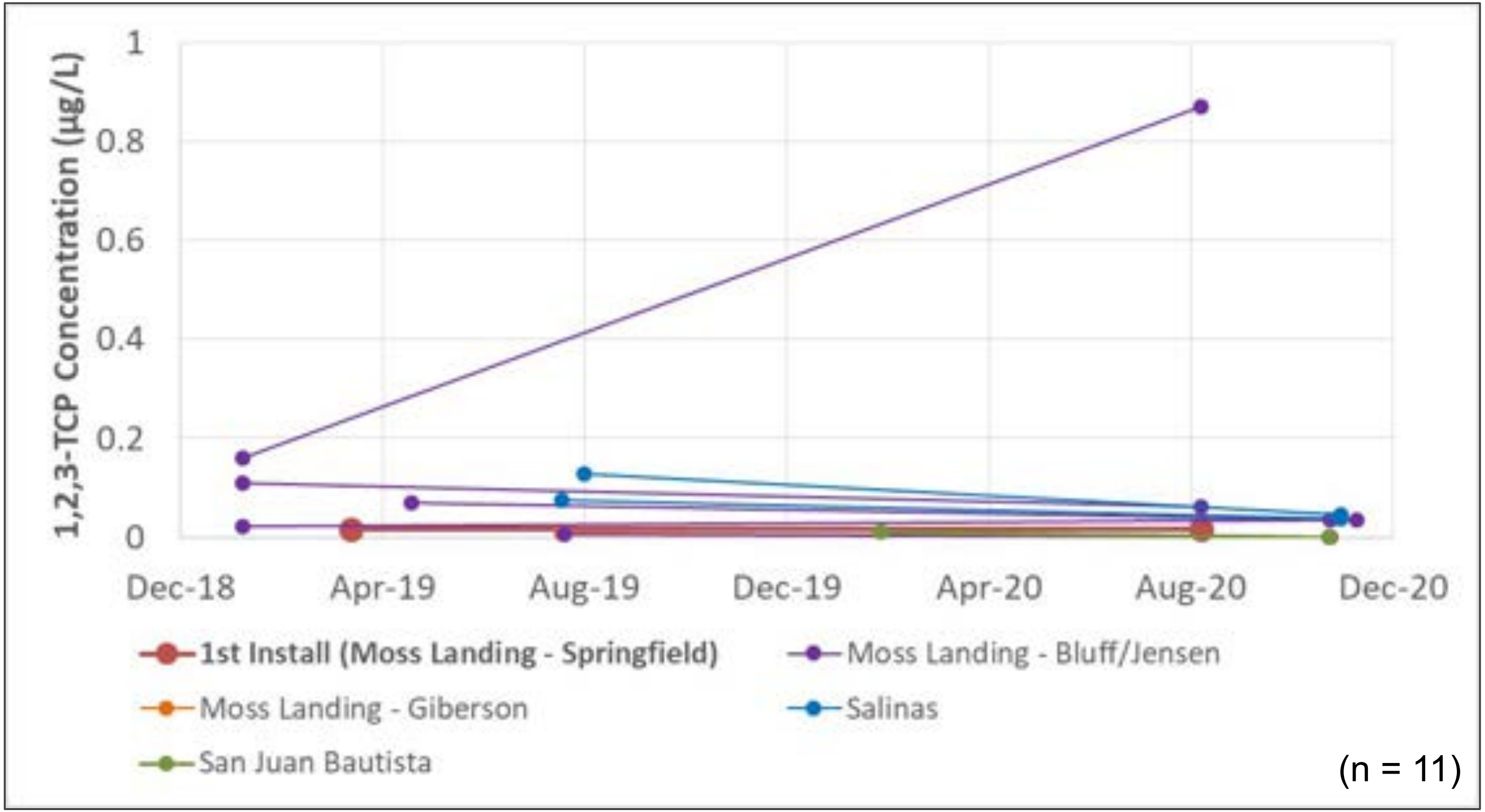
Site Assessment Results

- 12 site assessments were conducted (Aug-Nov 2020) by Weber Hayes and Associates

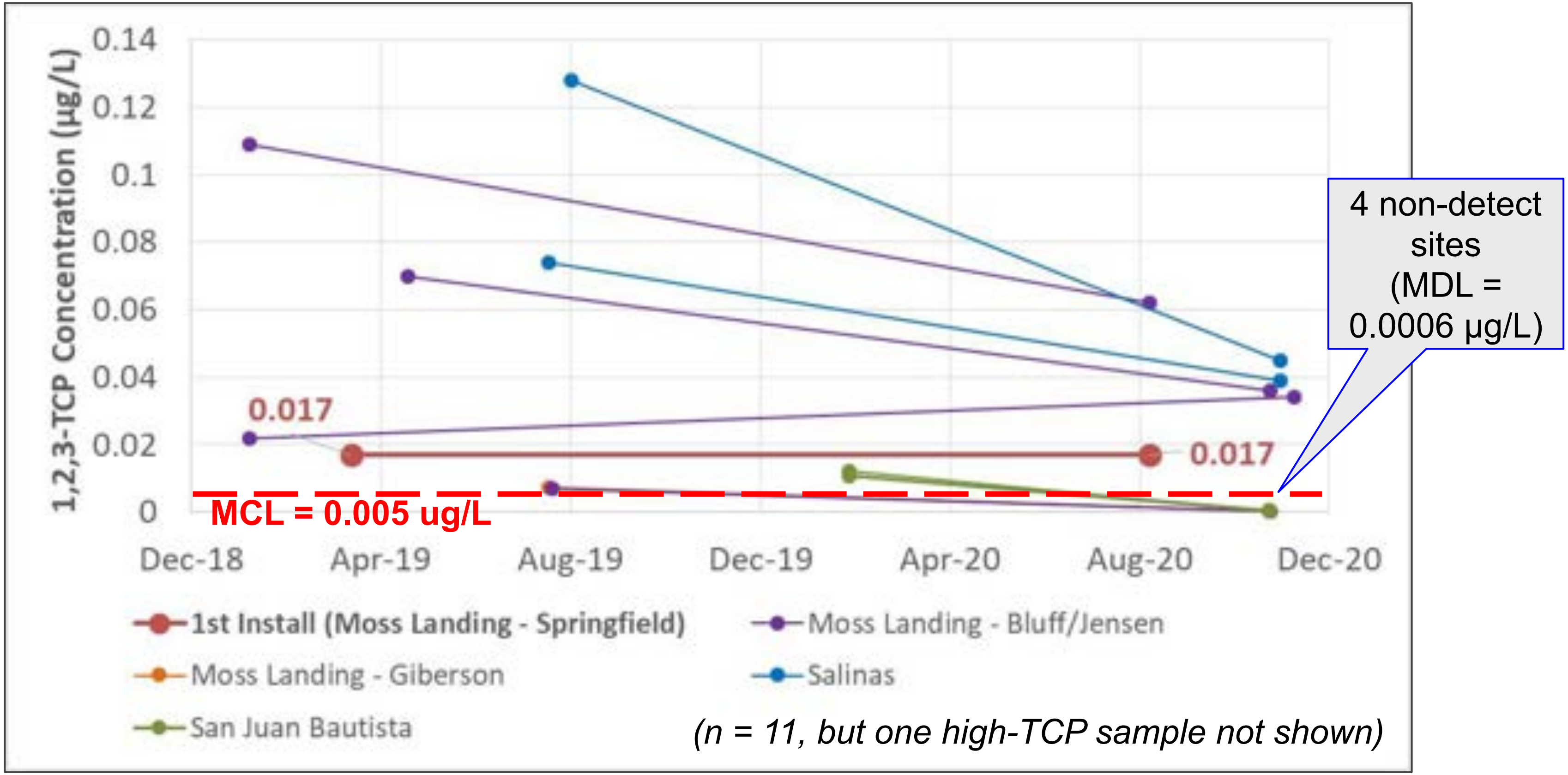
- Water Quality Results
  - TCP variability in shallow wells including 4 samples showing non-detect
  - Summary of other constituents of interest, including high levels of hardness (as CaCO3)

Sample Collection from Nearest-to-Well Hose Bib. Photo by Weber Hayes and Associates.

TCP Variability in Shallow Wells

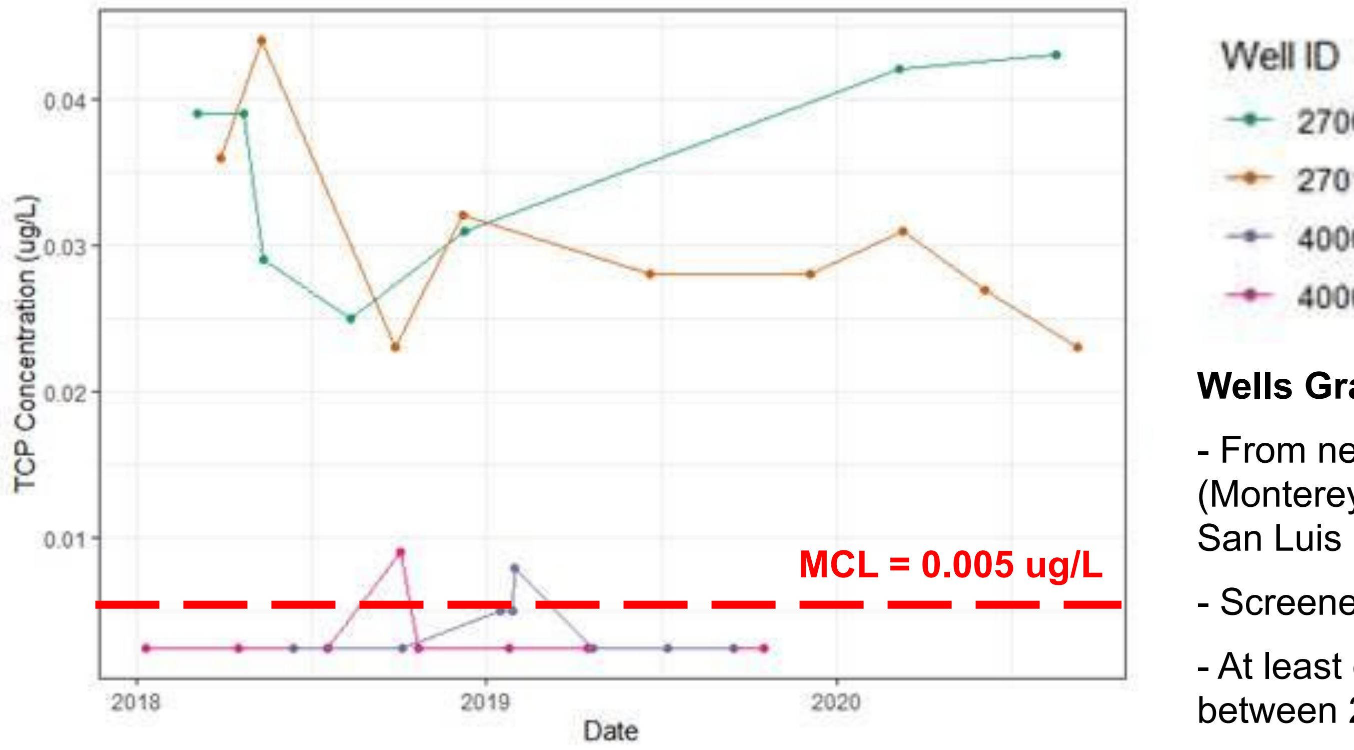


TCP Variability in Shallow Wells



GAMA TCP Data for Four Similar Wells

(Courtesy of Allie Sherris, Stanford University)



Near Moss Landing
Monterey County
San Luis Obispo
San Luis Obispo

Wells Graphed:

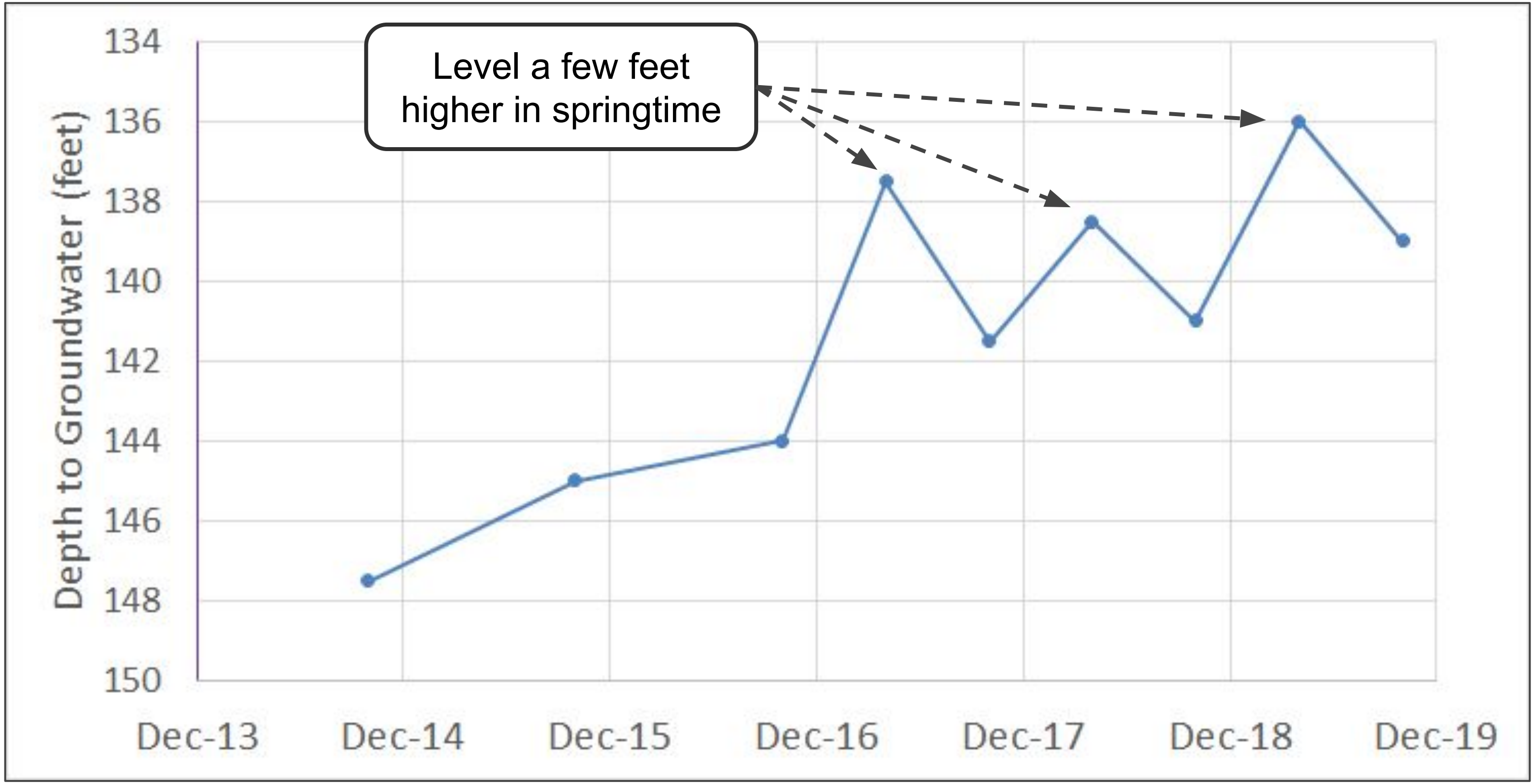
- From nearby counties (Monterey, San Benito and San Luis Obispo)

- Screened at depth of <200 ft

- At least one TCP detect between 2018-2020

Approximate Groundwater Depth near Moss Landing

(Interpolated from maps provided by the Pajaro Valley Water Management Agency)



TCP Variability

Potential Explanations for Variability

- Recharge of shallow aquifer during wet season with water that contacts shallow TCP
- Seasonal variation in depth to groundwater
- Sampling and analysis variability (but we think similar methods were used)

Proposed Strategies to Address Variability in the Pilot:

- Only install treatment systems where we have at least two TCP samples greater than the MCL.
- Quarterly sampling of source water for TCP.

<u>Discussion Questions:</u>

- How does this TCP variability compare to previous experience?
- Any other suggestions for addressing TCP variability as part of this project?

Other Constituents of Interest

	Units	Sec. MCL	# Sites	Min	Max	Median	DWMC 02
Non-Volatile Org. Carbon	mg/L	n/a	10	<0.30	1.40	0.93	<0.30
Turbidity	NTU	5	11	<0.10	1.4	0.24	<0.10
Total Coliform Bacteria*	CFU/100 mL	<1.0 (primary)	11	<1.0	150	<1.0	<1.0
Hardness (as CaCO3)	mg/L	n/a	11	309	7,400	**670**	1,000
Iron	mg/L	0.3	11	<0.03	0.44	0.073	<0.05
Manganese	mg/L	0.05	11	<0.004	0.036	<0.01	<0.01
Total Dissolved Solids	mg/L	1,000	11	540	18,000	**1,400**	1,800

* Of 11 sites, 4 were positive for Total Coliforms and one was positive for E. coli (2 CFU/100mL)

Discussion Questions:

- ***Concerns for interference with GAC treatment or any other issues?***
- ***Pre-treatment needed (other than for bacteria)?***
- ***Other parameters to consider?***

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Recommendation: Backwash Procedure

TAC Meeting (October) Summary

1. Options for backwash in the future

    Option A: Put carbon in another vessel, wash, and return

    Option B: Tanks could be removed and backwashed at facility in Salinas*

    Option C: Manual backwash with temporary backwash system*

*Design would require larger tanks.

2. Continuous backwash (TAC agreed this was not feasible at the household scale)

Backwash or Carbon Cleaning Procedure

TAC Meeting (October) Summary

1. Options for backwash in the future*

   Option A: Tanks could be removed and backwashed at facility in Salinas

   Option B: Put carbon in another vessel, wash, and return

   Option C: Manual backwash onsite with temporary backwash system

*Some options might require larger tanks.

2. Continuous backwash (TAC agreed this was not feasible at the household scale)

Considerations

- Channelization (due to larger tanks with same volume of media) could reduce performance.
- Cost
- Proper disposal of waste generated
- Need to sanitize carbon and/or vessels
- Homeowner preference
- Space

Backwash or Carbon Cleaning Procedure

Discussion Question for TAC:

- **For next phase of project (up to 19 systems installed), do you have recommendations related to backwash?**
    - Comparing vessels of different sizes with the same amount of carbon and contact time?
    - Using same procedure consistently in all locations (e.g. source water quality provides enough variability)
    - Opportunities to lower costs and improve efficiency?
    - Other

Considerations

- Channelization (due to larger tanks with same volume of media) could reduce performance.
- Cost
- Proper disposal of waste generated
- Need to sanitize carbon and/or vessels
- Homeowner preference
- Space

Technical Advisory Committee Meeting Agenda

1. TAC Roll Call (Noon-12:10pm)
2. Discussion of TAC Feedback (12:10-12:20)
3. Project Updates and Discussion (12:20-12:45)
4. Backwash Procedures (12:45-1:00)
5. **Carbon Sourcing and Disposal** (1:00-1:15)
6. Bacteria Pre-Treatment (1:15-1:30)
7. Implementation Recommendations (1:30-1:50)
8. Exit Survey & Next Steps (1:50-2:00)

Carbon Sourcing and Cleaning/Backwash

TAC Feedback

- Need to use same carbon over time
- Virgin media
- Certified for drinking water use
- Need to detail how to manage carbon replacement and deal with spent carbon

Carbon Sourcing and Cleaning/Backwash

TAC Feedback (Oct.)

- Need to use same carbon over time
- Virgin media
- Certified for drinking water use
- Need to detail how to manage carbon replacement and deal with spent carbon

CWC Recommendations

Carbon: FILTRASORB® 400 or approved equal

- 100% acid-treated virgin (not regenerated)
- NSF/ANSI 61 - Drinking Water System Components - Health Effects standard
- Must indicate the source of coal, carbon manufacturing location and a description of the reagglomeration/thermal process.

Backwash Procedure

Carbon Disposal Procedure

Carbon Sourcing and Cleaning/Backwash

TAC Feedback (Oct.)

- Need to use same carbon over time
- Virgin media
- Certified for drinking water use
- Need to detail how to manage carbon replacement and deal with spent carbon

CWC Recommendations

Carbon: FILTRASORB® 400 or approved equal

Backwash Procedure

Carbon Disposal Procedure

- The spent activated carbon media should be designed to be replaced.
- Spent carbon should undergo the California WET test prior to landfill disposal.
- While spent carbon will most likely pass the WET test, the procedure for reactivating carbon or alternate disposal alternatives if it fails the WET test should be described.
- Verify the ability to dispose of waste (that does not pass the WET test) at a (regeneration) facility that will accept a low volume of spent carbon.

Carbon Sourcing and Cleaning/Backwash

TAC Feedback Request

- Do you agree with our carbon specification recommendations?
- Any additional recommendations related to carbon cleaning or disposal that we should include in the RFP for the second project phase?

CWC Recommendations

Carbon: FILTRASORB® 400 or approved equal

Backwash Procedure

Carbon Disposal Procedure

- The spent activated carbon media should be designed to be replaced.
- Spent carbon should undergo the California WET test prior to landfill disposal.
- While spent carbon will most likely pass the WET test, the procedure for reactivating carbon or alternate disposal alternatives if it fails the WET test should be described.
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Addressing Positive Coliform Tests

Positive Coliform Test

Disinfect Well and Re-Test

Retest Positive

Can well be repaired or upgraded to prevent contamination?
(May not be economically feasible,
especially if well is an interim solution.)

Bacteria Pre-Treatment Required

<u>Discussion Question</u>: What are the microbial treatment standards for domestic wells?

- *UV: NSF Class A*
- *Chemical: Concentration x Time ?*

Bacteria Pre-Treatment

- UV Disinfection (NSF Class A for drinking water)
  - ***<u>Discussion Question</u>: Is UV feasible with high hardness?*** (309 - 7,400 mg/L vs. <120 mg/L rec. by Viqua^{TM})
  - Automatic shut-off due to scaling
- Chemical Disinfection (Chlorine, Ozone, Hydrogen Peroxide)
  - Configuration:
    - Upstream of GAC: Effect on TCP removal in GAC?
    - Upstream of GAC with roughing filter to quench oxidant before GAC
    - Downstream of GAC: Bacteria colonizing GAC? Taste and odor?
  - ***<u>Discussion Question</u>: Thoughts on relative Cost, Complexity, Reliability of different chemicals?***

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TAC Recommendations for Implementation

1. Are there specific considerations for scalability?
2. Anything else to incorporate into Phase 2 to answer key questions?
    - Alternatives to test
    - Monitoring

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	Phase 2 scope of work
February 2021	**Cost documentation methodology**
July 2021	Review monitoring results, Draft recommendations for POE/POU treatment for private wells
July 2022	Review monitoring results
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

Next Steps

1. Short exit survey (see chat box in zoom
2. Next Meeting
   - Feb 23, Noon-2pm
   - Feb 25, 10-Noon, Noon-2pm, 2-4pm

Communitywatercenter.org

Heather.Lukacs@
communitywatercenter.org

John.Erickson@
communitywatercenter.org

ĿΉΜΝĚ ẮĢ Ì ŦŅĶÚŔ ŅŔÚĢŌŔŖÚĢŦŖŅŅÚÔŖŦ ÆÆẮ DŖÛŲŅÖŔŖŌŅŲŌŔ ŰŌŅ Ē ŖŦŰŌŅŦŔ Ë ŖŔÚŅŦŅV ẮŖÛŔÚV AŦŅĶ
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Ë ŅŅŰŌŔÕ ĊŖŦŔ ĶÚË ÖŌJR ŅŅŰŌŔÕ ÚŔŖÞ TŌŊŅ ŌŔ ŰŌŅ ÔŖŦŔ ŖÔĶŔ ŖŔŌŖŅ Ű ŅΜŌŔĶŦ Ű ÖŅŦŅ TĶŦŰŌŌ TĶŔÚU ŦŖŌŔŅŇ ŮŌĶ ŮŌŅŅR ĶŔŇ ĶÛŇŌŔB ÆÛŦŌŔÕ TĶŦÚŖÔŰŌŅ R ŅŅŰŌŔÕĄ TĶŦŰŌŌ TĶŔÚU ÔŖŌŖŰ ŅŇ Ķ ŌŌŮŅ TŖŰ ŅŦTŖŌŔÚ TŦŅUŅŔÚĶÚŌŖŔB

Ë ŅŅŰŌŔÕ Ë ŌŔÛŰŅU ĊŖŦŔ ĶÚË ÖŅ ŌŔÔŖŦŔ ĶÚŌŖŔ ŅŖŮŅŦŅŇ ŇÛŦŌŔÕ ŰŌŅ TŦŅUŅŔÚĶÚŌŖŔ ĶUŰ ŅŌŌĶUŰŌŅ ÕŦŖÛT ŇŌŅÛUUŌŖŔ ŌUĶTŰŰŦŅŇ ŌŔ ŰŌŅUŅ ŔŖÚŅUBAÚŰŌŔ ŅUĄR ŌŔÛŰŅUĶŦŅ TĶŦĶTÖŦĶUŅŇ ĶŔŇ ĶΜΜŦŅŮŌĶÚŅŇ ÚŖ ÚŦV ÚŖ ŅĶTŰŰŦŅ ŰŌŅ ŌŔÚŅŔÚ ŖÔ ŰÖĶÚ ĶUĶŌŅB A ŦŅŅŖŦŇŌŔÕ ŖÔ ŰŌŅ ÌAẮ R ŅŅŰŌŔÕ ŌUĶŌĄŖ ĶŮĶŌŌĶΜŌĄ ÛTŖŔ ŦŅTÛŅUÚB I ŖŖ ŅUŅŅŰŌŔÕ ÚŖ ÔŰŌŅ ŇŌŅÛUUŌŖŔ Ű ŅŦŅ ŦŅĶŦŦĶŔÕŅŇ ÚŖ ÕŦŖÛT UŌŔ ŌŌĶŦ ŌŖŅUR UÚŖÕŅŰŌŅŦB

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[1] Project update: CWC and WHA are moving forward with a phased approach to Phase 2, which will include the installation of two additional treatment systems and the monitoring of the two new systems plus the one already installed for 4-6 months prior to installing additional systems.

[2] CWC and WHA have budgeted for one backflush per system for the duration of the project.
[3] It was also discussed during the December TAC meeting that chlorinating upstream of the GAC could interfere with GAC treatment by reducing the life of the GAC or causing iron or manganese to precipitate.
[4] In these minutes we use “microbial control” to refer to any methods used to ensure the microbiological safety of the water leaving the POE device, including monitoring, disinfection, or measures to limit microbial growth in the GAC.

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[5] Minnesota Pollution Control Agency. “Granular Activated Carbon Filters.” January 2009. https://www.pca.state.mn.us/sites/default/files/c-s1-05.pdf

[6] BARR Engineering. “Corrective Action Plan 2: Corrective Action Areas I and II - Operable Unit B North Bennington and Bennington.” March 2020. https://anrweb.vt.gov/PubDocs/DEC/PFOA/Corrective%20Action%20Plan%20OUB/2020-0320-Corrective-Action-Plan-2-OUB.pdf

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7 Update from CWC: IDEXX's Legiolert product (https://www.idexx.com/en/water/water-products-services/legiolert/) can be used to test for Legionella. The Monterey County Environmental Health Laboratory can provide Legionella testing using Legiolert (L. pneumophila) or culture and PCR methods (Legionella spp and L. pneumophila) https://www.co.monterey.ca.us/home/showpublisheddocument/16890/637370808875100000.

8 Robertson, W. and T. Brooks. "The role of HPC in managing the treatment and distribution of drinking-water." *Heterotrophic Plate Counts and Drinking-water Safety,* edited by J. Bartram, J. Cotruvo, M. Exner, C. Fricker, A. Glasmacher. The World Health Organization, IWA Publishing, 2003, pp. 233-244. https://www.who.int/water_sanitation_health/water-quality/guidelines/HPC12.pdf

[9] Added by CWC for reference: Centers for Disease Control and Prevention. “ASHRAE 188: Legionellosis: Risk Management for Building Water Systems.” April 30, 2018. https://www.cdc.gov/legionella/health-depts/ashrae-faqs.html

[10] USEPA. Point-of-Use or Point-ofEntry Treatment Options for Small Drinking Water Systems. April 2006. pg. 35. https://www.epa.gov/sites/production/files/2015-09/documents/guide_smallsystems_pou-poe_june6-2006.pdf

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[11] Corona Environmental Consulting. Developing Equitable and Effective Early Action Plans. Jan. 1, 2021. https://static1.squarespace.com/static/5e83c5f78f0db40cb837cfb5/t/6019c9fa8e458e020abc1f4d/1612302850746/20210128+Final+Report+CWC+Interim+Water+Costs+%28V7%29.pdf

[12] Project website: https://www.communitywatercenter.org/mosslandingwaterproject. POE treatment is not currently an approved solution in Monterey County, but the SWB has asked CWC to include it in this analysis since it could become an option in the future.

[13] SWRCB. 2021 Drinking Water Needs Assessment. April 2021. https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2021_needs_assessment.pdf

[14] CWC hopes the systems can remain in service after the pilot ends, but if homeowners are unable to cover the costs to maintain them and CWC is not successful in fundraising for those costs, removal may be required.

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COMMUNITY WATER CENTER

EL CENTRO COMUNITARIO POR EL AGUA

Technical Advisory Committee Meeting February 23, 2021:

"Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes."

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6. Cost Tracking Methods (1:25-1:50)
7. Exit Survey & Next Steps (1:50-2:00)

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA


Heather Lukacs, Director of Community Solutions


John Erickson, Community Solutions Manager


Mayra Hernandez, Community Solutions Advocate


Brandon Bollinger, Community Advocacy Manager


aisy Gonzalez, Community Solutions Coordinator


Ryan Jensen, Community Solutions Senior Manager


Reyna Gabriel-Peralta, Community Organizer


David Okita, Senior Fellow


Susana De Anda, E.D. & Co-Founder

Technical Advisory Committee Members
1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area

Name	Company / Agency / Organization	Title / Position
Mark Bartson, P.E.	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Kevin Berryhill, P.E.	Provost & Pritchard Consulting Group	Principal Engineer
Paul Boyer	Self-Help Enterprises	Program Director - Community Development
Guadalupe Gonzalez	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Kyle Graff	State Water Resources Control Board (DDW)	Northern California Drinking Water Field Operations
Tarrah Henrie	Corona Environmental Consulting	Senior Scientist
Alex Huang, P.G.	State Water Resources Control Board (DFA)	Office of Sustainable Water Solutions Branch
Brian Kidwell, P.E.	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Tori Klug, P.E.	Stantec Consulting Services, Inc.	Project Manager
Eugene Leung	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Edwin B. (Ned) Lofink, P.E.	Axiom Engineers	Senior Project Engineer
Tami McVay	Self-Help Enterprises	
Zane Mortenson	Rural Community Assistance Corporation	Rural Development Specialist | Central Coast
Laura Satterlee	Self-Help Enterprises	
Allie Sherris	Stanford University	PhD Candidate, Emmett Interdisc. Prog. in Env & Res.
Dave Wallis	Rural Community Assistance Corporation	Rural Development Specialist III - Environmental

Technical Advisory Committee Members 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area		
Name	**Company / Agency / Organization**	**Title / Position**
Cheryl Sandoval	Monterey County	Supervisor, Drinking Water Protection Program

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	Phase 2 scope of work
February 2021	**Cost documentation methodology and Bacteria/Disinfection Follow-up**
~~July 2021~~ Sept 2021	Review monitoring results, Draft recommendations for POE/POU treatment for private wells
July 2022	Review monitoring results
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts
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7. Exit Survey & Next Steps (1:50-2:00)

Response to TAC Feedback

We received consensus or majority TAC recommendation on the following items:

1. Empty Bed Contact Time (EBCT) - 10-minutes with lead/lag design
2. Backwash plan will not fluidize the bed, all waste will be disposed of offsite
3. Carbon specifications and disposal

CULLIGAN® NON-BACKWASHING FILTER SYSTEMS

Product Specifications

Benefits

- Simple design with no moving parts
- No backwash or rinse cycles saves water
- Non-electric saves energy
- System options to improve water quality by reducing*: *Chlorine, *Chloramine, *Disinfection Byproducts (DBPs)
- Activated carbon models prolong life of softening resins
- pH Neutralization for acidic water (Upflow models only)

Features

- Different sized models to accommodate a wide range of flow rates
- Bypass Valve included
- Downflow and Upflow system options
- Built-in metal reinforced 1/4" ports for:
  - Sampling Valves
  - Pressure Gauges

Quadra-Hull® Tank System

Fiberglass Tank System

Culligan Non-Backwashing Filter System Models	CULLAR D+	CULLAR S	CENTAUR NDS	CULLNEU	WITHOUT MEDIA
FIBERGLASS TANKS	GPM	GPM	GPM	GPM	Y/N
8" x 44"	3.75	1.75		3.0	Y
9" x 48"	5.5	2.75	1.0	5.0	Y
10" x 54"	7.5	3.75	2.0	7.0	Y
12" x 52"	10.0	5.0	3.0		Y
QUADRA-HULL® TANKS	GPM	GPM	GPM	GPM	Y/N
9" x 48"	5.5	2.75	1.0	5.0	Y
10" x 54"	7.5	3.75	2.0	7.0	Y
12" x 52"	10.0	5.0	3.0		Y
14" x 65"	16.7	8.5	5.0		Y
16" x 65"	22.5	11.0	6.5		Y

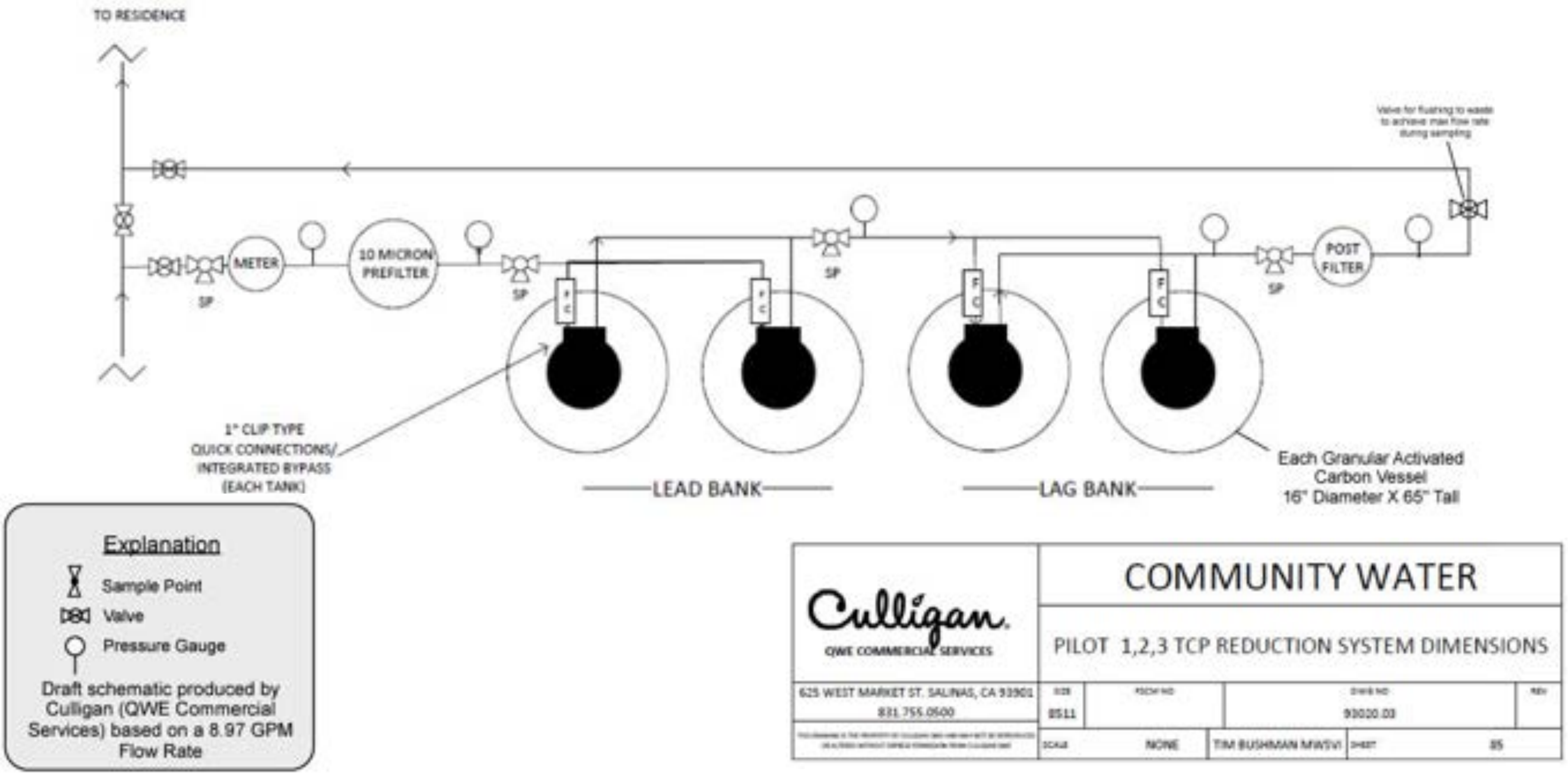
Data Sheet

CalgonCarbon

FILTRASORB® 400

Granular Activated Carbon

Schematic of First 123-TCP Treatment System



Response to TAC Feedback

We received consensus or majority TAC recommendation on the following items:

1. Empty Bed Contact Time (EBCT) - 10-minutes with lead/lag design
2. Backwash plan will not fluidize the bed, all waste will be disposed of offsite
3. Carbon specifications and disposal
4. TCP Variability in pilot project is similar to other locations.

CULLIGAN® NON-BACKWASHING FILTER SYSTEMS

Product Specifications

Benefits
- Simple design with no moving parts
- No backwash or rinse cycles saves water
- Non-electric saves energy
- System options to improve water quality by reducing*: *Chlorine, *Chloramine, *Disinfection Byproducts (DBPs)
- Activated carbon models prolong life of softening resins
- pH Neutralization for acidic water (Upflow models only)

Features
- Different sized models to accommodate a wide range of flow rates
- Bypass Valve included
- Downflow and Upflow system options
- Built-in metal reinforced 1/4" ports for:
  - Sampling Valves
  - Pressure Gauges

Quadra-Hull® Tank System

Fiberglass Tank System

Culligan Non-Backwashing Filter System Models	CULLAR D+	CULLAR S	CENTAUR NDS	CULLNEU	WITHOUT MEDIA
FIBERGLASS TANKS	GPM	GPM	GPM	GPM	Y/N
8" x 44"	3.75	1.75		3.0	Y
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Today, we will discuss UV treatment, bacteria, and hardness in more detail and request the TAC recommendation on this topic.


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Data Sheet

CalgonCarbon

FILTRASORB® 400

Granular Activated Carbon

Technical Advisory Committee Meeting Agenda

1. TAC Roll Call (Noon-12:10pm)
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Project Updates

First System Installed

- 123-TCP Level = 0.017 ug/L
- Well ID: DWMC02
- Located north of Moss Landing
- Community partner
- Member of Committee for Safe, Clean, and Affordable Drinking Water
- Has been working to get a long-term solution for her community for many years, including hosting community meetings outside her home

Project Updates

First System Installed

- Initial TCP results were non-detect between lead and lag vessels
- Bacteria issues within storage tank.
- Disinfected treatment vessels with 5% caustic solution per Calgon recommendation
- Disinfected distribution system - with 50 ppm chlorine.
- In process of storage tank rehabilitation/replacement.

Project Updates

Plan for Phase 2 Sites

- Prioritize the installation of additional systems at locations without bacteria issues (that we know about)
- Re-sample for bacteria at POE prior to placing the system in service.
- Monitor system influent and effluent for total coliform bacteria and E. coli

Potential Phase 2 Installation Locations (Photos by Weber Hayes & Associates)

Project Updates

Plan for Phase 2 Sites

- Prioritize the installation of additional systems at locations without bacteria issues (that we know about)
- Re-sample for bacteria at POE prior to placing the system in service.
- Monitor system influent and effluent for total coliform bacteria and E. coli
- **Consult TAC regarding additional recommendations (next agenda item)**

Potential Phase 2 Installation Locations (Photos by Weber Hayes & Associates)

Project Updates

Possible Phase 3 of Project

- After systems have been operating for 6-12 months, consider installing additional systems and/or continuing monitoring and maintenance after the project end date.

Potential Phase 2 Installation Locations (Photos by Weber Hayes & Associates)

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Bacteria and Disinfection

Background

- Coliform contamination is a common issue in private wells
- CWC has not found any clear regulatory guidance on microbial control for GAC POE systems on private wells
- Not including UV disinfection in this POE pilot, because:
    - Water not intended for drinking*
    - Avoiding sites with coliform contamination that can't be remedied
- Discussing microbial issues out of caution and to inform future POE systems

+

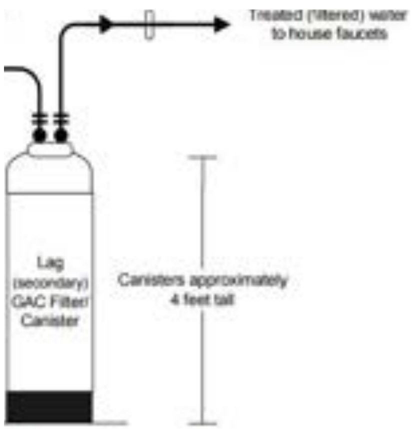
*POU and POE Nitrate Treatment is beyond this scope of this pilot project due to very high levels of nitrate, acute health risk posed by nitrate (need for frequent monitoring), potential need for off site waste disposal, and overall cost of nitrate treatment. (From Oct 2020 TAC Meeting)

TAC Feedback Regarding Bacteria

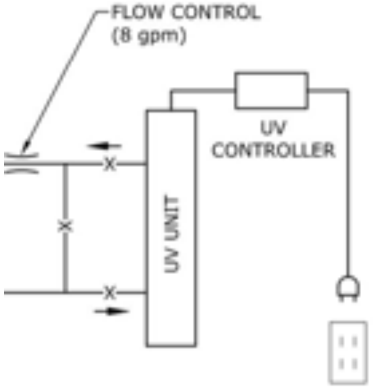
Dec. 2020 TAC Feedback	Response
Microbial growth in GAC and biofouling may be unavoidable	Including the ability to backflush for this reason
Coliforms in source water are concerning and likely a common problem in private wells Take measures to prevent contamination at the source by protecting wells Exclude sites from the project with *E. coli*	Proposing well and system improvements ($200 - $6,000) at sites with coliform positives Re-testing for bacteria at POE at least one month after disinfection/repairs and after rain
Hardness is a challenge for UV disinfection. Disinfection other than UV would likely be too operationally complex	Not planning to include disinfection at all sites UV Pure Hallett 500PN may be an option for sites with high hardness chronic bacteria issues

Microbial Control in GAC: Guidance & Practice

Federal Code (40 CFR § 141.100) for public water systems using POE devices:
"The design and application of the point-of-entry devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised."



Minnesota Pollution Control Agency POE GAC systems do not appear to include downstream disinfection.



Corrective Action Plan prepared by consultants in Vermont shows UV downstream of POE GAC to treat PFOA.

