Water Quality Strategic Plan
for SFPUC Drinking Water System

2024 Update

September 25, 2024

Water Quality Division, Water Enterprise, SFPUC

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

Kennedy Jenks

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PROJECT PARTICIPANTS AND ACKNOWLEDGEMENTS

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SFPUC Water Quality Division (WQD) Project Team

Manouchehr Boozarpour, PE, WQD Engineering Manager

Raymond Mah, PE, WQD Senior Engineer, Project Manager

Andrzej Wilczak, PhD, PE, WQD Project Engineer

Project Advisory Committee (PAC), Affiliation and Area of Expertise

Jean Debroux, PhD, Trussell Technologies, Inc., Risk Assessment, Emerging Contaminants

Alex Horne, PhD, University of California Berkeley, Professor Emeritus, Limnology

Mark W. LeChevallier, PhD, Dr. Water Consulting LLC, Microbiology, Utility Operations

William A. Mitch, PhD, PE, Stanford University, Professor, Water Treatment and Chemistry

R. Rhodes Trussell, PhD, PE, Trussell Technologies, Inc., Water Treatment and Chemistry

June Weintraub, ScD, REHS Deputy Director for Environmental Health and State Environmental Health Director, California Department of Public Health (formerly with SFDPH)

Stakeholders, Water Utility and Water Research Foundation Advisors

Yone Akagi, PE, Water Quality Manager, Portland Water Bureau, OR

Stefan Cajina, PE, Chief, North Coastal Section, California State Water Resources Control Board, Division of Drinking Water Region II

Alex Chen, PE, Drinking Water Deputy Director, Seattle Public Utilities, WA

Angela Cheung, PE, Water Treatment Division Manager, SFPUC

Jennifer Clary, SFPUC Citizens' Advisory Committee (CAC), Water Subcommittee

Andrew DeGraca, PE, WQD Director, SFPUC

Stakeholders, Water Utility and Water Research Foundation Advisors (continued)

Stephen Estes-Smargiassi, Planning Director, Massachusetts Water Resources Authority, Boston, MA

Tom Francis, PE, Water Resource Manager, Bay Area Water Supply & Conservation Agency (BAWSCA)

Alice Fulmer, Regional Liaison, Water Research Foundation (WRF)

Margaret Hannaford, PE, Hetch Hetchy Water and Power (HHWP) Division Manager, SFPUC

Maureen Hodgins, Regional Liaison, WRF

Grace Jang, PhD, Research Project Manager, WRF

Paula Kehoe, Water Resources Planning Manager, SFPUC

Betsy Lauppe Rhodes, Communications, SFPUC

Adam Mazurkiewicz, PE, Operations and Maintenance Manager, HHWP, SFPUC

Tim Ramirez, Natural Resources and Land Management Division Manager, SFPUC

Paul Rochelle, PhD, Water Quality Manager, Metropolitan Water District of Southern California

Francois Rodigari, MS, Director of Corporate Sustainability and Innovation, San Jose Water Company

Nicole Sandkulla, PE, CEO and General Manager, BAWSCA

Mary Smith, Research Project Manager, WRF

Richard Sykes, PE, BAWSCA

Bill Teahan, City Distribution Division Manager, SFPUC

Susan M. Teefy, PE, Water Quality Manager, East Bay Municipal Utility District, Oakland, CA

Peter Zhou, PE, Water Quality Manager, Santa Clara Valley Water District, CA

SFPUC WQD Project Contributors and Reviewers

Jacqueline Cho, PE, Senior Engineer, WQD Peninsula Workgroup

Robert Clark, PE, Senior Engineer, WQD Moccasin Workgroup

Dan Kim, PE, Engineer, WQD East Bay Workgroup

Kenneth Lee, WQD Laboratory Director

Keyvan Moghbel, PE, Engineer, WQD East Bay Workgroup

Kenneth Payne, WQD Manager of Environmental Field Services

SFPUC Water Quality Division Project Contributors and Reviewers (continued)

Araceli Ramirez, Executive Assistant, WQD Project Support and Coordination

Cameron Ripley, PE, Associate Engineer, WQD Applied Research & Analytics

Enio Sebastiani, PE, WQD Engineering Manager

Eddy So, PE, Senior Engineer, WQD Regulatory Compliance Workgroup

Shailen Talati, PE, Senior Engineer, WQD CIP Coordination Workgroup

Mike Williams, PE, Senior Engineer, WQD Moccasin Workgroup

Alan R. Wong, PE, Senior Engineer, WQD City Distribution Workgroup

KJ/A-T-S and Trussell Tech Project Team

Kyle Olewnik, EIT, Project Manager/Facilitator, Kennedy Jenks (KJ)

Steve Timko, PhD, Assistant Project Manager/Technical Coordinator, KJ

Mollie Sabo, EIT, Project Engineer, KJ

David Hokanson, PhD, PE, QA/QC, Trussell Technologies Inc.

Todd Reynolds, PE, Water Treatment Subject Matter Expert, KJ

Charlie Liu, PhD, PFAS and Regulatory Subject Matter Expert, KJ

Elahe Enssani, PhD, PE, Panel Selection Advisor, A-T-S

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EXECUTIVE SUMMARY

In 1974, the Safe Drinking Water Act (SDWA) was signed into law to ensure safe drinking water for the American public. The law and its amendments authorize the United States Environmental Protection Agency (USEPA) to set national health-based standards to protect drinking water and its sources, including surface water and groundwater, against naturally occurring and man-made contaminants. While the SDWA has been effective in ensuring the safety of drinking water for the last 50 years, regulatory agencies [USEPA and the California State Water Resources Control Board (SWRCB)] continue to remain vigilant in reviewing existing standards and evaluating newly identified contaminants to maintain safe drinking water. The pace of new regulations is increasing, with several new regulations finalized already in 2024 [e.g., California SWRCB Hexavalent Chromium, USEPA per- and polyfluoroalkyl substances (PFAS), USEPA Consumer Confidence Report Rule (CCR)]. The USEPA Lead and Copper Rule Improvements (LCRI) is expected to be finalized by October 2024 and Microbials and Disinfection Byproducts (M/DBPs) Rule revisions will likely be proposed in Summer 2025 and perchlorate regulations by November 2025 (USEPA 2024b).

Additionally, with rapidly developing analytical methods and a digitally connected world, the identification of emerging contaminants (e.g., microplastics, brominated and iodinated DBPs) is increasing at a more rapid pace. USEPA, the States, water systems, American Water Works Association (AWWA), Water Research Foundation (WRF) and others continue to work together to meet these challenges and provide safe drinking water for everyone.

Risk Management Needs to be Proactive and Preventive

Monitoring treated water quality against maximum contaminant levels (MCLs), no matter how stringent, is an inherently reactive approach. Effective risk management needs to be fundamentally preventive (Baum et al. 2016).

Though regulations can drive innovation and change, the SDWA was never meant to be a road map for building an effective, successful water system in terms of water quality. The statute is only a minimum set of requirements that a water system must meet. The water sector should consider taking (or in some cases, has already taken) non-regulatory actions to improve the state of US drinking water (Roberson and Wilkes 2020).

The San Francisco Public Utilities Commission (SFPUC) has a history of proactively identifying potential water quality issues and considering them in capital planning and operational decisions. This practice has enabled SFPUC to comply with all state and federal drinking water regulations and continue to provide high quality services to customers. To create a sound foundation for capital and operational investments that may be required in the next decade to protect drinking water quality, SFPUC's Water Quality Division (WQD) regularly assessed potential real-world scenarios and concerns that could impact water quality and identified recommendations to consider for implementation.

As part of this proactive approach, WQD conducts periodic updates to SFPUC's Water Quality Strategic Plan (WQSP). This 2024 WQSP was developed to update the previous 2016 WQSP.

SFPUC Strategic Plan Mission Statement[1]
"To provide our customers with high quality, efficient, and reliable water, power, and wastewater services in a manner that values environmental and community interests and sustains the resources entrusted to our care."

The participants of this 2024 WQSP stressed that to sustainably fulfill SFPUC's mission statement, an enterprise-level framework must be developed. Overall water quality sustainability can only be achieved if this holistic approach includes considerations of each of SFPUC's various workgroups to fulfill the overall organizational mission.

This Executive Summary presents:

- WQSP project goals and objectives,
- Project approach,
- 2016 WQSP recommendations and implementation status,
- 2024 WQSP project findings,
- 2024 WQSP recommendations prioritization (ranking) criteria, and
- Prioritized list of 2024 WQSP recommendations.