Potential Microbial Concerns

General Microbial Growth

- Sources: Environment
- Control:
  - Limit HPC and TOC in source water (Prevent contamination)
  - Disinfect downstream of GAC
- Indicator: HPC
- Concerns Considered:
  - Opportunistic pathogens: Optimal temperature for Legionella or Non-Tuberculosis Mycobacterium **>80 F**
  - Biofouling of GAC or premise plumbing

Pathogens *(e.g. enteric bacteria and viruses)*

- Sources: Septic tanks, Runoff, Distribution system contamination
- Control:
  - Prevent contamination
  - Disinfect
- Indicators:
  - *E. coli*
  - Total coliform (to a lesser extent)
- Concerns: Waterborne illness

Proposed Phase 2 Strategy

1. Require homeowners to repair and disinfect systems with coliform positives or obvious defects (prior to participating in this pilot project)*
   a. Wells: Repair surface seal, *Pressure relief valve & vent*, *Elevate well head*
   b. Tanks: Check valve and air gap on fill line, Seal penetrations
2. Sample at POE prior to installation
3. After installation, monitor before and after GAC for total coliform and E. coli
4. Given that water is <u>not to be used for drinking</u>, consider UV post-GAC only for:
   a. One or two sites to test UV feasibility for hard water (if funding available*)
   b. Sites where unanticipated persistent coliform contamination arises

We are seeking additional project funding to support homeowners who are interested in participating in this study but who are unable to afford repairs in the $200 - $6,000 range, and also for project partners interested in better understanding UV feasibility for hard water.

Proposed Phase 2 Strategy

1. Require homeowners to repair and disinfect systems with coliform positives or obvious defects (prior to participating in this pilot project)*
    a. Wells: Repair surface seal, *Pressure relief valve & vent*, *Elevate well head*
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    b. Sites where unanticipated persistent coliform contamination arises

Comments on this strategy? What repairs should be required for a homeowner to participate?

Discussion Questions - Indicator Bacteria

1. What are the best practices if a total coliform bacteria sample is detected at the GAC influent?
   a. Bypass the GAC, Disinfect the well and all water system plumbing (recommended by Minnesota Pollution Control Agency guidance on POE GAC, 2009)
   b. Is it necessary to disinfect the carbon with caustic?

2. What bacteriological monitoring should be done as part of point-of-entry GAC treatment?
   a. Coliform sampling upstream and downstream of GAC?
   b. HPC sampling upstream and downstream of GAC?

UV Treatment Options

UV Pure Hallett 500PN

NSF Class A Cert.

40 gal/min

For hardness up to 855 mg/L as $CaCO_3$

Indoor installation required

$2,550
(w/ 25% discount)

Softener

+

Viqua NSF Class A UV (~$2000)

Discussion Questions - Microbial Control

1. Under what conditions should UV treatment be used with POE GAC treatment?
   a. Water not used for drinking
   b. Water used for drinking
2. Should UV be installed upstream or downstream of the GAC?
3. Would a finer post-filter be feasible and effective?

NanoCeram-DP™ Series
Double Layer Pleated Filter Cartridges

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Monitoring Protocol: Operational Monitoring

<u>Operational</u>

1. Totalizing flow meter reading
2. Inlet/Outlet Pressure:
   a. Pre-Filter
   b. All 4 vessels
   c. Post-Filter
3. Note any issues

	Sampler / Technician					
	Date					
	Time					
Treatment System	**Pre-Treatment**					
	Totalizing Flow Meter (pre-15 min Flush)					
	Totalizing Flow Meter (post-15 min Flush)					
	Approximate Flow Rate (GPM)					
	Avg. Vol Water Treated per Day (gallons)					
	Total System Pressure Range During Inspection					
	Pre-Filter Inlet / Outlet (psi)	/	/	/	/	/
	Lead Vessels					
	Vessel A:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Vessel B:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Lag Vessels					
	Vessel C:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Vessel D:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Post-Treatment					
	Post-Filter Inlet / Outlet (psi)	/	/	/	/	/
pH/Temp Readings (Monthly)	Well Head (pH/Temp)	/	/	/	/	/
	Pre-Treatment Hose Bib (pH/Temp)	/	/	/	/	/
	Post-Treatment Hose Bib (pH/Temp)	/	/	/	/	/
NOTES	Issues?					
	Samples Collected (Y or N)? From Where?					

Water Quality Monitoring

Parameter	Well Head	Treatment Influent	After Lead Vessel	Treatment Effluent
pH & Temp.	**M**	**M**	**M**	**M**
123-TCP	**Q**	**-**	**M**	**M (HOLD)**
Coliform, E. coli, HPC	Develop monitoring plan based on unique conditions at each site			

- Flush effluent tap for 15 min prior to sampling
- M = Monthly, Q = Quarterly

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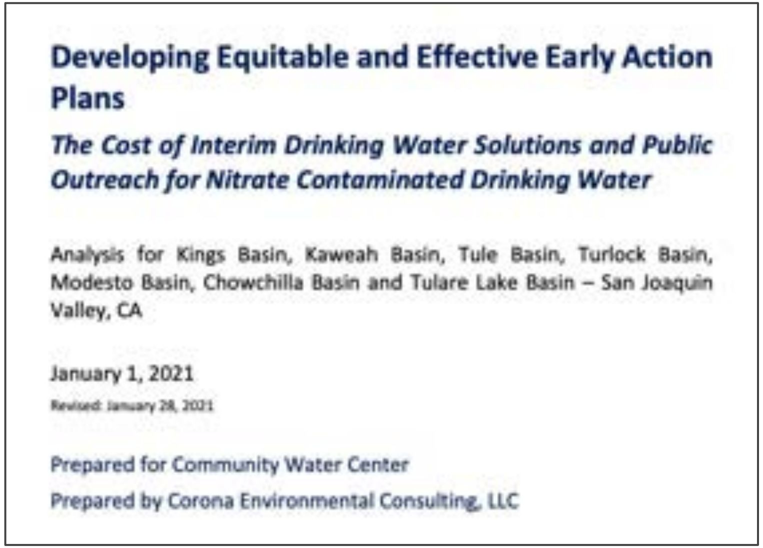
Cost Tracking Purpose

Project Goal:

- To provide transparent documentation of costs, outcomes and lessons learned to inform state-wide efforts to provide safe drinking water for all Californians specific to 1,2,3-TCP.

Current and Potential Applications:

- Reports: Developing Equitable and Effective Early Action Plan for CV Salts
- Alternatives Analysis for Long-term Drinking Water Solution Options for the Area North of Moss Landing
- State Water Board Needs Assessment



Developing Equitable and Effective Early Action Plans

The Cost of Interim Drinking Water Solutions and Public Outreach for Nitrate Contaminated Drinking Water

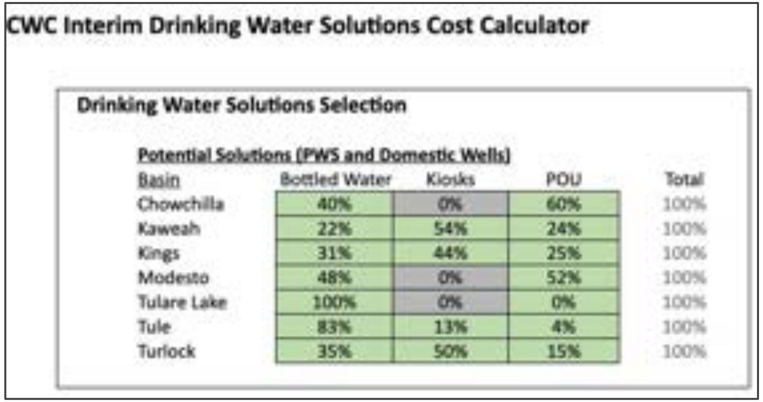
Analysis for Kings Basin, Kaweah Basin, Tule Basin, Turlock Basin, Modesto Basin, Chowchilla Basin and Tulare Lake Basin – San Joaquin Valley, CA

January 1, 2021

Revised: January 28, 2021

Prepared for Community Water Center

Prepared by Corona Environmental Consulting, LLC



CWC Interim Drinking Water Solutions Cost Calculator

Drinking Water Solutions Selection

Potential Solutions (PWS and Domestic Wells)

Basin	Bottled Water	Kiosks	POU	Total
Chowchilla	40%	0%	60%	100%
Kaweah	22%	54%	24%	100%
Kings	31%	44%	25%	100%
Modesto	48%	0%	52%	100%
Tulare Lake	100%	0%	0%	100%
Tule	83%	13%	4%	100%
Turlock	35%	50%	15%	100%

Report and calculator available here:
www.communitywatercenter.org/protecting-drinking-water-in-agricultural-regions

Cost Tracking Methodology

1. Track labor and materials by the following categories
   a. Outreach & Education (CWC)
   b. Well Testing and Site Assessments
   c. Installation - Installation report
   d. Monthly Field Monitoring - Monitoring reports
   e. Operation and Maintenance - Maintenance Log
   f. Project Management
2. Differentiate costs specific to this pilot project only and anticipated costs for future projects

Photos by Weber Hayes & Associates

Cost Tracking Methodology

1. Operation and Maintenance (Planned)
   a. Backflushing
   b. Media replacement
   c. Other maintenance and service calls
   d. Maintenance log
2. Operation and Maintenance (Other)
   a. Media disinfection
   b. Treatment system removal
   c. Other additional services

Any feedback on main cost considerations and categories for tracking project costs?

Photos by Weber Hayes & Associates

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Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	Phase 2 scope of work
February 2021	Cost documentation methodology and Bacteria/Disinfection Follow-up
~~July 2021~~ **Sept 2021**	**Review monitoring results, Draft recommendations for POE/POU treatment for private wells**
July 2022	Review monitoring results
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts

*Exact meeting dates to be determined

Next Steps

1. Short exit survey (see chat box in zoom)

http://bit.ly/TAC3Survey

2. Next Meeting
   - Sept 14, Noon-2pm
   - Sept 21, Noon-2pm

Communitywatercenter.org

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John.Erickson@ communitywatercenter.org

L·MNÈ ÅĢ Ì ŦŅKÚŔ ŅŔÚĢŎŘŖÚĢŦŖŀŅŃÚÔŖŦ ÆAÅ DŖÛŲŅÖŔŖÕŅŲÕŔ ÚÕŅ Ē ŖŦÚÕŅŀŔ Ë ŖŔÚŅŀŅV ÅŖÛŔÚV AŦŅK

Ì ŅNŎŔŌNKÓA ŇÛŎŖŦV ÅŖŖ R ŎÚÚŅŅ

I ŅTÚŅR MŅF L·ŃAM ĿM· Ë ŅŅÚŎŔÕ Ë ŎŔÛÚŅU

L·MÆĿĚMÆĿ ĢË

Ë ŅŅÚŎŔÕ ĊŖŦŔ KÚÈ ÖÕŪR ŅŅÚŎŔÕ ÚŔŖÞ TÖĶŅŅ ÕŔ ÚÕŅ ÕŖŦŔ ŖÔKŔ ŖŔÕŎŖŅ Ú ŅMÕŔKŦ Ú ÕŅŀŅ TKŦÚÕŅŌTKŔÚU ŀŖÕŔŅŇ ŮÕĶ ŮÕŇŅR KŔŇ KÛŇÕŖB ÆÛŦŎŔÕ TKŦÚŖÔÚÕŅ R ŅŅÚŎŔÕĄ TKŦÚÕŅŌTKŔÚU ÔŖŎŖŖ Ú ŅŇ K ŎŎÕŅ TŖÚ ŅŀTŖŎŔÚ TŦŅUŅŔÚKÚŎŖŔB

Ë ŅŅÚŎŔÕ Ë ŎŔÛÚŅU ĊŖŦŔ KÚÈ ÖŅ ŎŔÔŖŦŔ KÚŎŖŔ ŅŖŮŅŀŅŇ ŇÛŦŎŔÕ ÚÕŅ TŦŅUŅŔÚKÚŎŖŔ KUÚ ŅŎŎKUÚÕŅ ÕŦŖÛT ŇŎŌŅÛUUŎŖŔ ŎŪŅKTÚÚŦŅŇ ŎŔ ÚÕŅUŅ ŔŖÚŅUBÌ ÖŅ TŖÚ ŅŀTŖŎŔÚUŎŎŅŅUÔŦŖ ÚÕŅ TŦŅUŅŔÚKÚŎŖŔ ŇÛŦŎŔÕ ÚÕŅ R ŅŅÚŎŔÕ KŦŅ KÚÚKÖÕŅŇ KŔŇ KŦŅ ŦŅÔÕŀŅŔÚŅŇ ŎŔ ÚÕŅ R ŎŔÛÚŅUBAÚÚŎŔ ŅUĄR ŎŔÛÚŅU KŦŅ TKŦKTÖŦKUŅŇ KŔŇ KMMŦŅŮŎKÚŅŇ ÚŔ ÚŀV ÚŔ NKTÚÚŦŅ ÚÕŅ ŎŔÚŔŔÚŖÔÚ ÖKÚÚ KUUKÖŅB A ŦŅŅŖŦŇŎŔÕ ŖÔÚÕŅ Ì AÅ R ŅŅÚŎŔÕ ŌŪKŎŖ KŮKŎŎMŎŅ ÛT ŖŔ ŦŅŢÛŅUÚB I ŖŖ ŅUŅŅÚŎŔÕ ŔUŖÔÚÕŅ ŇŎŌŅÛUUŎŖŔ Ú ŅŀŅ ŦŅKŦŦKŔÕŅŇ ÚŖ ÕŦŖÛT UÚŎŖ ŎŎĶŦ ŎŎŅR U ÚŖÕŅÚÕŅŦB

AÚÚŅŔŇKŔŅŅÆ

Ë ŎŌÖKŅŎA ŇŅŎĶ KŔĄ I ÚKŔÚŅŅ ÅŖŔ ÚÛŎŎŔÕ I ŅŀŮÕŅŅUĄŇŔŅB

Ì KR KŦK AŔŇŅŅŀUŖŔĄ ÅŅŔÚŦKŎÅŖKUÚŦŅŎÕŔ ŔKŎĮ KÚŅŀ Ĥ ÛKÕŎV ÅŖŔÚŦŖÅŖKŦŇ

Ë KŦÞ ÅKŦÚUŖŔĄ I ÚKÚŅ Ì KÚŅŀ ÅŖKŦŇ ŀÆŎŮÕŎŎŖŔ ŖÔÆŦŔÞŎŔÕ Ì KÚŅŀ ĚÆÆÌ Ą Ì ŅŅÖŔŌNKOĖ TŅŀKÚŎŔÚUĄ ŦŅŅÚŌŅŇĢ

Ê ŅŮŎŔ ÅŅŀŀVÖŎŎĄ ĢŦŖŮŖÚŲÏ ĢŦŌŅÖKŦŇ ÅŖŔÚÛŎŎŔÕ Ç ŦŖÛT

ÅŦKŔŇŖŔ ÅŖŎŎŖŔŅŀĄ ÅŖŖ R ÛŔŎV Ì KÚŅ ÅŅŔÚŅŀ ŀÅÌ ÅĢ

ĢKÛÖÅŖVŅŀĄ I ŅŎŔĎŅŎ BŔÚŅŀŦŌŅUŀI DBĢ ŀŦŅÚŌŅŇĢ

Ì ŎŔ ÅÛŲÖŔ KŔĄ ÅÛŎŎŎŔKŔ Ĥ Ì B ÅŖŖ R ŅŀŅŎĶŎ VUÚŅR U

Ë KŦŎŅMVÆŎĶVĄI DB

ÅŦKŎŌ ÅBÆŦŎVŎŔĄ Ì ŅMŅŀĄ DKVŅUKŔŇ AUŖŅŎĶÚŅUŀ Ì DAĢ

ÉŖÖŔ BŦŎŅÞUŖŔĄ ÅÌ Å

Ë ŎŌÖŅŎŎŅ ĊŦŅŇŅŀŎŅÞĄ I ÚKÚŅ Ì KÚŅŀ ÅŖKŦŇ ŀÆÆÌ Ą I AĊBŦ BŔŎKŌŅR ŅŔÚÏ ŔŎĢ

Ê VŎŅ Ç ŦKŎŎĄ I ÚKÚŅ Ì KÚŅŀ ÅŖKŦŇ ŀÆÆÌ ĄË ŖŔÚŅŀŅV ÆŎŮÚŦŌŅĢ

Ì KŦKÖ DŅŔŦŌŅĄ ÅKŎŎŔŦŔĶ Ì KÚŅŀ I ŅŀŮÕŅŅ

DKŦŦŎŅŔ DÛŅÞUĄ Ì DA

Ì ŖŦŎÊ ŎŮÕĄ I ÚKŔÚŅŅ ÅŖŔ ÚÛŎŎŔÕ I ŅŀŮÕŅŅUĄŇŔŅB

ÆKŔ ĚKŦÞŎŔĄ I DB

BÛÕŅŔŅ ĚŅÛŔÕĄ I ÚKÚŅ Ì KÚŅŀ ÅŖKŦŇ ŀÆÆÌ ĄÌ ŅŅÖŔŌNKOĖ TŅŀKÚŎŔÚĢ

DŅKÚŎŅŀ ĚÛÞKŅUĄ ÅÌ Å

Ê KŦŅŔ Ē ŎŎÖŎŔ ŖÚŖĄ I ÚKÚŅ Ì KÚŅŀ ÅŖKŦŇ ŀÆĊAĢ

ÉŖUŅ ŦŖ ŖMŎŅŇŖĄ I ÚKÚŅ Ì KÚŅŀ ÅŖKŦŇ ŀÆÆÌ ĄĊŦŅUŖ ÆŎŮÚŦŌŅĢ

ÅÖŅŀVŎĮ KŔŇŖŮKŎĄË ŖŔÚŅŀŅV ÅŖÛŔÚV BŔŮŎŦŖŔ ŅŔÚKŎ DŅKŎÚÖ ÅÛŦŅKÛ

ĚKÛŦK I KÚŅŀŎŅŅĄ I DB

ÅÖKŇ I ŅŎŇŅŎĄ ÅŖŦŖŔK BŔŮŎŦŖŔ ŅŔÚKŎ ÅŖŔ ÚÛŎŎŔÕ

Ĭ KŔŅUK I ŖÚŖĄ I ÚKÚŅ Ì KÚŅŀ ÅŖKŦŇ ŀĖ ĢĢĢ

AŎŎŅ I ÖŅŀŀŎĄ I ÚKŔŖŦŅŇ Í ŔŎŅŀŌÚŎV

ÅŅŅŎĶ Ĭ ŅŎĶĄ I DB

ĎB ĎŔÚŦŖŇÛŅŰŖŔ ĶŔŇ ŦĦŖǪÅĶǪǪ

DŅĶÚŐŅŦ ĔÛÞĶŅǓŦŖŖ ÅŖŖ Ŗ ÛŔŌV İ ĶÚŅŦ ÅŅŔÚŅŦ ŦÅİ ÅGŰ ŅǪŅŖŖ ŅŇ ĶǪǪĶÚŰŅŔŇŅŅŅÚŖ ŰŐŅ ÔŖÛŦŰÖ Ì AÅ Ŗ ŅŅŅŰŖÕ ÔŖŦ ŰŐŅ Ŀ·ΜŃĚ ÅG GŖŌŖÚĚŖÔĦBŔÚŦV ŦGĖ BGÌ ŦŅĶÚŖ ŅŔÚGŌŖÚGŦŖŖŅŅÚBİ ÖŅ ŌŖÚŦŖŇÛŅŅŇ ŰŐŅ Åİ Å ÚŅĶŖ Ŗ ŅŖ ΜŅŦŦŖŔ ŰŐŅ ŅĶǪǪŅŖŔŌĦŖ ŅŇ Ű ÖŌÖ Ì AÅ Ŗ ŅŖ ΜŅŦŦŰ ŅŦŦŅ ŖŔ ŰŐŅ ŅĶǪǪ ĶŔŇ ŦŅŮŌŅŰ ŅŇ ŰŐŅ ĶÕŅŔŇĶ ÔŖŦ ŰŐŅ Ŗ ŅŅŅŰŖÕ B DŅĶÚŐŅŦ ĶǪŖ ŦŅŮŌŅŰ ŅŇ ŰŐŅ Ţ ŦŖ ŦŅŅÚŰŖ ŅǪŖŅ ĶŔŇ ŢĶÚĶŔŇ ŌÛÚŰŦŅ Ì AÅ Ŗ ŅŅŅŰŖÕ ÚŖ ŢŌŅB

ĎĎB ÆŌŅÛÚŰŖŔ ŖÔÌ AÅ ĊŅŅŇΜĶŅÞ

DŅĶÚŐŅŦ ĔÛÞĶŅǓŦŅŮŌŅŰ ŅŇ ŰŐŅ ÛŢŇĶÚŅŇ ÚŦĶÚŅÕV Åİ Å ĶŔŇ İ DA ĶŦŅ ŌŖ ŢǪŅŖ ŅŔÚŰŖÕ ÚŖ ĶŇŇŦŅÚÚ ŰŐŅ ŢŦŅŅŔŅ ŖÔÚŖÚĶǪŅŖŌǪŖŦŖ ĶŔŇ BB ŅŖǪΜĶŅÚŅŦÕĶ ŌŖ ÚŖŖ Ņ ŖÔŰŐŅ ŢŦŌĶÚŅ Ű ŅǪǪŰ ĶÚŅŦ ÚVÚŅŖ Ú ŅŖÚŌŅŦŅŇ ÔŖŦ Ŀ·ΜŃĚ ÅG ÚŦŅĶÚŖ ŅŔÚŰVÚŅŖ ŌŖÚĶǪǪŰŖŔB Ì ÖŌÚÚŦĶÚŅÕV ŰĶÚŇŅŮŅǪŖŢŅŇ ΜĶŅŇ ŖŔ Ì AÅ ÔŅŅŇΜĶŅÞ ĠŦŖ ŰŐŅ ĊŅΜŦŰĶŦV ΜΜĄΜŁ Μ· Ì AÅ Ŗ ŅŅŅŰŖÕ ĶŔŇ ŌÚÛ Ŗ ĶŦŌŅŅŇ ŌŖ ŰŐŅ ĶÚĶÖŅŇ ĪŌǪŅŅ ŅB AÚŅŔŅŇŅŅŅÚŇŌŅ ŔŖÚÖĶŮŅ ĶŔV ŅŖŖ Ŗ ŅŔÚÚŖŔ ŰŐŅ ÚŦĶÚŅÕVB

ĎĎĎB Í ŢŇĶÚŅǓŖŔ Ì ÖŦŅŅ ĎŔÚĶǪǪŅŇ İ VÚŰŅŖ Ú

DŅĶÚŐŅŦ ĔÛÞĶŅǓŢŦŖŮŌŅŅŇ ĶŔ ŖŮŅŦĶǪǪ ŢŇĶÚŅ ŖŔ ŰŐŅ ŰŦŅŅ Ŀ·ΜŃĚ ÅG GĖ B ÚŦŅĶÚŖ ŅŔÚŰVÚŅŖ ÚŰÖĶÚ ÖĶŮŅ ΜŅŅŅŔ ŌŖÚĶǪǪŅŇ ŦŅŅŅ İ ŌŅŅŅ Ŀ·Ł ÔŖŦ Ķ ŰÛŔ Ŗ ĶŦVGBÌ ÖŅ ŢŌŖÚŰ ŦŅŦŅŅÚÖĶŔŖÚ ΜŅŅŅŔ ŇŌŮŌŅŅŇ ŌŖÚ ŰŐŅŅ ŢÖĶÚŅÚ ĘGÖĶÚŅ Ŀ· ŦŅŖ ŢǪŅÚŅGĄGÖĶÚŅ ΜA ŦŌŖ ŢŦŖÕŦŅÚ ĶŔŇ GÖĶÚŅ ΜÅ ŦŢǪŅŔŅŅŇGBÌ ÖŅ ŰŖŦŅ ŅŖ ŢǪŅÚŅŇ ŌŖ ŖŦ ŢǪŅŔŅŅŇ ÔŖŦ ŅĶŅÖ ŢÖĶÚŅ ŌÚÛ Ŗ ĶŦŌŅŅŇ ŌŖ İ ŌŅŅŅ Ŀ·Ŀ·B

ÉŔÖŔ BŦŌŅÞŖŔ ŢŦŅŅŖŔÚŇÉ

- Ë ŖŦŅ ŇŅŅĶÚĶǪǪŅŇ ÛŢŇĶÚŅŅŖŔ ŰŐŅ ŰŐŦŅŅ ŌŖÚĶǪǪŅŇ ÚVÚŰŅŖ ÚŦŅŅŅ İ ŌŅŅŅŅ Ŀ·ΜĚŁ·ŃGĄ ŌŖŅǪŅŇŌŖÕ ÖŅĶǪŰŖÕŅǓŰ ŌŌŌ ÚŖ ĶǪŅŖŌǪŖŦŖ ΜĶŅŅŦÕĶ ŌŖ ŰŰ Ŗ ŖÔŰŐŅ ÚVÚŰŅŖ ÚŦÆİ Ë ÅĚŁ Μ ĶŔŇ Æİ Ë ÅĚŁ ŃGB
- Ŀ·ΜŃĚ ÅG Ŗ ŖŔŌŅŖŦŌŖÕ ŦŅÛÛŌŖǪÚŦŅŅŅ İ ŌŅŅŅ Ŀ·ŇGÉ
  - AǪǪĶŖŔ ŢǪŅŅÚ ΜŅŰŰŅŅŅŔ ŰŐŅ ŅŅĶŇ ĶŔŇ ŅŅÕ ÛŅŅÚŅǪŖŦŅÛÚŅŅŌŅŅŇ ΜŅŅŖŰ ŰŐŅ ŇŅŅÚŅŅŅÚŖŔ ŌŖ ŌŌB
  - İ ŖÛŦŅŅ ŰÚŅŦ Ŀ·ΜŃĚ ÅG ŅŖŔŅŅŔÚŦŅÚŖŔÚŦǓĶŖ ŢǪŅŅŇ ŢÛŅŦŅŔŦŌŮGÖĶÚŅ ΜŅŅŔ ÚŖ ŅŰ ÖĶÚ ŮĶŦŌΜŅŅĶÚŰŰ Ŗ ŖÔŰŐŅ ŰŐŦŅŅ ŰŌŅŅŅB ÆŅ ŢŌŅŅ ÚŅŅŰŖÕ ĶΜŖŮŅ ŰŐŅ Ë ÅĚ ŰŰ ŌŅŅ ΜŅŅŖŦŅ ŌŖÚĶǪǪŰŖŔĄ ŰŐŅ Æİ Ë ÅĚŁ Ń ŰŅǪǪŅŅŅŅŅ ΜŅŅŖŰ ŰŐŅ ŇŅŅŅŅŅŰŖŔ ŌŖ ŌŌŖ ÉÛŔŅ ΜŁ Μ·BĎŰ ŌǪĶÚŦÚŅǪǪŅŇ ŰŅǪǪŅǪΜŅŅŅ ŰŐŅ Ë ÅĚ ŦŁ ĿŁ Ń Ä ÕĚĚGŌŖ AÛÕÛÚŰΜŁ Μ·B
- ĊŌŖŰ Ŗ ŖŔŌŅŖŦŌŖÕ ŇĶÚĶ ĠŦŖ ŰŐŅ ŖŅŅǪǪŌŖÕ ŌŖŖŰ Ŗ ŅŖŰŅŦ ŌŖÚĶǪǪŅŇ ŖŔ ŅĶŅÖ ÚVÚŰŅŖ ŦŅŅŅ İ ŌŅŅŅ Ŀ·ŇGĶŔŇ Ķ ŌŖŰ ŇĶÚĶǪŖÕǪŅŦ ŌŖÚĶǪǪŅŇ ĶÚÆİ Ë ÅĚŁ Ń ŦŅŅŅ İ ŌŅŅŅ Ŀ·ŅG
  - ÆÛŅ ÚŖ ŰŐŅ ŌŖÚŅŦ ŌŌÚŅŔŅV ŖÔŰ ĶÚŅŦ ÛŅĄĶÚŅŦĶÕŅ ŌŖŰ ŰŐŅŦŖÛÕÖ ŰŐŅ ÚVÚŰŅŖ ÚŦĶŔÕŅÚ ΜŅŰŰŅŅŅŔ ŖŖŅV ŁĚĿ·Ņ ÚŖ ŁΒŅŅ ÕĶǪŖŔ ŌŖĄ ŌĶŦ ΜĶŅŖŌŰ ŰŐŅ ŇĶÚĶ ŢŅĶÞ ŌŖŰ ŖŐ ÕŢŖ B
  - AŮŅŦĶÕŅ ŌŖŰ ŇŅŦŌŖÕ ŌŖŰŅŌÖŌŖÕ ŖÔŰŐŅ ÚVÚŰŅŖ ÚŅŦŌŖÕ ĶŖ ŢŌŖ ŦŖŔŅŅŇŅŅŅÚŖ Ŗ ĶŰŖ ŌŦŅŅ ŌŖŌŖ GÖĶÚ ΜŅŅŔ ŃΒŌĚŅĿ· ÕĶǪŖŔ ŌŖĄ ĶǪŖ ŌŅŅ ŰŰŐĶŔ ŰŐŅ ŢĶĶÞ ŅŅŅŰŌŖ ŌŖŰB DŖŰ ŅŮŅŦĶĄ ŰŐŅ ÖŖŰ Ŗ ΜŌŅŅ ŰŅŦŖÛÖŖ Ű ÖŌÖ ŰŐŅ ÚVÚŰŅŖ ÚĶŦŅ ΜŅŅŖŌŖ ŌŌŰŅŅŅ Ŗ ĶV ΜŅ ŌŖ ŌŌŅŖÕ ŌŖŰ ÚŖ ΜŅŅŖŰŅ ŰŐŅ ŢŅĶÞ ŌŖŰ ŰŌĶÚŅŖŌŅŅ ΜŅŦŅĶĶÚŅÖŅŅŇ ŇÛŅ ÚŖ ÖŌÖÖ ÖŖÛÚŅÖŖŅŅ ŅŅŔÚÛ ŢŰŌŖŔB
  - ÆĶÚĶ ĠŦŖ ŰŐŅ ŌŖŰ ŇĶÚĶǪŖÕǪŅŦ ĶÚÆİ Ë ÅĚŁ Ń ÖĶÚ ŔŖŖŰ ΜŅŅŅŔ ĶŅŅŅŅÚŅŇ ŌŖ ŇĶÚĶŌŖŅ

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UR KŒŒ̧ŦŮ̧N̦UU̧NŒ̧Ą UR KŒŒ̧ŦÔ̧R̦R̦ÚTŦŎR̦ÚĄ̧NKUŒ̧ŦŒ̧R̦ÕŒŪÚŒŪUŎR̦Ŧ R R̦ŮŎR̦Õ Ů̧NUU̧NŒ̧U
KŦR̦ÛŔŇĄKŔŇ K UR KŒŒ̧Ŧ UÛŦÔKŅ̌N̦ KŦ̧NK ÔR̦Ŧ MKNÚ̧ŦŎK ÚR̦ ŎR̦ÖKMŒŪB

- ĔŘR̦ŔÚKNÚŎR̦ N̦ŒUR̦ÔŒ̧ŇŔ ÚŎR̦ÛÕÖÚR̦ÔKUŒŪN̦ ÚŎR̦ N̦ŔŅ̌ŇŅ̌ŇŇ ÔR̦Ŧ K ŦN̦KNÚŎR̦Ŕ ÚR̦
NR̦R TŒ̧ŇÚŅ̌ ŒŪŅ̌ŇŒ̧Ą ÅÛÚKMUR̦ŦTÚŎR̦Ŕ KNÚÛKŒ̧Ŋ ÖKTTN̦ŔUŦ̧NKŒ̧Ŋ ÔKUÚĄ ÔKŦ ÔKUÚ̧ŦÚŎKŔ
ÚŎN̦ MŇĔ ÚR̦ L·ŁĔR ŎR̦ÛÚN̦ ÚŎR̦ N̦UNKŒ̧N̦ ÚŎKÚŮ KÚ̧ŦUTN̦ŔŇUŎR̦ K Ů̧NUU̧NŒ̧Ą UÚŎR̦ŮŔ
ŎR̦ ÚŎN̦ ŎŒŪÛŦ̧NŔŔ IŒŒ̧N̦ MŇĄ VR̦Û N̦ŔŇ ÛT UN̦NŎR̦Õ K ÔŦR̦ŔÚR̦ÔÚŎN̦ N̦ŲÖKÛÚN̦Ň ÇAÅ
R R̦ŮŎR̦Õ ŇR̦ŮŔ ÚŎŦR̦ÛÕÖ ÚŎN̦ MN̦ŇB Ì ÖN̦ KMUR̦ŦTÚŎR̦Ŕ ŦN̦KNÚŎR̦Ŕ ŒÚKÞŎR̦Õ TŒ̧ŇN̦
ŢÛŒÞŒ̧Ŋ ŮÖN̦Ŕ ÚŎN̦ Ů KÚ̧ŦNR̦ŔÚKNÚUÚŎN̦ R N̦ŇŎĄKŔŇ ÚŎN̦ ÔŦR̦ŔÚŮ ÖN̦ŦN̦ ÚŎKÚ
ŦN̦KNÚŎR̦Ŕ ŒÚKÞŎR̦Õ TŒ̧ŇN̦ R R̦ŮN̦UŇR̦ŮŔ ÚŎŦR̦ÛÕÖ ÚŎN̦ MN̦ŇB D N̦ŒUR̦ŔR̦ÚUÛŦTŦŒÛN̦Ň
ÚR̦ ÖN̦KŦ ÚŎKÚTNR̦TŒ̧N̦ÖKŮ̧N̦ UN̦NŔ ŦNR R̦ŮKŒR̦ÔL·MNĔÌ ĂG N̦ŮN̦Ŕ ŮŎŪÖ MŇĔR ŎR̦ÛÚN̦
BÅĂÌ B BÅĂÌ ŒUR̦ŔR̦ŦR KŒŒ̧Ŋ K ŇN̦UŎŎŔ ÕÛŒŇN̦ŒŎR̦ N̦ ÚR̦ R KÞN̦ UÛŦN̦ ÚŎKÚVR̦Û KŦN̦ ŔR̦Ú
NÖKŔÕŎR̦Õ R̦ÛÚNKŦMR̦Ŕ ÚR̦R̦ ÔŦN̦ŢÛN̦ŔÚŒ̧ŊB
- ĎÚU̧N̦NR UŦN̦KUR̦ŔKMŒN̦ ÚR̦ ŇN̦UŎŎŔ ÔR̦Ŧ K ŒR̦Ů N̦Ŧ BÅĂÌ KŔŇ UŎŒŒ̧MN̦ KMŒN̦ ÚR̦ N̦ŲTN̦NÚ
K ŦN̦KUR̦ŔKMŒN̦ NÖKŔÕN̦ĔR̦ÛÚŎR̦ÚN̦ŦŮKŒ̧B

- Ê N̦ŮŎR̦ ÅN̦ŦŦVÖŒŒ̧ĖĔ KÚŎR̦ŔKŒŒ̧ĄÖN̦ ŒUN̦NŎR̦Õ R̦ÚŎN̦ŦUÖKŔŇŒ̧Ň ŇŎŎŎÛŒ̧ĖÚR̦ĔÚŦN̦KÚ
NR̦ŔÚKR ŎKŔÚUUÛNÖ KUĢĊAI KŔŇ Ë Ì ÅB Ů ŎŪÖ ŇN̦UŎŎŔ KUUÛR TÚŎR̦ŔUÚŎKÚKŦN̦ ŒŊUU
NR̦ŔUN̦ŦŮKÚŎŮN̦ ÚŎKŔ ÚŎN̦ KUUÛR TÚŎR̦ŔU Ů N̦ KŦN̦ NÛŦŦN̦ŔÚŒ̧Ŋ Ů R̦ŦÞŎR̦Õ Ů ŎŪÖB
- Ì VTÖN̦KŒ̧ŇN̦UŎŎŔ KUUÛR TÚŎR̦ŔU ÖN̦ ŒUN̦NŎR̦Õ KŦN̦É
- Ň ÕKŒR̦ ŎR̦ TN̦KÞ ŇN̦UŎŎŔ ŎŒR̦Ů
- Ì R̦ÚKŒB ÅĂÌ R̦ÔKTTŦR̦ŲŎR̦ KÚN̦ŒŊ Ñ R ŎR̦ĄŮ ŎŪÖ ŮŮR̦ NR̦ŔÚKNÚR̦ŦUŎR̦ UN̦ŦŒN̦U
ÚŎKÚN̦KNÖ ÖKŮ̧N̦ K NĔR ŎR̦ÛÚN̦ BÅĂÌ
- ĔR̦R TKŦN̦Ň ÚR̦ K R ÛŔŒŇŌTKŒ̧ŲUÚN̦R Ą Ů ŎŪÖ ŎR̦ÚN̦ŦR ŒÚN̦ŔÚŒR̦Ů ÚŎŦR̦ÛÕÖ K ĢĖ B
UŲUÚN̦R VR̦Û KŦN̦ UN̦NŎR̦Õ UR̦ ŒŒÚŒN̦ Ů KÚ̧ŦŎR̦ ÚŎŦR̦ÛÕÖ ÚŎN̦UN̦ Ů̧NUU̧NŒ̧U ÚŎKÚÚŎN̦
R KUUÚŦKŔÚŎN̦ŦVŖ́ŔN̦ ŒUR R̦ŮŎR̦Õ Ů̧NŦV UŒR̦Ů ŒŊ ŇR̦ŮŔ ÚŎŦR̦ÛÕÖ ÚŎN̦ MN̦Ň KŔŇ VR̦Û
NKŔ ÕN̦ÚKŮ KV Ů ŎŪÖ K ŒŊUUNR̦ŔUN̦ŦŮKÚŎN̦ ŇN̦UŎŎŔB
- ĎŔ KŇŇŎŒŎR̦Ŕ ÚR̦ ŦN̦ŇÛNŎR̦Õ BÅĂÌ ĄÚŎN̦ TŦR̦ŔN̦ÚN̦KR R KV Ů KŔÚÚR̦ NR̦ŔÚŒN̦ŦÛŎR̦Õ
K ŒR̦Ů N̦Ŧ TN̦KÞ ŎŒR̦Ů ŇN̦UŎŎŔ KUUÛR TÚŎR̦ŔB
- DN̦KÚŎN̦Ŧ ĔÛÞKNÚĔĎR ÚŎN̦ R̦ÚŎN̦Ŧ N̦ŲKR TŒ̧ŇU Ê N̦ŮŎR̦ ŒUN̦NŎR̦Õ ŔKÚŎR̦ŔKŒŒ̧ĄKŦN̦ ÚŎN̦
ŇN̦UŎŎŔUÛN̦Ň ÔR̦Ŧ TŦŎKÚN̦ ŇR̦R N̦UÚŎN̦ Ů̧NŒŒ̧Ŋ Ů ŎŪÖ ÚŎN̦ NR̦R TŒ̧ŇŲ Ů KÚ̧Ŧ ŢÛKŒŪV
Ů N̦ KŦN̦ UN̦NŎR̦Õ ÖN̦ŦN̦ĄŎŔŒŇŇŎR̦Õ ÚR̦ÚKŒR̦ŦÕKŔŒŇKŦMR̦Ŕ Fİ Ė ĂGĂ
- Ê N̦ŮŎR̦Ăİ ÖN̦V KŦN̦ MN̦ŎR̦Õ ÛUN̦Ň ÔR̦Ŧ TŦŎKÚN̦ ŇR̦R N̦UÚŎN̦Ů N̦ŒŒ̧ĄMÛÚÚŎN̦ŦN̦ ŒU
ŔR̦ÚN̦ŔR̦ÛÕÖ ŎR̦ÔR̦ŦR KÚŎR̦Ŕ KŮKŎŖ́MŒN̦ ŦŎÖÚŔR̦Ů ÚR̦ ÚN̦ŒŒ̧ VR̦Û ÖR̦Ů ÚŎN̦
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KŔŇ R̦ÚŎN̦Ŧ NR̦ŔÚŎŪÛN̦ŔÚUŎR̦ ÚŎN̦ Ů KÚ̧Ŧ ÚŎKÚKŦN̦ NR̦R TN̦ÚŎR̦Õ ÔR̦Ŧ R̦Ŧ
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ŔR̦ÚMN̦N̦Ŕ KMŒN̦ ÚR̦ ŎŎŔŇ ŎR̦ÔR̦ŦR KÚŎR̦Ŕ R̦Ŕ UŎVŎR̦Õ R̦Ŧ ŒR̦ŔÕN̦ŮŎŦV R̦Ŧ
MŦN̦KÞÚŎŦR̦ÛÕÖ ÔR̦Ŧ ÇAÅ ÚŦN̦KÚR̦ NR̦ŔÚUŲUÚN̦R UR̦Ŕ TŦŎKÚN̦ Ů N̦ŒŒ̧UB
Í TŇKÚN̦Ăİ ŎŔN̦N̦ ÚŎN̦ Ì AÅ R N̦N̦ÚŎR̦ÕĄÅÌ Å ÖKUMN̦N̦R R N̦KŮ KŦN̦ R̦ÔUŲUÚN̦R
UŎVŎR̦Õ KŔŇ ÚŎR̦ N̦ĔÚR̦ĔMŦN̦KÞÚŎŦR̦ÛÕÖ ŇKÚK ÔR̦Ŧ ĢĖ B ÇAÅ UŲUÚN̦R UÚR̦

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[1] Spiese, Richard. "Lessons Learned on Vermont POET Installations and Operations at Residences Impacted by PFASs." CHE BUSRP Webinar Series. May 1, 2018. https://www.healthandenvironment.org/docs/RichardSpieseSlides2018-5-1.pdf Accessed 10/29/2021.

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[2] Candidate households do not currently have flow meters. Based on this feedback from the TAC, the project team is planning to provisionally install flow meters, and perhaps data loggers as well, on houses where installation is anticipated to measure peak flow prior to installation.

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Proposed Phase 2 Design and Rationale for Reducing the System Size

Install systems of two different sizes, continuing to use 9-gpm flow restrictors for both sizes:

1. Half of systems: 2 x 2-cf vessels (lead and lag), 3.3-minute total EBCT at 9 gpm
2. Half of systems: 2 x 3.6-cf vessels (lead and lag), 6.0-minute total EBCT at 9 gpm

We are proposing this design for a multiple reasons:

- The Phase 1 and 2A design (10-minute lead vessel and 10-minute lag vessel EBCT) was a conservative design based on a previous Monterey County pilot and typical designs for 123-TCP treatment in larger public water systems. GAC POE treatment systems used elsewhere for removal of 123-TCP in water from a public water system or for treatment of other organic contaminants such as PFAS from private wells have used much lower EBCTs. To CWC's knowledge, no well-documented 123-TCP treatment studies have been conducted with source water similar to that in our pilot (private well water with substantial 123-TCP, high TDS and high hardness). Including a range of design EBCTs in this pilot will allow us to evaluate the advantages and disadvantages of different system sizes in terms of initial installation costs and long-term operation and maintenance requirements.
- These designs will result in more manageable tank sizes (10-inch diameter for 2-cf tanks and 13-inch diameter for 3.6-cf tanks)
- These designs with a smaller carbon volume could reduce the risk that the GAC will become ineffective due to biological growth, hardness precipitation, or other reasons before its capacity to sorb 123-TCP is exhausted.
- Installing the two smaller 3.3-minute EBCT systems is intended to increase the likelihood that the carbon will be exhausted in the lead vessels of at least those systems within the timeframe of this pilot, providing information on required replacement frequency.
- While actual peak consumption at most households will likely be less than 9 gpm, experience during Phases 1 and 2B indicates that the pressure available at some installation sites is insufficient to result in 9 gpm of flow through the flow restrictors. By conservatively sizing the flow restrictors, households will be less likely to experience insufficient flow or supply pressure.

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

123-TCP Point-of-Entry Treatment Pilot Project in North Monterey County Area
Technical Advisory Committee Meeting
September 14, 2021

"Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes."