1. Project Goals and Objectives

The overarching goals of this project are as follows:

1. Maintain SFPUC water quality regulatory compliance and provide an understanding of emerging drinking water quality related issues with respect to meeting regulations and proactively protecting public health.
2. Ensure SFPUC is well positioned to respond to future drinking water quality challenges.
3. Maintain/improve customer satisfaction in drinking water quality delivered to wholesale and retail customers.
4. Safeguard resources entrusted to our care.

[1] https://www.sfpuc.gov/sites/default/files/about-us/policies-reports/Strategic%20PlanExternal_2020.pdf

Specific project objectives are as follows:

1. Identify current and upcoming water quality issues, opportunities, and challenges using a deliberative process engaging the project team, stakeholders, and advisors.

2. Solicit expert opinions and input on identified issues from stakeholders and advisors.

3. Provide actionable recommendations for achieving water quality goals that can be prioritized using defined, semi-quantitative criteria.

2. Project Approach

The process of developing and updating the 2024 WQSP is illustrated below in Figure ES-1. It is a multi-step approach including: (1) review of previous work, (2) analysis of current water quality, operational, and regulatory conditions, and (3) engagement of a group of internal and external experts to identify and recommend planning actions. This document is based upon stakeholders' and advisors' consultation and deliberation coupled with WQD staff input and review. The project participants are identified at the beginning of this report.

The 2024 WQSP process was more expansive and detailed compared to previous planning efforts in 2008, 2009, and 2016 due to the increasing complexity of water quality issues and consideration of alternative water sources associated with prolonged droughts. The expanded effort focused on gathering input from staff, stakeholders and advisors, developing recommendations, and prioritizing the recommendations. The 2024 WQSP process included the following:

- Follow Previous WQSP Focus Area Structure.
  The overall information gathering, deliberation and recommendations followed "themes" or "Focus Areas" to organize workflow and concepts logically. This approach was necessary to process information for a large and complex water system like SFPUC, as well as many water quality issues facing water providers. Eight (8) Focus Areas were retained for the 2024 WQSP from previous water quality (WQ) planning projects, but the previous "Technological Advances" Focus Area was incorporated into each of the other Focus Areas rather than considered separately. The order of discussion and presentation of the Focus Areas was slightly changed for 2024 WQSP for better information flow, as presented below:

    1. Water Quality Regulatory Compliance.
    2. Public Health and Contaminants of Emerging Concern in Drinking Water.
    3. Source and Treated Water Quality, Operations, and Innovative Technologies.
    4. Distribution System Water Quality, Operations, and Innovative Technologies.
    5. Extreme Water Quality Events.
    6. Water Quality Sustainability.
    7. Customer Communication and Satisfaction.

8. Water Quality at the Tap/Premise Plumbing.

- Conduct Information Gathering and Prepare Written Materials.
  The initial review included investigating historical documents, previous findings, other relevant planning and operations reports, and scientific/technical studies. Detailed written material for each Focus Area was then prepared. The material was organized in a tabular format called Working Tables which summarized and organized WQ issues based on WQD and Project Advisory Committee (PAC) input. Excerpts from the scientific/technical studies and Working Tables were provided to all project participants as background materials. These tables served as the basis for developing PowerPoint presentations and discussions for the Focus Area Meetings.

- Obtain Input from Stakeholders and Advisors during Focus Area Meetings.
  Separate presentations and discussions were held for each Focus Area, a significant expansion from previous planning efforts that included two day-long workshops to discuss all Focus Areas at once. This structure allowed for additional input and a more deliberative process, resulting in more detailed and extensive WQ recommendations than previous WQSP projects. All stakeholders and project advisors were invited to participate in Focus Area Meetings to provide input and perspective.

- Summarize Findings and Prioritize Recommendations.
  Input from the Focus Area Meetings was consolidated into draft meeting summaries, which formed the basis of the recommendation tables and this report. The recommendations were divided into "new" and "on-going" to reflect their status regarding WQD activities. Prioritization criteria were then developed by the WQD project team in cooperation with the PAC, as well as input from other WQD members and stakeholders. The prioritization criteria are based on "importance" and "urgency". The criteria were applied to the new and on-going recommendations developed as part of this project. The prioritized recommendations form the main outcome of the 2024 WQSP.

- Prepare Project Report.
  A draft 2024 WQSP report was prepared based on information presented at the Focus Area meetings, meeting summaries, and the developed and prioritized recommendations. The draft report was reviewed by stakeholders and advisors, and their input was incorporated into the final report.

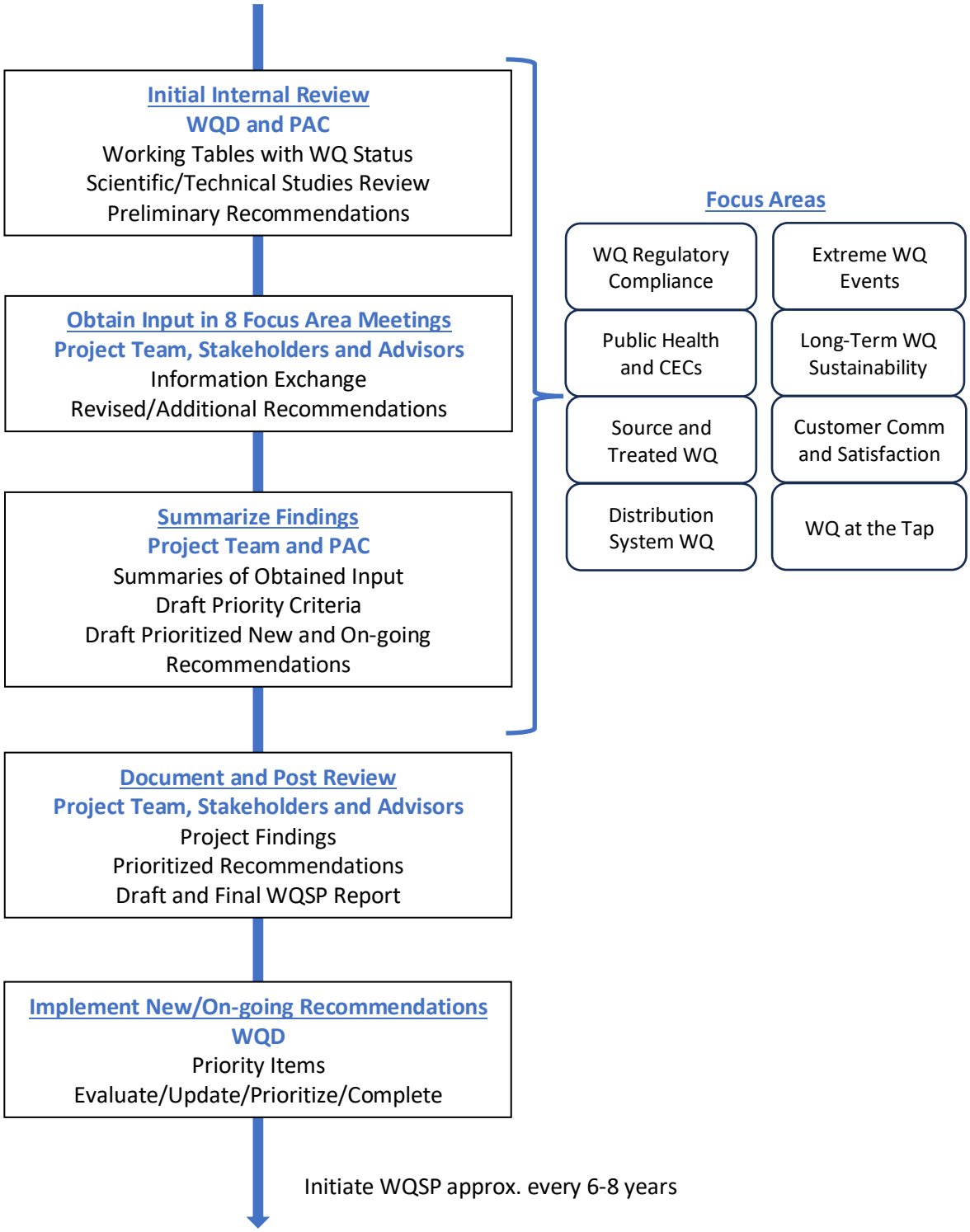

Figure ES-1. Overview of the 2024 SFPUC Water Quality Strategic Plan Process

3. 2016 WQSP Recommendations and Implementation Status

SFPUC successfully addressed and completed the recommendations outlined in the 2016 WQSP as shown in Table ES-1 below. Significant progress was made in tackling new water quality challenges and questions, as well as enhancing ongoing operations. Several follow-up recommendations from 2016 were included in the 2024 WQSP recommendations, reflecting the ongoing nature of certain activities. Overall, SFPUC demonstrated its commitment to continuously improving water quality and addressing evolving concerns by implementing the WQSP recommendations.

Table ES-1. 2016 SFPUC WQSP Recommendations and Implementation Status

2016 Recommendations	Status as of 2024
Focus Area #1: Water Quality Regulatory Compliance	
✓ Implement Revised Total Coliform Rule (RTCR).	✓ Completed. Implemented the RTCR. The system is in full compliance.
✓ Investigate alternatives to lower formation of disinfection by-products (DBPs) TTHM and HAA5 in East Bay blend of Hetch Hetchy and SVWTP treated waters.	✓ Completed. Discontinued pre-chlorination at SVWTP except when necessary (e.g., for manganese control) and optimized disinfection in the free chlorine contact basin. This had a significant effect to reduce DBP formation at SVWTP and in the East Bay blend. ✓ Conducted analysis of TTHM and HAA5 formation in Hetch Hetchy water source in 2017. ✓ Chlorine residual targets at Alameda East (AE) were lowered. This has not been very effective to control DBPs due to a long contact time with chlorine during disinfection in the Coast Range Tunnel. ✓ Conducted analysis of chemical mixing at AE siphons. Bench scale analysis did not indicate significant benefit of changing chemical injection location on DBP formation.
✓ Conduct USEPA UCMR4 monitoring for algal toxins, HAA, pesticides, industrial chemicals, germanium, manganese, and indicator parameters.	✓ Completed. Conducted UCMR4 monitoring and provided results to USEPA. Results were summarized in 2022 Contaminants of Emerging Concern (CEC) Report.

2016 Recommendations	Status as of 2024
Focus Area #2: Public Health and CEC in Drinking Water	
✓ Maintain collaboration between WQD and the San Francisco Department of Public Health (SFDPH).	✓ Completed. Maintained collaboration between WQD and SFDPH, including regular coordination meetings. This collaboration includes general and emerging WQ issues, for example: - Lead monitoring in schools drinking water and student blood and other related health issues. - Cross-connection control. - Fact sheets for multiple contaminants and other water quality topics. ✓ SFDPH participated in preparation of 2022 CEC Report and 2024 WQSP.
✓ Complete algal toxin monitoring in source water reservoirs. Develop follow-up monitoring, evaluation, and response plan to algal toxins occurrence.	✓ Completed. Algal toxin baseline monitoring for Peninsula reservoirs and HTWTP. ✓ In 2019, updated Algae Monitoring and Mitigation Plan. ✓ On-going algal toxin monitoring program for East Bay and Peninsula water sources includes bi-weekly total microcystins testing, depending on algae concentration. ✓ Developed in-house algal toxin testing protocol and instrumentation using EPA method 546 (ELISA) at WQD Millbrae Lab. ✓ On-going monitoring program includes quarterly sampling for three toxins (i.e., cylindrospermopsin, anatoxin-a, and saxitoxin) as a precautionary measure. These toxins were never detected during the baseline monitoring.
✓ Maintain optimized treatment for nitrosamines control. ✓ Continue voluntary nitrosamines monitoring.	✓ Completed. Maintained optimized treatment for nitrosamines and continued semi-annual monitoring at 10 locations including point-of-entry and distribution system.

2016 Recommendations	Status as of 2024
✓ Track CEC information, peer-reviewed publications, and regulatory developments. ✓ Be prepared for emerging issues. Present facts in a way that customers can understand.	✓ Completed. Prepared 2022 CEC Report for 2016 – 2021 cycle and submitted to stakeholders and Commission. Report is posted on SFPUC website. ✓ Tracked CEC information and regulatory developments.
✓ Consider collaboration with SFDPH to conduct *Legionella* follow-up study. ✓ Benchmark through national or state surveys, e.g., for microbial CECs and nanomaterials, when appropriate.	✓ Completed. Participated in Water Research Foundation (WRF) *Legionella* monitoring project #5156. WRF published the final report in September 2024. ✓ Preparing for participation in SWRCB's microplastics monitoring program for raw water.
✓ Conduct periodic, e.g., every 6 years, survey for PPCPs in source and treated waters. ✓ Conduct CEC monitoring in local and regional groundwater wells.	✓ Completed. Conducted monitoring for the Pharmaceuticals and Personal Care Products (PPCPs) in 2021. ✓ Conducted CEC monitoring in groundwater wells. ✓ Results are presented in 2022 CEC Report.
Focus Area #3: Source and Treated Water Quality: Operations and Innovative Technologies	
✓ Continue to participate in the AWWA and WRF activities relevant to SFPUC (Previously in Technological Advances Focus Area).	✓ Completed. Participated in WRF projects related to *Legionella* and UV disinfection. ✓ Planning to participate in the SWRCB Project for microplastics monitoring. ✓ Participated in AWWA, WRF, USEPA, SWRCB webinars. ✓ WQD Director is involved in AWWA and WRF management at national level. ✓ Organized Water Quality and Technology Workshop annually.

2016 Recommendations	Status as of 2024
✓ Evaluate new treatment technologies (Previously in Technological Advances Focus Area).	✓ Completed. Monitored and evaluated biofiltration at HTWTP. ✓ Completed design of ozone addition project for the SVWTP. ✓ Implemented maintenance and energy savings measures at Tesla UV disinfection.
✓ Maintain source water protection, especially in Priest and Moccasin reservoirs. ✓ Investigate new options to address algae issues in Moccasin and local reservoirs.	✓ Completed. Updated five-year sanitary surveys for the Alameda and Peninsula watersheds. ✓ Prepared annual sanitary survey for the Hetch Hetchy Water Supply. ✓ Installed Moccasin Reservoir security fence. ✓ Addressed Moccasin Reservoir algae issues by annually drying out the reservoir. ✓ Updated Algae Monitoring and Mitigation Plan in 2019.
✓ Monitor types of fire retardants used in watershed.	✓ Completed. Coordinated with Cal Fire when fire retardants were used in the watersheds. ✓ Conducted post-fire monitoring for Santa Clara Unit Lighting Complex fire in Calaveras Reservoir and San Antonio Reservoir watersheds. No impact was detected.
✓ Continue participation in the AWWA Partnership for Safe Water (PSW) for water treatment plants.	✓ Completed. Participated in PSW for SVWTP and HTWTP.
✓ Continue Chemical Quality Control Program at WTPs to minimize impurities in treatment chemicals.	✓ Completed. Continued the Chemical Quality Control Programs at the SFPUC facilities.
✓ Investigate multi-water provider opportunity to improve treatment chemical purchasing specifications.	✓ Completed. Multi-water provider/industry approach to improve treatment chemical specs is not feasible because of City & County of SF (CCSF) purchasing requirements.

2016 Recommendations	Status as of 2024
Focus Area #4: Distribution System Water Quality: Operations and Innovative Technologies	
✓ Maintain cross-connection control program and update CCSF ordinance.	✓ Completed. SFPUC routinely reports 92% annual backflow test results (out of 33,792 devices).
✓ Collect information on remaining galvanized/lead goosenecks and/or swing check valves to manage these assets for lead control and develop options.	✓ Completed. In 2018, submitted to SWRCB a list of water provider service lines that: 1) may have a lead component, such as a lead whip, and 2) have unknown material type in our records. ✓ Lead user service line replacement program schedule was submitted in July 2020 and replacement of all service lines with lead components will be completed by 2030.
✓ Continue to minimize detention time in distribution system (DS).	✓ Completed. Due to the COVID-19 pandemic, detention time in the DS increased because of low water demand. SFPUC mitigated that with removing several reservoirs temporarily out of service. ✓ Updated SolarBee mixers components for reliability and to extend service life. Installed 7 additional reservoir mixers in 2022-2023 to limit water age in reservoirs. ✓ Initiated distribution system Capital Improvement Project (CIP) to study reconveying Sutro and LaGrande pressure zones to limit water age.
✓ Ensure that only NSF61 materials are used in construction. Conduct soak tests as needed.	✓ Completed. Consistently used NSF61 materials. This requirement is a part of the current standard contract specification. ✓ There was no need to conduct soak tests in 2016 – 2023.