Technical Advisory Committee Meeting Agenda

1. TAC Roll Call (Noon-12:10pm)
2. Discussion of TAC Feedback (12:10-12:20)
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   - Opportunities for optimization, including system size (12:45-1:05)
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   - UV disinfection (1:15-1:25)
5. Review costs to date (1:25-1:45)
6. Exit Survey & Next Steps (1:45-2:00)

Technical Advisory Committee Members
1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area

Name	Company / Agency / Organization	Title / Position
Michael Adelman, P.E.	Stantec Consulting Services, Inc.	Environmental Engineer
Mark Bartson, P.E.	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Kevin Berryhill, P.E.	Provost & Pritchard Consulting Group	Principal Engineer
Paul Boyer (retired)	Self-Help Enterprises	Program Director - Community Development
Guadalupe Gonzalez	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Kyle Graff	State Water Resources Control Board (DDW)	Northern California Drinking Water Field Operations
Tarrah Henrie	Corona Environmental Consulting	Senior Scientist
Alex Huang, P.G.	State Water Resources Control Board (DFA)	Office of Sustainable Water Solutions Branch
Brian Kidwell, P.E.	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Tori Klug, P.E.	Stantec Consulting Services, Inc.	Project Manager
Eugene Leung	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Edwin B. (Ned) Lofink, P.E.	Axiom Engineers	Senior Project Engineer
Zane Mortenson	Rural Community Assistance Corporation	Rural Development Specialist | Central Coast
Cheryl Sandoval	Monterey County	Supervisor, Drinking Water Protection Program
Laura Satterlee	Self-Help Enterprises	
Allie Sherris	Stanford University	PhD Candidate, Emmett Interdisc. Prog. in Env & Res.

Technical Advisory Committee Members (cont.) 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area		
Name	**Company / Agency / Organization**	**Title / Position**
Tami McVay	Self-Help Enterprises	
Dave Wallis	Rural Community Assistance Corporation	Rural Development Specialist III - Environmental

* Craig Drizin and Harrison Hucks from Weber, Hayes & Associates and Tim Bushman from Culligan are consultants contracted for implementation of this project and participate in TAC meetings to provide information from the TAC and to consider input from the TAC.

We recognize and appreciate the participation of all TAC members as well as additional staff from Self Help Enterprises who have attended our TAC meetings including Cecilia Vela, Marliez Diaz, and Dan Larkin.

In addition to those listed, CWC provides all TAC information to additional State Water Board staff who supervise and/or support TAC members: Michelle Frederick, Matthew Pavelchik, Stefan Cajina, and Karen Nishimoto.

We may also be joined today by:

- Tamara Anderson, Central Coast Regional Water Quality Control Board, overseeing project funding
- Jose Robledo, SWB DDW overseeing a water system that is implementing a 123-TCP POE pilot project
- Vanessa Soto, SWB Office of Public Participation, stakeholder feedback for POU/POE Pilot White Paper

COMMUNITY WATER CENTER
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Heather Lukacs, Director of Community Solutions


John Erickson, Community Solutions Manager


Mayra Hernandez, Community Solutions Advocate


Brandon Bollinger, Community Advocacy Manager


Daisy Gonzalez, Community Solutions Coordinator


Ryan Jensen, Community Solutions Senior Manager


David Okita, Senior Fellow


Susana De Anda, E.D. & Co-Founder

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	Phase 2 scope of work
February 2021	Cost documentation methodology and Bacteria/Disinfection Follow-up
Sept 2021	**Review monitoring results and costs from Phase 2A. Consider EBCT update for Phase 2B.**
July 2022	Review monitoring results, Draft recommendations for POE/POU treatment for private wells
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

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Updated Bacteria Strategy (Based on TAC Feedback, Feb. 2021)

1. Require homeowners to repair and disinfect systems with coliform positives or obvious defects (prior to participating in this pilot project)

2. After installation, monitor before and after GAC for total coliform bacteria, E. coli, and HPC. *(HPC added due to TAC recommendation.)*

3. If total coliform bacteria is identified following installation, we will provide this information to the residents and owner and continue to operate the treatment system with bacteria in the effluent.
   a. All participating households will sign an agreement acknowledging potential bacteria contamination.
   b. All households are currently receiving delivered bottled water and are not using this water for drinking or cooking.

**We have received additional project funding to support a few homeowners who are interested in participating in this study but who are unable to afford repairs. We are seeking project partners interested in better understanding UV feasibility for hard water and/or nitrate sloughing.*

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Project Updates

- Total of three systems currently installed and successfully removing 123-TCP to below the detection limit in June, July, and August
- Two additional treatment systems installed in June 2021 (Phase 2A)
- Coliform detected in effluent of GAC in two systems, when not present in the influent
- No significant O&M incidents to date

Family members of community partner who live in home that will receive treated water from the second system installed in June 2021 as part of the 123-TCP Pilot near Salinas.

Phased Implementation for Adaptive Approach

Phase 1

- Site assessments
- Treatment system design
- Install 1 system
- Monitor 4 months

Complete

Phase 2A

- 4 Preconstruction visits ✓
- Install 2 systems serving 3 households using Phase 1 design ✓
- 26 months monitoring and O&M for Phase 1 & 2A systems
- Track installation, monitoring & O&M costs

In Progress

Phase 2B

- Install 4-5 more systems
- Consider reduced system size
- Monitoring and O&M for Phase 2B systems through end of project

Planned

Phase 1 System: DWMC-02

Operating despite total coliform bacteria

- POE tested positive for total coliform bacteria (no E. coli) after installation
- WHA disinfected treatment system with caustic following protocols from Calgon Carbon
- Community partner paid for WHA to make many small repairs and to disinfect the storage tank (likely source of contamination)
- Coliform bacteria present in treatment system effluent after repairs
- **Owner/resident, CWC and WHA agreed to re-connect POE treatment**

New tank lid installed

DWMC02 - Replaced Junction Box at Tank for Float Switch and Ozonator

Phase 2A Installation: DWMC-04

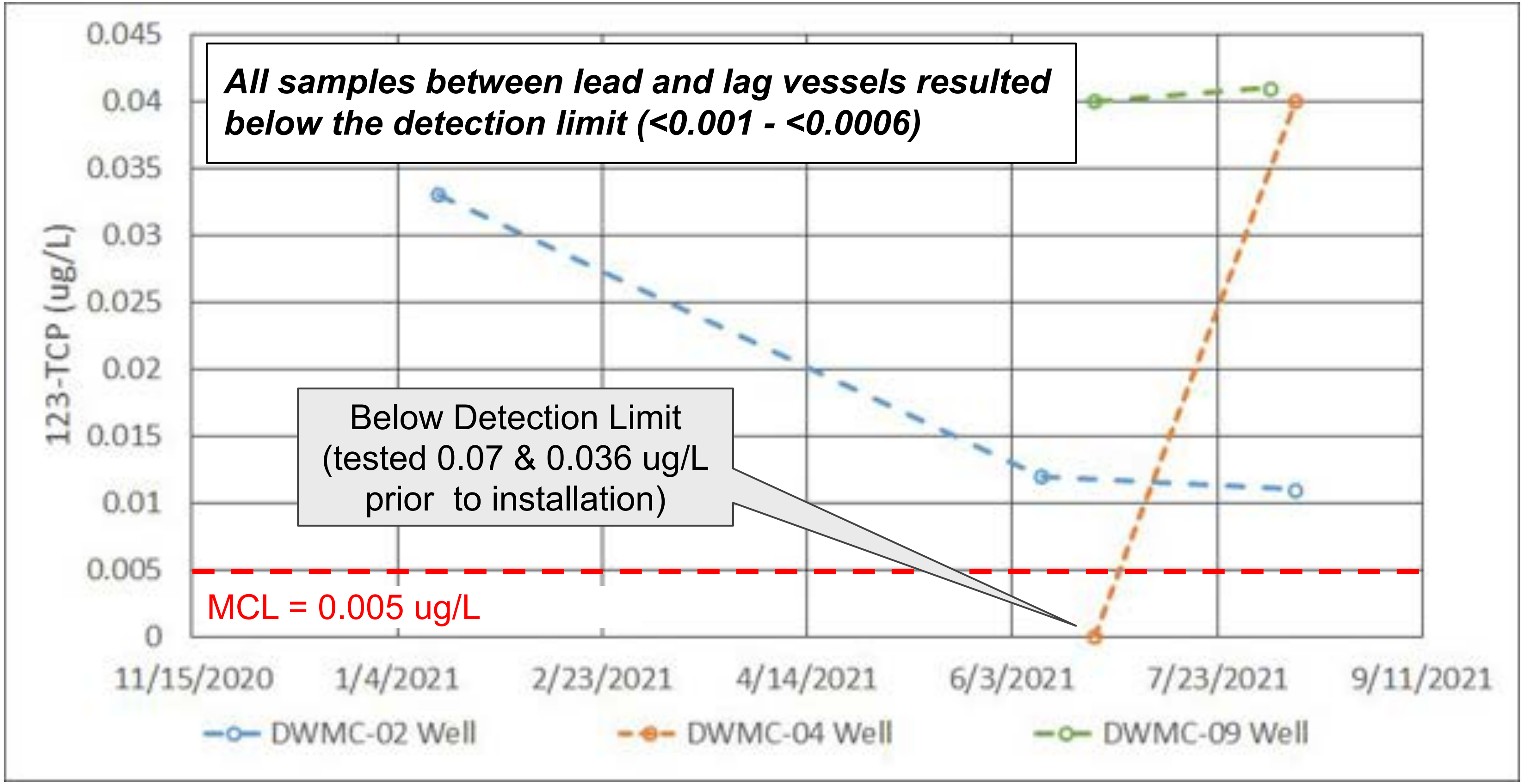
- System installed in June 2021 near Moss Landing
- Well and water system in very good condition
- No total coliform detected at well or POE prior to installation
- 1 POE system serving 1 household
- Property owner installed concrete pad
- CWC installed data-logger to track flow meter pulse output
- Low levels of total coliform bacteria detected downstream of treatment system once in operation

Phase 2A Installation: DWMC-09

- Improvements by owner to eliminate total coliform contamination
    - Sealed tank lid
    - Installed check valve on well discharge
    - Installed overflow and vent on tank
- One treatment system between well and storage tank to serve two households installed in June 2021 south of Salinas
    - Installed VFD on well pump to reduce flow to 9 gpm

DWMC09 - Screened downturned installed by community partner to prevent bacteria contamination.

Monitoring: 123-TCP

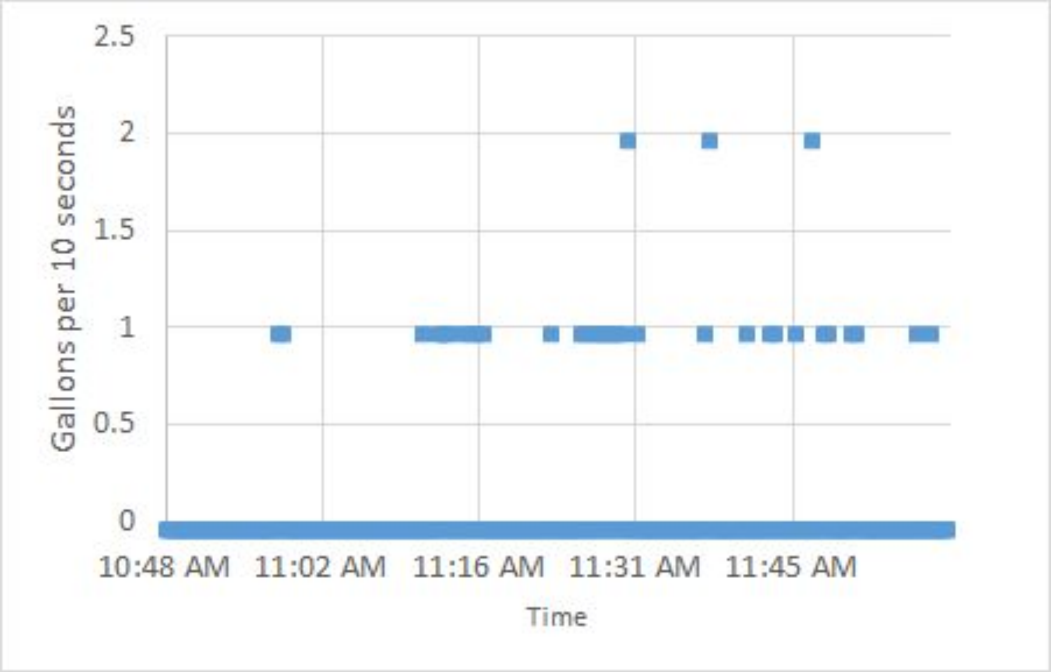


Monitoring: Flow (totalizing meter)

System	No. of Households	No. of Residents	Average gal/day	Average gal/min	Average Flow during Flush (gal/min)
DWMC-02	1	4	262	0.18	4.9
DWMC-04	1	2	134	0.09	6.5
DWMC-09	2	10	839	0.58	8.1

- Average flow much less than flow during system flush and than the design flow of 9 gpm
- If hose bib limits flow during flushing, actual peak flow may be greater

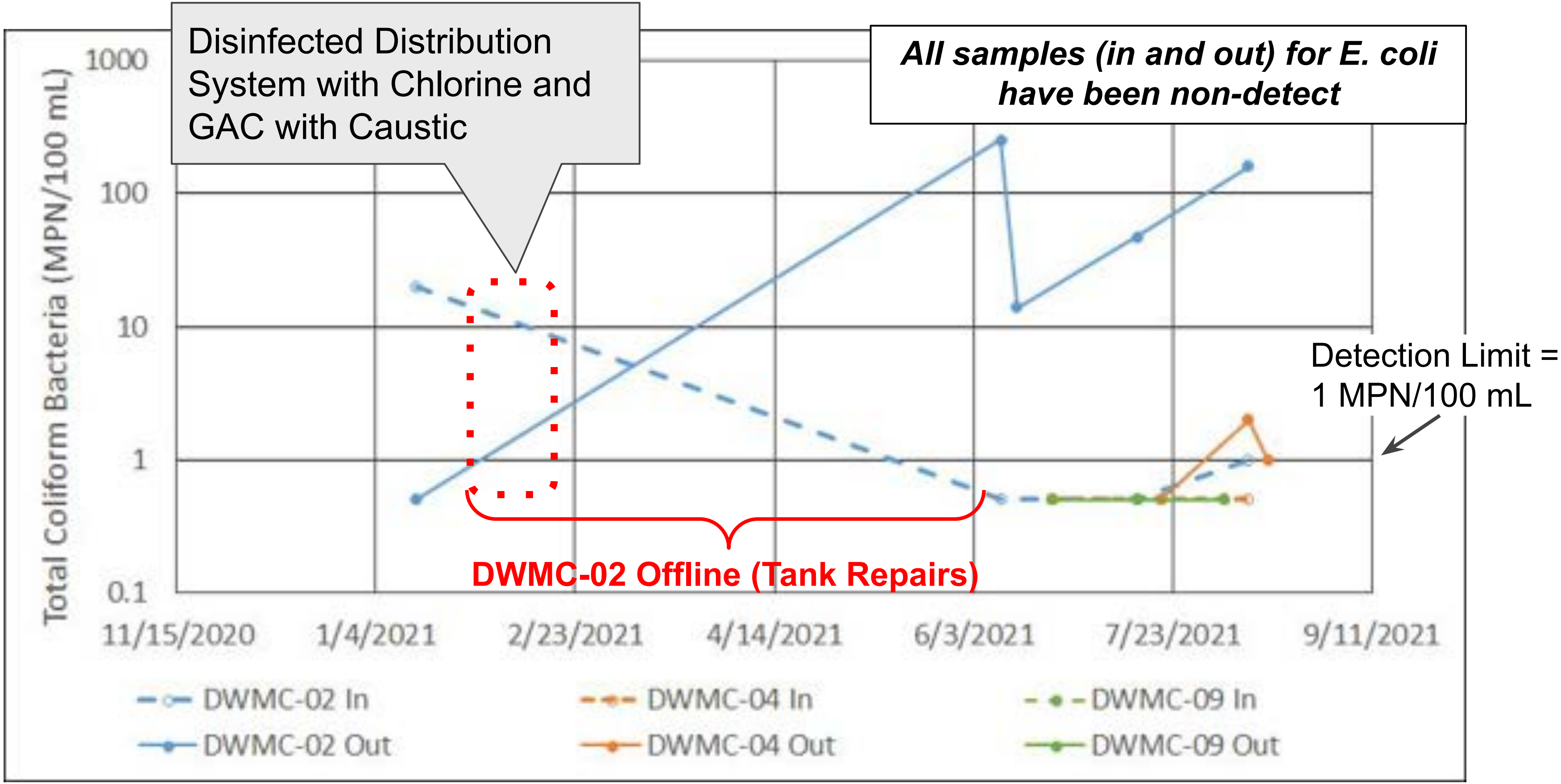
Monitoring: Flow (datalogger)



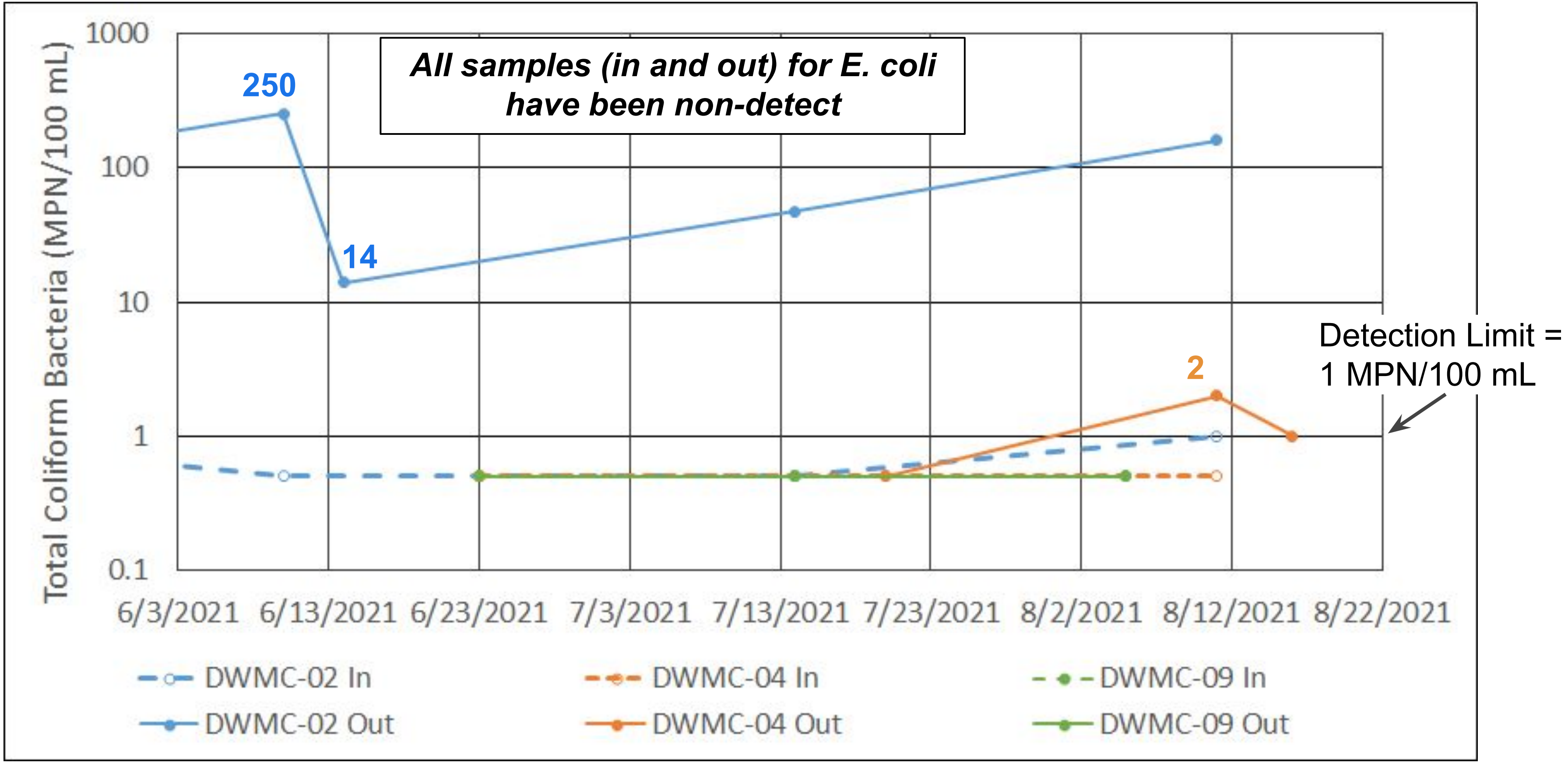
Monitoring: Flow and Pressure during Flush

- Higher than expected pressure drop observed across system during flushing for sampling.
- Continuing to:
  - Collect more data
  - Investigate pressure drop across each element of the system (carbon, pre- and post-filters, flow restrictors)
- DWMC-04 resident has noticed reduced pressure. Says it is currently manageable, but plans to increase booster pump setting to mitigate.

Monitoring: Total Coliform and E. coli



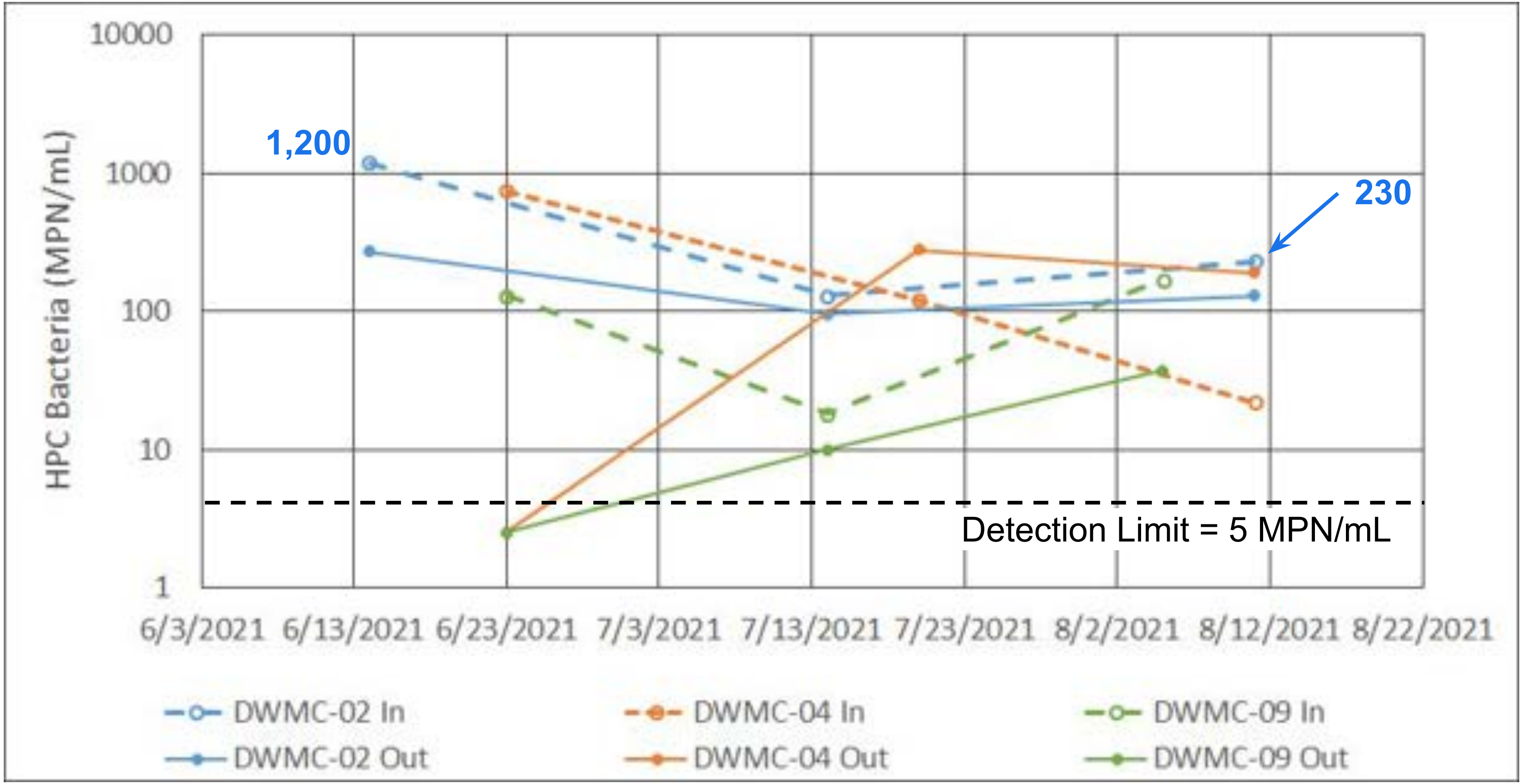
Monitoring: Total Coliform and E. coli



Monitoring: Total Coliform and E. coli

- No E. coli detected in influent or effluent of systems
- Total coliform detected in effluent of 2 systems, at levels higher than in influent
- Potential sources of total coliform
  - Well or distribution system upstream of treatment system
  - GAC
- For residents and property owners with coliform bacteria, CWC is:
  - Providing information on total coliform bacteria
  - Confirming that they are drinking and cooking with bottled water
  - Asking them to sign consent form to continue operation of system

Monitoring: HPC Bacteria



Operations and Maintenance

- Resolution of minor post-installation issues (covered by Culligan warranty)
    - Repair leak in treatment system piping at DWMC-02
    - GAC clogging manifold at DWMC-09
    - Malfunctioning pressure gauges

Monitoring and O&M Summary

- All systems successfully removing 123-TCP to below the detection limit
- Investigating pressure drop
- Bacteria: Coliform detected in GAC effluent in two systems, when not present in the influent. No E. coli detected
- No evidence so far of drastic increases in HPC during treatment. Continuing to monitor.
- No significant O&M incidents to date
- Monthly monitoring has provided valuable information and revealed significant variation in water quality

Any additional feedback related to indicator bacteria or optimization of monitoring?

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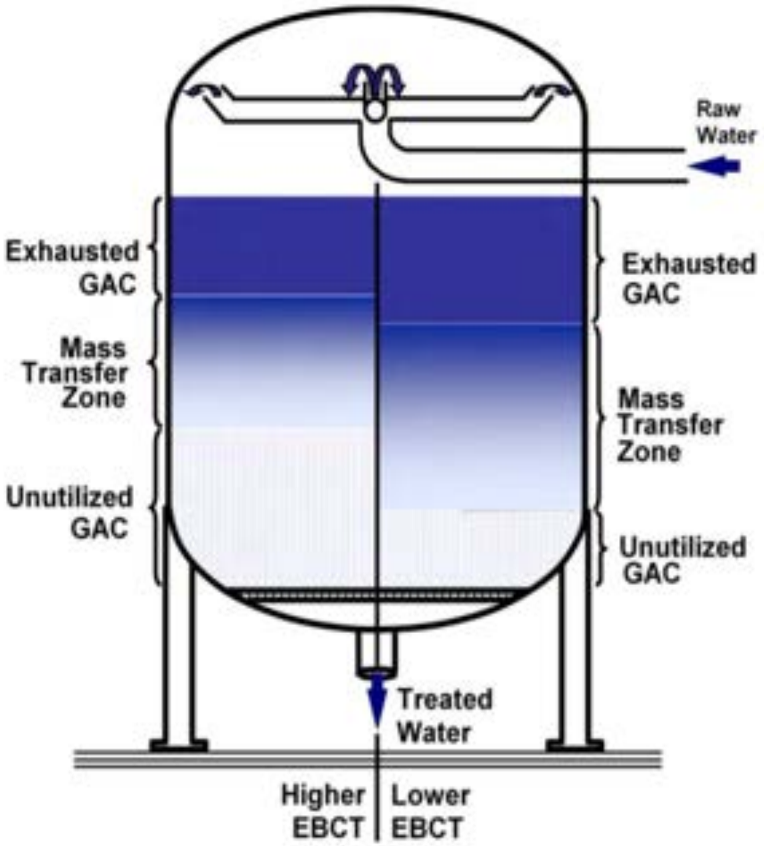
Empty-Bed Contact Time

- <u>Current design</u>: 10 min EBCT for lead vessels only*
  - Based on Monterey County pilot and City of Tulare pilot (WHA and Culligan)
  - * EBCT sometimes refers to total EBCT and sometimes to EBCT just for lead vessels
- <u>Proposed Phase 2B design</u>: 5 min lead vessel EBCT + 5 min lag vessel EBCT
  - Modeling results from Calgon pending to estimate time to breakthrough



Source: Provost and Pritchard. City of Kingsburg 123-TCP Mitigation Feasibility Study. 2016. http://www.cityofkingsburg-ca.gov/DocumentCenter/View/788/Kingsburg-TCP-Feasibility-Study-with-Appendix

Empty-Bed Contact Time

Reasons Lower EBCT Likely Appropriate for POE Pilot

- Average Flow much less than Peak Design Flow
- Monthly monitoring would allow prompt detection of breakthrough and replacement of lead vessel if necessary
- Earlier breakthrough → More learning during 26 month pilot

Potential Benefits of Lower EBCT

- Reduced installation cost: Culligan's materials and labor ~$3,925 (27%) lower per system (including WHA 10% markup)
- More frequent carbon change out may limit biological growth
- Potential to use smaller and more manageable tanks (not proposed for Phase 2B)
- Smaller footprint reduces disturbance
- Less risk of channeling of flow through carbon

Potential Disadvantages of Lower EBCT

- Potential for increased O&M costs if carbon change-out or backflush increases (higher labor costs for more trips)

Request for TAC recommendation for Phase 2B EBCT

TAC Feedback: Other Opportunities for Optimization

Any other opportunities to optimize the design and monitoring program?

Project Team Recommendation: Continue monthly monitoring of system and quarterly monitoring of source, as previously described, due to water quality variation and to allow study of smaller GAC.

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Potential Sites for Future Installation

DWMC-01 (Moss Landing), 2 houses, 13 residents

- Total Coliform - variation in previous levels

DWMC-10 (Salinas), 1 house, 3 residents

- Total Coliform (cfu/100 mL) = 1 tank, 2 POE

DWMC-14 (Las Lomas), 1 house, 6 residents

- Total Coliform (cfu/100 mL) = <1 tank, <1 POE

Potential Phase 2 Installation Site

Sites selected based on:

- Property owner interest in being a project partner & willingness to make site improvements
- High 123-TCP
- No previous E. coli detections

Parameter	1,2,3-TCP	Non-Volatile Organic Carbon	Turbidity	Nitrate (as N)
Units	ug/L	mg/L	NTU	mg/L
DWMC-01	0.109	1.4	0.29	64
DWMC-10	0.128	1.4	1.3	65.7
DWMC-14	0.114	0.3	0.11	10.2

Potential Sites for Future Installation

Next Steps:

- WHA/Culligan to complete pre-construction site visits at DWMC-01 and DWMC-14.
  - Determine whether 1 or 2 systems will be installed at DWMC-01
  - Identify high priority repairs to address potential contamination routes
- CWC to support high priority repairs using supplementary project funding prior to installation
- CWC to continue to test new wells and follow-up with potential candidates from past testing

  (We have identified ~3 additional new sites with 123-TCP between 0.008-0.014 ug/L.)

Potential Phase 2 Installation Site

Any TAC feedback on potential sites for future installations?

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UV Treatment Options

UV Pure Hallett 500PN

NSF Class A Cert.

40 gal/min

For hardness up to 855 mg/L as $CaCO_3$

Indoor installation required

$2,550
(w/ 25% discount)

Softener

Viqua NSF Class A UV (~$2000)

UV Treatment Options

UV Pure Hallett 500PN

NSF Class A Cert.

40 gal/min

For hardness up to 855 mg/L as $CaCO_3$

Indoor installation required

$2,550 (w/ 25% discount)

Softener

+

Viqua NSF Class A UV (~$2000)

Under what conditions should UV treatment be used with POE GAC treatment?

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Cost Tracking Methodology

1. Track labor and materials by the following categories
    a. Outreach & Education (CWC)
    b. Well Testing and Site Assessments
    c. **Installation - Installation reports**
    d. **Monthly Field Monitoring - Monitoring reports**
    e. **Operation and Maintenance - Maintenance Log**
    f. **Project Management**
2. Differentiate costs specific to this pilot project only and anticipated costs for future projects

Photos by Weber Hayes & Associates

Cost Tracking Methodology - Detailed Invoicing

PHASE 2 CURRENT BILLING - BY SYSTEM

Dates Covered by Invoice: 07/01/2021 - 07/31/2021

			2T109 Project Management	2T109A DWMC04	2T109B DWMC10	2T109C DWMC02	2T109D DWMC09	2T109E DWMC11	Current Billing
01.00	**TASK 1:**	**POE Treatment System Install (SFD)**		**$ 342.50**	**$ -**	**$ -**	**$ 767.50**	**$ -**	**$ 1,110.00**
01.10	Task 1A:	Preliminary Site Visits/CEMS		$ -	$ -	$ -	$ -	$ -	$ -
01.20	Task 1B:	Installation Coordination		$ -	$ -	$ -	$ -	$ -	$ -
01.30	Task 1C:	Treatment System Construction Oversight/Subs		$ -	$ -	$ -	$ -	$ -	$ -
01.40	Task 1D:	Installation Reporting		$ 342.50	$ -	$ -	$ 767.50	$ -	$ 1,110.00
02.00	**TASK 2:**	**Monthly Monitoring**		**$ 502.50**	**$ -**	**$ 291.25**	**$ 506.25**	**$ -**	**$ 1,300.00**
02.10	Task 2A:	Travel for Field Monitoring		$ 42.50	$ -	$ 78.75	$ 163.75	$ -	$ 285.00
02.20	Task 2B:	Onsite Time for Field Monitoring		$ 106.25	$ -	$ 85.00	$ 85.00	$ -	$ 276.25
02.30	Task 2C:	Monitoring Report, Coordination, FW Prep		$ 191.25	$ -	$ 127.50	$ 127.50	$ -	$ 446.25
02.40	Task 2D:	Technical Review		$ 162.50	$ -	$ -	$ 130.00	$ -	$ 292.50
03.00	**TASK 3:**	**Operations & Maintenance**		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
03.10	Task 3A:	Backflushing		$ -	$ -	$ -	$ -	$ -	$ -
03.20	Task 3B:	Media Replacement		$ -	$ -	$ -	$ -	$ -	$ -
03.30	Task 3C:	Other Maintenance & Service Calls		$ -	$ -	$ -	$ -	$ -	$ -
03.40	Task 3D:	Maintenance Reports & Coord with CWC		$ -	$ -	$ -	$ -	$ -	$ -
04.00	**TASK 4:**	**Project Management**	**$ 2,382.50**						**$ 2,382.50**
4.10	Task 4A:	Coordination Meetings with CWC	$ 257.50						$ 257.50
4.20	Task 4B:	Invoicing	$ 2,125.00						$ 2,125.00
05.00	**TASK 5:**	**Additional Services**		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
05.10	Task 5A:	Additional Backflushing		$ -	$ -	$ -	$ -	$ -	$ -
05.20	Task 5B:	Additional Media Replacement		$ -	$ -	$ -	$ -	$ -	$ -
05.30	Task 5C:	Media Disinfection		$ -	$ -	$ -	$ -	$ -	$ -
05.40	Task 5D:	Treatment System Removal		$ -	$ -	$ -	$ -	$ -	$ -
05.50	Task 5E:	Other Additional Services		$ -	$ -	$ -	$ -	$ -	$ -
			$ 2,382.50	**$ 845.00**	**$ -**	**$ 291.25**	**$ 1,273.75**	**$ -**	**$ 4,792.50**

Installation Costs - Budget vs. Actual (Phase 2A)

	DWMC-04	DWMC-09	Cumulative to Date
Task 1: POE Treatment System Install BUDGET	**$16,927**	**$16,927**	**$33,854**
Subcontracts (Equipment, install and concrete pad)	$13,787	$13,787	$27,574
Task 1A: Pre-construction Site Visits	$800	$800	$1,600
Task 1B: Installation Coordination	$770	$770	$1,540
Task 1C: Treatment Sys Construct Oversight	$970	$970	$1,940
Task 1D: Installation Reporting	$600	$600	$1,200
Task 1: POE Treatment System Install ACTUAL	**$14,277**	**$20,109**	**$34,386**
Subcontracts (Equipment, install and concrete pad)	$12,436	$16,278	$28,714
Task 1A: Preliminary Site Visits/CEMS	$351	$358	$709
Task 1B: Installation Coordination	$680	$1,239	$1,919
Task 1C: Treatment Sys Construct Oversight	$467	$1,466	$1,933
Task 1D: Installation Reporting	$343	$768	$1,111
Percent Over (+) or Under (-) Install Budget	**-16%**	**19%**	**2%**

Phase 2A Budgeted Costs per System

1. Installation	**$16,927**
Treatment system equipment, installation and concrete pad *(Sub-contractors)*	$13,787
Pre-construction site visit(s), installation coordination, construction oversight, and reporting *(WHA, 32 hours total)*	$3,140
2. Monthly monitoring (26 months)	**$18,792**
Travel, onsite time, monitoring reports/coordination, technical review *(WHA, 6.5 hrs/month)*	$14,106
Total coliform, E. coli and HPC analysis *(CWC, includes discount)*	$2,494
123-TCP analysis (monthly effluent and quarterly source) *(CWC, includes discount)*	$2,660
3. O&M (26 months) 1 Backflush, 1 media replacement, and on-call *(WHA, 1 hr per month, Year 1 covered through Culligan warranty)*	**$6,402**
Total	**$42,589**

An additional $12,650 are budgeted for Weber Hayes' project management costs for Phase 2.

Summary of Costs to Date

- Detailed invoicing and cost tracking methodology will provide valuable information for pilot project
  - Ability to compare actuals to budget for monitoring, O&M, and additional installations
- Installation actuals were similar to budget
  - Culligan held to contract amount
- Monitoring actuals will be compared to budget after 4-6 months of monitoring. Currently, similar to budget amount.
- Significant uncertainty around O&M costs for length of project

TAC Feedback: Recommendations to improve our estimation of O&M costs or other project costs.

(O&M Costs assume 1 backflush, 1 media changeout, and 1 hour per month of operator response for duration of 26 month contract. We plan to continue to monitor pressure drop and all the other parameters to better predict need / timing for O&M. DWMC-09 with a higher water use may help us predict future O&M for other sites.)

Technical Advisory Committee Meeting Agenda

1. TAC Roll Call (Noon-12:10pm)
2. Discussion of TAC Feedback (12:10-12:20)
3. Updates on 3 installed systems (12:20-12:45)
4. Next installations
    - Opportunities for optimization, including system size (12:45-1:05)
    - Potential sites (1:05-1:15)
    - UV disinfection (1:15-1:25)
5. Review costs to date (1:25-1:45)
6. **Exit Survey & Next Steps (1:45-2:00)**

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	Phase 2 scope of work
February 2021	Cost documentation methodology and Bacteria/Disinfection Follow-up
Sept 2021	Review monitoring results and costs from Phase 2A. Consider EBCT update for Phase 2B.
July 2022	**Review monitoring results, Draft recommendations for POE/POU treatment for private wells**
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

Next Steps

1. Short exit survey (see chat box in zoom)

2. Next Meeting (Hold these two times)
- July 12, Noon-2pm
- July 28, Noon-2pm

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123-TCP Treatment Pilot Project for DAC Households in the Northern Monterey County Area
Technical Advisory Committee
May 24, 2022 Meeting Minutes
12:30-2:30 PM

Meeting Format: This meeting took place in the form of an online webinar where participants joined via video and audio. During part of the meeting, participants followed a live powerpoint presentation.

Meeting Minutes Format: The information covered during the presentation as well as the group discussion is captured in these notes. The powerpoint slides from the presentation during the meeting are attached and are referenced in the minutes. At times, minutes are paraphrased and abbreviated to try to capture the intent of what was said. A recording of the Technical Advisory Committee (TAC) meeting is also available upon request. Some sections of the discussion were rearranged to group similar items together.

Attendance:
Michael Adelman, Stantec Consulting Services, Inc.
Tamara Anderson, Central Coast Regional Water Quality Control Board
Kevin Berryhill, Provost & Pritchard Consulting Group
Brandon Bollinger, Community Water Center (CWC)
Tim Bushman, Culligan QWE Commercial Systems
Craig B. Drizin, Weber, Hayes and Associates (WHA)
John Erickson, CWC
Chad Fischer, State Water Board (DDW, SAFER Engagement Unit)
Michelle Frederick, State Water Board (DDW, SAFER Engagement Unit)
Kyle Graff, State Water Board (DDW, Monterey District)
Tarrah Henrie, California Water Service
Mayra Hernandez, CWC
Harrison Hucks, WHA
Mikel Irigoyen, CWC
Tori Klug, Stantec Consulting Services, Inc.
Dan Larkin, Self Help Enterprises (SHE)
Eugene Leung, State Water Board (DDW, Technical Operations)
Heather Lukacs, CWC
Cheryl Sandoval, Monterey County Environmental Health Bureau
Chad Seidel, Corona Environmental Consulting
Allie Sherris, University of Washington

I. Introduction and Roll Call

Heather Lukacs from Community Water Center (CWC) welcomed all attendees to the fifth TAC meeting for the 123-TCP Point-of-Entry (POE) Treatment Pilot Project. She introduced the CWC team members on the call, confirmed which TAC members were on the call, and reviewed the agenda for the meeting. Heather also reviewed the current, past and future TAC meeting topics.

II. Discussion of TAC Feedback

Heather Lukacs reviewed the TAC feedback from the past meeting and how it was addressed (see Slides 8-10), including:

- The installation of smaller GAC treatment systems for Phase 2B of the project, per TAC feedback during and after the last TAC meeting:
    - Three systems with one 3.6-cubic foot (cf) lead vessel and one 3.6-cf lag vessel for a total empty-bed contact time (EBCT) of 6 minutes (at 9 gal/min)
    - Three systems with one 2.0-cf lead vessel and one 2.0-cf lag vessel for a total EBCT of 3.4 minutes (at 9 gal/min)
- Peak flow monitoring at households prior to installation of the Phase 2B systems was recommended to inform system sizing. However, flow meters were not pre-installed due to high cost and difficulty securing a contractor to complete the work. Like the Phase 1 and 2A systems, the Phase 2B systems were designed based on a conservative 9 gal/min peak flow.
- To better understand the presence of total coliform bacteria, TAC members recommended sampling for bacteria at intermediate points in the treatment train and looking for surface water near well heads during rain events. However, this additional investigation was not done because bacteria levels have remained stable or reduced and do not appear to be increasing during treatment.
    - Discussion:
        - Eugene Leung asked whether coliform bacteria at the system effluent appeared to be mainly from coliform bacteria entering the system or from increases in the coliform counts during treatment.
        - Heather said that this question would be addressed later in the Project Updates portion of the meeting.
- CWC is looking for additional funding to pilot UV treatment as part of the pilot, based on the observation that the installation of UV treatment on POE systems appears to be a common practice in other states.

III. Project Updates

Installation

- Heather Lukacs described how CWC and WHA are continuing to use a phased approach for implementing the treatment systems (see Slide 12), partly due to the challenges of installing treatment systems in water systems with deficiencies that can lead to bacteria contamination and the time required to make repairs to these systems.
- Brandon Bollinger provided an update on installation of the Phase 2B systems (see Slides 13-17). Five Phase 2B systems have been installed and four of those systems are online.[1] CWC and WHA are continuing to work with households to complete high priority repairs before the other two installed systems are put online. A sixth system will be installed when materials arrive.
- Harrison Hucks discussed the logistical aspects of the installations:
    - Acquiring the materials for the job was a challenge due to current supply chain issues.
    - Labor shortages were also an issue for system installation and water system repairs prior to installation. It was a challenge to find contractors to do the work in a timely manner.
    - Water system condition is always a challenge for these installations. Nevertheless, it is important to highlight that the Phase 1 and 2A systems are functioning well.
    - The smaller tanks for the Phase 2B systems are easier to install and less expensive. Monthly monitoring will provide insight into how these smaller systems perform, but he expects that they will perform just as well.
- Heather said that these challenges mentioned by Harrison have caused delays in the project overall and CWC has had to work closely with community partners to explain these project delays and encourage continued community partner participation.
- Eugene Leung asked if CWC and WHA have an inventory of the common problems with well systems like this and the costs of resolving them. This information will be valuable when budgeting and planning for future projects.
    - Harrison: There are two different costs 1) The repairs the water systems need prior to installation and 2) Operation and Maintenance (O&M) issues that have come up while the treatment systems are operating.
    - Heather:
        - For all of the Phase 2A and 2B systems, WHA is tracking their costs, including well repairs and O&M costs, in many specific categories, so

[1] At the TAC meeting, it was stated that three systems were online, but actually four of the systems were already online.

these costs will be itemized. We sent out the O&M log prior to this meeting which details what has been needed so far and associated costs.
        - The repairs being done to water systems prior to installation are not holistic and complete. Two of the systems that were repaired still need additional work. The project team is prioritizing high priority repairs, but we cannot guarantee that bacteria issues will be resolved.
- Kevin Berryhill: Regarding temperature, in some areas, if you get a cold spell, freezing could cause pipes to break if the pipes are not protected from freezing. From the photos, it looks as though the pipes are not insulated. Are there plans to insulate these pipes?
    - Heather: The project team currently does not have plans to insulate the pipes but this is helpful information to consider.
    - Tim Bushman: Freezing is always a possibility, but typically you will not see it close to the coast. You may see it farther inland in the Salinas Valley. The majority of well pump systems are not using insulation. Culligan has tens of thousands of portable softeners installed, and they do not insulate them. But every five years or so you may get some freezes, if this occurs, Culligan responds and fixes a lot of leaks. Overall, freezing pipes are not a common occurrence.
    - Harrison: Agrees with Tim. The DWMC-21 owner/resident said that they will see freezing temperatures about a day or two per year, and so they have considered the possibility of exposed pipe freezing. It might make sense to consider enclosing the shade structure to keep the systems a couple degrees warmer during short periods of below freezing temperatures.

Source water quality

- Heather Lukacs presented data on the source water quality for the Phase 1, 2A and 2B sites, the number of people in each household, as well as the EBCT and total cumulative volume of water treated for the installed systems (see Slide 18).
    - Heather mentioned that while this pilot is providing some information on 123-TCP concentrations in the Monterey County area, the forthcoming Ag Order 4.0 sampling data for on-farm domestic wells will provide additional information.
    - Heather pointed out that we continue to see variability in 123-TCP concentrations in wells over time.
    - Eugene Leung asked to confirm that no one participating in the pilot is drinking the water due to persistently high nitrate levels.
        - Heather confirmed that no one is drinking the water and that all households are receiving bottled water. All households with installed systems have signed an implementation agreement including an acknowledgement of the presence of nitrate and that the water should

not be used for drinking or cooking. They also signed a form acknowledging the presence of or the potential for total coliform bacteria.

- Eugene: Sites DWMC14, DWMC15, and DWMC19 have nitrate levels below 27 mg/L, which is the level that point-of-use (POU) reverse osmosis (RO) treatment devices are certified to treat. In those cases he said the combination of RO and GAC treatment may be able to produce safe water. Culligan has treatment systems certified to treat nitrate at these levels, as well as booster pumps that can improve efficiency. With booster pumps, it may also be possible to treat the nitrate levels (29.3 mg/L) at DWMC-21. Installation of these combined RO/GAC systems as part of this pilot could be a good way to learn more about how these systems function in real life.
    - Heather: In addition to nitrate, some of these systems also have total coliform bacteria contamination. CWC could consider including RO treatment in a funding proposal for follow-on work for this project. Given bacteria issues at some sites, UV treatment could also be considered. If community partners are willing, it would also be informative (as Eugene has suggested in previous TAC meetings) to install RO treatment for water that will not be used for drinking to see how it performs on the water quality in these wells.
    - Eugene: In the Central Valley, some have complained that the RO systems were not producing enough water. Some were continuously treating water and then storing it in 5-gallon jugs so they would have more water for use. Piloting RO would also be a good way to look at the quantity of water produced.
    - Heather asked if SHE or others have installed treatment systems with both GAC (for 123-TCP) and RO (for nitrate), or know of any examples of that being done.
        - Tim Bushman: Culligan does this all the time. Carbon treatment of all water entering the house would help the RO filters to last longer. Anytime Tim is installing treatment for nitrates, he includes a booster pump, which increases upstream pressure and ensures removal of as much nitrate as possible. They also include a permeate pump, which reduces the backpressure on the membrane. They have county-approved systems installed at sites with high levels

of nitrate (around 65 mg/L) and they are performing. They include pre and post TDS monitoring on these systems. RO treatment downstream of a whole-house water softener is also an example of a 2-stage process.

    - Eugene: Softening can raise concerns about brine disposal and salt loading for the groundwater and the septic system.
    - Tim: This is an example of other 2-stage systems, and could be used in a case where a softener is installed somewhere connected to municipal sewers.
- Heather: Has Corona Environmental Consulting looked at GAC and RO treatment combined? CWC was informed at the beginning of this pilot of the potential for GAC to slough nitrate downstream if there are temperature changes.
    - Tarrah Henrie: A study by Corona Environmental Consulting found that temperature changes could cause nitrate to slough off of GAC, affecting the nitrate concentrations downstream. They were not looking at the use of RO downstream specifically, but this is a concern with GAC treatment in general if there are high levels of nitrate in the source water. This means that nitrate concentrations downstream of the GAC may be different from levels upstream and that there can be short-term spikes downstream. Chad Seidel may be able to provide more information based on more recent data from the Water Research Foundation.
    - Eugene suggested providing shade over the systems to protect them from the sun and prevent water from being heated up in the black tanks, which could contribute to the nitrate sloughing problem.
        - Harrison: The project team agrees and we are working with a contractor to install shade structures over the sunnier systems. The covers and tanks are UV rated, but nevertheless, the plumbing will last longer if it is in the shade.

IV. Summary of the performance of the three installed systems

John Erickson summarized monitoring data to date from the three installed systems:

- 123-TCP (Slide 20)
    - All samples between the lead and lag vessels have had 123-TCP levels below the detection limit, so there is no evidence of breakthrough.
    - Source water concentrations continue to be variable, with some wells switching between being non-detect and above the MCL
    - Discussion
        - Michael Adelman: He is pleased to see the 123-TCP results, which confirm what we expected: after a year of operation the 123-TCP should not break through even the first vessel. This data can give us more confidence in the lower-EBCT Phase 2B systems that are easier to implement.
- Flow and pressure monitoring (Slides 21-27)
    - Monthly flow through each system has been generally consistent over time, with higher flow through DWMC09 during the summer months, perhaps due to higher outdoor water use during those months. Because DWMC09 was installed to serve all households on the property, it treats water for both indoor and outdoor use prior to entering a storage tank.
    - Average flow per day correlates with the number of residents served by the treatment system.
    - Flow and pressure drop through each system during flushing prior to sampling (with a downstream hose bib wide open) have been generally consistent over time. This suggests that headloss through the systems has been relatively consistent, with no major blockage of the carbon or pre- and post-filters.
    - Pressure loss and flushing flow were higher for systems with higher upstream pressure.
    - Where pressure loss is occurring:
        - Most of the pressure loss is occurring through the flow restrictors.
        - Very little pressure drop is observed through the GAC vessels themselves.
        - WHA observed that the post filter was fouled with carbon fines that may have initially been flushed from the GAC when the systems were put into service, which likely also caused some additional pressure loss.
        - While there are some outliers in the pressure data, these trends are clear when all measurements are considered together.
    - Water passing through the Phase 2B systems will only have to pass through one flow restrictor. This is expected to result in lower pressure loss than in the Phase 1 and 2A systems, where flow has to pass through two flow restrictors in series.

- Higher-resolution (0.1 gallon) flow meters and data loggers will be installed on Phase 2B systems, which will allow for accurate measurement of peak flow while systems are in use.
- Discussion:
    - Eugene Leung commented on the very high pressure loss (55 psi) through DWMC09 during flushing.
        - Tim Bushman: This pressure drop was primarily due to the flow restrictors.
        - John: The particularly high pressure drop through DWMC09 was due to the high available upstream pressure and the fact that the system was discharging freely into a storage tank. This high available pressure produces more flow through the system and thus generates more pressure drop through the flow restrictors.
    - Harrison Hucks summarized residents' comments regarding pressure loss.
        - DWMC09: Since the treatment system is upstream of the storage tank and booster pump, there has been no change in pressure
        - DWMC02: Residents did not notice any pressure drop. They have had low pressure for a long time and are accustomed to it.
        - DWMC04: Residents noticed a small drop in pressure and that their shower is not as strong. Today, Harrison increased the well pump pressure range setting at that site from 40-60 psi to 43-63 psi and, based on an initial test of their taps, the residents thought that the pressure in the house had improved.
    - Tim Bushman: Pressure loss is related to the flows used in the house. Once the data loggers are installed, we will be able to see the actual flow rates. Culligan just installed a treatment system in a new 3-bedroom, 2-bathroom house with water saving features, and with all of the fixtures in the house open they were not able to get the total flow up to 7 gallons per minute.

- Total coliform and E. coli bacteria (Slides 28-29)
    - There have been no detections of E. coli upstream or downstream of the treatment systems.
    - Total coliform detections have been less frequent since Fall 2021 than they were earlier in 2021, perhaps due to longer operation or seasonality.
    - Phase 2B implementation agreements signed with residents and owners included a document to:
        - Recommend system repairs to reduce bacteria contamination risk
        - Provide information on total coliform bacteria

        - Confirm that residents are drinking and cooking with bottled water
        - Request consent to continue operation of systems if total coliform bacteria are detected
    - Discussion:
        - Michele Frederick (via chat): We haven't had much rain over the past few months. That may be the cause of the decrease in coliform.
- Heterotrophic plate count (HPC) bacteria (Slide 30)
    - HPC levels have been relatively stable and not that high.
- Summary: Overall, John said that the monthly monitoring of the systems continues to provide valuable information.

John Erickson and Harrison Hucks summarized operations and maintenance (O&M) activity to date for the three installed systems (Slide 31):

- John: There have been no major O&M issues to date, only minor issues such as leaks, GAC initially clogging a piping manifold at DWMC09 after installation, malfunctioning pressure gauges, and post filter replacement. CWC sent out the O&M log for this project prior to the meeting for reference. It has also been attached to these meeting minutes.

Discussion:

- Chad Fisher: Are the small O&M incidents being discovered during routine monitoring visits, are residents calling to report them, or is it a combination of both?
    - Harrison: About two thirds of the time Harrison will notice the issues during routine monthly visits. About one third of the time the homeowner will call Harrison or CWC to report an issue.
- Chad Fisher: Is Culligan visiting the sites monthly?
    - Harrison: WHA is visiting the sites monthly for monitoring and is able to do some small repairs, such as tightening a leaky flow meter or replacing a hose bib or fitting. For any other more significant repairs, Culligan will come out after WHA reports the issue.
    - Heather: It was important to CWC that residents and owners report O&M issues and have them resolved in a timely manner. The implementation agreement that CWC signs with the property owner and tenants includes an agreement to respond to any issues within a certain timeframe. Some of the community members knew WHA and/or Harrison before this project because WHA operates small water systems in the area. Others have gotten to know Harrison through the project and also communicate with CWC about other projects. Some O&M issues can be urgent, but most to date have not been that urgent.

- Eugene Leung: The data is really helpful. For instance, without the HPC and coliform trend data we would not know that HPC and coliform levels are staying relatively stable and that there is no explosive growth. Hopefully we will get more rain this fall and will see what happens to bacteria levels for the duration of the project.
- Eugene Leung: This project shows that the people factor is huge. It is very unique that Harrison and Tim work so well together and do such a good job. It is very hard to recreate that elsewhere in the state, especially a Culligan dealership being so responsive and working on these small systems. We need Tim to help train other water dealers throughout the state to work like he does. It also makes a difference that people know Harrison and he is local.
    - Heather Lukacs: At CWC, Brandon Bollinger primarily and also Mayra Hernandez and Shirley Robles coordinate closely with Harrison regarding monthly monitoring and community questions that come up. The community partners are key in this project, and communicating all of the information we have been discussing today with community partners is very important.
- Tarrah Henrie: Are CWC and WHA finding that the cost of time spent sampling and/or the analytical costs are similar to or more expensive than what was originally estimated? When thinking about implementing these systems, there are always questions about whether the state would cover these O&M and monitoring costs and how they would, since ongoing O&M for individuals is not normally feasible unless you do it through a centralized place like CWC.
    - Heather: WHA and CWC are tracking all of this information and it is forthcoming. We are interested to see, as we move to WHA sampling more systems per month, if that brings down the average time spent per system even though the systems are spread out. Will also need to account for CWC staff time (Brandon Bollinger and soon Mikel Irigoyen) for coordination and providing community partners with monthly updates on the water quality results. Reporting back these results is a key part of the process. One community partner who has fluctuating coliform levels always celebrates when the results come back negative.

Discussion of potential UV Treatment (Slides 33-34)

- Heather Lukacs summarized feedback regarding UV treatment from the previous TAC meeting:
    - Given precautions being taken in this pilot (bacteria monitoring and residents not drinking the water due to nitrate), the pilot can continue without UV treatment. However, UV treatment should be considered for future POE projects due to the difficulty of keeping bacteria out of wells and water systems.

        - TAC members discussed pros and cons of using Class A and Class B UV treatment for this application, but no specific recommendation was made.
        - There were also some concerns about the cost effectiveness of adding UV treatment.
    - Heather said that CWC is seeking additional funding to pilot UV treatment as part of this project and would like the TAC's feedback on what type of treatment system to install. The UV treatment could be installed a) on water systems currently in line for POE treatment installation but held up waiting for well repairs intended to resolve bacteria issues and/or b) as part of future phases of the project.
        - Tarrah Henrie: She has not worked with these smaller systems but has worked with larger ones and they are a challenge. It requires significant maintenance to keep the bulbs clean and change the bulbs out.
        - Tim Bushman: Agrees that UV systems can be a challenge, especially if you have a Class A system that is frequently shutting down due to an automatic shutoff, leaving people without water until maintenance is performed.
        - Eugene Leung: The University of Illinois offers private well classes for rural well owners (link shared in chat: https://www.isws.illinois.edu/groundwater-science/the-private-well-class). This program can be found at www.privatewellclass.org and is funded by the EPA. If we can bring this to California, for folks to learn more about maintaining their wells rather than us throwing technology to solve problems, that may be a good option. This will help people to assess their well to make sure it is coliform negative. If it is coliform positive, Class B UV treatment could be considered. If a well is contaminated with E. coli, we have a bigger problem and should not throw technology at that problem, but rather should help them find an alternate source of water.
            - Heather: CWC is aware of this program, has reviewed some of the online training materials, and has been in touch with them and requested training for community partners related to well disinfection and water quality sampling.
            - Brandon: Some households in the project have installed water systems themselves and are knowledgeable of their systems. But major repairs like replacing a well head or tank can be cost-prohibitive. Some use intermittent chlorination and pour chlorine into the well each time total coliform is detected.
                - Heather: Based on past experience, she has not seen many households on private wells chlorinating on their own on a continuous basis. An exception to this (which applies to at least

one household in this pilot) is very small water systems where Monterey County samples, detects bacteria, and recommends and provides guidance for chlorination.

- Brandon agrees this is the case. He has also seen some households reliant on private wells that are not regulated by Monterey County chlorinate because they have relatives who have received guidance from Monterey County.

- Heather: What types of UV systems have TAC members seen installed in other states? We are aware that this project area has hard water, which will affect UV treatment.
    - Eugene: In a lot of states using UV systems, like Minnesota, where UV systems are installed in summer cottages, wells are not very deep, are influenced by surface water, and the water is not as hard.
    - Kevin Berryhill: He does not have any specific experience, but has seen that typically other states are using Class B systems that look similar to the Viqua Class A system shown on Slide 34.
    - Tim Bushman: Small-scale UV systems are all pretty much identical, except for ones that have wipers to clean the bulbs, which are generally on larger commercial systems and are included on the Hallet system shown on Slide 34. With the wipers, you generally run into expense and complexity. Hallet systems have a brilliant design, but Culligan does not use them any more because they had too many service issues with them.
        - Culligan typically uses UV treatment for prophylactic protection. Not having a disinfectant residual is a drawback if you are actually trying to disinfect water.
    - Cheryl Sandoval: She does not see very much UV treatment in the County. A couple public systems might have some UV treatment for extra protection. They have one 60-connection surface water system with UV treatment, but she does not know which UV system they use.
    - Michelle Frederick: They may have had some small UV systems for surface water treatment in Mendocino County. She thinks they may have been Trojan UV. She could look at other small surface water systems to see if some have UV treatment.
        - Eugene: Viqua is a smaller household system that is made by Trojan.
    - Eugene Leung linked this New Hampshire Department of Environmental Services “Guidance on Addressing Bacteria Contamination in Small

Transient Water Systems" document in the chat: https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/dwgb-7-8.pdf
    - Chad Fischer: UV treatment is very much on his radar, and he is happy to hear it may be included in potential future funding proposals. As his group has been workshopping the POU/POE white paper, UV treatment is coming up a lot. Imperial Irrigation District has some small-scale UV systems.
  - Heather requested that TAC members provide any additional feedback or information they have on UV after the meeting, including information on the systems Cheryl and Michelle mentioned in Monterey County and the state database. CWC will follow up further with the group and individual TAC members.

V. State Water Board POU/POE updates

- Heather summarized the update on NSF standards for POE treatment of 123-TCP that Eugene Leung provided at the last meeting (see Slide 36).
- Chad Fischer summarized DDW's current efforts related to POU/POE treatment:
  - DDW has conducted four outreach workshops regarding POU/POE treatment, and he appreciates the participation of some TAC members in those efforts. The efforts have been really successful in highlighting issues, both issues that were already on DDW's radar and issues that are new. Based on those workshops, DDW is preparing a white paper on the current state of POU/POE treatment and knowledge gaps. They are tentatively planning on holding a public workshop in late summer.
- Kevin Berryhill: Right now there is no regulatory framework for domestic water supplies. What is the master plan? Are we expecting that there will be regulatory guidance for private systems in the future; for instance, guidance that if you have coliform positive you need to put in UV, or guidance on minimum EBCT for GAC treatment?
  - Chad: The concept right now is to provide resources and guidance rather than regulation.
  - Michelle Frederick: This is a great question. If the TAC has feedback, it would be great to hear it. DDW is planning to conduct a survey of all the counties to see what their various policies are. They are trying to understand the breadth of these policies across the state for the white paper. The white paper may include recommendations around pilot studies, legislative updates that may be needed, and a categorization of issues around education, technology, or having enough

    trained operators. The paper will also include significant POU/POE treatment case studies that DDW is aware of around the state. They are also trying to collect all the data for where POU/POE is being used across California, and put that on a map so people can understand what treatment is being used for and where.

    - Kevin Berryhill: He appreciates the feedback. As often happens, there is a game of regulatory chicken, where everyone wants to do the right thing. The knee-jerk reaction tends to be to think conservatively, like putting UV treatment on if there is a total coliform positive, when that may or may not be a requirement or necessary. The sooner we get guidance, the better off everyone will be on this.
    - Michelle: To be clear, it is outside DDW's jurisdiction to regulate domestic wells. So they cannot do anything more than make recommendations.
- Heather: The SWB has significant funding to implement the HRTW across the state, and that includes projects for private wells. There could be guidance for implementing state-funded treatment programs for private wells in a way that ensures water quality. CWC sees this as a human rights issue and would like to see the state funds reach these hard-to-reach communities, and not just in a token way where a system is installed but not maintained, but where private well solutions are compared apples to apples with other alternatives like consolidation.
- Eugene: Going back to the NSF standards, there has been some fragmentation, with NSF having drinking water treatment unit standards and IAPMO coming out to work with the American Society of Sanitary Engineers to create some listing standards for some other treatment devices. NSF standards will apply to treatment systems built in a factory, but it appears they may not apply to custom systems built by a dealer. We may need to work with the California delegation for WQA to have certification of or guidelines for a custom-built solution. At the national level there really is not much interest in having a certification process for custom-built systems. If we can replicate the quality assurance that is being done by the TAC with this pilot, we may be able to keep going with the custom-built approach. But he is not sure whether the certification process will come to save the day.
- Heather: CWC would also like to see these treatment certification and registration issues included in the State Water Board white paper. How do we get from the SWB's current residential treatment certification system program, which has gaps, to something that will allow for successful implementation of 123-TCP POE treatment? CWC started our first TAC meeting for this project discussing limitations of the SWB's residential treatment system program and certification process that make it hard for CWC to recommend residential treatment in many cases. The current program does not meet the needs of some of the community members that CWC works with.

VI. CWC draft recommendations for POE/POU treatment for private wells

- Prior to the TAC meeting, Heather emailed TAC members a copy of the comments that CWC and other organizations submitted to the State Water Board in February 2022. CWC sees POU/POE treatment as an environmental justice and human right to water issue. We need to ensure safe, reliable, and affordable drinking water for all Californians.

VII. Next steps

- CWC will follow-up with the TAC about recommendations regarding specific UV treatment technologies that may be appropriate for this pilot.
- The next TAC meeting will be February 16, 2023 noon-2pm.

Short discussion after the meeting related to TAC members preference for when we host the next TAC meeting:

- Michael Adelman: If there are any indications of breakthrough through the first vessels, that would be a good time to check in with TAC members. It will be interesting to look at the shape of the breakthrough curve. If the 123-TCP gradually ramps up slowly, that might mean the mass transfer zone has a significant length.
    - Heather: Current funding ends July 2023 and a final report will be provided by then based on results to date. Hopefully, CWC will secure funding to continue the project, which would provide more information on time to breakthrough if breakthrough does not occur by July 2023.
- Eugene Leung asked if it would be good to have a quick one-hour check-in in the fall to discuss updated water quality data.
    - Heather said that by the time CWC receives data from the lab and it is uploaded into our monitoring log, the February meeting would be a good time to see the data from the Fall (through November). CWC can also send out an update in late November with the Summer data, if the TAC is interested in seeing that in advance.

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123-TCP Point-of-Entry Treatment Pilot Project in North Monterey County Area
Technical Advisory Committee Meeting
May 24, 2022

“Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.”

Technical Advisory Committee Meeting Agenda

1. TAC Roll Call (12:30-12:40)
2. Discussion of TAC Feedback (12:40-12:50)
3. Project Updates (12:50-1:05)
4. Summary of performance (3 installed systems) (1:05-1:45)
5. State Water Board POU/POE updates (1:45-2:00)
6. CWC Draft recommendations for POE/POU treatment for private wells (2:00-2:15)
7. Next Steps (2:15-2:30)

Technical Advisory Committee Members
1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area

Name	**Company / Agency / Organization**	**Title / Position**
Michael Adelman, P.E.	Stantec Consulting Services, Inc.	Environmental Engineer
Mark Bartson (retired)	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Kevin Berryhill, P.E.	Provost & Pritchard Consulting Group	Principal Engineer
Paul Boyer (retired)	Self-Help Enterprises	Program Director, Community Development
Guadalupe Gonzalez	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Kyle Graff	State Water Resources Control Board (DDW)	Northern California Drinking Water Field Operations
Tarrah Henrie	*California Water Service (CalWater)*	Manager, Water Quality
Chad Seidel, PhD, PE	*Corona Environmental Consulting*	*President*
Alex Huang, P.G.	State Water Resources Control Board (DFA)	Office of Sustainable Water Solutions Branch
Brian Kidwell, P.E.	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Tori Klug, P.E.	Stantec Consulting Services, Inc.	Project Manager
Eugene Leung	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Edwin B. (Ned) Lofink, P.E.	Axiom Engineers	Senior Project Engineer
Cheryl Sandoval	Monterey County	Supervisor, Drinking Water Protection Services
Laura Satterlee	Self-Help Enterprises	Water Division Manager
Allie Sherris	*Univ. of Washington* (Stanford University)	*Postdoctoral Researcher,* Public Health

Technical Advisory Committee Members (cont.) 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area		
Name	**Company / Agency / Organization**	**Title / Position**
Tami McVay	Self-Help Enterprises	Assistant Program Director-Partner Services
Dave Wallis	Rural Community Assistance Corporation	Rural Development Specialist III - Environmental

* Craig Drizin and Harrison Hucks from Weber, Hayes & Associates and Tim Bushman from Culligan are consultants contracted for implementation of this project and participate in TAC meetings to provide information from the TAC and to consider input from the TAC.

We recognize and appreciate the participation of all TAC members as well as additional staff from Self Help Enterprises who have attended our TAC meetings including Cecilia Vela, Marliez Diaz, and Dan Larkin.

In addition to those listed, CWC provides all TAC information to additional State Water Board staff who supervise and/or support TAC members: Michelle Frederick, Matthew Pavelchik, Stefan Cajina, and Karen Nishimoto.

We may also be joined today by:

- Tamara Anderson, Central Coast Regional Water Quality Control Board, overseeing project funding
- Jose Robledo, SWB DDW overseeing a water system that is implementing a 123-TCP POE pilot project
- Vanessa Soto, SWB Office of Public Participation
- *Chad Fischer, SWB DDW SAFER Engagement Unit, leading POU/POE Pilot White Paper effort*

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Heather Lukacs, Director of Community Solutions

Brandon Bollinger, Community Advocacy Manager

Mayra Hernandez, Community Solutions Advocate

Mikel Irigoyen, Community Solutions Coordinator

John Erickson, Consultant

Ryan Jensen, Community Solutions Senior Manager

David Okita, Senior Fellow

Susana De Anda, E.D. & Co-Founder

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	Phase 2 scope of work
February 2021	Cost documentation methodology and Bacteria/Disinfection Follow-up
Sept 2021	Review monitoring results and costs from Phase 2A. Consider EBCT update for Phase 2B.
May 2022	**Review monitoring results, Draft recommendations for POE/POU treatment for private wells**
February 2023	Draft final report
June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

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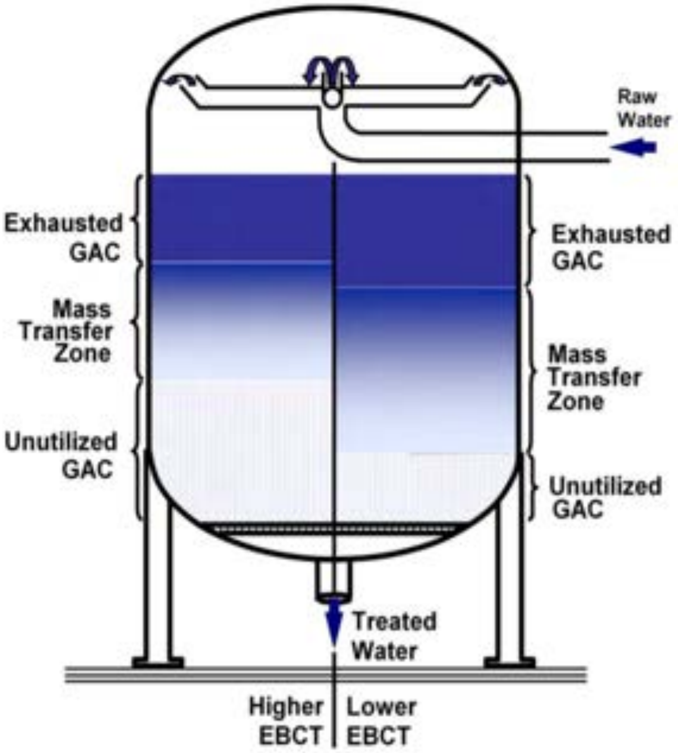
Empty-Bed Contact Time of Installed Systems
(at 9 gal/min peak flow)

- <u>Phase 1 and 2A Design</u>: 10 min lead vessel EBCT + 10 min lag vessel (3 systems total)
    - DWMC02, DWMC04, DWMC09

- <u>Phase 2B Designs</u>
    - 3 min lead vessel EBCT + 3 min lag vessel EBCT (3 systems total @<u>3.6 cf carbon per vessel</u>)
    - 1.7 min lead vessel EBCT + 1.7 min lag vessel EBCT (3 systems total @<u>2.0 cf carbon per vessel</u>)



Source: Provost and Pritchard. City of Kingsburg 123-TCP Mitigation Feasibility Study. 2016. http://www.cityofkingsburg-ca.gov/DocumentCenter/View/788/Kingsburg-TCP-Feasibility-Study-with-Appendix

Other Feedback from Sept. 2021 TAC Meeting

- To inform system size for Phase 2B, monitor peak household flow rate prior to system installation by opening multiple plumbing fixtures and metering flow
    - Did not measure pre-installation peak flow due to the high cost to pre-install flow meter and difficulty to secure a contractor to complete the work
    - Sized Phase 2B systems based on a lower EBCT, still calculated at conservative 9 gal/min peak flow, and we will monitor the flow rate after installation

Other Feedback Related to Indicator Bacteria

- If bacteria levels continue to increase during treatment, consider:
    - Sampling for bacteria at intermediate locations to determine where increase is taking place
    - Looking for surface water near wells and sampling following rain events
        - Bacteria levels have reduced and do not appear to be increasing substantially during treatment
- Due to difficulty in keeping bacteria out of shallow wells and treatment systems, consider adding UV disinfection to mitigate bacteria issues.
    - “For other states that have been using POE systems for longer, the best practice seems to be putting in UV systems as a standard practice. You may not have the budget to install UV as part of this project, but long-term that is something that probably needs to be looked at.”
        - CWC agrees and is looking for additional funding for UV and high priority well repairs as part of future phases of this project

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Phased Implementation for Adaptive Approach

Phase 1

- Site assessments
- Treatment system design
- Install 1 system
- Monitor 4 months

Complete

Phase 2A

- 4 Preconstruction visits ✓
- Install 2 systems serving 3 households using Phase 1 design ✓
  - 20 min EBCT @ 9gpm
- 26 months monitoring and O&M for Phase 1 & 2A systems
- Track installation, monitoring & O&M costs

In Progress

Phase 2B

- Install 6 more systems
  - 3 Systems - 3.6 cf per vessel (6.0 min EBCT @ 9gpm)
  - 3 Systems - 2.0 cf per vessel (3.3 min EBCT @ 9gpm)
- Monitoring and O&M for Phase 2B systems through June 2023

In Progress

Project Updates

- Phase 1 & 2A: Three systems have been successfully removing 123-TCP to below the detection limit from June 2021 through last monthly monitoring
- Phase 2B:
    - Five additional treatment systems were installed in April and May 2022*
    - One more system will be installed in the coming weeks
- No significant O&M incidents to date
- More information to follow on bacteria

* 2 are installed but not yet in operation pending high priority well repair

CWC Team Member Shirley Robles pictured next to the Phase 2B treatment system installed at DWMC-19 located near Las Lomas in north Monterey County. This treatment system is the 3.6 cubic foot size.

Phase 1 and 2A Systems

DWMC-04
Moss Landing

DWMC-02
Moss Landing

DWMC-09
Salinas

Systems contain 6 cubic feet (cf) of carbon per vessel or <u>24 cf total</u> for <u>20 min EBCT total @ 9gpm</u>.

Phase 2B Systems

DWMC-14
Royal Oaks
2 x 3.6 cubic foot vessel

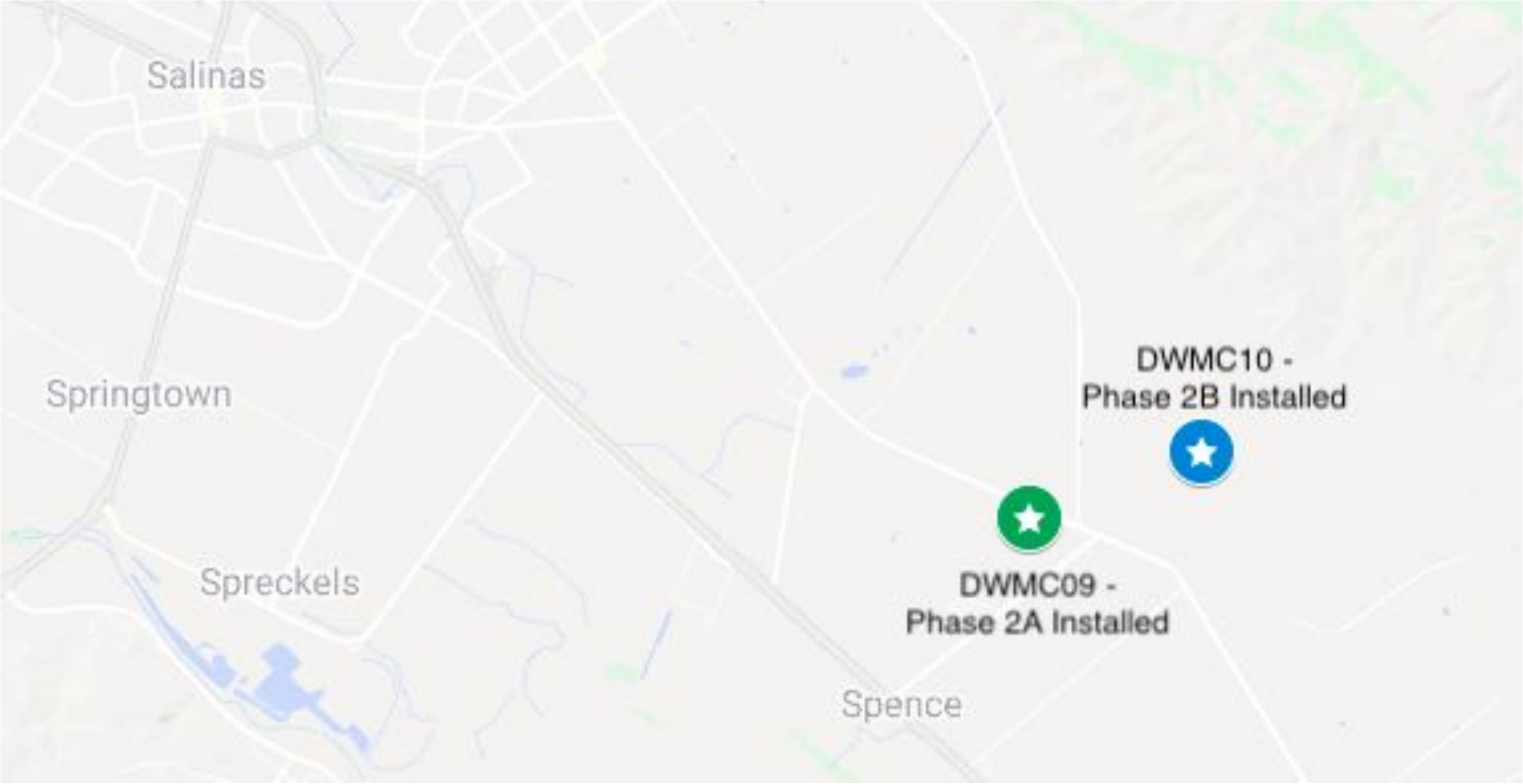
DWMC-21
Moss Landing
2 x 2.0 cubic foot vessels

DWMC-19
Royal Oaks
2 x 3.6 cubic foot vessel

Treatment System Locations in North Monterey County (Map shows 7 of 9 total systems)

Treatment System Locations Near Salinas

(Map shows 2 of 9 total systems)



Water Quality Summary and Project Updates for Households Participating in this Study

No.	Site ID (with Report Link)	# of people in each household	Empty Bed Contact Time of Treatment System @ 9gpm (minutes)	Total Cumulative Volume of Water Treated (Gallons) 3/16/22	Sample Date		1,2,3-TCP	Nitrate (as N)	Turbidity	Non-Volatile Organic Carbon	Iron	Manganese	Hardness	TDS	Install Date
						MCL	0.005	10	5**	N/A	0.3**	0.05**	N/A	1000**	
						PHG	0.0007	10	N/A	N/A	N/A	N/A	N/A	N/A	
						Units	ug/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L as CaCO3	mg/L	
1	DWMC02	2	20	54,028	1/20/21			65	<0.1	<0.3	<0.05	<0.01	1000	1800	Dec 2020
					3/27/2019		0.017	56						1620	
2	DWMC04	2	20	30,128	10/29/20		0.036	42	0.14	1	<0.03	<0.004	850	1400	June 2021
					5/2/19		0.070	50						1100	
3	DWMC09	Site A: 5 Site B: 5	20	153,423	11/4/20		0.039	64	0.12	0.47	0.1	<0.004	350	740	June 2021
					7/30/19		0.0741	66						870	
4	DWMC10	2	3.3		4/7/21			50	1.3	1.4	0.14	0.0054	300	540	April 2022
					8/13/19		0.128	65.7						784	
5	DWMC14	6	6.0		7/30/21		0.096		0.11	0.3	ND	Non-detect			April 2022
					7/1/21		0.114	10.2						289	
6	DWMC01	Site A: 7 Site B: 6	6.0		2/28/22		0.074								May/June 2022
					3/24/21			64	0.29	1.4	0.13	<0.01	620	1100	
7	DWMC15	2	3.3		7/27/21		0.014	17.2	0.80	0.55	0.14	Non-detect	240	458	May/June 2022
8	DWMC19	7	6.0		7/1/21		0.00879	20.3						410	May/June 2022
					11/1/21		0.0066		Non-detect	0.85	ND	Non-detect			
9	DWMC21	3	3.3		11/15/21		0.0858	29.3						1310	April 2022
					3/3/22		0.048			1.1					

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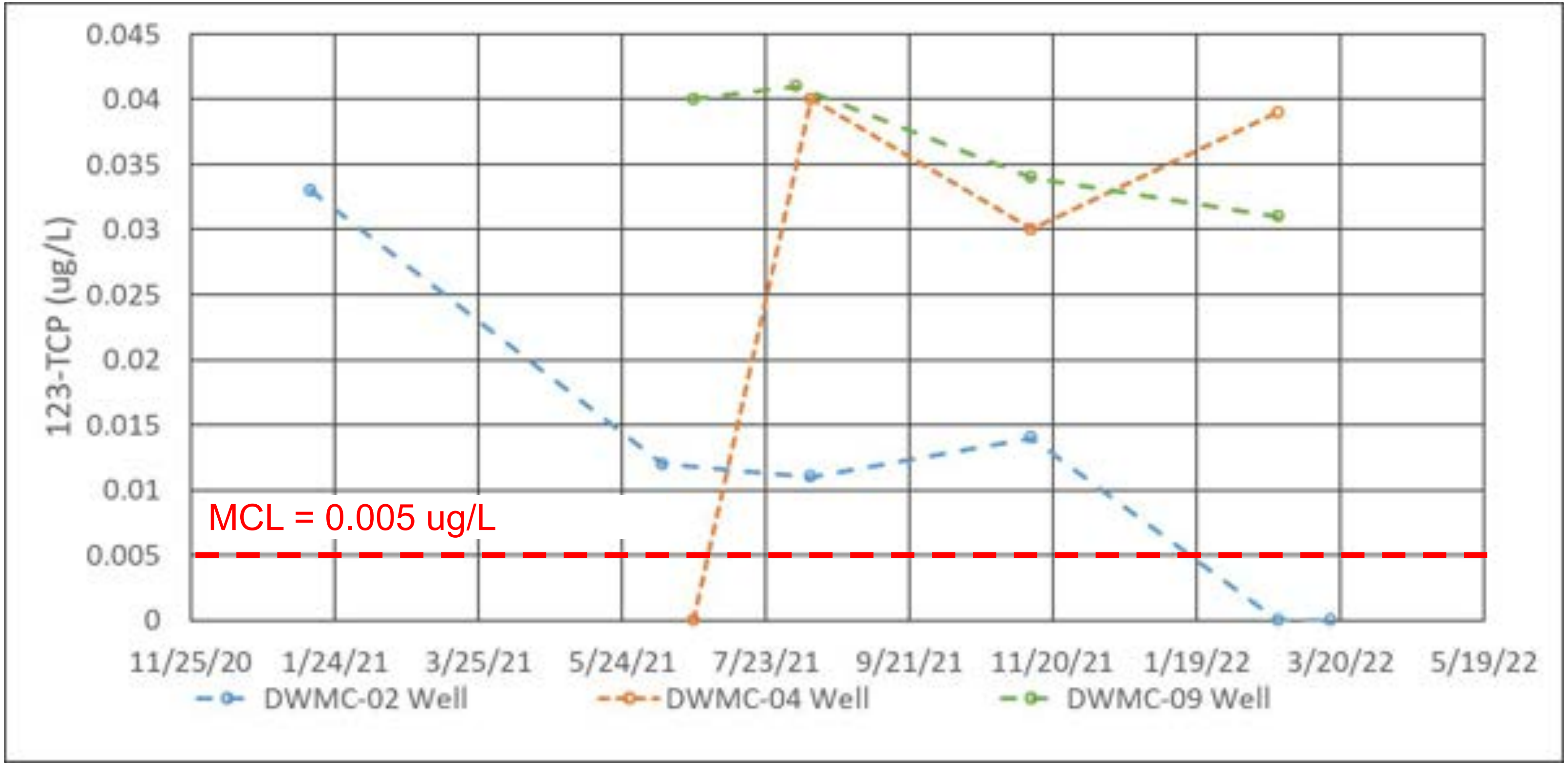
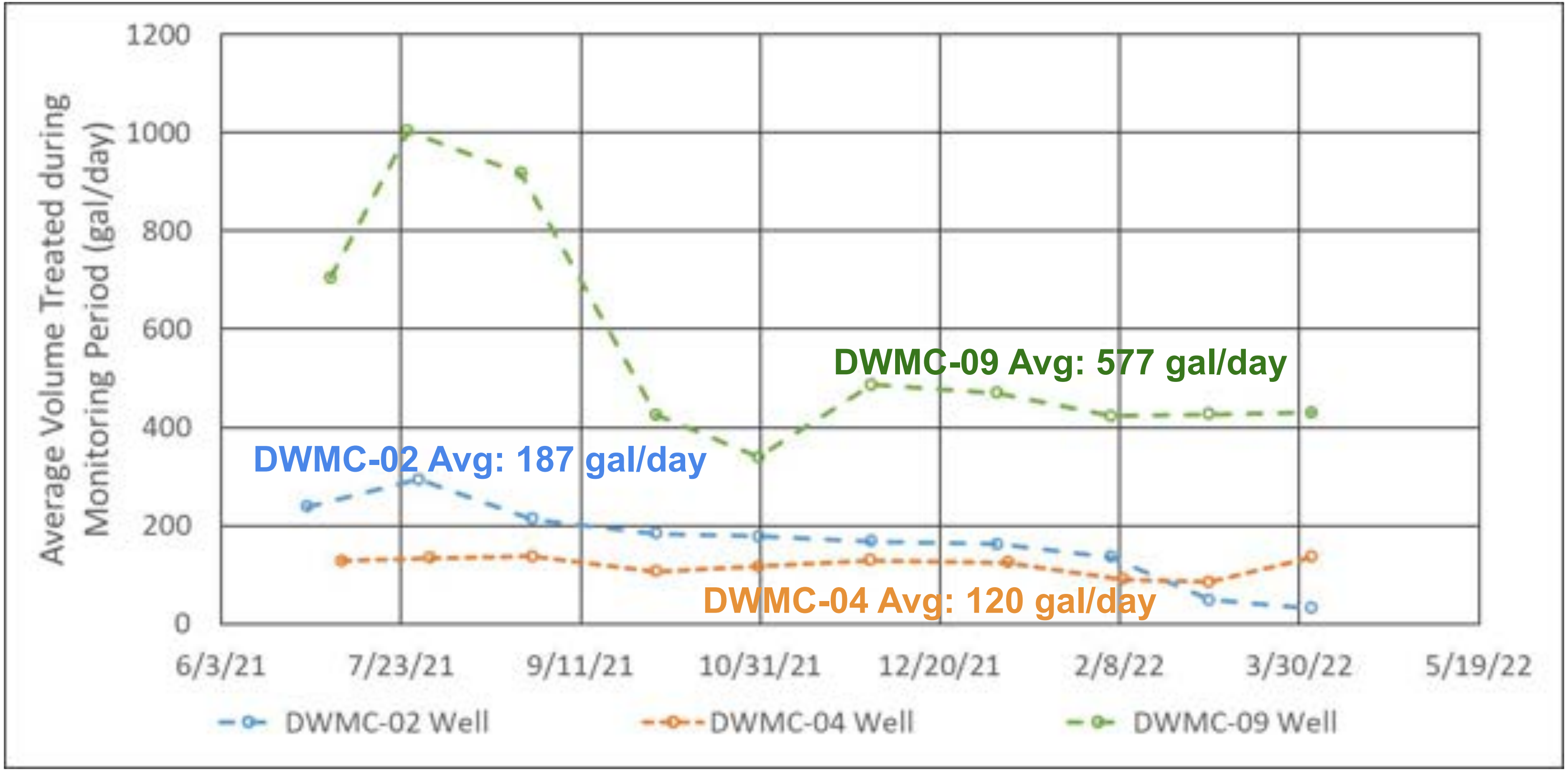
7. Next Steps (2:15-2:30)