2016 Recommendations	Status as of 2024
✓ Monitor potential WQ changes from introduction of groundwater.	✓ Completed. Monitored WQ in distribution system (DS) after blending with groundwater. Blending occurs in two large water storage reservoirs to achieve uniformity in WQ. To date, groundwater production has been at a rate of ~0.24 MGD (~1.3% of blend) resulting in no WQ issues.
✓ Investigate Best Management Practices (BMPs) for pressure management and flushing.	✓ Completed. SFPUC began compiling and analyzing online pressure data for FY22-23 and reported to PSW. Evaluation is ongoing. ✓ SFPUC practices dead-end flushing, as needed, and grid flushing (a variant of unidirectional flushing).
✓ Consider following the PSW for DS.	✓ Completed. Participated in PSW for local retail DS since 2019. ✓ Monitoring and characterization based on PSW for DS did not identify problematic areas. However, relatively few pressure gauges are deployed in pressure zones (most on pump stations and pressure reducing valves).
✓ Further develop sanitary practices in new construction and main breaks.	✓ Completed. In 2023 updated SFPUC MOP for Disinfection/Dechlorination and Other Related Tasks, which assures that disinfection of facilities and associated sanitary work practices is implemented consistent with internal & updated industry practices. SFPUC also updated local disinfection practices and held training for City Distribution Division (CDD) staff.
Focus Area #5: Extreme Water Quality Events	
✓ Continue to diversify water sources for drought, climate change, earthquakes, and other extreme events.	✓ Completed. City and Regional Water groundwater supplies have been and continue to be developed. ✓ Continued development of non-potable and potable recycled water supplies.

2016 Recommendations	Status as of 2024
✓ Continue WQ emergency response planning and training.	✓ Completed. When wildfires occurred in SFPUC watershed, subsequent sampling determined that firefighting retardant chemicals did not impact source WQ. ✓ Extensive responses by SFPUC to extreme events: fires – 2013 Rim Fire, 2020 Santa Clara Unit Lightning Complex Fire, drought and atmospheric rivers events such as in January–March 2023. ✓ WQ emergency response exercise and training were conducted in November 2021.
Focus Area #6: Water Quality Sustainability	
✓ Diversify water sources including Lower Cherry Aqueduct water from Upcountry Non-Hetch Hetchy sources, and regional and local groundwater wells.	✓ Completed. Cherry Reservoir and Lake Eleanor approved as water sources. ✓ Continued development of local and regional groundwater resources. ✓ Continued development of non-potable and potable reuse projects.
✓ Continue sanitary surveys.	✓ Completed. Conducted sanitary surveys during required 5-year period (2016- 2020) for local watersheds. ✓ Conducted annual Hetch Hetchy watershed sanitary surveys.
✓ Continue staff training.	✓ Completed. Conducted staff training for new and current employees including special topics for staff with distribution and treatment operator licenses.
✓ Ensure cross-connection control in recycled water applications.	✓ Completed. Cross-connection control included in completed and ongoing recycled water projects.

2016 Recommendations	Status as of 2024
✓ Plan for succession of WQD staff.	✓ Completed. Several detailed technical reports were prepared that can serve as a template for training staff for future updates (e.g., AMMP, CEC Report, WQSP). ✓ Succession planning is an on-going effort.
Focus Area #7: Customer Communication and Satisfaction	
✓ Continue strategic planning discussion and information exchange with stakeholders, water providers and regulatory agencies.	✓ Completed 2024 WQSP update and increased stakeholders' engagement in WQSP development. Each focus area is discussed separately, and more details are provided. ✓ An update of the Water Quality Notification and Communication Plan (WQNCP) was completed in July 2022 (Revision 7).
✓ Maintain positive relationship with wholesale customers.	✓ Completed. Wholesale customer relationship is supported by SFPUC liaison staff and on-call WQD engineering staff. ✓ Routine meetings and an annual workshop are conducted with Wholesale Customers. ✓ SFPUC Regional Water System (SFRWS) WQ information is regularly shared via blend change notices, weekly Process Sheet, website and WQ fact sheets.
✓ Investigate centralized point of contact for wholesale customers.	✓ Completed. WQD assigned a Senior Engineer as the point of contact for Wholesale Customers.
✓ Consider new opportunities of sharing more data and information with wholesale customers, e.g., improve communication about algae control efforts.	✓ Completed. Conducted Annual WQ & Technology Workshops with the Wholesale Customers highlighting SFPUC activities and projects relevant to water quality. ✓ Conducted WQ Committee meetings which routinely reviewed algal and DBP trends in the SFRWS.

2016 Recommendations	Status as of 2024
✓ Continue sharing system data and publishing topical information for retail and wholesale customers. Remain in the forefront of releasing data and being transparent.	✓ Completed. Prepared Consumer Confidence Report (CCR) annually. ✓ Prepared Public Health Goal (PHG) Report and engaged the Citizens' Advisory Committee at least every 3 years. ✓ Developed new fact sheets with relevant SFPUC data on WQ topics and posted on sfpuc.gov. ✓ Improved and enhanced language translations of CCRs and fact sheets.
✓ Communicate quality of water to customers; bottled water is not better.	✓ Completed. Included information regarding bottled water and SFPUC water in the CCR.
✓ Continue to use 311 program and analyze the data from those calls.	✓ Completed. Compiled, analyzed, and prepared Annual WQ Complaint Report.
✓ Perform internal staff training on the topic of how to communicate WQ issues to customers.	✓ Completed. Updated the WQNCP as a resource for staff. ✓ Conducted monthly coordination meeting with SFPUC Communications. ✓ Planning internal training on topics addressed by WQ fact sheets.
✓ Consider conducting a survey to assess customer satisfaction.	✓ Completed through participation in annual national surveys. SFPUC WQD has proactively enrolled with JD Power to gauge customer satisfaction and evaluate recommendations. ✓ SFPUC Communications has actively polled customers to support development of a new rate structure. ✓ AWWA has been conducting national water provider customer satisfaction surveys for several years.

2016 Recommendations	Status as of 2024
Focus Area #8: Water Quality at the Tap/Premise Plumbing	
✓ Engage customers to determine their interest and willingness to pay for service beyond meter.	✓ <u>In Progress.</u> Customers have paid a nominal fee for home lead test for decades. ✓ Pitcher filters to remove lead have been provided for free to customers when service lines (potentially having a small lead service connector pipe) have been replaced. ✓ Premise plumbing support will be reviewed after the final USEPA Lead and Copper Rule Improvements (LCRI) are enacted.
✓ Educate customers on lead issues.	✓ <u>Completed.</u> Updated lead-related Fact Sheets on the sfpuc.gov website: Tips for Schools, Tips for Residents, Schools and Licensed Childcare Centers. ✓ Posted information about Lead in Schools sampling, and Lead Service Line (LSL) Replacement Program. ✓ Prioritized service line inspections and renewals for schools. ✓ Fact Sheets on sfpuc.gov are translated into several languages: Spanish, Chinese, Tagalog. ✓ Developed pilot program with limited English proficiency disadvantaged community group to provide free home water test, check customer service line material, and review translated fact sheets.
✓ Continue timely responses to customer complaints.	✓ <u>Completed.</u> Customer WQ complaints are investigated, documented, and compiled by SFPUC's WQ Field Services (WQFS) Section. ✓ SFPUC's level of service performance measure is to respond within two business hours. ✓ In 2022, about 78% of complaints were addressed over the phone; 22% (147) resulted in a WQFS Inspector meeting customers and collecting water samples for analysis.

2016 Recommendations	Status as of 2024
✓ When feasible, support beyond-the-meter activities, e.g., for large or green buildings.	✓ Completed. WQFS Inspectors conduct Shutdown Tests for buildings with dual plumbing systems. ✓ SFPUC and SFDPH prepared information on "Required Levels of Backflow Protection for Onsite Water Reuse Systems" and posted on sfpuc.gov. ✓ Prepared a Fact Sheet for large building return to service after extended vacancy during COVID-19 shutdown.

4. 2024 WQSP Project Findings

The 2024 WQSP Project Findings are presented in the Summary section of each chapter of this report. The key findings and observations from each Focus Area are highlighted in this section.

Focus Area #1: Water Quality Regulatory Compliance

SFPUC continues to comply with all water quality regulations. The 2024 WQSP regulatory compliance recommendation topics focused on groundwater (7 recommendations), followed by lead (6 recommendations), compliance with future regulations (4 recommendations), and compliance with other current regulations (3 recommendations). This breakdown reflects SFPUC's efforts to develop and operate a new water resource, groundwater, as well as to complete the abatement of the last remaining lead components in the distribution system. Notably, SFPUC has been at the forefront of addressing lead issues in drinking water for decades, well before Federal regulations were established.

Focus Area #2: Public Health and CECs in Drinking Water

The contamination of SFPUC surface water sources by contaminants of emerging concern (CECs) is unlikely because of highly protected watersheds. There are no significant municipal or industrial wastewater discharges, that are generally recognized as the principal sources of many CECs, to SFPUC water sources.

SFPUC has developed and followed a CEC monitoring and review program for the last 15 years. Proactive monitoring and mitigation of algal toxins in water supply reservoirs allows SFPUC to remain ahead of the issue. Similarly, SFPUC is planning to participate in sampling for microplastics while they are evaluated by regulatory agencies. SFPUC has consistently been proactive in evaluating and prioritizing numerous other groups of unregulated drinking water contaminants.

Legionella bacteria monitoring conducted in 2003, 2004, and 2005 in large buildings in San Francisco confirmed the benefits of chloramination in reducing the occurrence of these bacteria, compared to previously using free chlorine as a distribution system disinfectant. This study

demonstrated that *Legionella* colonization in building plumbing systems was effectively eliminated after using monochloramine for residual disinfection. Recent monitoring at Total Coliform Rule (TCR) taps further confirmed the effectiveness of chloramine for *Legionella* control in the distribution system. SFPUC developed internal *Legionella* analytical capabilities, participated in a Water Research Foundation (WRF) project, and continues regular monitoring for *Legionella*.

PFAS contaminants have not been detected in SFPUC's source water, groundwaters, or drinking water in the SFRWS and SFWS including recently completed UCMR5 monitoring. Similarly, monitoring conducted in 2006, 2012, 2013, and 2020/2021 indicated a limited number of Pharmaceuticals and Personal Care Products (PPCP)/ Endocrine-Disrupting Chemicals (EDC) detections at low levels near the detection limit. These occasional low-level (parts per trillion, ppt) detections are almost unavoidable during sampling and analysis, in spite of best quality control/quality assurance. The 2020/2021 monitoring of sixteen (16) groundwater wells indicated similar results. SFPUC plans to continue periodic monitoring for these contaminants in the future.

The continuation of SFPUC's CEC monitoring program depends on the resources available to WQD such as internal laboratory capabilities, and the recruitment and retention of knowledgeable engineering and laboratory staff. The importance of CEC investigations will become more significant as SFPUC develops new water sources including groundwater, reclaimed water via indirect potable reuse (IPR) and direct potable reuse (DPR), and other surface water sources that are generally not considered as pristine as current ones.

Focus Area #3: Source and Treated Water Quality: Operations and Innovative Technologies

Watershed and reservoir monitoring and management are critical to providing consistent water quality in a changing environment. Many tools are available to SFPUC to evaluate long-term trends and respond to variability and emergencies, but significant effort is required to implement them.

SFPUC continues to invest in upgrades of treatment technology, especially reservoir management, UV disinfection, ozonation, and biofiltration. SFPUC awarded a $235 million contract in May 2024 to add ozonation to the SVWTP.

SFPUC also participates in the AWWA Partnership for Safe Water (PSW), which includes self-assessment and optimization programs to assist operators, managers, and administrators in improving treatment performance beyond regulatory requirements.

SFPUC's Millbrae WQD Laboratory is located in an older building with limited space to support the operation of newer and more sophisticated analytical instruments. Due to new regulations (PFAS), more stringent upcoming regulations, alternative water sources, and the increasing likelihood of future regulations for CECs, the older building will eventually inhibit SFPUC's ability to continue to effectively monitor its system water quality and respond to emergencies. Other water providers have emphasized the benefits of direct control over water quality testing with in-house laboratory analysis and shortened turnaround times for emergencies. SFPUC is

currently completing the conceptual design for a new WQD Laboratory with construction completion expected in 2029.

SFPUC WQD generates a vast quantity of data to help monitor and evaluate operational and regulatory status of its source waters, and treatment and transmission facilities. The WQ data from laboratory and on-line instruments are presented in regular reports and distributed internally. SFPUC dedicates significant resources to automating these reports to reduce workload and improve efficiency. In addition, SFPUC is making investments in new tools for data analysis and trending. The resulting reports are critical for timely response, regulatory compliance, and operational decisions.

Focus Area #4: Distribution System Water Quality: Operations and Innovative Technologies

Maintaining disinfectant residual in the SFWS is becoming a bigger challenge given water demand variations. Recently, water demand and related water age has varied due to external factors such as the Coronavirus Disease 2019 (COVID-19) pandemic and historically high office vacancy rates in downtown San Francisco. Nevertheless, SFPUC has successfully operated nine hypochlorite trim/booster stations to meet total chlorine residual disinfectant targets within the distribution system.

Future SFPUC recycled water projects and water conservation efforts will further impact the demand and overall water age within the distribution system.

SFPUC continues participation in the AWWA Partnership for Distribution System Optimization Program. Distribution system optimization is achieved by preserving system integrity including water quality preservation, hydraulic reliability, and physical security.

SFPUC has actively addressed customer complaints related to WQ. Discolored water continues to be the most frequent water quality complaint; however, this issue is typically transitory. Taste and odor (T&O) complaints are actively addressed and constitute a small fraction of overall complaints.

Focus Area #5: Extreme Water Quality Events

Resilience to extreme events is closely tied to system flexibility. SFPUC maintains high flexibility in its ability to deliver water from multiple reservoirs and groundwater sources. Total production of groundwater is limited to 11 million gallons per day (MGD) including 7 MGD in the SFRWS and 4 MGD in the SFWS. The Regional Groundwater Storage and Recovery (RGSR) would be used during designated dry years following multiple years of drought conditions. In the event of water quality disruption driven by an extreme event, SFPUC can reliably maintain high-quality water by switching the source of supply and drawing from a different reservoir. "Lessons learned" from early 2023 in response to significant atmospheric river events will help SFPUC prepare for the possibility of more intense rainfall events.

Considering extreme rainfall and wildfire threats, reservoir bypasses at Early Intake, Priest and Moccasin reservoirs are in place to mitigate the impact to water quality of these events in these watersheds, but operational activities may be impacted. SFPUC manages vegetation in areas surrounding local reservoirs to limit fuel load and the potential impacts of fires on water quality.

In May 2019, a new Calaveras Dam was brought into service. The new dam was designed to restore the historically higher water levels and increase operational flexibility, which should benefit water quality in terms of taste and odor mitigation and other WQ parameters (e.g., TOC).

Groundwater supply provides additional resilience in case extreme events affect surface water supplies. Groundwater quality is less likely to be affected by extreme events than surface water sources; however, the supply is limited (up to approximately 11 MGD) and must be monitored and managed for several WQ constituents such as manganese, chromium (VI), mineral content, perchlorate, and organics. Nevertheless, it is a valuable water source in case of long term drought conditions and an emergency.

Focus Area #6: Water Quality Sustainability

A review of policy documents and published studies for this report shows that the term "water quality sustainability" is neither used nor defined in the industry. Sustainability is defined as using resources in an economic, environmental, and social manner, equating sustainability with resources (water supply) and not drinking water quality. Maintaining or improving drinking water quality is not evident in the current concept of sustainability and could be defined as a "public health" component.

Additional source water storage and existing drinking water conservation (through metering, decreasing leakage, and low-flow plumbing components) are proven and effective sustainability approaches. Sustainability approaches also involve alternative "new" water sources in a water-limited environment, usually of poorer water quality, such as water sources susceptible to point and non-point source pollution, recycling of wastewater, indirect or direct potable water reuse, groundwater of unproven long-term quality, harvesting of humidity from air, etc. However, alternative water resources unquestionably impact water quality and unit cost, may present health questions, and require more resources and skilled staff (ever more difficult to hire) to deal with "new" drinking water sources.

While the Hetch Hetchy water supply (HHS) is the most economical and reliable water source, SFPUC wants to pursue a diverse water portfolio to be prepared for supply reliability challenges and emergencies. These alternative sources come with increased treatment costs and lower water quality than upcountry water supplies due to their respective raw water qualities.

Alternative water supply projects include the delivery of water supplies from new sources such as purified wastewater, groundwater, and desalinated water, and may include surface water supplies from sources such as the Sacramento River Delta. The result is that water from several alternative supply sources may be commingled with the existing surface water supply in the SFRWS, via direct and indirect potable reuse. Current considerations include potential future direct potable water reuse into the Bay Division Pipelines in the SFRWS, as well as into major distribution system reservoirs in the SFWS. Indirect potable reuse is being considered for Crystal Springs Reservoir.

Surface water supplies from the SFRWS have long been viewed as a high-quality source by SFPUC customers. While SFPUC will maintain its high-quality standards across all supply sources, customers may not perceive alternate sources such as groundwater, transfer water, or

purified wastewater with the same regard despite those sources meeting or exceeding the same regulatory standards, testing, and monitoring requirements.

Focus Area #7: Customer Communication and Satisfaction

Based on JD Power national surveys, overall customer satisfaction with SFPUC water quality is above the national average. Water quality and conservation drive higher levels of satisfaction compared to other water providers in the nation and the West (Heath, 2022).