Monitoring: 123-TCP

All samples between lead and lag vessels resulted below the detection limit (<0.001 - <0.0006)



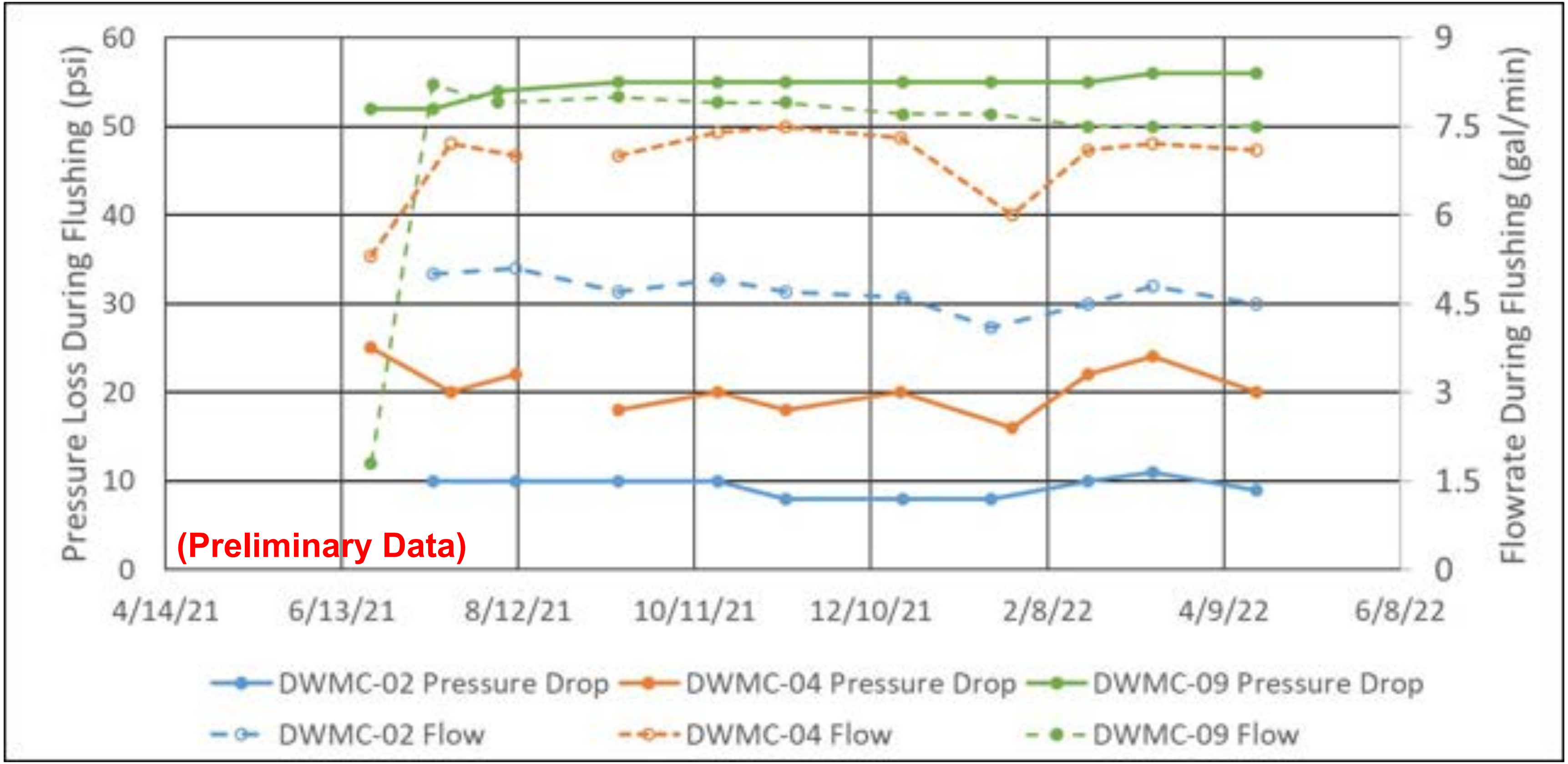
Avg. daily volume treated each monitoring period *(totalizing flow meter)*



Monitoring: Flow (totalizing meter)

System	No. of Households	No. of Residents	Average gal/day	Average gal/day /person	Average gal/min	Total Gallons Treated as of 4/20/2022
DWMC-02	1	4	170	43	0.12	55,200
DWMC-04	1	2	122	61	0.08	34,900
DWMC-09	2	10	560	56	0.39	168,500

Monitoring: Flow and Pressure during Flush

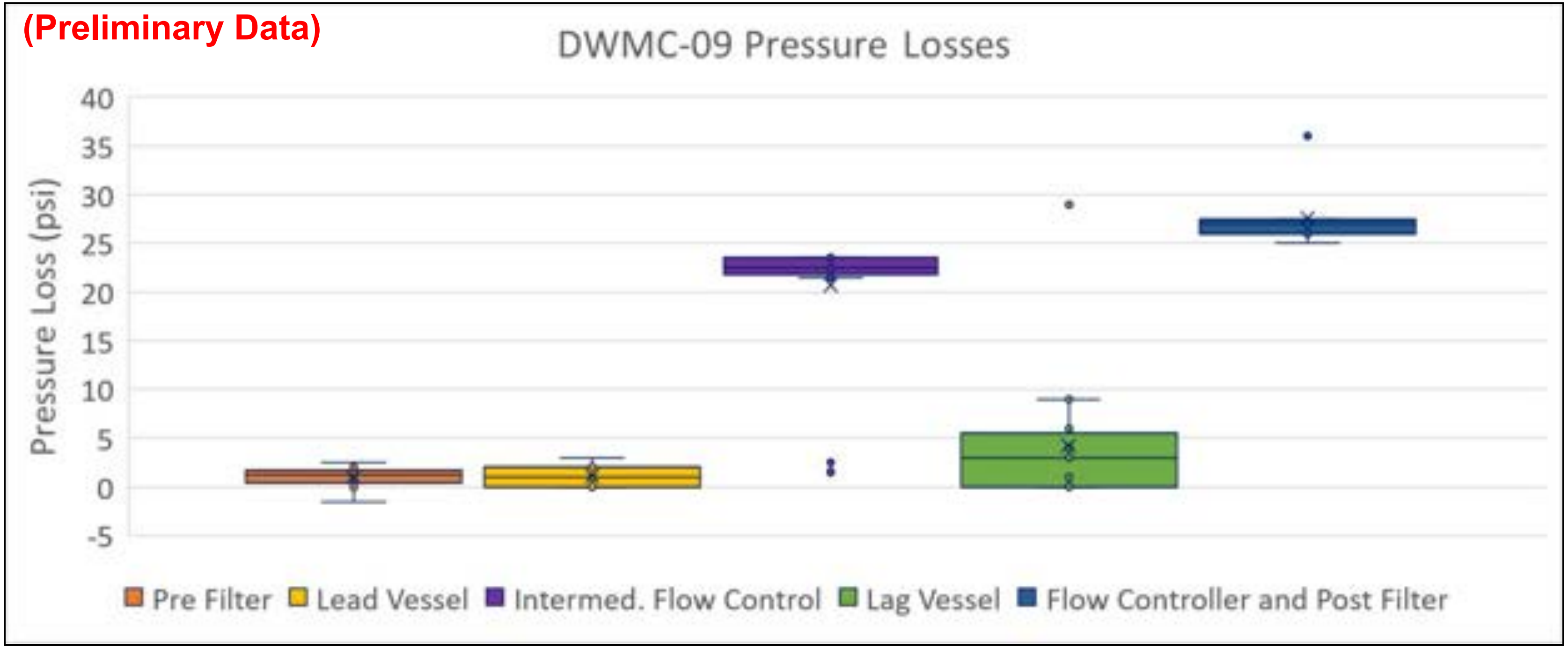


Monitoring: Flow and Pressure during Flush

(Preliminary Data) System	Average Upstream Pressure (psi)	Average Downstream Pressure (psi)	Average Pressure Loss (psi)	Average Flushing Flow (gal/min)
DWMC-02	21	12	9	4.7
DWMC-04	42	22	21	6.9
DWMC-09	55	0	55	7.8

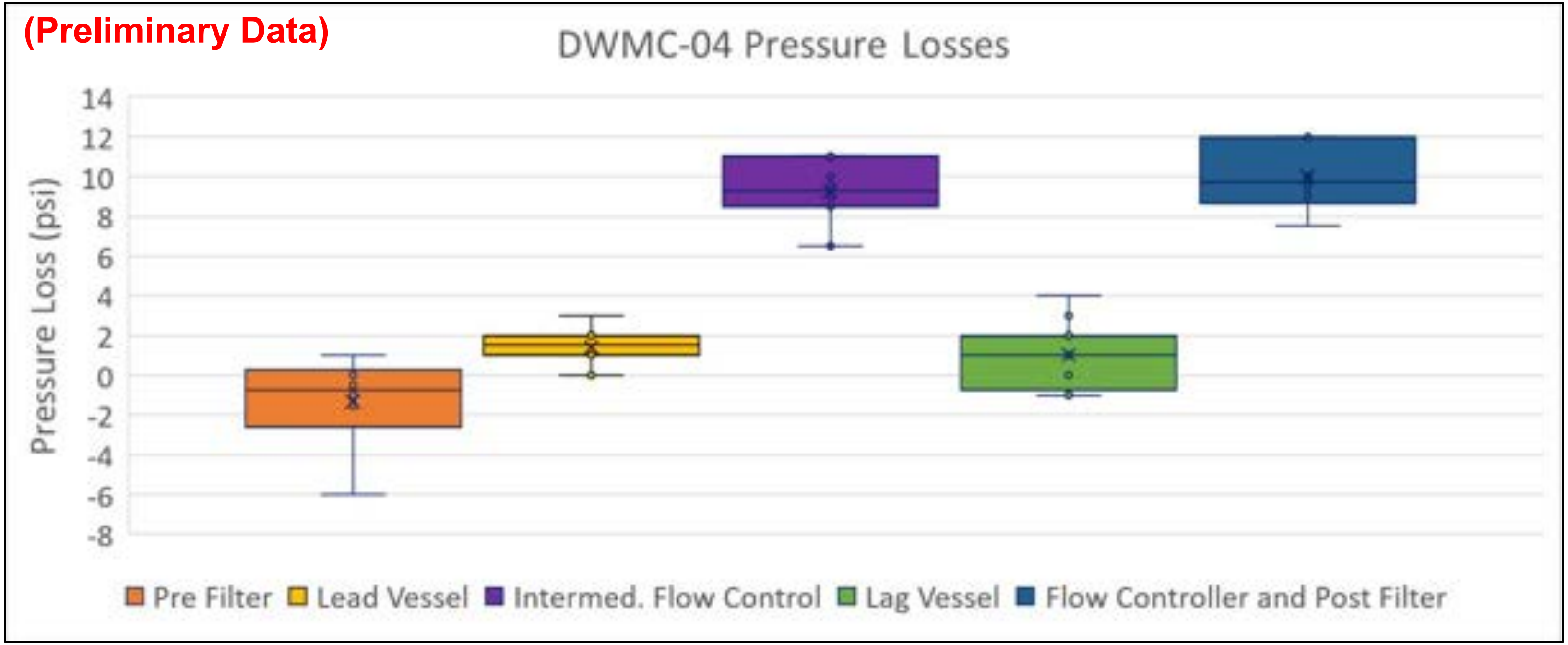
- Pressure loss and flushing flow are higher for systems with higher upstream pressure
- Flushing flow may be an indicator of peak flow through the system, unless flushing hose bib is limiting flushing flow.
- Installing higher-resolution (0.1 gal) flow meters and dataloggers on Phase 2B systems to better understand peak flow during use.

Monitoring: Pressure Losses during Flushing



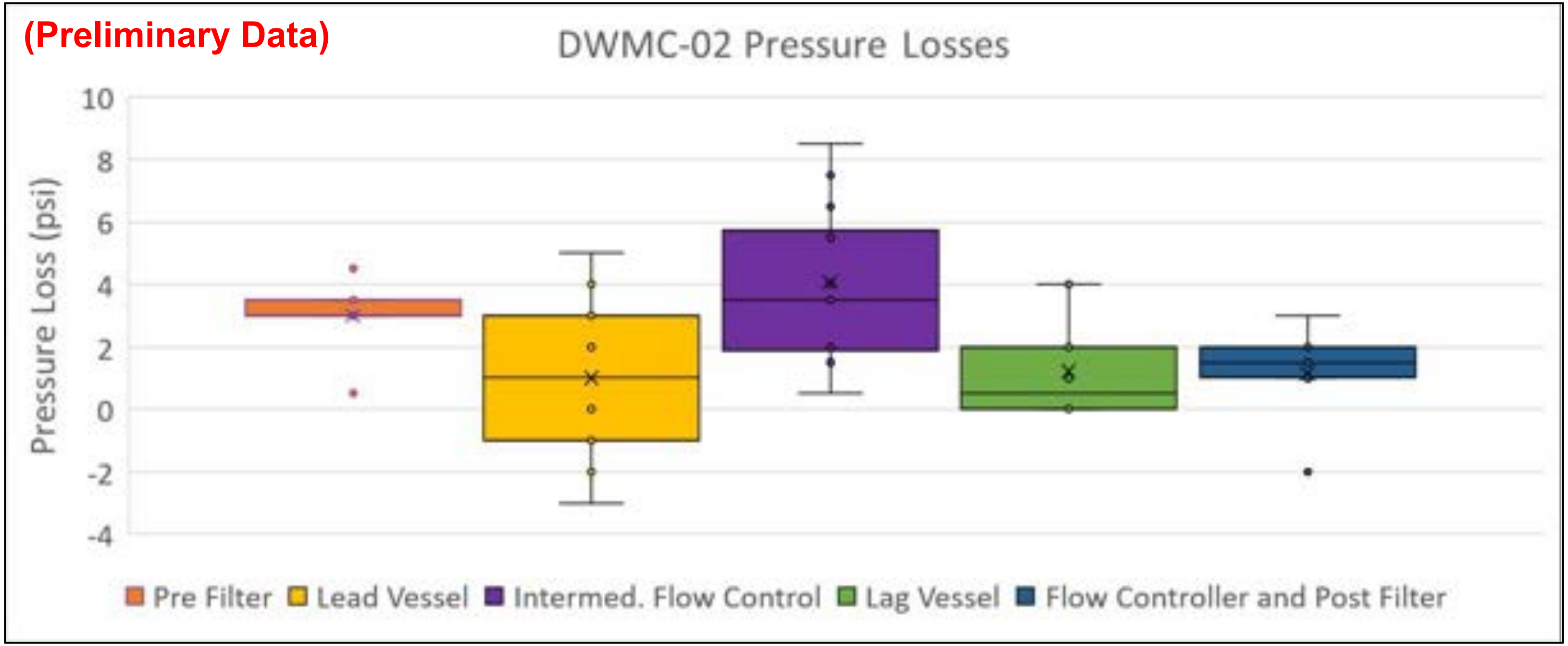
- Data shown are based on pressure gauge readings during monitoring visits 6/2021-4/2022.
- Data from some pressure gauges known to have been faulty have been removed. However, additional cleaning and validation of the data is needed to determine the explanation for outliers.

Monitoring: Pressure Losses during Flushing



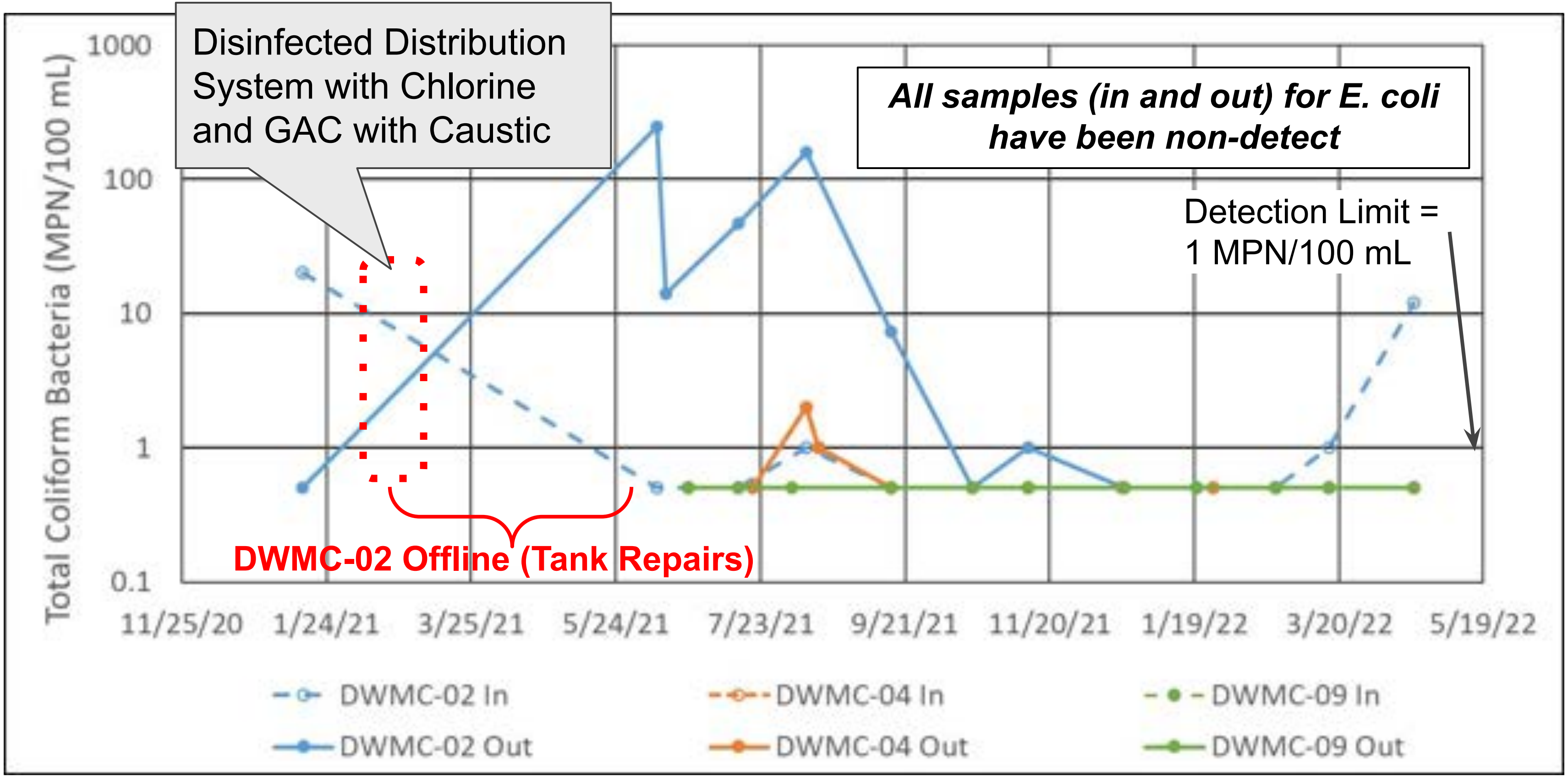
- Data shown are based on pressure gauge readings during monitoring visits 11/2021-4/2022. Early months of data were removed due to malfunctioning pressure gauges.
- Data from some pressure gauges known to have been faulty have been removed. However, additional cleaning and validation of the data is needed to determine the explanation for outliers.

Monitoring: Pressure Losses during Flushing



- Data shown are based on pressure gauge readings during monitoring visits 10/2021-4/2022. Early months of data were removed due to malfunctioning pressure gauges.
- Data from some pressure gauges known to have been faulty have been removed. However, additional cleaning and validation of the data is needed to determine the explanation for outliers.

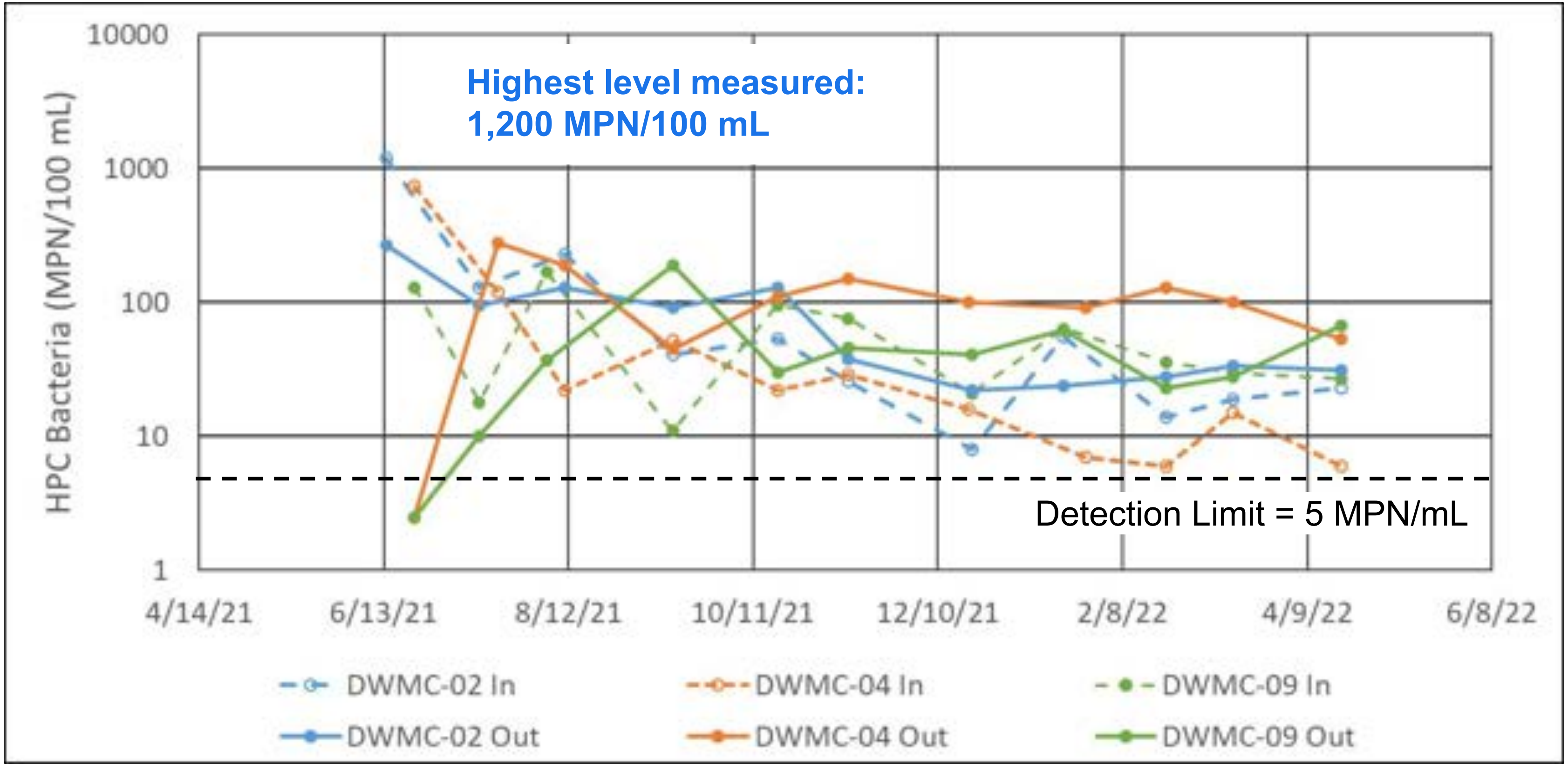
Monitoring: Total Coliform and E. coli



Monitoring: Total Coliform and E. coli

- No E. coli detected in influent or effluent of systems
- Total coliform in 2 system effluents early in study, at levels higher than influent
- Total coliform positives becoming less frequent, perhaps due to longer operation or seasonality
- Regardless of whether coliform bacteria have been detected, Phase 2B implementation agreements signed with residents and owners:
  - Recommend any water system repairs to reduce bacteria contamination risk
  - Providing information on total coliform bacteria
  - Confirm that residents are drinking and cooking with bottled water
  - Request consent to continue operation of system if total coliform bacteria are detected

Monitoring: HPC Bacteria



Operations and Maintenance

- Minor operations and maintenance activity to date:
  - Repair leak in treatment system piping at DWMC-02 (post-installation)
  - GAC clogging manifold at DWMC-09 (post-installation)
  - Replace malfunctioning pressure gauges
  - Replace leaky sampling hose bibs
  - Replace leaky ‘O’ Ring on DWMC-09 tank header
  - Replace post filters on all three systems (suspected fouling with carbon fines)

Monitoring and O&M Summary

- All systems successfully removing 123-TCP to below the detection limit
- Peak flow through system appears to be limited by supply pressure. High-resolution flow monitoring will provide more insight.
- Bacteria:
  - Total coliform positives less frequent. No E. coli detected
  - HPC concentrations decreasing or stable over time.
- No significant O&M incidents to date
- Monthly monitoring continues to provide valuable information

Any additional feedback related to indicator bacteria or optimization of monitoring?

Other Feedback Related to UV Treatment (from Sept 2021 TAC Meeting)

- Due to difficulty in keeping bacteria out of shallow wells and treatment systems, consider adding UV disinfection to mitigate bacteria issues.
  - "For other states that have been using POE systems for longer, the best practice seems to be putting in UV systems as a standard practice. You may not have the budget to install UV as part of this project, but long-term that is something that probably needs to be looked at."
    - CWC agrees and is looking for additional funding for UV and high priority well repairs as part of future phases of this project
- Deciding between Class A and Class B UV treatment systems is a touch choice
  - Class B systems used in other states due to lower power requirements, assumes water is already safe and installed as a precaution
  - Class A intended for water that may not be bacteriologically safe or is E.coli positive
- Concerns about cost effectiveness of adding UV treatment

Which UV Treatment system should we include in proposal for future funding?

UV Pure Hallett 500PN

NSF Class A Cert.

40 gal/min

For hardness up to 855 mg/L as $CaCO_3$

Indoor installation required

$2,550 (w/ 25% discount)

Softener

+

Viqua NSF Class A UV (~$2000)

Source water: Hardness 240-1,000 mg/L as $CaCO_3$; Iron up to 0.14 mg/L

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State Water Board POU/POE Updates

- At last TAC meeting in September 2021, Eugene Leung provided an update on NSF standards for POE treatment:
  - A standard for certifying POU- and POE-scale 123-TCP treatment devices has now been added under the NSF 53 standards to treat water so it complies with the California MCL.
  - It will now take some time for manufacturers to put in requests for certification of their products and for their products to get certified.
  - Three certifiers, IAPMO, NSF, and WQA are working to have some scaling factors
  - Working to determine whether or not the replacement of carbon is within the scope of the NSF drinking water treatment unit standard.

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6. **CWC Draft recommendations for POE/POU treatment for private wells (2:00-2:15)**
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CWC Draft Recommendations for POU/POE Treatment for Private Domestic Wells

- POU/POE Treatment is an Environmental Justice and Human Rights issue. All solutions need to consider:
  - Reliability
  - Exposure to contaminants from other taps
  - Possible exposure if system fails (without warning)
  - Increased cost of POU/POE treatment paid for by customers/households
  - Burden of determining whether water is safe placed on households
  - Community trust and community choice

See CWC, LCJA, and CWA's comments on the State Water Board POU/POE White Paper (Feb 2022) for more information. These were sent to the TAC separately.

CWC Draft Recommendations for POU/POE Treatment for Private Domestic Wells

- Need critical evaluation and framework to determine the conditions under which POU/POE treatment is appropriate and feasible
  - Total coliform and e.coli
  - Need state certified device
  - High risk of acute contaminants like nitrate and perchlorate
- SWB White Paper should provide guidance for POU/POE treatment on private wells. We recommend:
  - Source water monitoring to determine feasibility
  - POE treatment for 123-TCP or other contaminants to address not consumptive routes of exposure
  - Automatic shut off if systems stop working, and mechanical warning device
  - Monitoring frequency that matches risk posed by contaminants
  - O&M funding to ensure system function, and evaluate tradeoff between capital and O&M

See CWC, LCJA, and CWA's comments on the State Water Board POU/POE White Paper (Feb 2022) for more information. These were sent to the TAC separately.

Technical Advisory Committee Meeting Agenda

1. TAC Roll Call (12:30-12:40)
2. Discussion of TAC Feedback (12:40-12:50)
3. Project Updates (12:50-1:05)
4. Summary of performance (3 installed systems) (1:05-1:45)
5. State Water Board POU/POE updates (1:45-2:00)
6. CWC Draft recommendations for POE/POU treatment for private wells (2:00-2:15)
7. **Next Steps (2:15-2:30)**

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
Nov/Dec 2020	Phase 2 scope of work
February 2021	Cost documentation methodology and Bacteria/Disinfection Follow-up
Sept 2021	Review monitoring results and costs from Phase 2A. Consider EBCT update for Phase 2B.
May 2022	Review monitoring results, Draft recommendations for POE/POU treatment for private wells
February 2023	**Draft final report**
June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

Next Steps

- CWC to continue support high priority repairs using supplementary project funding prior to installation
- CWC to install final Phase 2B system and put two additional systems online
- CWC to apply for funding to continue O&M and monitoring after June 2023 and for other key improvements to this pilot project.
- CWC to continue to test new wells and follow-up with potential candidates from past testing

Phase 2B Installation Site

Next Steps

1. Short exit survey (see chat box in zoom)

2. Next Meeting (Hold these two times)

- **Th. Feb 16, Noon-2pm**
- Tu. Feb 21, Noon-2pm

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123-TCP Treatment Pilot Project for DAC Households in the Northern Monterey County Area
Technical Advisory Committee
February 16, 2023 Meeting Minutes
12:30-2:30 PM

Meeting Format: This meeting took place in the form of an online webinar where participants joined via video and audio. During part of the meeting, participants followed a live PowerPoint presentation.

Meeting Minutes Format: The information covered during the presentation as well as the group discussion is captured in these notes. The PowerPoint slides from the presentation during the meeting are attached and are referenced in the minutes. At times, minutes are paraphrased and abbreviated to capture the intent of what was said. A recording of the Technical Advisory Committee (TAC) meeting is also available upon request. Some sections of the discussion were rearranged to group similar items together.

Attendance:
Michael Adelman, Stantec Consulting Services, Inc.
Tamara Anderson, Central Coast Regional Water Quality Control Board
Brandon Bollinger, CWC
Tim Bushman, Culligan QWE Commercial Systems
Craig B. Drizin, Weber Hayes, and Associates (WHA)
John Erickson, CWC
Chad Fischer, SWB (DDW, SAFER Engagement Unit)
Kyle Graff, State Water Board (DDW, Monterey District)
Tarrah Henrie, California Water Service
Mayra Hernandez, CWC
Harrison Hucks, WHA
Mikel Irigoyen, CWC
Tori Klug, Stantec Consulting Services, Inc.
Eugene Leung, State Water Board (DDW, Technical Operations)
David Okita, CWC
Karmina Padgett, State Water Board (DFA)
Roxanne Reimer, CWC
Cheryl Sandoval, Monterey County Environmental Health Bureau
Chad Seidel, Corona Environmental Consulting
Allie Sherris, Stanford University
David Zensius, State Water Board (DDW)

I. Introduction and Roll Call

John Erickson from Community Water Center (CWC) welcomed all attendees to the sixth TAC meeting for the 123-TCP Point-of-Entry (POE) Treatment Pilot Project. He introduced the CWC team members on the call, confirmed which TAC members were on the call, and reviewed the agenda for the meeting. John also reviewed the current, past, and future TAC meeting topics.

II. Discussion of TAC Feedback

John Erickson reviewed the TAC feedback from the last meeting and how it was addressed (see Slides 8-9), including:

- The installation of shade structures for systems that receive large amounts of sunlight per feedback from the TAC last meeting about how temperature is an important factor to consider for nitrate sloughing and microbial growth.
    - Shade structures were installed at DWMC01, DWMC09, and DWMC15.
    - Benefits include longer-lasting plumbing and better temperature regulation to reduce potential for microbial growth and nitrate sloughing.
- Discussion:
    - Chad Seidel said it is great to see shade structures, which are especially important for equipment longevity. He will be interested to see how they impact temperature and nitrate.
- Feedback from Eugene Leung in the last TAC meeting that having an inventory of common problems with wells/water systems and the observed costs of resolving them will have value when budgeting and planning for future projects
    - John said that CWC plans to include a list of repairs and associated cost in the technical appendix of the final report.
- Observation from TAC members in the last meeting regarding lack of rain and how that may correlate with lower total coliform levels.
    - John said this would be discussed in the System Performance portion of the meeting, including looking at how the extensive rains in December/January affected coliform levels.

III. Project and System Performance Updates

Mikel Irigoyen presented Project Updates (Slides 11-18):

- CWC and WHA are continuing to use a phased approach for implementing systems (Slide 11). Phase 1 is complete; Phase 2A installations are complete with monitoring and O&M in progress; and Phase 2B is in progress with 6 systems installed, 4 of them online and

O&M in progress. CWC is looking to install multiple additional Phase 2B systems.

- DWMC14 & DWMC19 were taken offline in mid-June shortly after installation due to E.coli detections (1 - 3 MPN/100mL) downstream of treatment systems (Slide 13). WHA and Culligan replaced the carbon in both systems, disinfected the tanks and all plumbing components, and resampled the system effluents. Both system effluents were non-detect for E.coli. The E. coli could have been from minor contamination from upstream of the systems or during installation.
    - Next steps taken or being taken for each system are:
        - DWMC14: A water system inspection did not identify likely contamination routes. System was put back online 11/30/22 and has been non-detect for E. coli in subsequent sampling events.
        - DWMC19: Well repairs are needed to eliminate contamination routes and address total coliform contamination prior to putting the system back online.

    - Discussion:
        - Eugene Leung: At DWMC14, did you collect a source sample to check that E. coli was present at the well? E. coli would not normally just show up within a treatment system.
        - Harrison Hucks: I collected a source sample downstream of the tank at DWMC14, which is the closest sample tap to the well, since there is no tap at the well. The post-tank sample was Non-Detect. The E. coli contamination could be from two different potential routes:
            - Coincidental contamination in the source water that was not detected in source water sampling.
            - Contamination during installation, despite Culligan installation team's efforts to avoid contamination by laying down plastic sheets and disinfecting pipes. The presence of chickens at both sites may have contributed to contamination.
        - Eugene: Did you collect a confirmation sample to confirm E. coli contamination?
            - Harrison: Confirmation samples were collected. [CWC confirmed after the meeting that DWMC14 samples downstream of treatment were positive for E. coli on 6/16/2022 and 6/29/2022, and DWMC19 samples downstream of treatment were positive for E. coli on 6/15/2022 and 6/29/2022.]
        - Eugene: In the future it would be helpful to have a sample tap right at the well.

- E. coli (1 MPN/100 mL) was detected both upstream and downstream of the DWMC21 treatment system during a routine monitoring visit on 12/21/2022 and homeowners were notified immediately (Slide 14). Confirmation samples were taken upstream and downstream of the treatment system on 12/30/22 but were lost by the lab. Upstream and downstream confirmation samples were re-collected on 1/4/2023 and again on 1/12/2023. E. coli was not detected in any of the upstream or downstream confirmation samples. The initial E. coli detection may have been a false positive and the system remains online.
- Well repairs are planned to eliminate identified contamination routes at DWMC15 and DWMC19 (Slide 15). DWMC15 is installed but has yet to be put online due to the presence of total coliform bacteria and potential contamination routes. Limited well contract availability has delayed progress on these repairs.
- A successful well repair was completed at DWMC-01 (Slide 16), where total coliform levels were previously very high, and previous disinfection attempts were unsuccessful. As shown in the pictures on Slide 16, the actual well casing was smaller than and within the well head. Previous disinfection attempts were unsuccessful, likely because chlorine solution poured through a hole in the well head cap did not actually enter the well. Repairs included lifting the well head to disinfect, replacing the existing cement pad, and installing a new surface seal. Total coliform bacteria have not been detected after repairs and the system has been online since 11/17/2022.
    - Harrison: This is a really good example of what we have been seeing in the pilot: In terms of 123-TCP concentrations downstream of the lead tanks we have been really successful, but bacteria and distribution issues have been a major hurdle. DWMC01 is a great example of how spending the money, figuring out what the problem is, and hiring the right people to get the work done can be successful. You create a sealed, tight distribution system, and we haven't detected coliform since this repair. With these older systems, you want to get treatment, but to do that you also have to address the distribution system. It is a dual battle.
- The project team is considering four additional sites for potential additional installations (Slides 17-18), three in Royal Oaks and one in Aromas. WHA has conducted site assessments at all four sites and is finalizing the reports from those assessments.
    - DWMC14B is served by the same well as DWMC14.
    - DWMC25 would be serving two households and the project team is considering whether it would be best to install one or two treatment systems there. Total coliform has been detected at DWMC25 and disinfection or water system repairs may be required prior to treatment system installation.

John Erickson provided an update on System Performance (Slides 19-25)

- 123-TCP (Slide 19)
    - All samples collected between lead and lag GAC vessels have been non-detect for 123-TCP. It is good that the systems have performed well this long without GAC replacement, but this also means we need to continue the project for longer to know how long the different sized systems will last until breakthrough.
    - Source water 123-TCP concentrations have continued to vary, with some wells fluctuating between above the MCL and non-detect. (Slide 19)
- Total Coliform
    - Phase 1 and 2A systems (Slide 20)
        - No recent total coliform detections downstream of the treatment systems.
        - Some periodic detections of low levels of total coliform bacteria upstream of DWMC02 & 04.
        - There was a small uptick in total coliform levels for DWMC-02 around the most recent rain events in November, December and January, but nothing big. It would be interesting to look at past rain events and compare how coliform levels changed then.
        - No E. coli detections
    - Phase 2B systems (Slide 21).
        - Some higher levels of total coliform, especially in DWMC21 and DWMC10.
            - One DWMC21 sample with high levels of total coliform was the same sample where E. coli was detected. The high levels of total coliform may also have been due to sampling error. The follow-up samples collected had lower total coliform levels.
            - There did appear to be an increase in total coliform levels for these systems associated with recent rain events.
- Heterotrophic plate count (HPC) bacteria (Slides 22-23)
    - The influent and effluent HPC levels generally follow similar trends and we are not seeing any large amounts of growth.
    - DWMC21 has higher HPC levels coming from the well compared to other systems.
- Discussion:
    - Chad Seidel: In addition to 123-TCP have you been tracking other indicators of GAC utilization, such as TOC UV absorbance breakthrough?
        - John: We have not had that in our monitoring plan, but could consider adding it. Could monitoring for this quarterly provide an early indicator of potential 123-TCP breakthrough?

- Chad: Source water TOC is a bigger driver for 123-TCP breakthrough than source water 123-TCP concentration is, because TOC concentrations are much higher than 123-TCP concentrations. TOC breakthrough usually precedes TCP, but more analysis of data on this topic is needed. UV absorbance as a surrogate for TCP breakthrough is typically a pretty fast, low cost way to help schedule carbon replacement, particularly in cases where the time to go out and do the replacement is a large part of the cost.
- John: Can UV absorbance be measured in the field?
- Chad: It can be measured in the field to some extent with more sophisticated colorimetric methods, but it is more typically measured in a local lab with a spectrometer. The sample does not need to be preserved. Larger water utilities typically measure UV absorbance with something like the Hach DR6000 spectrophotometer.
- John: This sounds like something to consider, if not as part of the last 6 months of the SEP project, maybe as we look to expand this project for three more years.
- Tarrah Henrie: You may want to do an initial round of sampling for TOC. If you do not detect TOC in that initial round, you may not want to do this quarterly, since you will probably continue to see non-detect. A lot of groundwater wells in California have very minimal amounts of TOC, and many labs still test in the mg/L range which will not detect the very minimal amounts actually present.
- Chad: You need a lab that will report TOC at levels below 1 mg/L. Detection at 0.3 mg/L is usually achievable. Most wells in California have less than one mg/L TOC.
- John: Some of the wells in the pilot did have somewhat significant levels of TOC, but it sounds like it would be important to be able to detect the lower levels downstream of treatment.
- Tarrah: You need to look at both influent and effluent TOC.

Mikel provided an update on Operations and maintenance (Slide 24)

- Minor maintenance activities since the last TAC meeting have been similar to those reported at the last meeting.
- WHA has been replacing the pre-filter at DWMC21 monthly due to persistent sedimentation issues. DWMC21 is the same system that had high levels of HPC bacteria and coliform. This leads us to believe that the well/water system may be in need of repairs.

- Harrison Hucks said the issue seems to be a well issue, either an incorrectly set well pump depth or a failed well screen. WHA recently recommended that the homeowner have a video log survey done to determine the cause. WHA's priority is to protect the carbon until the well owner can remediate the issue. To do that they are replacing the pre-filter on a monthly basis. Source water quality issues like this have been typical with this project and are informative. They bring up the question of whether these issues will shorten the life of the carbon, or result in needing to backflush the carbon. That is still to be determined, but so far we have not seen a 123-TCP breakthrough.

Mikel summarized the Monitoring and O&M updates (Slide 25) previously discussed and said that monthly monitoring continues to provide valuable information like E.coli detection and the identification of problems that come up due to the uniqueness of each system/location.

- Michael Adelman: These results seem to confirm initial suspicions that biofilm development and other factors are going to govern carbon life to a much greater extent than TCP breakthrough.

IV. Overview of Draft Report

Mikel Irigoyen described the objectives of the draft community facing report that was shared with the TAC before the meeting and is to be completed in June (Slides 27-28). The main audience for the report is project participants and others that live in areas with 123-TCP present in the groundwater. CWC is aiming for the community facing report to be around 10 pages. Technical appendices will be attached and directed mainly toward stakeholders like policymakers, TAC members, and organizations considering implementing POE treatment. Mikel then shared a screen briefly walked through the report, and asked for feedback.

Discussion:

- Chad Seidel: How do the community members respond to this project? Are others in the community clambering to have a 123-TCP POE treatment system installed?
    - Brandon Bollinger: There is a range of community feedback related to the project. Many participants have appreciated them and their children being able to shower without having to worry about 123-TCP. On Slide 8 a community partner is holding up a sign expressing appreciation for the project and saying that it has provided their family peace of mind. Others who have chosen not to participate have had various reasons including looking towards longer-term solutions and uncertainty about how long the pilot will continue.
- Chad: Has residents' water usage changed at all?
    - John Erickson: We considered installing flow meters at the POE prior to

treatment system installation to be able to compare water usage before and after installation, looking at both monthly consumption and peak flows to see if the system restricted peak flows. We have not been able to do that yet, because it would be a significant additional cost to separately install the meter prior to installing the system. But we still need to look more at the flow data we have and can continue to think about whether there is a way to do a before and after comparison.