Among JD Power Key Performance Indicators, SFPUC stands out for its:

- Water mineral content (91% as compared to 66% average and 94% best in class), and
- Unfiltered water safety (75% as compared to 58% average and 84% best in class); [Heath, 2022].

SFPUC has the foundation to being viewed as a top-performing water provider by its customers. Improvements to direct customer experiences will improve overall customer satisfaction.

During water quality incidents, customer satisfaction depends on promptly sharing relevant water quality information on investigative progress and the implementation of remedial actions. Proactive communication can help protect against potential negativity following an incident or media event.

Focus Area #8: Water Quality at the Tap/Premise Plumbing

SFPUC intends to continue proactively supporting beyond-the-meter activities (eight on-going or new recommendations were developed as part of the 2024 WQSP on this topic), primarily through the Cross Connection Control (CCC) program and customer outreach and education, in addition to active projects associated with the Lead and Copper Rule Revisions (LCRR). These efforts stem from a greater recognition by the project participants of the importance of premise plumbing impact on water quality issues, as similarly noted in Focus Area #7.

Controlling biofilm formation poses a significant challenge in premise plumbing systems, as biofilms serve as protective reservoirs where *Legionella* and other microorganisms, including amoebae, can evade the effects of disinfectant residuals. Plumbing codes should address configurations that may contribute to biofilm and *Legionella* growth. *Legionella* will remain an important challenge for the foreseeable future, and longer periods of higher ambient temperatures will likely add to the problem.

Public outreach regarding microbial growth in premise plumbing is necessary to educate consumers about potential exposure pathways and highlight realistic concerns. SFPUC and the SFDPH collaborated to publish the "*Legionella* Fact Sheet" and "*Naegleria fowleri* and Drinking Water Fact Sheet" on the SFPUC website. In July 2022, following the COVID-19 pandemic, SFPUC issued on its website "Flushing Guidance for Building Water Systems Following Extended Shutdown."

The City and County of San Francisco (CCSF) implements an effective CCC Program, specifically geared towards addressing backflow concerns. Notably, this program focuses on the potential risks associated with water reuse systems, particularly within onsite applications.

5. 2024 WQSP Recommendations Prioritization Criteria

The prioritization of recommendations is a key enhancement to the WQSP process and its future implementation. Tables ES-2 and ES-3 present prioritization criteria for new water quality recommendations developed as part of this project and for on-going water quality recommendations previously discussed. The criteria are in two general categories of "importance" and "urgency" that were used for ranking the recommendations; "importance" is related to the water quality/public health significance while "urgency" relates to the timing.

Table ES-2 presents specific water quality-related importance criteria within each level along with the related numerical score. Four importance levels were used for both new and on-going recommendations in the descending order: mandatory, high, important, and beneficial.

Table ES-2. Importance Criteria for New and On-going WQ Recommendations

Importance Criteria for WQ Recommendations	Score
MANDATORY:	**4**
Regulatory compliance - comply with current, new/revised, and upcoming WQ regulations (e.g., LCRR, public water supply permit or compliance order)	
Public health - address CEC of significant and immediate public health concern (e.g., *Cryptosporidium parvum cysts* in 1990's)	
Safety - potential impact on staff or public safety (e.g., chemical spill or unsafe conditions)	
HIGH (When Resources Allow):	**3**
Future WQ regulations - planning and preparation with a longer timeline (e.g., M/DBP3 revisions)	
Emergency response/Security - update and/or improve preparedness and maintain WQ (e.g., potential security breaches impacting WQ)	
Customer satisfaction – significant/heightened public interest and interaction, impact on customer satisfaction, perception, confidence regarding WQ (e.g., T&O, other aesthetic WQ parameters, timeliness of response)	
Improve multiple WQ parameters - implement processes that can address multiple WQ issues (e.g., reservoir management, ozonation)	
Improve efficiency/Significantly reduce workload - automation and remote sensors implementation; streamline labor or resource intensive activities	
Work force development - staff training and succession planning to help maintain and improve workforce (e.g., training to maintain water treatment or distribution system operator licenses)	
IMPORTANT (When Resources Allow):	**2**
Optimization/Operational flexibility - improve reliability and WQ	
Contaminants of Emerging Concern (CEC) - monitor and prepare for unregulated contaminants	
Customer information/Customer relations - provide educational resources for customers (e.g., guidelines for campuses, buildings, hospitals and other large users)	
Applied technology - evaluate and implement new proven technologies with full-scale applications	
Benchmarking - participate in state/national surveys regarding system performance and WQ	
BENEFICIAL (When Resources Allow):	**1**
Track WQ issues - track WQ trends and challenges in the industry	
Emerging technology - monitor new WQ research findings	

Table ES-3 presents timeline-related urgency criteria, the numerical score for new recommendations, and bins for on-going recommendations. For on-going water quality recommendations, bins were used instead of scores. This decision accommodates currently in-progress activities that may be terminated in the future. To note, on-going recommendations discussed as part of this WQSP project are only a subset of WQD on-going activities.

Table ES-3. Urgency Criteria for New and On-going WQ Recommendations (Approximate Timeline)

Urgency Criteria for New WQ Recommendations (Approximate Timeline)	Score
Short-Term:	**4**
< 3 years	
Long-term solutions may require early planning	
Near-Term:	**3**
3 – 6 years	
Long-term solutions may require early planning	
Mid-Term:	**2**
6 – 12 years	
Long-Term:	**1**
>12 years	

Urgency Criteria for On-going WQ Recommendations (Timeline)	Bin
Continuous/Recurring	**A**
Short-Term	**B**
Activities to be completed within 3 years	
Long-Term	**C**
As-Needed	**D**

6. Prioritization Process and 2024 WQSP Prioritized Recommendations

Recommendations discussed at the Focus Area meetings were reviewed by the SFPUC Project Team and Project Advisory Committee and presented to Project Participants prior to writing this report. This process streamlined recommendations (e.g., avoided duplication, organized within the appropriate Focus Area), made sure that they fit within the strategic scope of the project (e.g., avoided details of implementation), fine-tuned language, and aligned with the on-going work already performed by SFPUC. Hence, all recommendations were divided into on-going and new activities that should be incorporated into upcoming annual workplans.

Table ES-4 presents on-going recommendations (OR) of the 2024 WQSP, prioritized in each Focus Area using importance criteria and urgency bins. Table ES-5 presents new recommendations (NR) of the 2024 WQSP, prioritized in each Focus Area using a multiplier of importance and urgency criteria scores. Project Participants reviewed and discussed the proposed prioritization approach, prioritized criteria, and reviewed the draft final report. WQD will complete the highest rated priorities over the next 6 to 8-year period and address lower rated priorities as resources permit.

Table ES-4. SFPUC 2024 Water Quality Strategic Plan. On-Going Recommendations with Prioritization.

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
Number	On-Going Recommendations (OR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	A Cont./Recur	B Short-Term	C Long-Term	D As Needed		
Focus Area #1: Drinking Water Quality Regulatory Compliance											
OR 1.1	**Regulatory Compliance.** Continue to monitor and participate in Federal and State regulatory developments.	4				A				4A	Regulatory Compliance
OR 1.2	**Regulatory Compliance. WQ Targets.** Periodically review and update WQ Goals/Treatment Targets systemwide based on regulatory requirements or operational needs.	4				A				4A	Regulatory Compliance
OR 1.3	**SFWS. Revised Lead and Copper Rule (LCRR).** Continue sampling in compliance with LCRR and future Lead and Copper Rule Improvements (LCRI).	4				A				4A	Regulatory Compliance
OR 1.4	**Watersheds. Sanitary Surveys.** Continue conducting sanitary surveys and implement recommendations.	4				A				4A	Regulatory Compliance
OR 1.5	**SFWS. CA LUSL.** Complete remaining galvanized/lead goosenecks replacement program.	4					B			4B	Regulatory Compliance
OR 1.6	**SFWS. Revised Lead and Copper Rule (LCRR).** Continue service line inventory and replacements in compliance with LCRR and LCRI.	4					B			4B	Regulatory Compliance
OR 1.7	**SFWS. Lead.** Secure adequate resources to ensure compliance with all the regulatory requirements related to lead.	4					B			4B	Regulatory Compliance
OR 1.8	**SFWS. Groundwater.** Continue evaluation of VOC treatment at local groundwater wells.	4					B			4B	Regulatory Compliance
OR 1.9	**SFWS. Lead.** Develop a proposal for replacing leaded swing checks at building fire services.	4						C		4C	Regulatory Compliance

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
		4	3	2	1	A	B	C	D		
Number	On-Going Recommendations (OR) Identified During the Discussions	Mandatory	High	Important	Desirable	Cont./Recur	Short-Term	Long-Term	As Needed		
OR 1.10	**SFWS. Groundwater.** Continue to plan for an update of corrosion control study once groundwater programs are operating consistently at design capacity (4MGD) or about 20% of blend with surface water in a City distribution system reservoir.	4						C		4C	Regulatory Compliance
OR 1.11	**SFWS. Groundwater.** Continue to monitor CECs, chromium (VI), chloride, sulfate, nitrate, manganese, iron, VOCs and SOCs in groundwater.		3			A				3A	Future Regulations, Customer Satisfaction
OR 1.12	**SFWS. Lead.** Complete leaded meter replacements and removal of final <1% of leaded meters.		3				B			3B	Customer Satisfaction
Focus Area #2: Public Health and Contaminants of Emerging Concern in Drinking Water											
OR 2.1	**CEC.** Maintain collaboration between WQD and the SFDPH and prepare joint fact sheets on CECs as needed.	4				A				4A	Public Health
OR 2.2	**Public Health.** Continue to routinely review waterborne disease outbreak data with SFDPH.	4				A				4A	Regulatory Compliance, Public Health
OR 2.3	**Organics.** Continue to specify NSF 61 materials for the interiors of tanks, pipelines, and other facilities.	4				A				4A	Regulatory Compliance
OR 2.4	**SFRWS & SFWS. Nitrosamines.** Maintain optimized treatment for nitrosamines control.		3			A				3A	Future Regulations
OR 2.5	**SFRWS & SFWS. Nitrosamines.** Continue voluntary nitrosamines monitoring. Add and monitor locations after boosting and nitrification in SFWS.		3			A				3A	Future Regulations
OR 2.6	**Algal Toxins.** Maintain/enhance analytical capabilities for algal toxins at WQD Millbrae Laboratory.		3			A				3A	Future Regulations

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
Number	On-Going Recommendations (OR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	A Cont./Recur	B Short-Term	C Long-Term	D As Needed		
OR 2.7	**CECs.** Continue tracking peer-reviewed and regulatory agency developed CEC information.			2		A				2A	CEC
OR 2.8	**CECs.** Continue CEC monitoring and benchmarking through industry surveys.			2		A				2A	CEC, Benchmarking
OR 2.9	**Organics.** Continue unregulated organics monitoring in source and drinking water.			2				C		2C	CEC
OR 2.10	**Microbial Pathogens.** Participate in Water Research Foundation (WRF) occurrence studies as a water provider partner as appropriate.			2					D	2D	CEC
OR 2.11	**Organics.** Conduct periodic soak tests as needed to ensure that materials are installed properly.			2					D	2D	CEC
Focus Area #3: Source & Treated Water Quality: Operations and Innovative Technologies											
OR 3.1	**Treatment. Tesla TF.** Continue maintenance improvements and equipment upgrades at UV facility to improve facility maintenance and operation.		3			A				3A	Improve Efficiency
OR 3.2	**Data Analysis.** Continue to implement data analysis and reporting automation.		3			A				3A	Emergency Response, Improve Efficiency
OR 3.3	**Source Water. Algal Toxins.** Continue to implement the recommendations from the 2019 AMMP Update for Peninsula and Alameda Reservoirs.		3			A				3A	Customer Satisfaction, Multiple WQ Parameters

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
Number	On-Going Recommendations (OR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	A Cont./Recur	B Short-Term	C Long-Term	D As Needed		
OR 3.4	**Source Water, Algal Toxins.** Continue seasonal HOS operations at local reservoirs.		3			A				3A	Customer Satisfaction, Multiple WQ Parameters
OR 3.5	**Treatment. Microbial Pathogens.** Continue participation in PSW for SFPUC water treatment plants to meet the best industry standards for turbidity removal.			2		A				2A	Optimization
OR 3.6	**Treatment. Inorganics.** Continue Chemical Quality Control Program at WTPs to minimize impurities in treatment chemicals.			2		A				2A	Optimization, CEC
OR 3.7	**Source Water. Algal Toxins.** Protect watershed raw quality from construction activities, fires, etc. per the recommendations provided in the sanitary surveys.			2		A				2A	CEC
OR 3.8	**Treatment.** Continue to monitor and optimize biofiltration at HTWTP and implement biofiltration after ozone facility startup at SVWTP.			2		A				2A	Optimization
OR 3.9	**Monitoring.** Complete evaluation of the need and benefit of existing on-line monitoring instruments and facilities.		3				B			3B	Emergency Response
OR 3.10	**Treatment. SVWTP.** Continue as-needed pre-chlorination at SVWTP for manganese control.		3						D	3D	Multiple WQ Parameters
OR 3.11	**New Technologies.** Continue to participate in AWWA and WRF activities relevant to SFPUC. (e.g., UV-LED WRF Project #5173, Microplastics Testing, WRF Project # 5185, etc.)		3						D	3D	Future WQ Regulations, Improve Efficiency
OR 3.12	**Watershed Protection.** As needed monitor types of fire retardants used in watershed.		3						D	3D	Multiple WQ Parameters

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
		4	3	2	1	A	B	C	D		
Number	On-Going Recommendations (OR) Identified During the Discussions	Mandatory	High	Important	Desirable	Cont./Recur	Short-Term	Long-Term	As Needed		
OR 3.13	**Treatment.** Develop and implement strategies to address DBP formation during Hetch Hetchy Water Supply (HHS) elevated TOC events.			2					D	2D	Optimization
OR 3.14	**Treatment. Almeda Siphons.** Minimize DBP formation at Alameda Creek Siphons if formation is significant to justify the required improvements and complexity.			2					D	2D	Optimization
OR 3.15	**New Technologies.** Evaluate new treatment technologies as needed.			2					D	2D	Applied Technology
Focus Area #4: Distribution System Water Quality: Operations and Innovative Technologies											
OR 4.1	**SFWS. Cross-Connection Control (CCC).** Maintain CCC Program to ensure protection of the potable water system.	4				A				4A	Regulatory Compliance, Public Health
OR 4.2	**SFWS. Microbial Pathogens.** Continue implementing clean construction practices and bacteriological sampling after construction or outage events.	4				A				4A	Public Health, Regulatory Compliance
OR 4.3	**SFWS. Microbial Regrowth/Biofilm.** Continue to prevent large scale nitrification episodes in distribution system.		3			A				3A	Reduce Workload
OR 4.4	**SFWS. Microbial Regrowth/Biofilm.** Establish baseline monitoring by continuing to monitor *Legionella* in SFWS.			2		A				2A	CEC
OR 4.5	**SFWS. Microbial Pathogens.** Continue participation in PSW for SFWS distribution to maintain best industry standards for disinfectant residual and water pressure.			2		A				2A	Optimization
OR 4.6	**SFWS. Microbial Regrowth/Biofilm.** Maintain monochloramine residual on target at TCR taps.			2		A				2A	Optimization

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
Number	On-Going Recommendations (OR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	A Cont./Recur	B Short-Term	C Long-Term	D As Needed		
OR 4.7	**SFWS. Water Age.** Minimize detention time in distribution system at low flow areas in anticipation of more stringent future M/DBP Rule.			2		A				2A	Optimization
OR 4.8	**SFWS. Security.** Complete signage programs, security cameras, alarms, monitoring systems.		3				B			3B	Security
OR 4.9	**SFWS. Water Age.** Develop operating strategies for better turnover of reservoirs and overall reduction in water age in the distribution system.			2			B			2B	Optimization
OR 4.10	**SFWS. Water Age.** Make maintenance and optimization of the reservoir mixers a higher priority to ensure maximum benefit from them.			2			B			2B	Optimization
OR 4.11	**SFWS. Disinfectants & DBPs.** Expand use of chlorine-only trim stations to combine free ammonia and limit nitrification where necessary.			2			B			2B	Optimization
OR 4.12	**SFWS. Groundwater.** Monitor potential WQ changes from introduction of groundwater.		3					C		3C	Customer Satisfaction
Focus Area #5: Extreme Water Quality Events											
OR 5.1	**Extreme Events.** Continue WQD staff involvement in the review and update of SFPUC's Risk and Resilience Assessment, Emergency Response Plan, and other planning documents to account for WQ considerations.		3			A				3A	Emergency Response
OR 5.2	**Extreme Events.** Continue to communicate and train staff on emergency preparedness plans.		3			A				3A	Emergency Response
OR 5.3	**Security.** Review existing reservoir and facility security systems and identify potential improvements.		3				B			3B	Security