- David Okita (in chat): One suggestion is to add information about other contaminants (nitrates) that are in the area.
- Tamara Anderson: It would be great if the report assessed the value of putting a system at one household or one that serves multiple households and seeing if there are benefits related to that. Separately, I wanted to make sure that it is clearly stated in this report that this pilot project is funded through the settlement with Monterey Mushrooms.
- John: CWC can send language to Regional Board Staff to make sure it is appropriate. Also, thanks for the comment on the number of households served, as it will be of interest to community partners.
- Eugene Leung: Earlier you mentioned these households are looking towards long-term solutions. Are they looking at consolidation? Or what are the other options being considered?
- John: It depends on the household and where they are located. The majority are in areas where CWC is working with the community to pursue long-term solutions. A few households are in more isolated areas that do not have a long-term solution on the horizon as of now.
- Eugene: It would be good to consider that long-term solutions like consolidation come with costs to these households that were not previously there, such as a water bill and it may not be cheap.
- John: In CWC's experience, community partners are very interested in costs associated with long-term solutions. This is taken into consideration when looking into the feasibility of long-term solutions. Community members also face costs related to domestic well ownership and upkeep, such as the sanding issue at DWMC21.
- Eugene: The households participating in this pilot are all on bottled water For the long-term solution, the public water system would be treating both 123-TCP and other contaminants, which would eliminate the need for bottled water service. Are community partners okay with getting off bottled water and not having these 123-TCP treatment systems? Would there be push-back to losing the bottled water service?
- Brandon: That is a really good point. In both the bottled water enrollment process and the 123-TCP pilot project we frequently bring up with residents that this is an interim solution until we obtain a long-term one. In our experience, community members have

been very receptive to and understanding of that message.

- Harrison Hucks: Homeowners in this 123-TCP project are very invested in how the system is performing, but also in the long-term solution. I get asked frequently about the status of the long-term solutions, especially in the North of Moss Landing area. The community partners are the most important part of this project, and providing them with information is incredibly important.
- Tori Klug: Regarding costs, there is a pretty substantial range on the site assessment, monitoring, and installation costs by site. It would be helpful to include things like well condition and necessary well and water system improvements to better understand the context of the high and low range. This information can be used to inform applications in other communities as well. It would also be helpful to include notes about why some of the wells with E. coli detections have higher monitoring costs.
- John: That makes a lot of sense, and we will plan to go into more detail about costs in the technical appendices.
- Eugene: Detailed source water quality should be included. Raw water quality is critical to this project. If someone has bacteriologically unsafe water coming from their well, there will be additional costs and delays to do well repairs before treatment can be implemented. Less is known about the health of these domestic wells than with public water system wells, and you may need more time upfront in investigating the well to make sure you have a bacteriologically safe system. Also, participants in this particular project cannot drink this water because of the high levels of nitrates. This project is taking steps to address inhalation exposure to 123-TCP through uses like bathing and washing dishes. Unfortunately, 123-TCP tends to occur in areas with high levels of nitrate, and in those situations this type of treatment system is not a complete solution.
- David: Regarding source water and variability of 123-TCP levels, Kevin Berryhill mentioned in a past TAC meeting that this variability is fairly common with 123-TCP. It would be good to point that out in the report.
- Eugene: It is important to note that the MCL is based on a running average of quarterly samples over a year.
- John: This is all very helpful feedback. We will have time to update this report as we move towards June, so any additional feedback or suggestions via email would be appreciated.

V. State Water Board POU/POE Updates

Chad Fischer summarized the Division of Drinking Water's (DDW) current efforts to finalize their report on POU/POE treatment:

- DDW has a draft report on POU/POE treatment out and solicited public comments on it late last year. They received several comments and DDW followed up and reached out to commenters, and incorporated comments into the report as they apply. DDW is doing some additional vetting on the recommendations with State Water Board executive management and board members. Chad anticipates the report will be finalized in March, 2023. DDW has initiated internal detailed talks about the POU/POE piloting that the draft report suggests and is trying to further detail what should be accomplished in those pilots and what kind of outcomes or datasets should come out of them we are looking for to come out of these pilots.

- John Erickson: CWC has been really interested in this report and appreciates the large quantity of work and thought that clearly went into the report.

John Highlighted some public comments that CWC, Leadership Counsel for Justice and Sustainability, and Clean Water Action submitted on DDW's draft POU/POE report (Slide 31):

- DDW's POU/POE treatment draft report identifies a lot of the challenges with POU/POE treatment that we have been experiencing in this pilot, such as source water quality. Given these challenges and the limitations of POU/POE treatment, it is important that POU/POE treatment not be disproportionately deployed in disadvantaged communities, and CWC wants to make sure that is reflected in the SWB's Needs Assessment and strategy for implementing the Human Right to Water.
- When developing this pilot, CWC searched for guidance on details such as the number of tanks and how much carbon to use, and fortunately received guidance from the TAC. CWC plans to publish as much of this detail as possible about this pilot. Cost information and monitoring data will help inform State policy.
- It is important to consider both the technical and managerial aspects of deploying POU/POE treatment. If POU/POE treatment needs to be a long-term solution for some households, we need to find the institutional process to make that sustainable.
- CWC is also working with DDW to include a summary of this 123-TCP POE treatment pilot project in DDW's POU/POE report.

John asked if Eugene Leung wanted to provide any updates regarding the registration process for POU/POE technologies.

- Eugene Leung: The registration process is handled by the regulatory development unit. I know they are working on improving their database/improving their process. He will see if there are any updates.
- Harrison Hucks: Will the system used in this pilot be state certified for 123-TCP treatment, or is that still being worked on?
- Eugene: In the case of this GAC treatment system, we know it works, but there is not a way to do a standardized certification. These vessels are filled by Culligan in Salinas, so

we have to work on it on a case-by-case basis. There is not a standardized system that Culligan has done, where there is an assurance of uniformity across all of Culligan's dealerships. Other treatment products that are certified are manufactured in a centralized location, but in this case Culligan's headquarters is not getting these GAC vessels certified so we need to work at a more local level to make sure each franchisee has the same quality.

- Tim Bushman: The larger filters that we originally used and the Calgon carbon were actually standard Culligan products that are certified to WQA NSF 61, but that is all they have been certified as.
- Eugene: I agree that each component is certified for use in drinking water systems, but that is not a certification of treatment performance. Certifications for POU devices give a contaminant concentration range and capacity for which they are safe for use. In this case, we know the materials being used are certified as safe for use with drinking water systems (they will not be leaching additional chemicals into the water), but we do not have a certification for the contaminant removal capacity or concentration for which they work.
- Eugene: We are willing to determine a setup that works. For instance, having lead/lag capacity, looking at the range of raw water quality including interfering agents like TOC, and seeing how much treatment capacity that we can get out of that. Then maybe we can reduce monitoring frequency to quarterly because of the lead/lag configuration. For public water systems the monitoring will always be monthly because they have more users. Since the breakthrough is so slow on these smaller systems quarterly monitoring may be acceptable.

VI. SWB Funding Proposal: Continue Pilot through June 2026

John Erickson provided an update on CWC's goal to continue the pilot through June 2026 (Slide 33). The main impetus to extend this pilot is to continue providing treatment for community members since long-term solutions have not yet been implemented and to learn when breakthroughs will occur and more about the longer-term costs. Extending the pilot also offers the opportunity to install additional systems.

John asked for the TAC's feedback on two components CWC plans to add to the pilot as part of the extension: disinfection and sampling for nitrate to gain a better understanding of the extent to which nitrate sloughing from the GAC is a concern:

- Discussion:
    - John: Should we just focus on piloting UV disinfection, or are there any other disinfection methods we should consider as part of this project?

- Chad Seidel: What is the objective? Is the objective to control coliform levels or is it something else?
- John: The objective is to provide microbiologically safe water to households where we have not been able to eliminate total coliform with well repairs and well disinfection. Coliform is an indicator, but we are wanting to inactivate any pathogens that could potentially come with it. Another objective would be figuring out what the costs, challenges, and implementation process for disinfection at the household level.
- Chad: UV is likely the preferable option, but may not achieve all the objectives. A beneficial result of piloting disinfection could be to compare different disinfection options, even if it is just a desktop comparison and only one option is piloted physically. The biggest challenge for the small systems in terms of chlorine is that it has more potential to be detrimental, but it has some advantages.
- John: In terms of detrimental, are you referring to overdosing and disinfection byproducts?
- Chad: Yes, chlorine disinfection is more onerous to operate and maintain. Appropriate dosing at low flows is a challenge, and there can be more of an impact on the plumbing downstream that can be detrimental depending on the plumbing material. Beyond that, folks may not be used to having chlorinated water in their taps and may not like it.
- Tim Bushman: I agree, keeping a chlorine feed system operating correctly is a challenge. We see challenges all the time with homeowners operating these systems.
- Eugene Leung (in chat): For UV Treatment, it should be installed upstream of the GAC treatment. Also, [prior to installation], you need to measure the hardness of the water and UVT (UV Transmissivity) to determine if UV will even be effective. The recommended place [to install] is usually ahead of the filter, to make it safe. Then the GAC would not contaminate the water. That is the typical setup, but open to other thoughts. Checking the hardness to [determine feasibility is important]. If it is too hard, you may need a softener.

- John: Does the TAC have any guidance on how nitrate sampling might help us to better understand nitrate sloughing? CWC has thought mainly about grab sampling. We thought about continuous monitoring, but understand from talking with Tim that those online analyzers are costly and difficult to maintain.
    - Chad: Hopeful that we are within months of having a Water Research Foundation project publication on nitrate sloughing funded by Cal Water

and Calgon available. This report looked at 123-TCP contaminated water with lower levels of nitrate that can peak above the 10 mg/L MCL downstream of GAC, and defined temperature as the driving influence. Another influence is run time of the well, but temperature differential was the biggest issue. Nitrate adsorption decreases with increased temperature which increases the risk for nitrate sloughing. This report will be really useful to reference. Online nitrate analyzers are in the $30,000 range and are more onerous to operate than anything else at the pilot sites. A low-flow meter with a temperature sensor was used in the other study and could be a recommendation here.

John provided an update on the timeline for CWC's proposal to incorporate funding to continue the 123-TCP treatment pilot into its State Water Board Regional Bottled Water agreement and highlighted that completing well and water system repairs done, getting all systems online, and installing additional systems will be a priority for use of SEP funding from now until June. CWC plans on extending implementation agreements with residents if State Water Board funding to extend the pilot is approved (Slides 35-36).

VII. **Next Steps**

The next meeting will be held in June and will be focused on discussion of the Final Report

- Mikel Irigoyen will send out meeting minutes, PowerPoint slides, and a Doodle to confirm the next TAC meeting date and time.

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

123-TCP Point-of-Entry Treatment Pilot Project in North Monterey County Area
Technical Advisory Committee Meeting
Feb 16, 2023

"Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes."



Technical Advisory Committee Meeting Agenda

1. **TAC Roll Call (12:00-12:10)**
2. Discussion of TAC Feedback (12:10-12:15)
3. Project and System Performance Updates (12:15-12:40)
4. Overview of Draft Report (12:40-1:10)

---------- *Short Break (1:10-1:20)* -------------

5. State Water Board POU/POE Updates (1:20-1:35)
6. Project Next Steps (Proposal for SWB Funding to Continue) (1:35-2:00)

Technical Advisory Committee Members
1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area

Name	Company / Agency / Organization	Title / Position
Michael Adelman, P.E.	Stantec Consulting Services, Inc.	Environmental Engineer
Mark Bartson (retired)	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Kevin Berryhill, P.E.	Provost & Pritchard Consulting Group	Principal Engineer
Paul Boyer (retired)	Self-Help Enterprises	Program Director, Community Development
Guadalupe Gonzalez	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Kyle Graff	State Water Resources Control Board (DDW)	Northern California Drinking Water Field Operations
Tarrah Henrie	*California Water Service (CalWater)*	Manager, Water Quality
Chad Seidel, PhD, PE	*Corona Environmental Consulting*	*President*
Alex Huang, P.G.	State Water Resources Control Board (DFA)	Office of Sustainable Water Solutions Branch
Brian Kidwell, P.E.	State Water Resources Control Board (DDW)	Safe and Affordable Funding for Equity and Resilience
Tori Klug, P.E.	Stantec Consulting Services, Inc.	Project Manager
Eugene Leung	State Water Resources Control Board (DDW)	Program Management Branch Technical Operations
Edwin B. (Ned) Lofink, P.E.	Axiom Engineers	Senior Project Engineer
Cheryl Sandoval	Monterey County	Supervisor, Drinking Water Protection Services
Laura Satterlee	Self-Help Enterprises	Water Division Manager
Allie Sherris	*Univ. of Washington* (Stanford University)	*Postdoctoral Researcher,* Public Health

Technical Advisory Committee Members (cont.) 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area		
Name	**Company / Agency / Organization**	**Title / Position**
Tami McVay	Self-Help Enterprises	Assistant Program Director-Partner Services
Dave Wallis	Rural Community Assistance Corporation	Rural Development Specialist III - Environmental

* Craig Drizin and Harrison Hucks from Weber, Hayes & Associates and Tim Bushman from Culligan are consultants contracted for implementation of this project and participate in TAC meetings to provide information from the TAC and to consider input from the TAC.

We recognize and appreciate the participation of all TAC members as well as additional staff from Self Help Enterprises who have attended our TAC meetings including Cecilia Vela, Marliez Diaz, and Dan Larkin.

In addition to those listed, CWC provides all TAC information to additional State Water Board staff who supervise and/or support TAC members: Michelle Frederick, Matthew Pavelchik, Stefan Cajina, and Karen Nishimoto.

We may also be joined today by:

- Tamara Anderson or Thea Tyron, Central Coast Regional Water Quality Control Board, overseeing project funding
- Vanessa Soto, SWB Office of Public Participation
- Karmina Padgett, SWB Division of Financial Assistance
- Chad Fischer, SWB DDW SAFER Engagement Unit, leading POU/POE Pilot White Paper effort

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

John Erickson,
Technical Director

Mikel Irigoyen,
Community Solutions
Coordinator

Brandon Bollinger,
Senior Community
Advocacy Manager

Heather Lukacs, Director
of Community Solutions

Mayra Hernandez,
Community Solutions
Advocate

Roxanne Reimer,
Community Solutions
Manager

David Okita,
Senior Fellow

Susana De Anda,
E.D. & Co-Founder

Technical Advisory Committee Meeting Schedule 1,2,3-TCP Residential Treatment Pilot Project in Northern Monterey County Area	
October 2020	Project goals and overview. Phase 1 scope of work. Review draft design of 12,3,-TCP POE treatment system. Review proposed monitoring protocols.
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June 2023	Plan to share final report and results to inform state-wide efforts
*Exact meeting dates to be determined	

Technical Advisory Committee Meeting Agenda

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2. **Discussion of TAC Feedback (12:10-12:15)**
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4. Overview of Draft Report (12:40-1:10)

--------- *Short Break (1:10-1:20)* ------------

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6. Project Next Steps (Proposal for SWB Funding to Continue) (1:35-2:00)

Shade Structures

- Shade structures were installed at DWMC01, DWMC09, and DWMC15
- Benefits include:
  - Plumbing will last longer
  - Reducing potential for microbial growth and nitrate sloughing

Community partner María Gonzalez next to DWMC01 with installed shade structure.

Other Feedback from May 2022 TAC Meeting

- Inventory of common problems with well systems like this and the costs of resolving them will be valuable when budgeting and planning for future projects.
  - Will include list of repairs and cost in technical appendix to final report

- Lack of rain may contribute to decreasing levels of total coliform.
  - December/January are an opportunity to look at this
  - Will revisit when we look at water quality data later in presentation

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Phased Implementation for Adaptive Approach

Phase 1

- Site assessments
- Treatment system design
- Install 1 system
- Monitor 4 months

Complete

Phase 2A

- 4 Preconstruction visits ✓
- Install 2 systems serving 3 households using Phase 1 design ✓
    - 20 min EBCT @ 9gpm
- 26 months monitoring and O&M for Phase 1 & 2A systems
- Track installation, monitoring & O&M costs

Monitoring & O&M In Progress

Phase 2B

- Install 6 more systems
    - 3 Systems - 3.6 cf per vessel (6.0 min EBCT @ 9gpm)
    - 3 Systems - 2.0 cf per vessel (3.3 min EBCT @ 9gpm)
- Monitoring and O&M for Phase 2B systems through June 2023

6 Systems Installed, 4 of them Online
Monitoring, O&M In Progress

Project Updates

- 9 systems installed, 7 currently online and effectively treating 123-TCP
- E.coli detections at DWMC14, 19, & 21
- Well/water system repairs
- Four potential sites assessed for future system installs: DWMC25, 26, 27, &14B

Community Partner Roberto Ramirez pictured next to the Phase 2B treatment system installed at DWMC-14 located near Royal Oaks in north Monterey County. This treatment system is the 3.6 cubic foot size.

E. Coli Detected and Carbon Replaced (DWMC 14 & 19)

- Both taken offline in mid-June shortly after installation due to E. Coli downstream of treatment systems (1 MPN/100 mL).
- Carbon was replaced and systems thoroughly disinfected.
- Effluent was re-sampled, and both systems were confirmed to be non-detect for E.Coli.
- **DWMC14:** Water system inspected and no contamination routes identified. GAC system put online 11/30/22 and has been non-detect for E. coli since then.
- **DWMC19:** Well repairs needed to eliminate contamination routes and address total coliform prior to being put online.
- E. coli could have been from minor contamination from upstream system or during installation.

E. Coli Detected (DWMC21)

- E. coli (1 MPN/100 mL) detected both upstream and downstream of the system during a routine monitoring visit on 12/21/2022 and homeowners were notified immediately.
- Resampled 12/30/2022 but sample lost by lab.
- Confirmation samples collected on 1/4/2023 and 1/12/2023 and E. coli was not detected upstream or downstream of the system on either date.
- The system remains online.

Phase 2B treatment system installed at DWMC-21 located near Moss Landing in north Monterey County.

Planned Well Repairs to Eliminate Identified Contamination Routes

- **DWMC15**:
  - Lifting the well head and disinfecting
  - Installing new well seal plate
  - Replumbing well discharge piping
  - Replacing concrete pad
  - Repairing electrical supply conduit

Estimator going out week of 2/13/23

- **DWMC19**:
  - Lifting the well head and disinfecting
  - Installing new control box support and relocating off of the well plate
  - Installing watertight conduit from control box to the well plate
  - Disinfecting the well casing

Repairs scheduled for 2/17/23

Completed Well Repairs (DWMC01)

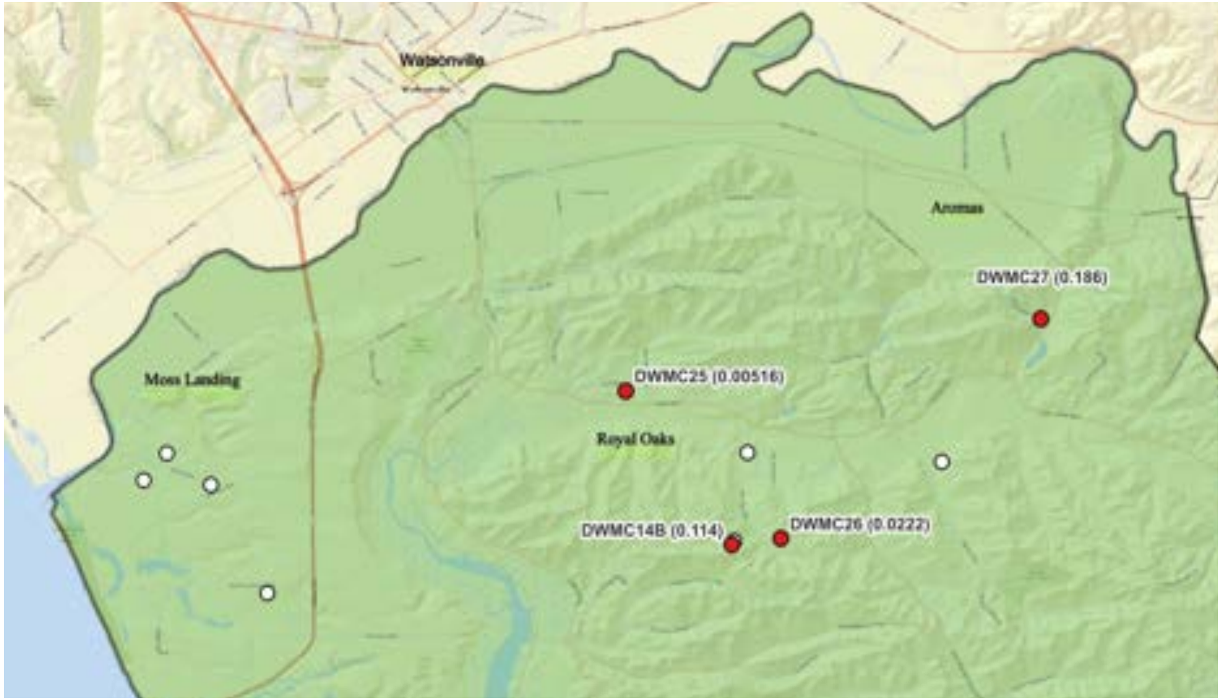
- Consistently high total coliform levels not resolved with initial disinfection
- Repairs included:
  - Lifting well head to disinfect
  - Replacing existing cement pad
  - Installing new surface seal
- Total Coliform bacteria has not been detected after repairs
- System online since November 17th, 2022

Before Repairs

After Repairs

Additional Site Assessments

- Four additional candidate sites
    - DWMC14B
    - DWMC25
    - DWMC26
    - DWMC27
- Pending finalized site assessment reports



Additional Site Assessments

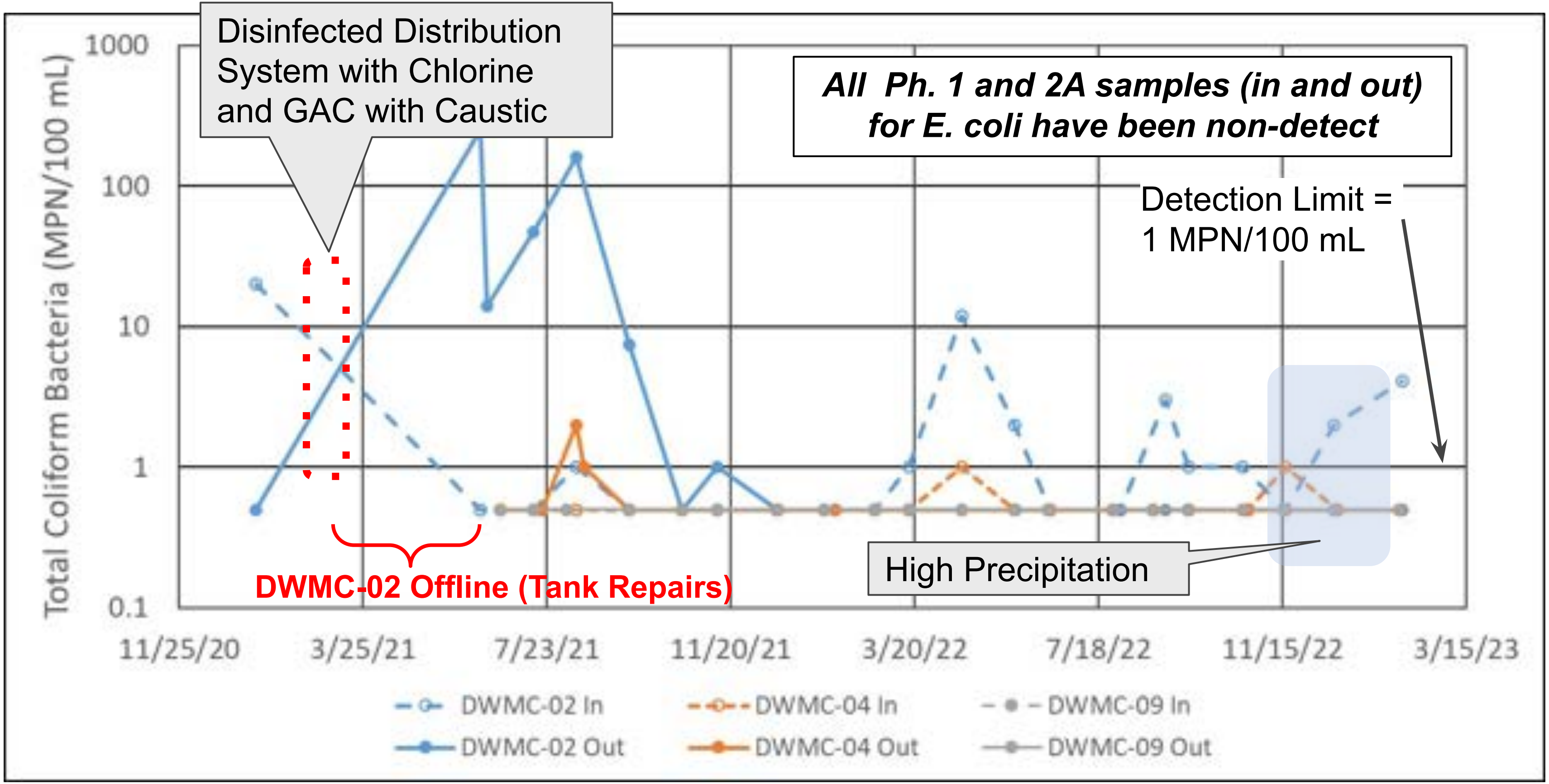
Site	Number of Households	TCP Level (ug/L)	Total Coliform (MPN/100mL)	E. Coli (MPN/ 100 mL)	Notes
DWMC14B	1	0.114	<1	<1	Same well as DWMC14A (already installed), but different property.
DWMC25	2	0.00516	9.7 (tank effluent) 1 (POE for one house)	<1 at both locations	Cound install one or two systems.
DWMC26	1	0.0222	<1	<1	
DWMC27	1	0.186	<1	<1	

Monitoring: 123-TCP

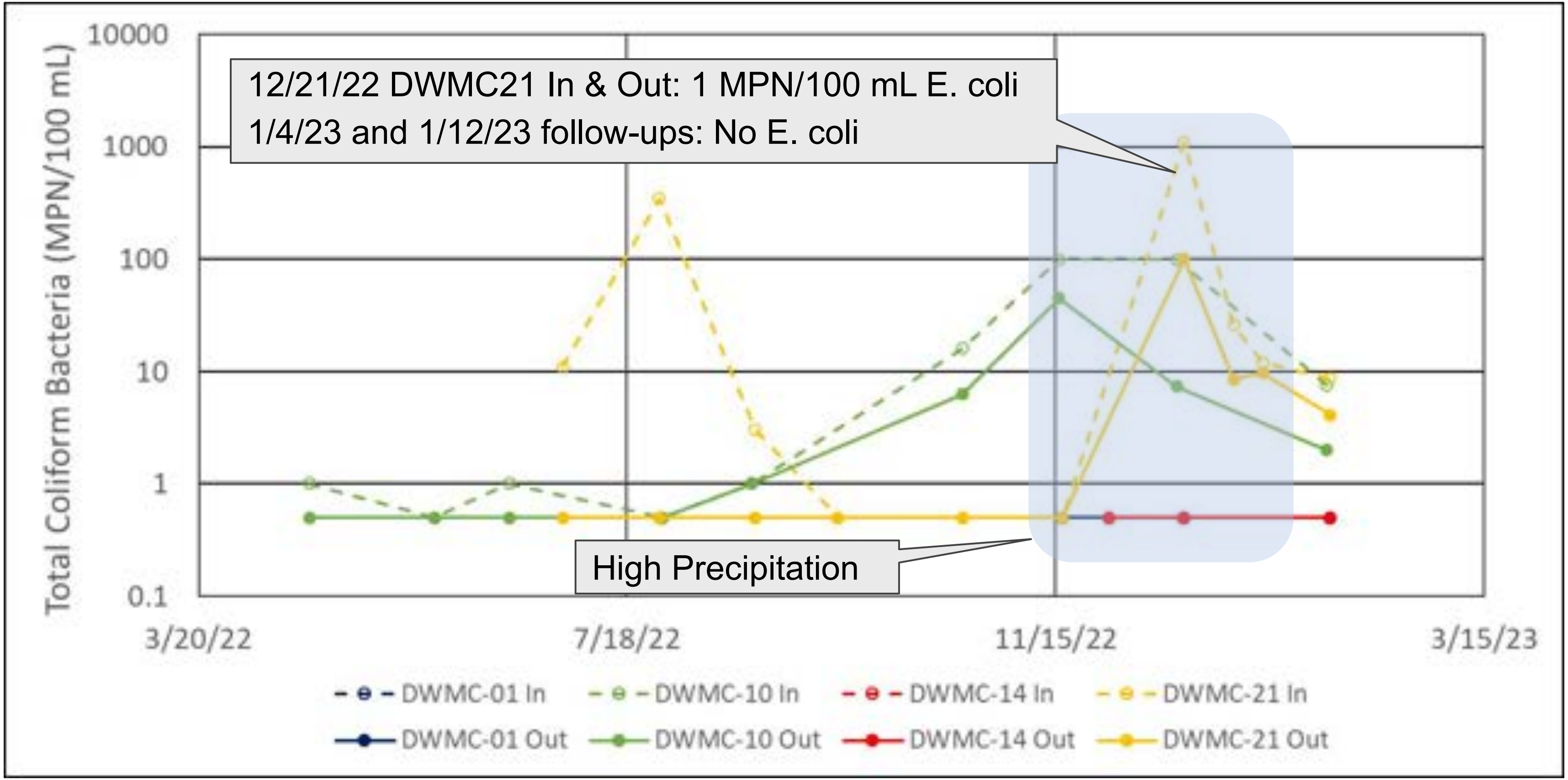
- All samples collected between lead and lag GAC vessels have been non-detect for 123-TCP.

- We have continued to see variation in source water 123-TCP concentrations, with some wells fluctuating between above the MCL and non-detect.

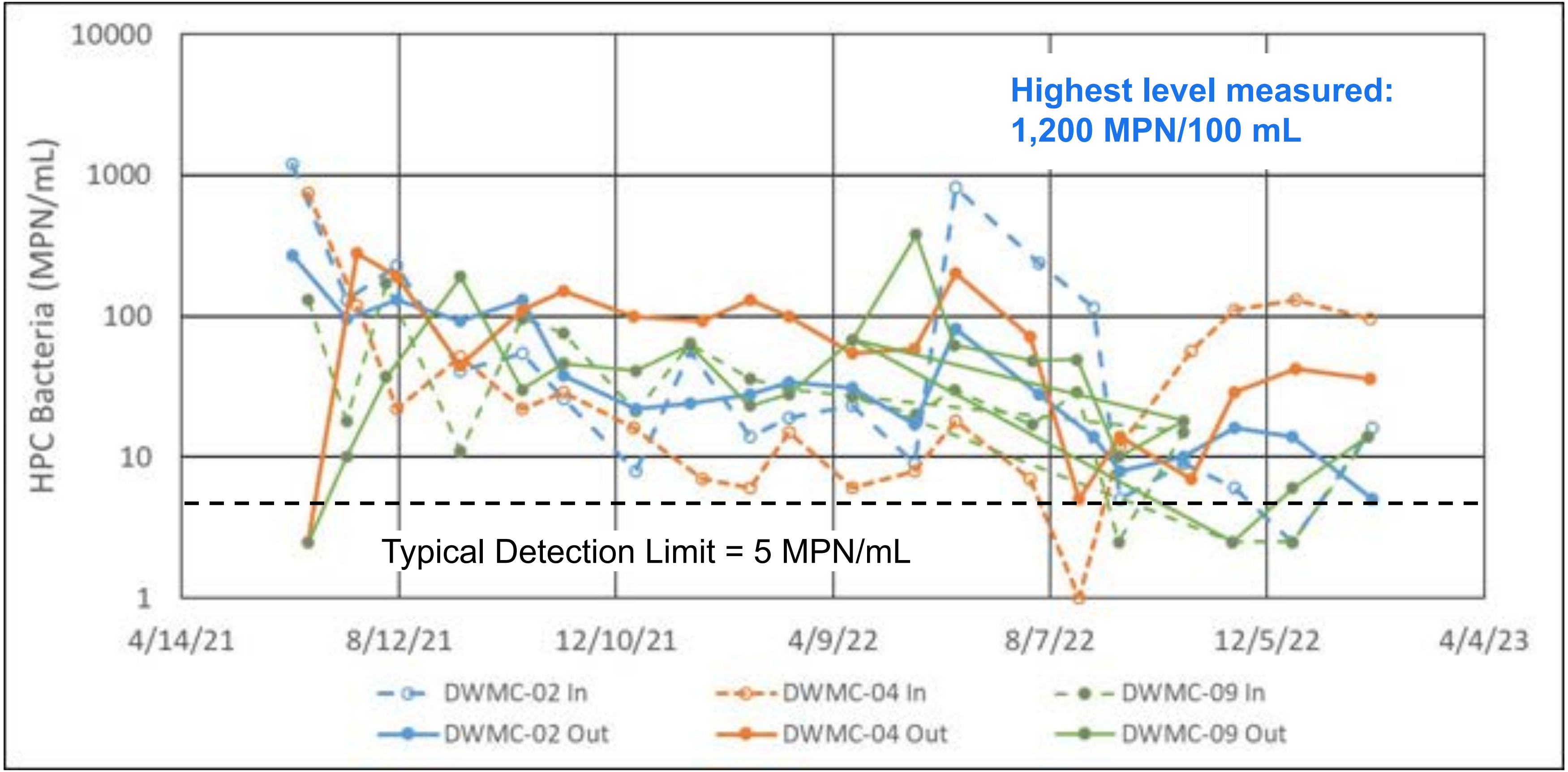
Monitoring: Total Coliform, Phase 1 and 2A systems



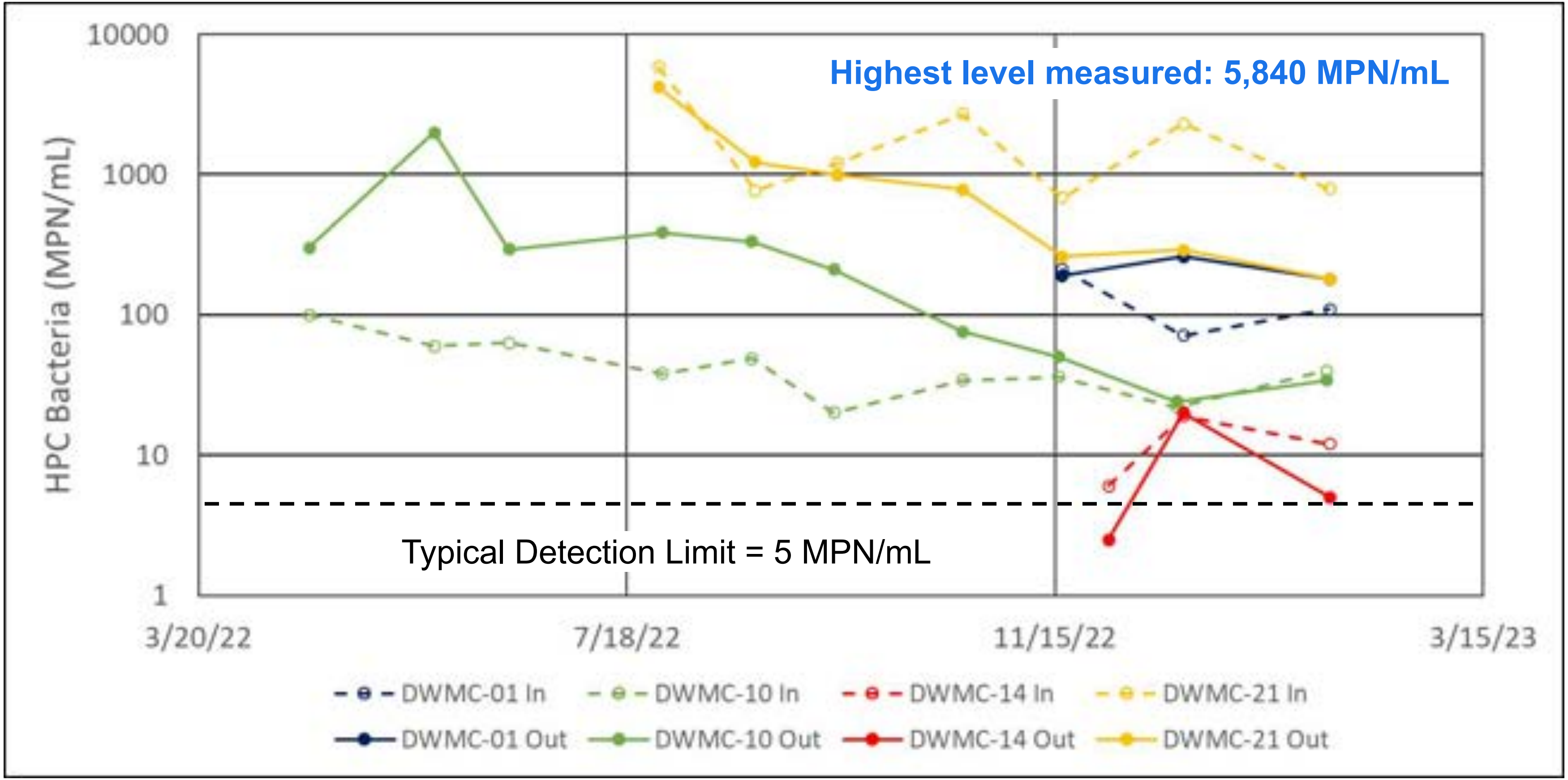
Monitoring: Total Coliform, Phase 1 and 2B systems



Monitoring: HPC Bacteria, Phase 1 & 2A systems



Monitoring: HPC Bacteria, Phase 2B systems



Operations and Maintenance

- Minor operations and maintenance activity to date:
  - Replace pre-filter at DWMC-21 monthly
    - Persistent sediment issues
  - Replace hose bibs to address leaks
  - Replace faulty gauges
  - Replace cracked plastic fitting to address leak

Monitoring and O&M Summary

- Online systems successfully removing 123-TCP to below the detection limit
- E.coli detected at three systems (DWMC14,19, & 21). Addressed by:
    - Confirmation sampling (DMWC21)
    - Carbon replacement (DWMC14 and DWMC19)
    - Planned well repairs (DWMC19)
- Monthly monitoring continues to provide valuable information

Any additional feedback related to monitoring and O&M?

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6. Project Next Steps (Proposal for SWB Funding to Continue) (1:35-2:00)

Proposed format of report

10-page Report (provided in draft form)

Audience:

- Project participants and community members concerned with 123-TCP contamination
- Policymakers and other stakeholders seeking high-level overview of project

Detailed Technical Appendices (under development)

Audience:

- Technical stakeholders
- Organizations considering implementing 123-TCP or other POE treatment

Information to include in technical appendices

- System Design:
  - Diagram of system
  - Granular activated carbon specification
- Well and water system repairs: Cost and detail
- Water quality monitoring data
- O&M Log
- Detailed source water quality for each site
- Implementation agreement signed with property owners and residents
- TAC meeting minutes

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State Water Board POU/POE Updates

CWC, Leadership Council and Clean Water Action comments on SWB POU/POE Report

- The report identifies limitations on where POE/POU can be effectively implemented and the importance of not disproportionately deploying it in disadvantaged communities.
    - State Water Board's Needs Assessment and strategy for implementing the Human Right to Water should account for these considerations.

- We have much to learn about how to reliably and sustainable implement POE/POU treatment. More pilots are required that:
    - Transparently report cost information, details on the treatment technology, and monitoring data.
    - Include the full POE/POE implementation process.

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SWB Funding Proposal:
Continue Pilot through June 2026

Project Area: Monterey and San Benito Counties

- Task 1: Outreach and Well Testing (~75 wells, Contaminants relevant to pilot + PFAS)
- Task 2: Recruitment and site assessment visits (~14 site assessments)
- Task 3: Well and water system repairs (~$7,800 per site, including CWC staff oversight)
- Task 4: Installation (~8 new systems)
- Task 5: Monitoring
- Task 6: O&M
- Task 7: Nitrate sampling (for sloughing) and piloting disinfection (likely UV at ~6 sites)
- Task 8: TAC facilitation and sharing lessons learned
- Task 9: Project management

SWB Funding Proposal:
Continue Pilot through June 2026

Requests for feedback: Task 7: Nitrate sampling and piloting disinfection

- Piloting disinfection
    - Were any TAC members able to find more information on the application of UV or other disinfection to domestic wells?
    - Should any disinfection methods other than UV be considered for piloting?
- Nitrate sampling to better understand sloughing
    - Can useful information be gained from grab sampling? Can grab samples be collected at certain times when risk of sloughing is highest?
    - Would continuous nitrate monitoring be feasible and useful?

SWB Funding Proposal:
Continue Pilot through June 2026

- Proposal Submitted October 2022
- CWC and SWB Division of Financial Assistance (DFA) staff decided to include it as an amendment to CWC's existing "Central Coast Region Bottled Water Project" funding agreement
- Anticipating DFA approval next week

Remaining Work under SEP Pilot

- Well/Water System repairs so DWMC15 and DWMC19 can be put online
- Install 3-5 additional systems (once SWB funding to continue monitoring and O&M is confirmed)
- Update implementation agreements for existing systems to extend monitoring and O&M through 2026 if property owners and residents want to continue participation
- Continue monitoring and O&M of all systems through June 2023
- Finalize and share report

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*Exact meeting dates to be determined	

Next Steps

Next Meeting
(Hold these two times)

- Thur. June 8th Noon-2pm
- Tues. June 13th, Noon-2pm

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Appendix C
Source Water Quality

Source water quality sampling results for samples collected prior to treatment system installation are shown in Table C-1 at the end of this appendix. Those samples were collected through the Central Coast Regional Water Quality Control Board's free well testing program and by WHA during site assessments for this project.

After treatment systems were installed, source water quality was sampled quarterly for 123-TCP and monthly for total coliform, E. coli, and heterotrophic plate count (HPC) bacteria. 123-TCP source water quality sampling results before and after installation are shown below in Figures C-1 and C-2. Source water bacteria sampling results are provided in a tabular form in Appendix G and are also graphed in the slides from the February 16, 2023 TAC meeting provided in Appendix B.

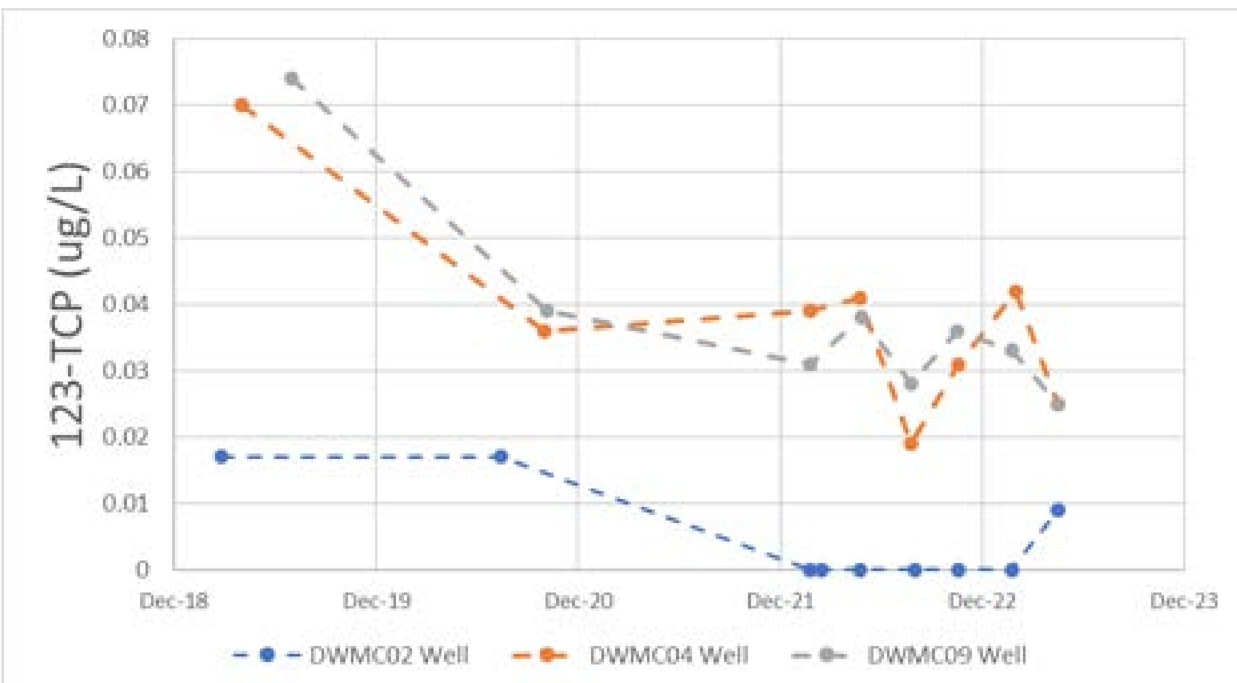


Figure C-1: Source water levels of 123-TCP in DWMC02, DWMC04, and DWMC09. Samples with non-detect results are shown as zero (detection limits varied from <0.0006 µg/L to <0.0007 µg/L).

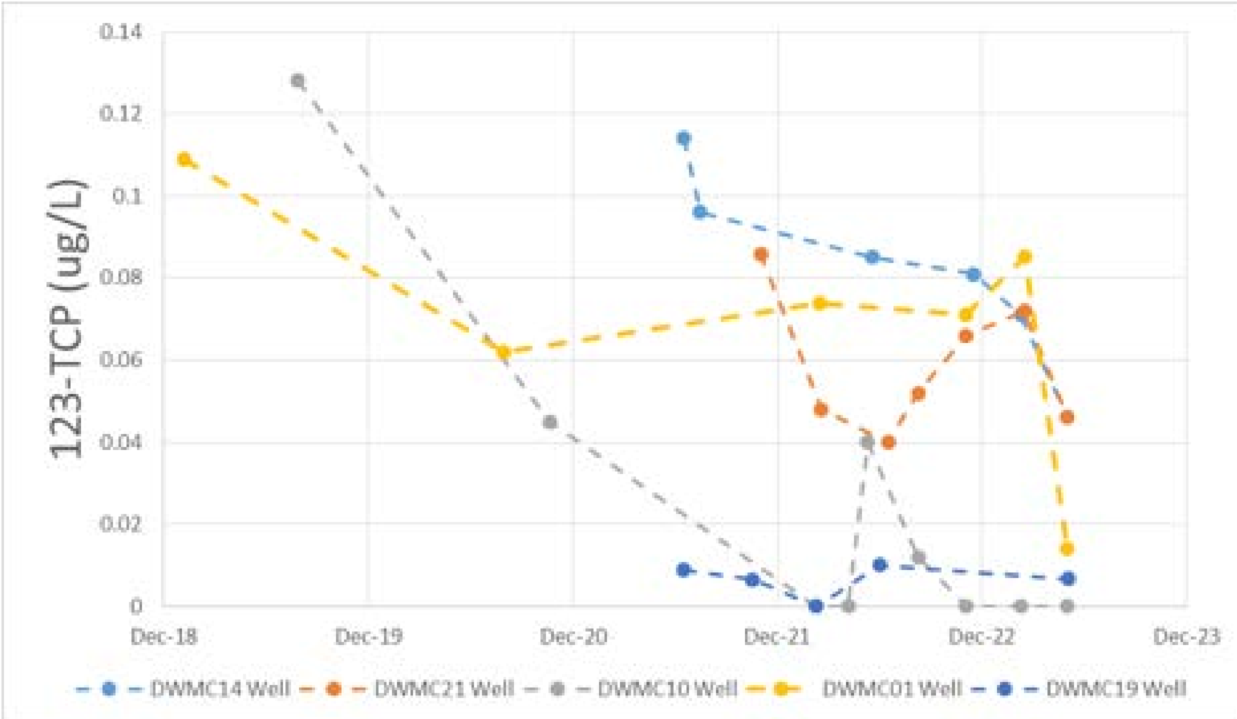


Figure C-2: Source water levels of 123-TCP in DWMC01, DWMC10, DWMC14, DWMC19, and DWMC21. Samples with non-detect results are shown as zero (detection limits varied from <0.0006 µg/L to <0.0007 µg/L).

Appendix C - Source Water Quality

Table C-1: Water Quality Summary for households participating in this study

No.	Site ID	# Houses Served By Well	# of people in each household	Area	Sample Date		Arsenic	Hexavalent Chromium	Nitrate (as N)	Perchlorate	Turbidity	Non-Volatile Organic Carbon	Iron	Manganese	Calcium	Magnesium	Hardness	Chloride	Sulfate	TDS	Install Date
						MCL	10	n/a	10	6	5*	N/A	0.3*	0.05*	N/A	N/A	N/A	500*	500*	1000*	
						PHG	0.004	0.02	10	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
						Units	ug/L	ug/L	mg/L	ug/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L as CaCO3	mg/L	mg/L	mg/L	
						Max	5.9	13.3	67.3	4.5	4.1	1.4	0.59	0.017	150	160	1000	432	370	1800	
						Min	<0.038	0.908	10.2	Non-detect	<0.1	<0.3	Non-detect	Non-detect	20.1	13	140	30.3	17.2	289	
1	DWMC02	1	2	Moss Landing	1/20/2021		4.5	3.5	65	<0.81	<0.1	<0.3	<0.05	<0.01	150	160	1000	390	370	1800	Dec 2020
					8/13/2020																
					3/27/2019		4.32	2.87	56	1.64					138	106		432	309	1620	
2	DWMC04	1	2	Moss Landing	10/29/2020		1.3	2.8	42	4.5	0.14	1	<0.03	<0.004	150	120	850	360	220	1400	June 2021
					5/2/2019		<0.038	5.1	50	4.4					130	100		290	180	1100	
3	DWMC09	2	House A: 5 House B: 5	Salinas	11/4/2020		1.4	3.5	64	1.7	0.12	0.47	0.1	<0.004	81	36	350	110	65	740	June 2021
					7/30/2019		1.67	2.91	66	1.92					76.9	37.1		101	71.2	870	
4	DWMC10	1	2	Salinas	2/22/2022																April 2022
					4/7/2021		2.6	1.9	50	1.1	1.3	1.4	0.14	0.0054	65	33	300	95	50	540	
					11/4/2020																
					8/13/2019		2.4	0.908	65.7	1.79					62.2	37.3		102	59.2	784	
5	DWMC14	2	6	Royal Oaks	9/22/2022																April 2022
					3/25/2022																
					3/16/2022																
					7/30/2021						0.11	0.3	ND	Non-detect							
					7/1/2021		1.05	13.3	10.2	Non-detect					20.1	13.5		42.8	17.2	289	
9	DWMC21	1	3	Moss Landing	6/2/2022						4.1		0.59	0.017	120	110	750				April 2022
					3/16/2022																
					3/3/2022																
					11/15/2021		5.79	9.39	29.3	3.6					105	101		358	178	1310	
					3/3/2022							1.1									
6	DWMC01	2	House A: 7 House B: 6	Moss Landing	2/28/2022																Installed: May 2022 Put online: November 2022
					3/24/2021		5.9	10	64	<0.81	0.29	1.4	0.13	<0.01	94	93	620	130	260	1100	
					8/13/2020																
					1/22/2019		5.48	9.77	67.3	<0.29					87.1	81.6		119	262	1130	
8	DWMC19	1	7	Royal Oaks	6/2/2022										35	13	140				Installed: May 2022 Put online: April 2023
					2/22/2022																
					1/20/2022																
					7/1/2021		0.689	5.15	20.3	Non-detect					32.3	13.9		30.3	41.1	410	
					11/1/2021						Non-detect	0.85	ND	Non-detect							
7	DWMC15	1	2	Royal Oaks	7/27/2021		1.3	6.5 (Tot Cr)	17.2	Non-detect	0.80	0.55	0.14	Non-detect	45	30.8	240	87.1	86	458	June 2023 *Not yet online*

Notes:

*MCLs shown for turbidity, Iron, Manganese, Chloride, Sulfate and TDS are Secondary Maximum Contaminant Levels.

Appendix D
Treatment System Design

The Request for Proposals (RFP) for this project specifically requested that the consultant's design use granular activated carbon (GAC). The RFP also specified the carbon specifications, developed with input from the TAC and available upon request.

In most cases, one POE treatment system was installed at the point-of-entry to one household to treat only the water used indoors by that household. Treating water for outdoor uses unnecessarily expends the GAC's capacity. However, in two cases, one treatment system was installed to treat water for two households on the same property served by the same well. At one site (DWMC-01), a tap was installed upstream of the treatment system and residents were encouraged to use untreated water from that tap for outdoor use. At the other site (DWMC-09) a tap was installed upstream of the treatment system; however, the distance from the residences to the upstream tap is too great for practical outdoor use. Outdoor use at DWMC-09 was estimated to be low.

The treatment system is also equipped with:

- Pre-filter to prevent sediment from entering into the GAC tanks
- Post-filter to filter out any GAC that might come out of the tanks
- Flow restrictors to prevent the flow through the system from exceeding its maximum design flow of 9 gallons per minute
- Flow meter to measure how much water is treated
- Pressure gauges to measure the pressure loss through the treatment system
- Taps to collect water samples upstream of the system, after the lead GAC tank, and after the lag GAC tank

Three different sizes of treatment systems were installed in the project to test the costs and benefits of larger and smaller systems. All systems had a maximum design flow of 9 gallons per minute:

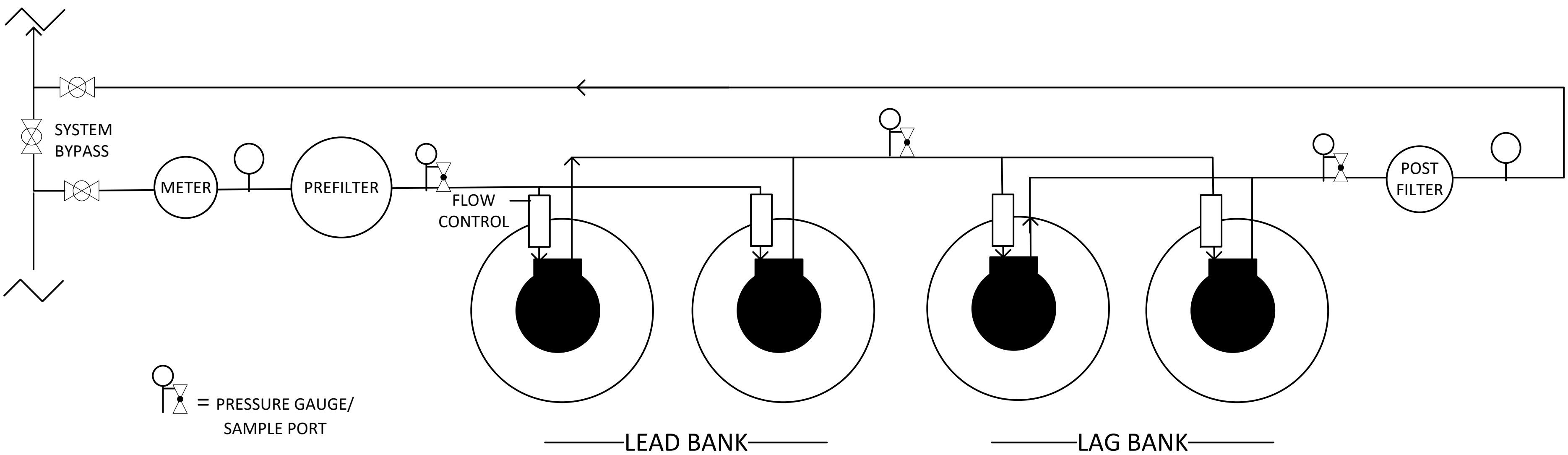
- 24-cubic-foot, 20-minute empty bed contact time (EBCT): The first three systems installed in the project have four GAC tanks each, with two parallel trains of lead and lag tanks. The tanks have a total of 24 cubic feet of GAC.
- 7.2-cubic-foot, 6.0-minute EBCT: Three systems installed later in the project have two GAC tanks each, one train consisting of a lead tank and a lag tank. The tanks have a total of 7.2 cubic feet of GAC.
- 4.0-cubic-foot, 3.3-minute EBCT: Three other systems installed later in the project also have the same two-tank design as the 7.2-cubic-foot systems, except they only have a total of 4.0 cubic feet of GAC.

Treatment System Design Specifications:

- Peak design flow: 9 gallons per minute
- Treatment technology: Must use Best Available Technology for 123-TCP treatment of Granular Activated Carbon, according to CA Regulations Related to Drinking Water (Table 64447.4-A).
- Granular Activated Carbon (GAC): Calgon Filtersorb 400 AR or approved equal
- Empty bed contact time (EBCT) at peak design flow (including lead and lag vessels):
    - 24-cubic foot systems: 20 minutes
    - 7.2-cubic foot systems: 6.0 minutes
    - 4.0-cubic foot Systems: 3.3 minutes
- Configuration:
    - 24-cubic foot systems: Four equally sized GAC tanks, installed in one line but piped in two parallel trains, with each train consisting of a lead tank and a lag tank.
    - 7.2- and 4.0-cubic foot systems: Two equally sized GAC tanks installed in series (one lead tank and one lag tank).
- Prefilter:
    - 24-cubic foot systems: Two-stage (20 microns and 10 microns) pleated cartridge filter, equivalent to Enpress Cartridge Tank Filtration System with Orange Filtration Series filters.
    - 7.2- and 4.0-cubic foot systems: Pentair 20-inch DGD polypropylene filter cartridge in heavy-duty Big Blue housing or approved equivalent.
- Postfilter: Pentair 20-inch DGD polypropylene filter cartridge in heavy-duty Big Blue housing or approved equivalent.
- Flow control and distribution: Design to limit total flow to a maximum of 9 gpm. For the 24-cubic foot design, provide even flow distribution between the two parallel trains (either by hydraulic similarity or the use of flow control devices).
- Materials: All materials in contact with the water shall be NSF certified as lead-free and suitable for contact with potable water and shall not interact with constituents in the water in any way that will prevent the system from functioning as designed.
- Plumbing:
    - Quick-release connections or unions shall be included to allow easy removal and reconnection of individual tanks.
    - The system shall be valved and plumbed to allow for the bypass of the entire system and the bypass of any individual tank.
    - The plumbing should be designed to allow the system to be gently backwashed without fluidizing the GAC of the media bed. The plumbing design should allow this backwash to take place either onsite or offsite.
    - A sample tap between the lead and lag vessels and a sample tap downstream of the lag vessel shall be included. The sample tap downstream of the lag vessel shall be PVC ball valves of the same diameter as the connecting piping, to maximize the flushing flow rate.

        - A pressure relief valve shall be installed at the system influent to prevent excessive pressures from developing in the treatment system.
- Required monitoring devices:
    - Flow monitoring:
        - All systems: A flow meter in series with the treatment system that provides both a totalizer visual readout and a pulse output that could be used for continuous flow monitoring as potential additional scope for the project.
        - 4.0-cubic foot and 7.2-cubic foot systems shall also include an EasyLog EL-USB-5+ pulse data logger for continuous flow monitoring.
    - Pressure sight gauges (with resolution of 1 psi or less) at the locations shown in the schematics at the end of this Appendix to monitor headloss through the system. An isolation ball valve shall be installed directly upstream of each gauge so that the gauges can be replaced without shutting off flow to the system.
- At most sites, the tanks shall be installed single-file on concrete pads (to be constructed as part of this project) along the wall of an existing building and attached to the wall with seismic restraints.

Phase 2A Treatment System Design Schematic



Note the following additions will be included for Phase II installations:
-Isolation valves and pressure gauges on inlet and outlet of each filter vessel
-Additional valving for disinfection
-NSF 65 and Lead Free for wetted components and Pulse output flow meter

QWE COMMERCIAL SERVICES

COMMUNITY WATER

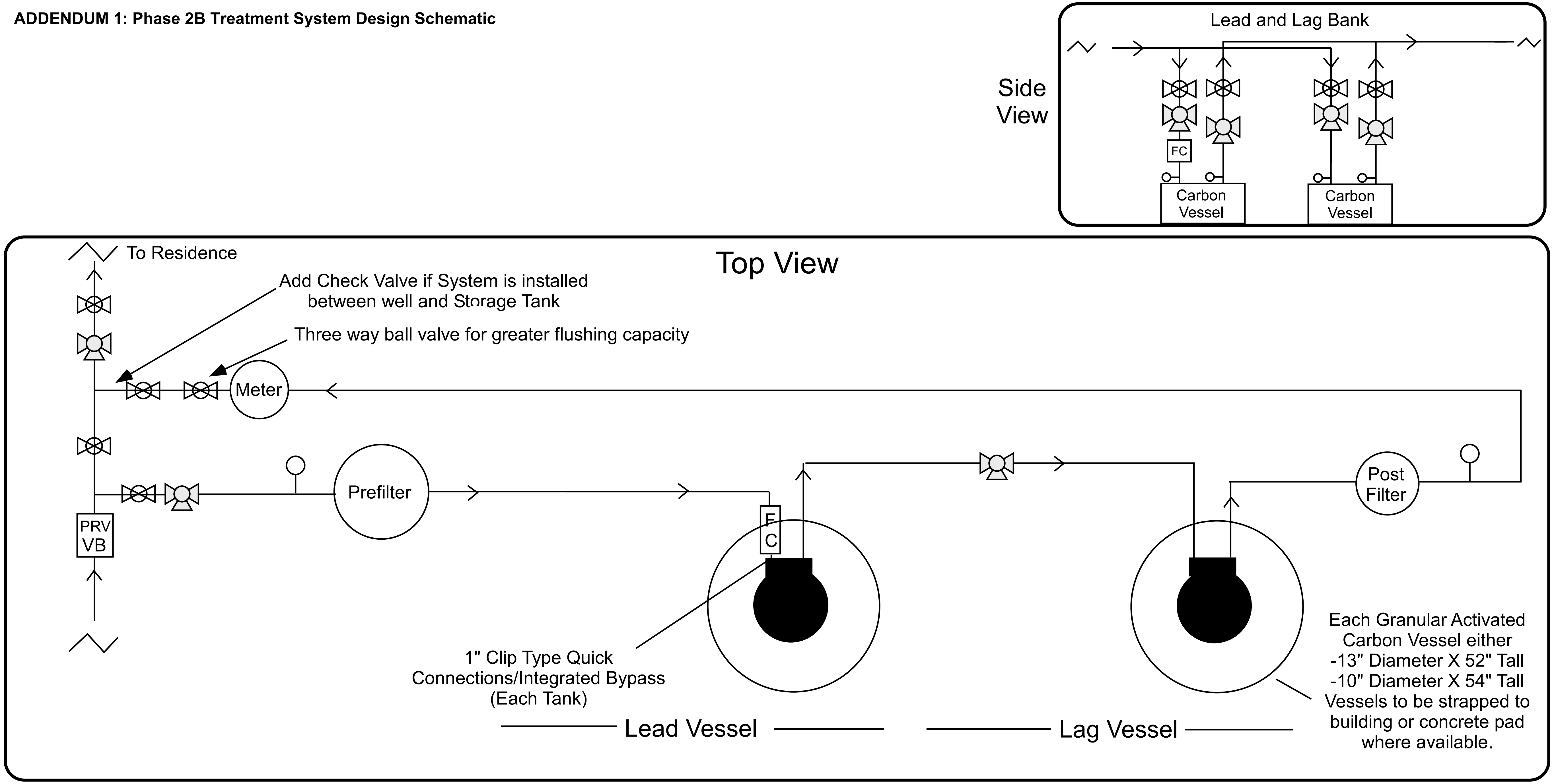
PILOT 1,2,3 TCP REDUCTION SYSTEM DIMENSIONS

625 WEST MARKET ST. SALINAS, CA 93901
831.755.0500

SIZE	FSCM NO	DWG NO	REV
8511		93020.03	

SCALE	NONE	TIM BUSHMAN MWSVI	SHEET	85

ADDENDUM 1: Phase 2B Treatment System Design Schematic



Explanation

- See attached specification sheets for additional detail on components characteristics
- Treatment system plumbed with 1 inch diameter Schedule 80 PVC pipe. Components will be NSF Certified. Threaded ball valves to be installed at all pressure gauge locations.

F.C. 4.5 gpm flow control

PRV + VB Pressure Relief Valve (PRV) and Vaccum Breaker (VB) to be installed as-needed

Hose Bib and Sample Point (S.P.)

Ball Valve

Pressure Gauge

- Draft schematic produced by Culligan (QWE Commercial Services) based on a 8.97 GPM Flow Rate. Not to Scale.

Culligan.
QWE COMMERCIAL SERVICES
625 WEST MARKET ST. SALINAS, CA 93901
831.755.0500

COMMUNITY WATER

1,2,3 TCP REDUCTION SYSTEM SCHEMATIC

SIZE	FSCM NO	DWG NO	REV
8511		93020.04	04

SCALE	NONE	TIM BUSHMAN MWSVI	SHEET	85

FIGURE 3
Project 2T109

1,2,3 TCP Treatment System Schematic
CWC - North Monterey County

Site: CWC
Address: Moss Landing, CA

Revisions/Notes:

Date: January 2022

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Appendix E
Well and Water System Condition and Repairs

The condition of domestic wells and water systems varied among the households considered for inclusion in the project. Many systems had deficiencies resulting in potential contamination routes, such as cracks or openings in well heads, cracked concrete well pads, unsealed perforations or apertures in storage tanks, and poorly fitting storage tank lids. Total coliform bacteria were detected in samples collected at the POE of many households considered for the project, and E. coli was detected in a few cases. Regardless of whether total coliform or E. coli bacteria were detected, CWC and WHA worked with households to eliminate potential contamination routes through the high-priority well and water system repairs described in **Table E-1**. Systems, where total coliform or E. coli had been detected, were also disinfected after the repairs. Depending on the case, repairs and disinfection were done directly by homeowners or residents, or paid for by CWC using either SEP funding or supplemental grant funding.

Based on TAC feedback, households, where E.coli was detected during site assessments, were not included in the project due to concerns that the E. coli contamination could reoccur even with repairs. However, E. coli was detected and confirmed at two sites after treatment systems were already installed. At one site (DWMC-14), this contamination was addressed by re-inspecting the system and not finding any potential contamination routes, replacing the GAC and disinfecting the treatment system, confirming that E. coli was no longer present, and placing the treatment system back online. At the other site (DWMC-19), the GAC was replaced, the treatment system was disinfected, and the system was put back online after the repairs described in **Table E-1** were completed.

Table E-1: Summary of well or water system repairs completed or planned.

System ID and Repair Status	Well or Water System Repairs Made or Planned	Who Made Repairs	Funding	Cost (includes WHA coordination but not CWC coordination)
DWMC-01 (completed)	Initial unsuccessful disinfection of well. Lift the well head to more thoroughly disinfect the well. Replace the concrete well pad and install a new well cap.	Well contractors	Supplemental Grant	$6,957
DWMC-02 (completed)	Tank repairs (seal crack; replace lid; remove old ozonator; replace cracked drain valve; install screened vent and overflow; replace electrical junction box). Replace the leaking irrigation pipe. Replace leaking fittings at the pressure pump discharge. Disinfect tank and distribution piping.	WHA	Homeowner	$700 (discounted rate)
DWMC-09 (completed)	Seal tank lid. Install screened vent and overflow on the tank. Install check valve on well discharge.	Homeowner	Homeowner	Unknown
DWMC-10 (completed)	Tank repairs and improvements (replace lid and float valve; seal and move electrical conduit; install screened overflow and vent)	Well contractor	Supplemental Grant	$2,375
DWMC-15 (planned)	Lift the well head and disinfect well. Well repairs and improvements (Install new well cap, pressure relief valve, sample tap, and pump-out valve; re-plumb discharge piping; replace concrete pad; repair electric supply conduit).	Well contractor	SEP ($5,500) and Supplemental Grant ($2,166)	$7,666 (estimated)
DWMC-19 (completed)	Tank repairs and improvements (seal/move electrical conduit; install overflow and vent). Install sample tap between well and tank.	Well contractor	Supplemental Grant	$1,462
DWMC-19 (completed)	Lift well head and disinfect well. Install new control box and electrical conduit near well.	Well contractor	Supplemental Grant	$2,782

Appendix F
Bacteria Consent Form and Implementation Agreement

Letter Attached to Ongoing Bacteria Consent
Option 1: Total coliform bacteria has been detected at this site. All text in brackets will be updated based on site specific recommendations and conditions.

—

Hello [Property Owner/Resident],

As we have discussed with you on Day, Month, Year the water at [the well and/or POE on xx/xx/xx at Address] tested *positive* for total coliform bacteria. However, water at [the well and/or POE] tested *negative* for E. coli bacteria. The laboratory results are attached to this letter.

It is very important that you DO NOT drink or cook with your water. Your water is not safe to drink or cook with because it has very high levels of nitrate. Not drinking or cooking with your water will also reduce any potential health risks from microbial contaminants such as bacteria or viruses. The 123-TCP point-of-entry treatment system that will be installed at your household will not remove nitrate or microbial contaminants. It is only designed to remove the harmful chemical 123-TCP.

Given the positive test for total coliform bacteria, we recommend and can support you in taking the following measures to attempt to address the total coliform bacteria contamination:

1. Re-sampling for total coliform bacteria and E. coli at the well and each POE

2. In the event that total coliform bacteria contamination is confirmed, we recommend disinfecting the well and distribution system/storage tank according to Monterey County guidelines.

3. In order to determine whether the disinfection procedure worked, we recommend testing for total coliform bacteria and E. coli at the [well, tank and POE's] one week after the procedure and conducting a second round of testing approximately one month after the procedure and/or after it has rained.

4. [Insert any recommended water system improvements to prevent contamination here]

However, it is possible that the recommended upgrades to the well and water system may not completely resolve the total coliform bacteria contamination.

Based on guidance from the Technical Advisory Committee for this project, which is composed of technical, regulatory and public health experts, Community Water Center and Weber, Hayes & Associates recommend that the 123-TCP treatment system to be installed at [Address] be kept in use to reduce your exposure to 123-TCP, even if total coliform bacteria are detected.

If total coliform bacteria are detected and E. coli continues to *not* be detected in your water system, it is less likely that your water is contaminated with microbes from human or animal waste that would cause disease. Your risk from microbial contamination is also decreased as long as you do not use your water for drinking or cooking.

For the duration of this project, we will monitor regularly for total coliform and E. coli bacteria and keep you informed of those results. If E. coli bacteria are later detected and confirmed, we will have to disconnect the system until the E. coli contamination can be addressed.

We request that you review the attached information on total coliform bacteria that is present in your water. If you agree with keeping the 123-TCP treatment system in use when total coliform bacteria is detected, please review and sign the attached consent form so we can continue to reduce exposure to 123-TCP even though total coliform bacteria is present. The removal of 123-TCP reduces your exposure to this harmful chemical from inhalation of water vapor during uses such as showering and washing dishes. If you have any questions, please do not hesitate to contact me at the phone number below.

Sincerely,
Mikel Irigoyen / Brandon Bollinger
Community Water Center
831-809-5937 / 831-500-2162

Letter Attached to Ongoing Bacteria Consent

Option 2: Total coliform bacteria has not been detected at this site. All text in brackets will be updated based on site specific recommendations and conditions.

—

Hello [Property Owner],

As we have discussed with you on Day, Month, Year the water at [the well and/or POE on xx/xx/xx at Address] tested *negative* for total coliform bacteria and E.coli.

It is very important that you DO NOT drink or cook with your water. Your water is not safe to drink or cook with because it has [very high levels of nitrate]. Not drinking or cooking with your water will also reduce any potential health risks from microbial contaminants such as bacteria or viruses. The 123-TCP point-of-entry treatment system that will be installed at your will not remove nitrate or microbial contaminants. It is only designed to remove the harmful chemical 123-TCP.

[Even though total coliform bacteria were not detected in your system, we recommend and can support you in taking the following measures to reduce the risk of any future total coliform bacteria contamination:]

- [Insert any recommended water system improvements to prevent contamination here]

For the duration of this project, we will monitor regularly for total coliform and E. coli bacteria and keep you informed of those results. If E. coli bacteria are later detected and confirmed, we will have to disconnect the system until the E. coli contamination can be addressed.

We are seeking your consent to continue to operate the 123-TCP treatment system even if total coliform bacteria are detected at your well or at the POE of your water system at a later date.

Based on guidance from the Technical Advisory Committee for this project, which is composed of technical, regulatory and public health experts, Community Water Center and Weber, Hayes & Associates recommend that the 123-TCP treatment system at your property be kept in use to reduce your exposure to 123-TCP, even if total coliform bacteria are detected.

If total coliform bacteria is detected and E. coli continues to *not* be detected in your water system, it is less likely that your water is contaminated with microbes from human or animal waste that would cause disease. Your risk from microbial contamination is also decreased as long as you do not use your water for drinking or cooking.

We request that you review the attached information on total coliform bacteria that is present in your water. If you agree with keeping the 123-TCP treatment system in use when total coliform bacteria is detected, please review and sign the attached consent form so we can continue to reduce exposure to 123-TCP even though total coliform bacteria is present. The removal of 123-TCP reduces your exposure to this harmful chemical from inhalation of water vapor during uses such as showering and washing dishes. If you have any questions, please do not hesitate to contact me at the phone number below.

Sincerely,

Mikel Irigoyen / Brandon Bollinger
Community Water Center
831-809-5937 / 831-500-2162

Ongoing Bacteria Consent - All residents and owners at sites where treatment systems will be installed will sign these forms to acknowledge potential future total coliform bacteria and provide ongoing consent to continue to operate 123-TCP treatment systems when total coliform bacteria are present.

–

Information on Total Coliform Bacteria

According to the Monterey County Health Department, *"Coliform bacteria normally live in the soil, on plants and in the intestinal tract of humans and other warm blooded animals. Coliform bacteria is not naturally present in groundwater. If water sampling shows the presence of coliform bacteria, this indicates that there is contamination in your water supply. If coliform bacteria are present, other organisms that cause disease can also be present in your water supply."*

(Source: County of Monterey Health Department. "Instructions for the Care of Small Water Supplies when Coliform Bacteria is Found." Accessed Sept. 1, 2021. https://www.co.monterey.ca.us/home/showpublisheddocument/14834/637203007046930000)

According to the California State Water Resources Control Board: *"Coliforms, a group of common bacteria, are generally harmless to humans. However, some coliforms may cause illness in humans, and the presence of coliforms at any concentration is an indication that other harmful microorganisms may be present. Fecal coliforms such as E. coli, and other types of harmful bacteria are found in animal and human wastes, and when detected they are indicators of water supply contamination. Ingestion of water containing coliform bacteria increases the risk of contracting a water-borne illness."*

(Source: California State Water Resources Control Board, Division of Water Quality. "Groundwater Information Sheet: Bacteria Indicators." Revised Sept. 2019. https://www.waterboards.ca.gov/gama/docs/coc_bacteria_indicators.pdf)

Ongoing Consent to Operate 123-TCP Treatment System if Total Coliform Bacteria are Present

By signing below, I am indicating that:

- I have read the attached letter and information above about total coliform bacteria.
- I want Weber, Hayes and Associates and Community Water Center to continue to operate, monitor, and maintain the 123-TCP treatment system located at [ADDRESS] even if total coliform bacteria are present.
- The residents on my property will **NOT** use tap water for drinking or cooking. Eliminating these uses will prevent residents from being exposed to nitrate and any other contaminants in the tap water, and will also reduce any potential risks related to the presence of total coliform bacteria.

Property Owner Name: ________________________________

Signature: ______________________________ Date: __________________________________

Resident Name: _________________________________

Signature: ______________________________ Date: __________________________________

COMMUNITY WATER CENTER
POINT-OF-ENTRY TREATMENT PROJECT AGREEMENT

THIS POINT-OF-ENTRY TREATMENT PROJECT AGREEMENT (the "Agreement" or "Project") is entered into effective as of ______________________, 20_____by and between Community Water Center **("**CWC"**),** a California Non-Profit Corporation, and ____ "Homeowner", and (*if applicable)* ____, "Tenant". CWC will contract with an engineering firm "Consultant" for implementation of this project and the engineering firm will subcontract with a "Contractor" for the installation of the treatment system.

In consideration of the mutual covenants set forth herein and other good and valuable consideration, the parties agree as follows:

1. DESCRIPTION OF SERVICES. Subject to the terms and conditions of this Agreement, Community Water Center shall install a Point-Of-Entry (POE) device on the outside or near the residence located at the Homeowners 's property, specifically (*address, city, state, zip*): ____ to be monitored and maintained at no cost to the Homeowner and Tenant (*if applicable*) from the time of installation through June 2023. The POE device is designed to provide water that meets drinking water standards for 1,2,3-trichloropropane (123-TCP). If other contaminants are present, the Homeowner and Tenant (*if applicable*) should continue to use bottled water for all consumptive uses including drinking and cooking. Installation will be conducted by a licensed contractor chosen by the Consultant. Water quality testing by a third-party certified laboratory will be conducted on a monthly basis for 123-TCP. Any POE failure properly reported as stated in Article 3 of this Agreement will be addressed and a confirmation sample for 123-TCP will be conducted to ensure the device is functioning properly. This service will be provided by the Consultant at no cost to the Homeowner or Tenant (*if applicable*), as described in Article 3. Test results will be available to the Homeowner or Tenant (*if applicable*) upon request. The test results report will include an identification number assigned to the Homeowners and Tenant's house and well along with the 123-TCP level (if any). In the event the 123-TCP level exceeds the maximum contaminant level (MCL) of 0.005 parts per billion, the Homeowner and Tenant (*if applicable*) will be notified of such results and instructed as to how to limit exposure to 123-TCP. Repairs or replacement will be made by the Consultant as needed and a confirmation sample for 123-TCP will be conducted to ensure the device is working properly.

2. INSTALLATION. Installation of the POE device will be performed by a licensed contractor. The Contractor will use every reasonable effort to install the necessary equipment, which may include drilling holes in exterior walls, installing straps on exterior walls, installing a small concrete pad, modifying existing plumbing infrastructure, opening walls to gain access to necessary plumbing, and/or modifying plumbing fixtures to accommodate the treatment system. The Contractor will make every reasonable effort to confer with the Homeowner and Tenant (*if applicable*) in order to minimize disturbance, but the Contractor will have the final decision in order to best install the POE device in the safest, most cost efficient manner. The Contractor will use every reasonable effort to install the necessary equipment without damaging water system

plumbing. The Contractor and Consultant are only responsible for repair of equipment or piping they install. The Contractor and Consultant are not responsible for other parts of the water system or plumbing. Installation of equipment does not include any repairs to the Homeowner's plumbing system. The Consultant and CWC warrant that any plumbing work furnished in connection with this agreement shall be free from defects for the term of the agreement.

3. HOMEOWNER RESPONSIBILITIES AND AGREEMENTS. From the time of installation through June 30, 2023, the Homeowner understands that CWC will own and operate the POE device and will ensure proper operation, maintenance, and compliance with the drinking water standard for 123-TCP. The Homeowner and Tenant (*if applicable)* agrees to installation and use of a POE treatment device and grants access to the property, including both the exterior of the home and the well for installation, as well as regular maintenance and sampling. Access inside the home is not necessary. The Homeowner and Tenant (*if applicable),* further agrees to allow CWC, the Consultant, and the Contractor access to all relevant and necessary property for other purposes of this Agreement. The Homeowner and Tenant (*if applicable)* understands the POE treatment device is designed for 123-TCP contamination only and to reduce dermal and inhalation exposure from this contaminant. If other contaminants are present, the Homeowner and Tenant (*if applicable*) should continue to use bottled water for all consumptive uses including drinking and cooking. The Homeowner and Tenant (*if applicable*) acknowledge that water pressure in their household may drop up to 10 psi as a result of a normally functioning POE system, and that this pressure loss does not constitute a system failure. The Homeowner and Tenant (*if applicable*) will be responsible for maintaining, to the standards provided by CWC and/or the Consultant, the exterior of the installed POE device to ensure the device is clean, hygienic, and working properly. In the event of any damage or deficiency of any equipment furnished or installed under this agreement, any claim by the Homeowner or Tenant (if applicable) shall be initiated via written notice to CWC within 24 hours of the occurrence of the event giving rise to the claim. At no time will the Homeowner and Tenant *(if applicable*) or any other unauthorized person attempt to disable, tamper with, alter, bypass, repair, or otherwise interfere with the proper use and maintenance of the POE device. Such action will void this Agreement and the Homeowner will be responsible for any and all damages, including repair, replacement, and/or additional sampling costs.

4. CONSULTANT AND CWC RESPONSIBILITIES AND AGREEMENTS. CWC and the Consultant agree that they are responsible for the purchase, installation, testing, repairs, replacement, and ongoing maintenance of the POE device, to include monthly water sampling for 123-TCP and replacing filters as needed. Any deficiencies of the POE device and its operation, including leaks, that are beyond the Homeowner and Tenant (*if applicable)* control, will be the responsibility of the Consultant and CWC for the term of the agreement Other plumbing or piping deficiencies upon the property not related to the POE device will solely be the responsibility of the Homeowner and Tenant (*if applicable*).

5. AUTHORITY TO ACCESS PROPERTY. The Homeowner and Tenant (*if applicable)* agrees to allow the Consultant, Contractor, and CWC staff access to the property, including POE location and well location, during normal business hours at mutually agreed upon dates and mutually agreed upon times. Access will be provided in order to make repairs,

exchanges, deliveries, or other maintenance of the equipment, and also for water sampling and monitoring purposes. Sampling and monitoring will occur on a continuous basis until June 2023 when this contract ends. If needed, CWC or the Consultant will provide 24 hours notice to reschedule routine monitoring at a mutually agreed upon time. During the COVID-19 emergency, the Homeowner, Tenant *(if applicable)*, CWC, and the Consultant agree to make every effort to avoid in person contact, maintain at least 6 feet of distance, and wear a face covering during installation and monitoring. The Consultant will also require the Contractor to take the same precautionary measures.

6. FUNDING. Funding for this project through the end of June 2023 is provided by a Supplemental Environmental Project as part of a Settlement Agreement with the Central Coast Regional Water Quality Control Board.

7. CONTRACTOR AND SUBCONTRACTOR CLAIMS. The Homeowner and Tenant *(if applicable*) further agree, to the fullest extent permitted by law, to limit the liability of CWC, the Consultant, and all contractors and subcontractors on the Project for any and all claims, losses, costs, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees, so that the total aggregate liability of CWC, the Consultant, and the Contractor to all those named shall not exceed total cost of services rendered by CWC for this Project. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising unless otherwise prohibited by law.

8. MEDIATION AND ARBITRATION. The parties agree to meet and negotiate in good faith in order to resolve any claims or disputes arising out of or related to this Agreement or work performed by CWC, the Contractor, or the Consultant prior to using mediation, arbitration or court intervention. If the claims or disputes cannot be resolved informally, the parties agree to mediate any claims or disputes using a professional mediator. Any party refusing to mediate shall not prevent the other party or parties from pursuing their claims in arbitration. The parties will share the cost of mediation equally. If the parties cannot resolve their claims or disputes at mediation, the parties agree that their claims or disputes shall be decided by arbitration in accordance with the Commercial Arbitration rules of the American Arbitration Association then in effect. No such arbitration shall include, by consolidating or joinder or other manner, any party other than the Contractor, Consultant, CWC, the Homeowner, and the Tenant (*if applicable*). Nothing herein will be construed to prevent any party's use of injunction, and/or any other prejudgment or provisional action or remedy. Any such action or remedy will not waive the moving party's right to compel arbitration of any dispute.

9. INDEMNITY. The Homeowner and Tenant (*if applicable),* agrees to indemnify, hold harmless, and defend in any action or proceeding, CWC, the Consultant, and the Contractor, from and against all claims, damages, liability, costs, losses or expenses, including but not limited to attorneys' fees and costs, expert fees, and any other expense, for or relating to any injury to person, property, or reputation, suffered or claimed to have been suffered by anyone, arising out of or resulting from the Homeowner and Tenant (*if applicable*) access to or use of the POE device, regardless of whether the act or omission complained of was caused by negligence in any form by CWC, or any of its subconsultants or subcontractors.

10. WAIVER. Homeowner and Tenant *(if applicable*) hereby waives and releases CWC and its officers, agents and employees from any and all claims for loss or damage caused by any act or omission on the part of CWC or any of its officers, agents and employees, exempting any willful misconduct by same.

11. APPLICABLE LAW; CONSTRUCTION. This Agreement will be governed by and construed in accordance with the laws of the State of California, without regard to any conflict of laws rule or principle that might refer to the governance or construction of this Agreement to the laws of another jurisdiction. This Agreement will at all times and in all events be construed as a whole, according to its fair meaning, and not strictly for or against any party.

12. ENTIRE AGREEMENT. This Agreement constitutes the entire understanding between the parties and supersedes all proposals, commitments, writings, negotiations, and understandings, oral and written, and all other communications between the parties relating to the subject matter hereof. This Agreement may not be amended or otherwise modified except in writing duly executed by all of the parties.

13. PARTIES BOUND. This Agreement will be binding upon, and inure to the benefit of, each of the parties hereto to the extent applicable to them and their respective successors and assigns. If the Homeowner intends on transferring the real property subject to the Agreement (for example, the homeowner decides to sell the household where the POE treatment is installed), the Homeowner will notify CWC in writing 30 days prior to the sale or agreement for sale, whichever is earlier.

14. TERM OF AGREEMENT. This Agreement will be held in force and effect until 30th day of June, 2023 and may be extended by written agreement by both parties. Upon this date, CWC will relinquish ownership of the POE device and all associated rights and responsibilities to the Homeowner. The Homeowner accepts and agrees to assume ownership, and all rights and responsibilities related to the installed POE device, including maintenance, monitoring, repairs, media replacement, and filter purchase and replacement. By February 1, 2023, CWC will provide information on operation and maintenance costs to the Homeowner. The Homeowner will notify CWC in writing no later than March 1, 2023 if they would like to have the treatment system disconnected or removed when the project ends in June 2023. If the Homeowner asks for the treatment system to be removed, CWC will retain all of its ownership, rights and responsibilities pertaining to the POE device. The Homeowner and Tenant *(if applicable)* understand that this is a pilot treatment project and performance can not be guaranteed. If E.coli is detected in the water supply or if CWC or the Consultant are unable to address a system failure due to raw water quality challenges or other unforeseen circumstances, CWC will notify the Homeowner and Tenant (*if applicable*) and remove the POE system at a time agreed upon with the Homeowner and Tenant. This Agreement will be terminated upon system removal.

15. MUTUAL UNDERSTANDING. Each party has read this entire Agreement, fully understands the contents hereof and has had the opportunity to obtain independent advice as to

its legal effect. This Agreement reflects the mutual understanding of the parties with respect to all subject matter addressed herein and will be construed accordingly.

16. NOTICE. Except as expressly provided to the contrary herein, any notice required or permitted under this Agreement will be deemed sufficiently given if in writing and personally delivered, transmitted by facsimile, sent by email, or sent by certified mail (postage prepaid) to the party at the address set forth beneath its signature below or at such other address as the party may subsequently designate.

IN WITNESS WHEREOF, the parties have executed this Agreement effective as of the date first above written.

Community Water Center

____

Signature

Signed By: _________________________
Address: ___________________________
City, State, Zip: _____________________

Homeowner

____

Signature

Signed By: _________________________
Address: ___________________________
City, State, Zip: _____________________

Tenant (*if applicable*)
____
Signature
Signed By: ____________________________
Address: ______________________________
City, State, Zip: ________________________

Tenant (*if applicable*)
____
Signature
Signed By: ____________________________
Address: ______________________________
City, State, Zip: ________________________

Appendix G
Monthly Monitoring

WHA visits the treatment systems monthly to collect water samples to confirm the treatment systems are removing 123-TCP to below the MCL, and monitor for total coliform, E. coli, and heterotrophic plate count bacteria upstream and downstream of the treatment systems. The results are shown on the following page. Sample results are reported to community partners on a monthly basis. The Field Sampling Methodology that WHA uses during each visit is provided after the sampling results. Graphs of bacteria results through January 2023 can be found in February 16, 2023 TAC meeting slides in Appendix B, and graphs of 123-TCP in source water are provided in Appendix C

Appendix G - Monthly Monitoring Report
CWC 123-TCP Point-of-Entry Treatment Pilot Monitoring Data Through April 2023

System ID	Monitoring Date	Time System Has Been In Service (Days)	Total Cumulative Volume of Water Treated (Gallons)	123-TCP Well (ug/L)	123-TCP Between Lead/Lag Vessels (ug/L)	123-TCP After Lag Vessels (ug/L)	Total Coliform Bacteria Upstream of Treatment (MPN/100 mL)	Total Coliform Bacteria Downstream of Treatment (MPN/100 mL)	E. coli Upstream of Treatment (MPN/100 mL)	E. coli Downstream of Treatment (MPN/100 mL)	HPC Upstream of Treatment (MPN/mL)	HPC Downstream of Treatment (MPN/mL)
DWMC-01	11/17/2022	1	158	0.071	<0.0006	Not Analyzed	<1	<1	<1	<1	210	190
DWMC-01	12/21/2022	35	20809		<0.0006	Not Analyzed	<1	<1	<1	<1	71	260
DWMC-01	1/31/2023	76	46520		<0.0006	Not Analyzed	<1	<1	<1	<1	110	180
DWMC-01	3/1/2023	105	64739	0.085	<0.0007	Not Analyzed	52	11	<1	<1	510	66
DWMC-01	3/30/2023	134	85462		<0.0007	Not Analyzed	<1	<1	<1	<1	190	76
DWMC-01	4/24/2023	159	121267		<0.0007	Not Analyzed	<1	<1	<1	<1	220	230
DWMC-02	1/14/2021	8	919	0.033	<0.0006	Not Analyzed	20.1	<1	<1	<1		
DWMC-02	6/10/2021	10	2759	0.012	<0.0006	Not Analyzed	<1	250	<1	<1		
DWMC-02	6/14/2021	14						14		<1	1200	270
DWMC-02	7/14/2021	44	10858		<0.0006	Not Analyzed	<1	47	<1	<1	130	96
DWMC-02	8/11/2021	72	19076	0.011	<0.0010	Not Analyzed	1	160	<1	<1	230	130
DWMC-02	9/15/2021	107	26541		<0.0010	Not Analyzed	<1	7.4	<1	<1	41	92
DWMC-02	10/19/2021	141	32788		<0.0010	Not Analyzed	<1	<1	<1	<1	54	130
DWMC-02	11/11/2021	164	36873	0.014	<0.00060	Not Analyzed	<1	1	<1	<1	26	38
DWMC-02	12/21/2021	204	43612		<0.0050	Not Analyzed	<1	<1	<1	<1	8	22
DWMC-02	1/20/2022	234	48470		<0.00060	Not Analyzed	<1	<1	<1	<1	56	24
DWMC-02	2/22/2022	267	52945	<0.00060	<0.00060	Not Analyzed	<1	<1	<1	<1	14	28
DWMC-02	3/16/2022	289	54028	<0.00060	<0.00060	Not Analyzed	1	<1	<1	<1	19	34
DWMC-02	4/20/2022	324	55210		<0.00060	Not Analyzed	12	<1	<1	<1	23	31
DWMC-02	5/24/2022	358	56090	<0.00060	<0.00060	Not Analyzed	2	<1	<1	<1	9	17
DWMC-02	6/16/2022	381	56478		<0.00060	Not Analyzed	<1	<1	<1	<1	810	81
DWMC-02	8/1/2022	427	57750		<0.00060	Not Analyzed	<1	<1	<1	<1	238	28
DWMC-02	8/31/2022	457	59570	<0.00060	<0.00060	Not Analyzed	3	<1	<1	<1	114	14
DWMC-02	9/15/2022	472	61644		<0.00060	Not Analyzed	1	<1	<1	<1	5	8
DWMC-02	10/20/2022	507	66160		<0.00060	Not Analyzed	1	<1	<1	<1	9	10
DWMC-02	11/17/2022	535	70177	<0.0006	<0.0006	Not Analyzed	<1	<1	<1	<1	6	16

System ID	Monitoring Date	Time System Has Been In Service (Days)	Total Cumulative Volume of Water Treated (Gallons)	123-TCP Well (ug/L)	123-TCP Between Lead/Lag Vessels (ug/L)	123-TCP After Lag Vessels (ug/L)	Total Coliform Bacteria Upstream of Treatment (MPN/100 mL)	Total Coliform Bacteria Downstream of Treatment (MPN/100 mL)	E. coli Upstream of Treatment (MPN/100 mL)	E. coli Downstream of Treatment (MPN/100 mL)	HPC Upstream of Treatment (MPN/mL)	HPC Downstream of Treatment (MPN/mL)
DWMC-02	12/19/2022	567	74663		<0.0006	Not Analyzed	2	<1	<1	<1	<5	14
DWMC-02	2/1/2023	611	80111		<0.0006	Not Analyzed	4.1	<1	<1	<1	16	5
DWMC-02	2/22/2023	632	82942	<0.0007	<0.0007	Not Analyzed	2	<1	<1	<1	9	12
DWMC-02	3/22/2023	660	86673		<0.0007	Not Analyzed	<1	<1	<1	<1	<5	<5
DWMC-02	4/24/2023	693	92279		<0.0007	Not Analyzed	<1	<1	<1	<1	11	5
DWMC-04	6/23/2021	1	455	<0.0006	<0.0006	Not Analyzed	<1	<1	<1	<1	740	<5
DWMC-04	7/20/2021	13	1999		<0.0010	Not Analyzed	<1	<1	<1	<1	120	280
DWMC-04	8/11/2021	35	4937	0.040	<0.0010	Not Analyzed	<1	2	<1	<1	22	190
DWMC-04	8/16/2021	40						1		<1		
DWMC-04	9/15/2021	70	9761		<0.0010	Not Analyzed	<1	<1	<1	<1	52	45
DWMC-04	10/19/2021	104	13396		<0.0010	Not Analyzed	<1	<1	<1	<1	22	110
DWMC-04	11/11/2021	127	16097	0.030	<0.00060	Not Analyzed	<1	<1	<1	<1	29	150
DWMC-04	12/20/2021	166	21150		<0.0050	Not Analyzed	<1	<1	<1	<1	16	100
DWMC-04	1/27/2022	204	25899		<0.0010	Not Analyzed	<1	<1	<1	<1	7	92
DWMC-04	2/22/2022	230	28260	0.039	<0.00060	Not Analyzed	<1	<1	<1	<1	6	130
DWMC-04	3/16/2022	252	30128		<0.00060	Not Analyzed	<1	<1	<1	<1	15	100
DWMC-04	4/20/2022	287	34891		<0.00060	Not Analyzed	1	<1	<1	<1	6	54
DWMC-04	5/24/2022	321	38204	0.041	<0.00060	Not Analyzed	<1	<1	<1	<1	8	59
DWMC-04	6/16/2022	344	42024		<0.00060	Not Analyzed	<1	<1	<1	<1	18	200
DWMC-04	7/27/2022	385	46519		<0.00060	Not Analyzed	<1	<1	<1	<1	7	71
DWMC-04	8/23/2022	412	49422	0.019	<0.00060	Not Analyzed	<1	<1	<1	<1	1	5
DWMC-04	9/15/2022	435	52594		<0.00060	Not Analyzed	<1	<1	<1	<1	12	14
DWMC-04	10/24/2022	474	56586		<0.00060	Not Analyzed	<1	<1	<1	<1	57	7
DWMC-04	11/17/2022	498	61247		<0.00060	Not Analyzed	1	<1	<1	<1	110	29
DWMC-04	12/21/2022	532	65286		<0.00060	Not Analyzed	<1	<1	<1	<1	130	42
DWMC-04	1/31/2023	573	70249		<0.00060	Not Analyzed	<1	<1	<1	<1	95	36
DWMC-04	2/28/2023	601	71445	0.042	<0.0007	Not Analyzed	<1	<1	<1	<1	6	9
DWMC-04	3/31/2023	632	74912		<0.0007	Not Analyzed	<1	<1	<1	<1	Not Analyzed	Not Analyzed

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DWMC-04	4/27/2023	659	78409		<0.0007	Not Analyzed	<1	<1	<1	<1	18	<5
DWMC-09	6/23/2021	1	470	0.040	<0.0006	Not Analyzed	<1	<1	<1	<1	130	<5
DWMC-09	7/14/2021	21	14574		<0.0006	Not Analyzed	<1	<1	<1	<1	18	10
DWMC-09	8/5/2021	43	36636	0.041	<0.0006	Not Analyzed	<1	<1	<1	<1	170	37
DWMC-09	9/15/2021	84	74230		<0.0010	Not Analyzed	<1	<1	<1	<1	11	190
DWMC-09	10/19/2021	118	88701		<0.0010	Not Analyzed	<1	<1	<1	<1	96	30
DWMC-09	11/11/2021	141	96498	0.034	<0.00060	Not Analyzed	<1	<1	<1	<1	76	46
DWMC-09	12/21/2021	181	115957		<0.0050	Not Analyzed	<1	<1	<1	<1	21	41
DWMC-09	01/20/2022	211	130066		<0.00060	Not Analyzed	<1	<1	<1	<1	64	62
DWMC-09	02/22/2022	244	144044	0.031	<0.00060	Not Analyzed	<1	<1	<1	<1	36	23
DWMC-09	03/16/2022	266	153423		<0.00060	Not Analyzed	<1	<1	<1	<1	30	28
DWMC-09	04/20/2022	301	168466		<0.00060	Not Analyzed	<1	<1	<1	<1	27	68
DWMC-09	05/25/2022	336	184018	0.038	<0.00060	Not Analyzed	<1	<1	<1	<1	20	380
DWMC-09	06/15/2022	357	192884		<0.00060	Not Analyzed	<1	<1	<1	<1	30	62
DWMC-09	07/28/2022	400	211894		<0.00060	Not Analyzed	<1	<1	<1	<1	17	48
DWMC-09	08/22/2022	425	221845	0.028	<0.00060	Not Analyzed	<1	<1	<1	<1	29	49
DWMC-09	09/14/2022	448	226607		<0.00060	Not Analyzed	<1	<1	<1	<1	<5	10
DWMC-09	10/20/2022	484	235493		<0.00060	Not Analyzed	<1	<1	<1	<1	15	18
DWMC-09	11/16/2022	511	239039	0.036	<0.00060	Not Analyzed	<1	<1	<1	<1	<5	<5
DWMC-09	12/19/2022	544	242089		<0.00060	Not Analyzed	<1	<1	<1	<1	<5	6
DWMC-09	01/30/2023	586	247610		<0.00060	Not Analyzed	<1	<1	<1	<1	14	14
DWMC-09	02/02/2023	589	250395	0.033	<0.0007	Not Analyzed	<1	<1	<1	<1	8	6
DWMC-09	03/23/2023	638	254116		<0.0007	Not Analyzed	<1	<1	<1	<1	24	14
DWMC-09	04/25/2023	671	258399		<0.0007	Not Analyzed	<1	<1	<1	<1	34	12
DWMC-10	04/20/2022	1	374	<0.00060	<0.00060	Not Analyzed	1	<1	<1	<1	100	300
DWMC-10	05/25/2022	36	1628	0.040	<0.00060	Not Analyzed	<1	<1	<1	<1	60	2000
DWMC-10	06/15/2022	57	2496		<0.00060	Not Analyzed	1	<1	<1	<1	63	292
DWMC-10	07/28/2022	100	3791		<0.00060	Not Analyzed	<1	<1	<1	<1	38	387

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DWMC-10	08/22/2022	125	5025	0.012	<0.00060	Not Analyzed	1	1	<1	<1	49	332
DWMC-10	09/14/2022	148	6091		<0.00060	Not Analyzed	Present	Absent	<1	<1	20	210
DWMC-10	10/20/2022	184	7496		<0.00060	Not Analyzed	16	6.3	<1	<1	34	76
DWMC-10	11/16/2022	211	8527	<0.0006	<0.00060	Not Analyzed	99	45	<1	<1	36	50
DWMC-10	12/19/2022	244	9812		<0.00060	Not Analyzed	99	7.4	<1	<1	22	24
DWMC-10	01/30/2023	286	10927		<0.00060	Not Analyzed	7.5	2	<1	<1	40	34
DWMC-10	02/21/2023	308	11624	<0.0007	<0.0007	Not Analyzed	9.8	3.1	<1	<1	11	36
DWMC-10	03/23/2023	338	12806		<0.0007	Not Analyzed	3	3.1	<1	<1	17	24
DWMC-10	04/25/2023	371	14065		<0.0007	Not Analyzed	<1	1	<1	<1	6	14
DWMC-14	06/02/2022	42	6525	0.085	<0.00060	Not Analyzed	<1	1	<1	<1	35	185
DWMC-14	06/16/2022	56	8995		<0.00060	Not Analyzed	<1	11	<1	1	25	280
DWMC-14	06/29/2022	Offline					<1	31	<1	3		
DWMC-14	11/30/2022	69	25657	0.081	<0.0006	Not Analyzed	<1	<1	<1	<1	6	<5
DWMC-14	12/21/2022	90	29108		<0.0006	Not Analyzed	<1	<1	<1	<1	19	20
DWMC-14	01/31/2023	131	35606		<0.0006	Not Analyzed	<1	<1	<1	<1	12	5
DWMC-14	02/21/2023	152	39039	0.071	<0.0007	Not Analyzed	<1	<1	<1	<1	8	5
DWMC-14	03/23/2023	182	43708		<0.0007	Not Analyzed	<1	<1	<1	<1	16	<5
DWMC-14	04/25/2023	215	48538		<0.0007	Not Analyzed	<1	<1	<1	<1	<5	<5
DWMC-19	06/15/2022	37	9898	0.010	<0.00060	Not Analyzed	<1	8	<1	1	44	2900
DWMC-19	06/17/2022	Offline					<1	2	<1	<1		
DWMC-19	06/29/2022	Offline					<1	5	<1	1		
DWMC-19	03/22/2023	Offline					3.1		<1			
DWMC-19	04/25/2023	22	16013		<0.0007	Not Analyzed	3.1		<3	<1	<5	120
DWMC-21	6/30/22	73	6861	0.040	<0.00060	Not Analyzed	11	<1	<1	<1	>5700	>5700
DWMC-21	7/27/22	100	9790		<0.00060	Not Analyzed	344	<1	<1	<1	5840	4210
DWMC-21	8/23/22	127	13695	0.052	<0.00060	Not Analyzed	3	<1	<1	<1	765	1230
DWMC-21	9/15/22	150	18117		<0.00060	Not Analyzed	<1	<1	<1	<1	1200	990
DWMC-21	10/20/22	185	23889		<0.00060	Not Analyzed	<1	<1	<1	<1	2700	780

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DWMC-21	11/17/22	213	29060	0.066	<0.00060	Not Analyzed	<1	<1	<1	<1	680	260
DWMC-21	12/21/22	247	34364		<0.00060	Not Analyzed	1100	100	1	1	2300	290
DWMC-21	1/4/23						26	8.5	<1	<1		
DWMC-21	1/12/23						12	9.7	<1	<1		
DWMC-21	1/31/23	288	41780		<0.00060	Not Analyzed	8.6	4.1	<1	<1	790	180
DWMC-21	3/1/23	317	45979	0.072	<0.0007	Not Analyzed	2	3.1	<1	<1	290	26
DWMC-21	3/30/23	346	50392		<0.0007	Not Analyzed	1	< 1	<1	<1	340	48
DWMC-21	4/24/2023	371	55438		<0.0007	Not Analyzed	<1	<1	<1	<1	580	98

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1,2,3 TCP Treatment System Sampling Field Methodology

This 1,2,3-Trichloropropane (1,2,3 TCP) Treatment System specific sampling methodology has been prepared in addition to our standard *Domestic Well Sampling Field Methodology.* 1,2,3 TCP sampling protocols described below have been prepared for systems managed by the Community Water Center.

Sample Port Locations and Frequency of Sampling:

- Well Head (source water) – Quarterly sampling for 1,2,3 TCP
- Mid-point (hose-bib between 'lead & lag' filter vessels) – Monthly sampling for 1,2,3 TCP
- Effluent (hose-bib at end of treatment system, prior to POE) – Monthly sampling for 1,2,3 TCP placed on HOLD

Sampling Protocols:

The first step in sampling preparation is to identify the sampling ports where water samples will be collected in the given sampling event. Efforts will be taken to label each of the respective sample ports, however it is the responsibility of the sampler to correctly identify the required sample ports.

Field staff will

1. Identify the sampling ports where water samples will be collected in the current sampling event
2. Record the volume of water shown on the totalizing flow meter prior to flushing
3. Connect a hose to the effluent hose-bib located at the end of the treatment train
4. Open effluent hose-bib to the maximum position and flush for at least 15 minutes - the water will be flushed to waste and/or irrigation
5. Following the 15-minute flushing time period, record the volume shown on the totalizing flow meter
6. Collect the sample(s):

a. 1,2,3 TCP samples will be collected in unpreserved amber glass 40 milliliter (ml) Volatile Organic Analyses (VOA) bottles (laboratory provided)
b. Open the mid-point hose-bib (between the parallel lead & lag vessels) fully for 1 minute, then close it to reduce flow and collect a VOA sample as described below. Collect the mid-point sample while the effluent hose-bib is still fully open. Close the mid-point hose bib after collecting the sample. Label and handle the sample as described below.
c. Follow the same sampling procedure at the effluent location (OK to sample at reduced flow rate). Identify the effluent hose-bib sample to be placed on HOLD on the Chain-of-Custody form.
d. Make sure all sample ports are closed

7. Label all samples in the field with the sample ID, sampler initials, and collection date/time
8. Transport the samples in insulated containers cooled with ice to the appropriate state-certified laboratories under proper chain of custody procedures

Record Field Data:

Data regarding the treatment system will be collected on an operation log (totalizing flow meter, pressure gauge readings, descriptive notes, etc.).

VOA Sampling:

VOAs are to be filled slowly by allowing water to “pour” into the side of the vial until a positive meniscus is present at the top of the vial. The vial should then be tightly capped to compress the meniscus and inverted to confirm there are no air bubbles within the vial. If air bubbles are present the vial is discarded, and a new sample should be collected. A total of three 40 ml vials will be collected via this method for each sample, packed within foam packaging, and placed on ice for transport under proper chain-of-custody procedures to a State-Certified Laboratory for analysis.

Quarterly source water 1,2,3 TCP samples will be collected following our *Domestic Well Sampling Field Methodology.*

Water System Operations and Monitoring Log

Sampler / Technician						
Date						
Time						
Treatment System	**Pre-Treatment**					
	Totalizing Flow Meter (pre-15 min Flush)					
	Totalizing Flow Meter (post-15 min Flush)					
	Approximate Flow Rate (GPM)					
	Avg. Vol Water Treated per Day (gallons)					
	Total System Pressure Range During Inspection					
	Pre-Filter Inlet / Outlet (psi)	/	/	/	/	/
	Lead Vessels					
	Vessel A:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Vessel B:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Lag Vessels					
	Vessel C:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Vessel D:					
	Inlet / Outlet (psi)	/	/	/	/	/
	Post-Treatment					
	Post-Filter Inlet / Outlet (psi)	/	/	/	/	/
		/	/	/	/	/
		/	/	/	/	/
		/	/	/	/	/
NOTES	Issues?					
	Samples Collected (Y or N)? From Where?					

Sampling Frequency for 123 TCP

Monthly: **Mid-point between 'lead & lag vessels'**

Monthly: **HOLD Effluent Sample Point**

Quarterly: **Well Head**

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Domestic Well Sampling Field Methodology

Weber, Hayes and Associates' groundwater monitoring and domestic well sampling methodology is based on years of experience and generally accepted water well sampling practices, including procedures specified in the *Leaking Underground Fuel Tank Guidance Manual,* September 2012 and the California Department of Toxic Substances Control *Guidance Manual for Groundwater Investigations, Representative Sampling for Groundwater for Hazardous Substances,* revised February 2008.

The first step in sampling preparation is to identify the most appropriate sampling port (e.g. dedicated downturned sample port or hose bib) in the water system and remove any attachments. Samples are collected as close to the well head as possible, and the sampling location is noted on field data sheets.

All field and sampling equipment are decontaminated before, between, and after measurements or sampling by washing in a Liqui-Nox and tap water solution, rinsing with tap water, and rinsing with distilled water.

Field staff prepare a YSI Professional Plus Multi-Parameter flow-through meter and a demarcated 5-gallon bucket in the sample port vicinity. All field instruments are calibrated before each use. Water is purged prior to sampling to ensure a representative sample is collected. The purge water volume is measured and recorded. During well purging, the physical parameters of temperature, conductivity, pH, dissolved oxygen concentration, and oxidation-reduction potential of the purge water are monitored with the YSI meter to determine when these parameters have stabilized (are within 15 percent of each other for three consecutive measurements). Purging is determined to be complete (stabilized aquifer conditions) after at least 15 minutes of purging, the physical parameters have stabilized, and/or approximately three to five well casing volumes (if well construction diagrams and depth-to-water information are available) have been removed from the well. After physical parameters have stabilized, a groundwater sample is collected from the well at a reduced flow rate in the appropriate laboratory-supplied sample container(s).

All field data (well purge volume, physical parameters, and sampling method) is recorded on field data sheets. All samples are labeled in the field with the sample ID, sampler initials, and collection date/time, and transported in insulated containers cooled with ice to state-certified laboratories under proper chain of custody procedures. Purge water is pumped to waste on the property.

After well purging and prior to collecting water samples for bacteriological analyses, the sampling port is decontaminated using heat and/or isopropyl alcohol to remove fixture bacteria bias. Water is flushed through the sampling port after decontamination and prior to collecting a sample in laboratory-supplied bacteriological sample container(s).

Samples to be analyzed for Volatile Organic Compounds (VOCs) are collected following the above purging procedures and a minimum of 15 minutes of purging. VOC samples are collected in 40 milliliter (ml) laboratory-supplied glass Volatile Organic Analyses (VOA) vials. VOAs are filled slowly by allowing water to "pour" into the side of the vial until a positive meniscus is present at the top of the vial. Care is taken to prevent preservative in the VOA from being washed out during filling. The vial is then tightly capped to compress the meniscus and inverted to confirm there are no air bubbles within the vial. If air bubbles are present the vial is discarded, and a new sample is collected. A total of three 40 ml vials are collected via this method for each sample, packed within foam packaging, and placed on ice for transport under proper chain-of-custody procedures to a State-Certified Laboratory for analysis.

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-01	4/24/23 - WHA inspected pre-filter and post-filter - none present.	4/24/23 - Install new pre- & post-filters.	4/24/23 - Install new pre- & post- filters.	Same day	Filter = $40.19 x 2 No labor cost because completed during monitoring visit	$80.38
DWMC-01	4/24/23 - WHA observed flow data logger battery dead	4/24/23 - Replaced battery	Replace battery on Flow Data Logger	Same day	Battery = $10.25 No labor cost because completed during monitoring visit	$10.25
DWMC-02	1/14/21 - WHA reported faulty pressure gauge on lag bank C. Culligan to replace under warranty. Gauge is used for monitoring, but does not affect treatment.	10/15/21 - Culligan replaced faulty gauge.	Gauge replacement	Reported immediately upon observation - ~9 months for replacement under warranty	Covered under warranty	
DWMC-02	6/1/21 - Worked with property owner after storage tank disinfection and water system repairs to plan to put treatment system back online	N/A	Put treatment system back online on 6/10/21.	N/A	3 hrs @ $85/hr = $255	$255.00
DWMC-02	6/29/21 - Voicemail from Property Owner. Reported leak on system.	WHA inspected on 6/30/21, reported the leak to Culligan, and took two of the four vessels offline to stop the leak until it was repaired. Culligan repaired the leak and put the full system back online on 7/2/21.	Leak at hose bib (post-treatment) and leak at flow controller effluent on vessel A. WHA completes inspection of problem and coordinates with Culligan plumber for repair. Culligan plumber completes repair.	3 days	WHA coordination: 1 hr @$85/hr = $85 Culligan costs covered under warranty	$85.00
DWMC-02	10/19/21 - WHA to replace post-filter during November monitoring visit	11/11/21 - WHA replaced post filter	Post-filter replacement	Scheduled and completed - 23 days	Post-Filter Cost ($35) + Replacement Labor (1.25 hrs @ $75/hr = $93.75) + Vehicle Use ($15) = $143.75	$143.75
DWMC-02	1/20/22 - WHA observed very small leak at post treatment hosebib. Will need to replace hose bib.	1/28/22 - WHA replaced hosebib	Hosebib replacement	8 days	1 hour of WHA Labor - Senior Scientist ($85)	$85.00

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-02	6/03/22 - CWC staff put system into bypass. Property owner completed disinfection prior to collecting bacteria sample. 06/10/22 - CWC requested chlorine sample and system to be placed online.	6/12/22 - WHA sampled water system for chlorine and put system online	System online	2 days	Completed as part of Monthly Monitoring	
DWMC-02	9/15/22 - WHA observed faulty gauge on pre- pre-filter and potentially Vessel A. Still need gague replacement on Vessel A.	10/20/22 - WHA replaced gauge on pre- pre-filter	Gauge replacement	Approx. 1 month	Labor Costs Covered under warranty Gauge = $62.13	$62.13
DWMC-02	No incident - pre-filter purchased to have on standby for replacement.	12/13/22 - Pre-filter purchased	Pre-filter purchase		Filter cost: $205.70	$205.70
DWMC-02	Pressure gauge malfunction over time	2/22/23 - Replace pressure gauges	Pressure gauge replacement (2 total)	N/A	Pressure Gauge Cost ($90.97 - 2 total)	$90.97
DWMC-04	6/23/21 - WHA reported faulty pressure gauges on lag banks C & D. Culligan to replace under warranty. Gauge is used for monitoring, but does not affect treatment.	10/15/21 - Culligan replaced faulty gauge.	Gauge replacement	Reported immediately upon observation - ~3.5 months for replacement under warranty	Covered under warranty	
DWMC-04	10/19/21 - WHA observed slight leak at Lead Bank A during monitoring. Reported to Culligan immediately.	11/11/21 - Re-inspected with no leak observed	Culligan technician visited site and completed inspection for leaks. No leaks present. WHA confirmed no leaks during 11/11/21 monitoring visit.	1.5 weeks	Covered under warranty	
DWMC-04	10/19/21 - WHA to replace post-filter during November monitoring visit	11/11/21 - WHA replaced post filter and O-ring	Post-filter and O-ring replacement	Scheduled and completed - 23 days	Post-Filter Cost ($35) + O-ring cost ($5.43) + Replacement Labor (1.25 hrs @ $75/hr = $93.75) + Vehicle Use ($15) = $149.18	$149.18
DWMC-04	01/10/22 - Home owner reported a small leak on treatment system and requested repair tech visit.	1/14/22 - Culligan inspected system and completed repair of leak	Remove and Clean hosebib + threads. There is a potential leak will return - Culligan is ordering replacement fitting if needed in future.	4 days	Covered under warranty	

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-04	2/22/22 - WHA observed hosebib leak on treatment system (same location as before - Vessel A). Reported to Culligan same day. 3/3/22 update - Culligan scheduled repair for week of 3/8/22. Culligan postponed 3/8/22 repair. WHA to follow-up weekly with Culligan until repair complete.	4/18/22 - Culligan completed repair of leak	Removed cracked PVC fitting and replaced with new fitting.	Reported upon observation. Approx. 2 months.	Covered under warranty	
DWMC-04	5/24/22 - WHA confirmed Vessel A inlet gauge needs replacement. Contacted Culligan for gauge replacement.	10/20/22 - WHA purchased replacement gauge	Gauge replacement	Approx. 1 month	Labor Costs Covered under warranty Gauge = $62.13	$62.14
DWMC-04	8/23/22 - WHA observed slight leak on two Vessel C hosebibs. Will replace on next monthly monitoring visit.	9/15/22 - WHA replaced leaking hosebibs.	Hosebib replacement	Approx. 1 month	Hosebib Cost (2 total + markup): $26.08 No labor cost because completed during monitoring visit	$26.08
DWMC-04	No incident - pre-filter purchased to have on standby for replacement.	12/13/22 - Pre-filter purchased	Pre-filter purchase		Filter cost: $205.70	$205.70
DWMC-04	1/31/23 - Flow Data Logger ran out of battery	1/31/23 - Replace battery	Replace battery on Flow Data Logger	1 day	Battery Cost: $10.23	$10.23
DWMC-04	2/28/23 - Pressure gauge malfunction over time	2/28/23 - Replace pressure gauges	Pressure gauge replacement (1 total)	1 day	Pressure Gauge Cost ($45.49 - 1 total)	$45.49

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-09	10/19/21 - WHA reported potentially faulty pressure gauges on lag bank C. However, during the subsequent 4 months the gauges appeared to function normally. WHA will continue to monitor this gauge and ask Culligan to replace under warranty of it appears to have problems in the future.	WHA continuing to monitor monthly.				
DWMC-09	10/19/21 - WHA to replace post-filter during November monitoring visit	11/11/21 - WHA replaced post filter	Post-filter replacement	Scheduled and completed - 23 days	Post-Filter Cost ($35) + Replacement Labor (1.5 hrs @ $75/hr = $112.50) + Vehicle Use ($15) = $162.50	$162.50
DWMC-09	12/21/21 - WHA observed small leak on Vessel B tank header while well pump is operating. Notify Culligan of leak and request technician visit. 3/3/22 - Culligan observed leak and scheduled repair for week of 3/7/22	3/28/22 - Culligan replaced 'O' ring on vessel B header	Culligan replaced 'O' ring on vessel B header	Reported upon observation. Confirmation of repair on 3/28/22 - Approx. 3 months.	Covered under warranty	
DWMC-09	4/20/22 - WHA observed leak on mid-point hosebib.	6/15/22 - WHA replaced hosebib	Hosebib replacement	Monitored until repaired on 6/15/22 - Approx. 2 months	No Additional Charge	
DWMC-09	No incident - pre-filter purchased to have on standby for replacement.	12/13/22 - Pre-filter purchased	Pre-filter Purchase		Filter cost: $205.70	$205.70
DWMC-09	Pre-filter replacement	2/9/23 - Pre-filter replaced	Pre-filter Replacement	Ongoing O&M	WHA labor ($85 * 2)	$170.00

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-10	1/30/23 - Flow Data Logger ran out of battery	1/30/23 - Replace battery	Replace battery	1 day	Battery Cost: $10.23	$10.23
DWMC-14	5/24/22 - Resident reported to CWC a leak in a valve - CWC reported to WHA who went in person on 5/25/22 to review, and reported to Culligan's to fix on 5/26/22	5/26/22 - Culligan resolved leak in valve	Replace cracked plastic fitting	Scheduled and completed - 2 days	Covered under warranty	
DWMC-14	5/26/22 - Resident reported to CWC additional hosebib leak, CWC reported to WHA who inspected on 6/2/22	6/2/22 - WHA resolved leak	Replaced hose bib	Scheduled and completed - 7 days	No Additional Charge	
DWMC-14	6/17/22 - Lab results indicate presence of E.coli post-treatment. WHA notified CWC immeditaley. WHA put treatment system into bypass on 6/18/22. WHA re-sampled post-treatment on 6/29/22. E. coli still present post-treatment. Notified CWC. Treatment system remains in bypass. Devloping plan to resolve the issue.	7/11/22 - WHA completes ongoing coordination of carbon replacement 9/6/22, 9/22/22, 9/27/22, 9/28/22 - WHA coordinates with Culligan to complete carbon replacement, treatment system disinfection, system flushing, and bacteria sampling			7/11/22 - WHA Labor for Solution Coordination ($85 * 0.5) 9/22 - WHA Labor for Solution Coordination ($85 * 4) + ($130* 0.5) + Distilled Water ($1.53) + Truck ($15)	$42.50 $421.53
DWMC-14	6/23/22 - Resident reported additional leak to CWC. CWC reported to WHA who inspected on 6/29/22. Repaired by Culligan on 6/30/22	6/30/22 - Culligan resolved leak	Replace cracked plastic fitting	Scheduled and completed - 7 days	Covered under warranty	

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-14	Week of 10/17/22 - Culligan replaced GAC and sanitized the system. Flushed system and collected bacteria samples prior to placing system in service.	10/17/22 - Prep 10/20/22 - Bacteria Sampling	Collect confirmation bacteria samples	3 days	10/17/22 - WHA labor ($85*0.25) 10/20/22 - WHA labor ($85*1) GAC replacement cost (with 10%WHA markup) $2103.81	$2,210.06
DWMC-14	10/28/22 - Resident reported seeing carbon fines in water. Pre and Post filters were removed during carbon treatment sanitizing.	10/31/22 - WHA replaced pre- and post- filters	Replace pre-filter and post-filter	3 days	10/31/22 - WHA labor + truck for filter replacement and oversight ($85*2) ($130*.25) ($15) Pre/Post Filters (2) = $67.87	$285.37
DWMC-14	3/23/23 - Flow data logger battery dead	4/3/23 - Battery replaced	Replace Flow Data Logger Battery	11 days	4/3/23 - WHA Labor + battery (1.5*$75) ($10.25)	$122.75
DWMC-19	6/16/22 - Lab results indicate presence of E.coli post-treatment. WHA notified CWC immeditaley. WHA put treatment system into bypass on 6/17/22 and re-sampled. E.coli absent post-treatment. Re-sampled on 6/29/22 to confirm absence of E.coli post-treatment. E.coli was present. Notified CWC. Treatment system remains in bypass. Devloping plan to resolve the issue.	7/11/22 - WHA completes ongoing coordination of carbon replacement 9/6/22, 9/30/22 - WHA coordinates with Culligan to complete carbon replacement			7/11/22 - WHA Labor for Solution Coordination ($85 * 0.5) 9/22 - WHA Labor for Solution Coordination ($85 * 0.5) + ($130 * 0.5)	$42.50 $107.50

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-19	Week of 10/3/22 - Culligan replaced GAC and sanitized the system. Flushed system and collected bacteria samples prior to placing system in service. system in service.	10/6/22 - Prep and Bacteria Sampling	Collect confirmation bacteria samples	3 days	10/20/22 - WHA labor ($85*1.75) GAC replacement cost (with 10%WHA markup) $2083.65	$2,232.40
DWMC-19	4/19/23 - WHA inspected pre-filter and post-filter - none present.	4/19/23 - Install new pre- & post-filters.	4/19/23 - Install new pre- & post- filters.	Same day	Filter = $40.19 x 2 WHA Labor ($85*1.5)	$207.88
DWMC-21	6/1/22 - Resident reported having brown water and no water pressure. Resident called Culligan, who told them to turn the three-way valve to bypass (i.e. treatment system off-line). WHA inspected on 6/2/22 when out at the household for monthly monitoring.	6/2/22 - WHA inspected system	It appears the well is producing sand/turbid water. This is likely due to the well pump intake sucking in sand. There could be sedimentation in the bottom of the well. There could be a failure in the well screen which is causing sand/filter pack material to enter well. Treatment system was put in bypass until this well-related issue could be addressed by pump contractor.	Inspected - 1 day	No Additional Charge	
DWMC-21	6/16/22 - CWC reported no sand/'mud'/turbidity observed in water system by resident in last two weeks. CWC requested treatment system to be placed online.	6/16/22 - WHA inspected system and purged well until well pump operated. No observable sand/sediment observed in water.	Treatment system placed back online	Inspected - 1 day	Completed during Monthly Monitoring	
DWMC-21	6/30/22 - Potential for sediment/sand clogging of pre-filter (noticeable pressure drop). WHA will inspect pre/post filters on next visit.	7/27/22 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand. Post-treatment filter appeared impacted with carbon fines. Place system in bypass until filters changes and discussion with property owner.	Change pre and post filters. Property owner to complete additional well investigation regarding long-term well solution	Inspected - 27 days	1.5 hrs @ $85/hr = $127.50 + Pre/Post Filters (2) = ($30.85 * 2) = $61.70	$127.50
DWMC-21	8/23/22 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	8/23/22 - Pre-filter Replacement	Replace and sanitize pre-filter	Inspected and replaced - 1 day	Pre Filter = $30.85 No labor cost because completed during monitoring visit	$30.85

Treatment System #	Incident Date Report	Incident Date Resolved	Resolution Action	Resolution Time	WHA, Subcontractor & Materials Expenses (See Note 1)	Total O&M Expense
DWMC-21	9/15/22 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	9/15/22 - Pre-filter Replacement	Replace and sanitize pre-filter	Inspected and replaced - 1 day	Pre Filter = $30.85 No labor cost because completed during monitoring visit	$33.94
DWMC-21	10/20/22 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	10/20/22 - Pre-filter Replacement	Replace and sanitize pre-filter	Inspected and replaced - 1 day	Pre Filter = $30.85 No labor cost because completed during monitoring visit	$33.94
DWMC-21	11/17/22 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	11/17/22 - Pre-filter Replacement	Replace and sanitize pre-filter	Inspected and replaced - 1 day	Pre Filter = $30.85 No labor cost because completed during monitoring visit	$33.94
DWMC-21	12/21/22 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	12/21/22 - Pre-filter Replacement	Replace and sanitize pre-filter	Inspected and replaced - 1 day	Pre Filter = $46.52 No labor cost because completed during monitoring visit	$33.94
DWMC-21	12/21/22 - Bacteria sample positive for E.coli	12/21/22 - Notify/discuss with CWC immediately 12/30/22 - Confirmation bacteria sampling	Confirmation samples collected upstream and downstream of the treatment system on 1/4/23 and 1/12/23 were non-detect for E. coli and the system was left online.	Notified immediately and re-sampled	WHA Labor: ($75 * 2)	$150.00
DWMC-21	1/31/23 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	1/31/23 - Pre-filter Replacement	Replace and sanitize pre-filter	Inspected and replaced - 1 day	Pre Filter = $30.85 No labor cost because completed during monitoring visit	$30.85
DWMC-21	3/30/23 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	3/31/23 - Pre-filter Replacement	Replace and sanitize pre-filter	Inspected and replaced - 2 day	Pre Filter = $40.19 No labor cost because completed during monitoring visit (Billed in April 2023)	$40.19
DWMC-21	4/24/23 - WHA inspected pre-filter. Appeared heavily impacted with turbid water/sand.	4/24/23 - Pre-filter Replacement	Replace and sanitize pre-filter	Same day	Pre Filter = $40.19 No labor cost because completed during monitoring visit	$40.19
					Total O&M Expense	**$8,293.26**

NOTES:

(1) Per CWC's contract with Weber Hayes and Associates (WHA), Culligan is providing a one-year warranty on equipment and appurtenances they supply for installation and a five-year warranty on the filter tanks after installation. This warranty does not include WHA staff time to coordinate repairs and the granular activated carbon (GAC) filter media or pre- or post-filter cartridges. Operation and maintenance activites not covered under Culligan's warranty are performed by WHA and Culligan according to costs shown in CWC's contract with WHA or on a time and materials basis.

Appendix I
Costs

In addition to system implementation costs, there were additional costs for community outreach and education as well as project management and technical oversight (see **Table I-1**) that are not shown in the Project Costs section of the main report. Project outreach, education and enrollment included the time spent connecting with households served by drinking water wells with 123-TCP contamination; drafting and signing of participation and implementation agreements; coordination of site assessments, monitoring, and other site visits; overall determination of the feasibility of system installation on a case-by-case basis; and troubleshooting numerous issues with community partners as they arose based on the unique aspects of each site. Technical oversight included coordination with WHA and convening of the TAC. Project management included management of CWC's SEP funding agreement as well as CWC's subcontract with WHA.

WHA's project management costs are also shown in Table I-1 and were not included in the costs presented in the main report.

The costs in Table I-1 do not include CWC staff time spent on outreach and recruitment for initial well testing of 211 wells facilitated by CWC (which identified 27 wells with 123-TCP), or CWC staff time to develop this report or present the results of the pilot.

Table I-1: Outreach, Management, Technical Oversight Costs

	CWC Outreach, Technical Oversight, and Project Management (through May 2023)	WHA Project Management (through April 2023)	Total Outreach, Management, and Technical Oversight Costs
Total Cost	$181,804	$19,305	**$201,109**
Average Cost per System Installed	$20,200	$2,145	**$22,345**

Table I-2 illustrates the implementation costs through April 2023 of all nine installed systems. Installation costs are higher, as expected, for the larger systems. In addition, some individual systems had higher costs due to the following:

- The DWMC-09 installation cost was higher due to the need to install a variable frequency drive and controller on the well pump so that the treatment system could be located directly downstream of the well and serve both households on the property.

- Shade structures were installed at DWMC-01, DWMC-09, and DWMC-15 to protect the treatment systems from direct sunlight, prolong the life of plastic plumbing components, and prevent high temperatures which could promote microbial growth in the GAC.
- The higher monthly monitoring costs for DWMC-14 and DWMC-19 represent only seven and two months of monitoring, respectively, and thus may not be representative of long-term monitoring costs.
- The high average monthly minor maintenance cost for DWMC-14 and DWMC-19 includes WHA's time to inspect the water system after E. coli was detected following installation and is also averaged over a short time span so is likely not representative of long-term costs.

Table I-2: Implementation Costs (through April 2023)

System ID	Volume of Carbon (cubic feet)	Site Assessment and Installation (WHA and Culligan)	Months in Service	Average Monthly Monitoring Cost to Date (WHA)	Average Monthly Minor Maintenance Costs (WHA and Culligan)	GAC Replacement Costs to Date[1] (WHA and Culligan)	
						To Date	Budget to Replace Lead tank(s)
DWMC-01	7.2	$11,502	5	$388	$18	N/A	$1,317
DWMC-02	24	$12,233	23	$366	$40	N/A	$2,915
DWMC-04	24	$14,277	22	$364	$23	N/A	$2,915
DWMC-09	24	$20,673	22	$425	$24	N/A	$2,915
DWMC-10	4.0	$9,796	12	$392	$1	N/A	$771
DWMC-14	7.2	$10,295	7	$403	$113	$2,228	$1,317
DWMC-15	4.0	$10,101	0	N/A	N/A	N/A	$771
DWMC-19	7.2	$9,882	2	$524	$149	$2,293	$1,317
DWMC-21	4.0	$9,359	12	$339	$46	N/A	$771

[1] Because 123-TCP breakthrough has not occurred in any systems yet, GAC replacement frequency (and thus annual cost) is not yet known. The budgeted cost for replacing the lead tank(s) in each system is shown for reference. GAC in DWMC-14 and DWMC-19 lead and lag tanks was replaced shortly after installation to resolve E. coli contamination issues.