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
Number	On-Going Recommendations (OR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	A Cont./Recur	B Short-Term	C Long-Term	D As Needed		
OR 5.4	**Extreme Events.** Review and update messaging and targeted customer notification strategies for outages, main breaks, wildfires, earthquakes, and other events.		3				B			3B	Customer Satisfaction
OR 5.5	**Extreme Events.** Continue to diversify water sources for drought, climate change, earthquakes and other extreme events.		3					C		3C	Optimization, Emergency Response
Focus Area #6: Long-Term Water Quality Sustainability											
OR 6.1	**HHS. Climate & Economic Sustainability.** Continue HHWP infrastructure improvements to sustain a reliable gravity fed system (i.e., SFPUC Level of Service Goal).		3			A				3A	Customer Satisfaction
OR 6.2	**SFRWS & SFWS. WQ Sustainability.** Continue to participate as a stakeholder in groundwater and AWS programs.		3			A				3A	Customer Satisfaction
OR 6.3	**SFRWS & SFWS. WQ Sustainability.** Continue to monitor and participate in Federal and State regulatory developments regarding desalination, water reclamation, and direct potable reuse (DPR).		3			A				3A	Future WQ Regulation, Customer Satisfaction
OR 6.4	**SFWS. Social Sustainability.** Continue public outreach and education programs on alternative water supplies and provide equitable WQ.		3			A				3A	Customer Satisfaction
OR 6.5	**Source Water. WQ Sustainability.** Continue monitoring long-term WQ trends in water supply reservoirs.		3			A				3A	Multiple WQ Parameters; Track WQ Issues

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
Number	On-Going Recommendations (OR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	A Cont./Recur	B Short-Term	C Long-Term	D As Needed		
Focus Area #7: Customer Communication and Satisfaction with Water Quality											
OR 7.1	**Communication.** Continue strategic planning discussion and information exchange with stakeholders, water providers and regulatory agencies.		3			A				3A	Future WQ Regulations, Customer Satisfaction
OR 7.2	**Communication. Wholesale Customers.** Encourage wholesale customers to consistently use SFPUC's wholesale customer WQ complaint webpage to report WQ issues, thus providing systematic records of WQ complaints and resolutions.		3			A				3A	Customer Satisfaction, Emergency Response
OR 7.3	**SFWS. WQ Satisfaction.** Continue to use 311 program and prepare Annual WQ Complaint report to analyze the data from those calls.		3			A				3A	Emergency Response, Customer Satisfaction
OR 7.4	**SFWS. WQ Satisfaction.** Continue to prepare annual WQ Complaint Summary for SFWS and implement its recommendations.		3			A				3A	Customer Satisfaction
OR 7.5	**SFWS. WQ Satisfaction.** Continue to review the findings of the annual JD Power survey and request presentation from JD Power representative to discuss the findings.		3			A				3A	Customer Satisfaction
OR 7.6	**SFRWS & SFWS. Communication.** Continue to proactively keep interested customers apprised of investigation progress on WQ issues and recommendations for mitigation.		3			A				3A	Customer Satisfaction

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Bin				Combined Bin	Importance Criteria
Number	On-Going Recommendations (OR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	A Cont./Recur	B Short-Term	C Long-Term	D As Needed		
OR 7.7	**SFWS Maintenance. Communications.** Continue to anticipate the potential for major operations to create customer complaints of dirty water and prepare inspectors and call lines 24-48 hours in advance of operation.		3			A				3A	Customer Satisfaction
OR 7.8	**Communication.** Perform internal staff training on the topic of how to communicate WQ issues with customers.		3				B			3B	Customer Satisfaction, Work Force Development
Focus Area #8: Water Quality at the Tap/Premise Plumbing											
OR 8.1	**SFWS. Lead in Schools.** Continue to provide tap water lead testing for schools.	4				A				4A	Regulatory Compliance
OR 8.2	**SFWS. Lead for Fee.** Continue to provide tap water lead testing to retail customers for a nominal fee.		3			A				3A	Customer Satisfaction

Table ES-5. SFPUC 2024 Water Quality Strategic Plan. New Recommendations with Prioritization.

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
		4	3	2	1	4	3	2	1		
Number	New Recommendations (NR) Identified During the Discussions	Mandatory	High	Important	Desirable	Short-Term	Near-Term	Mid-Term	Long-Term	I x U	
Focus Area #1: Drinking Water Quality Regulatory Compliance											
NR 1.1	**Compliance. PFAS.** Conduct regulatory required monitoring for PFAS and lithium for surface and drinking water.	4				4				16	Regulatory Compliance
NR 1.2	**Compliance. P**repare to adopt the requirements contained in the new SWRCB Cross Connection Control (CCC) Policy Handbook regulations.	4				4				16	Regulatory Compliance
NR 1.3	**Compliance. SWTR.** Develop/Update Moccasin Reservoir flushing and notification procedures when unapproved Moccasin Creek water enters Moccasin Reservoir.	4				4				16	Regulatory Compliance
NR 1.4	**Compliance. M/DBP3 Rule.** Review proposed Microbial/DBP3 (M/DBP3) Rule revisions and plan for compliance as appropriate.	4				4				16	Regulatory Compliance
NR 1.5	**SFWS Groundwater. PFAS.** Conduct repeat groundwater PFAS monitoring in 2027.	4					3			12	Regulatory Compliance, Public Health
NR 1.6	**SFWS Groundwater. Inorganics.** Perform alternatives analysis for groundwater manganese compliance including current blending strategy, treatment, and non-potable uses of groundwater.		3				3			9	Future Regulation, Customer Satisfaction
NR 1.7	**SFRWS Groundwater. Inorganics.** Evaluate/implement treatment for Cr (VI), perchlorate, and manganese in Regional Wells.		3				3			9	Future WQ Regulation, Customer Satisfaction

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 1.8	**SFWS Groundwater. Organics.** Evaluate feasibility of lower detection limits for VOCs analytical testing to assist with VOC reduction goals.			2			3			6	Optimization
Focus Area #2: Public Health and Contaminants of Emerging Concern in Drinking Water											
NR 2.1	**SFRWS & SFWS. Microplastics.** Participate in SWRCB's mandatory compliance program to monitor microplastics.	4				4				16	Regulatory Compliance
NR 2.2	**Source Water. DBP Precursors.** Conduct bromide, iodide and total organic nitrogen (TON) monitoring.		3				3			9	Future WQ Regulations
NR 2.3	**SFWS Groundwater. PPCP/EDCs.** Repeat groundwater monitoring for PPCP/EDC after groundwater wells are operated at design production rates.			2			3			6	CEC
NR 2.4	**SFRWS & SFWS. Nitrosamines.** Add NDPhA and NMOR to semi-annual monitoring program.			2			3			6	CEC
NR 2.5	**Source Water. Algal Toxins.** Monitor algal toxins listed in the final CCL5.			2			3			6	CEC
NR 2.6	**Water Reuse. PPCP/EDCs.** Track water reclamation activities in SFRWS and SFWS.			2			3			6	CEC
NR 2.7	**SFRWS & SFWS. Unregulated DBPs.** Monitor the effects of algal blooms in SFPUC reservoirs on unregulated DBPs formation in SFPUC system.			2			3			6	CEC
NR 2.8	**SFWS. Unregulated DBPs.** Monitor the effects of nitrification within storage facilities on unregulated DBPs formation in SFWS.			2			3			6	CEC
NR 2.9	**SFRWS & SFWS. Unregulated DBPs.** Evaluate impacts of any plans for potable reuse on unregulated DBPs formation in SFPUC system.			2			3			6	CEC

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 2.10	**SFRWS & SFWS. Unregulated DBPs.** Evaluate the effects of wildfires on unregulated DBPs formation in SFPUC system after a significant wildfire in the watershed.			2			3			6	CEC
Focus Area #3: Source & Treated Water Quality: Operations and Innovative Technologies											
NR 3.1	**Source Water. East Bay.** Conduct inspection and maintenance of the existing oxygenation line diffusers of Calaveras and San Antonio reservoirs.		3			4				12	Multiple WQ Parameters, Customer Satisfaction
NR 3.2	**HHS. SWTR.** Develop emergency disinfection procedures for unapproved water (e.g., Moccasin Creek) potential intrusion into Hetch Hetchy water conveyance system (i.e., Foothill Tunnel).		3			4				12	Emergency Response
NR 3.3	**Monitoring.** Implement the new WQD Millbrae Laboratory, which is strategically important for SFPUC to maintain and increase analytical reliability and capability.		3				3			9	Emergency Response, Customer Satisfaction, Improve Efficiency
NR 3.4	**Source Water. East Bay.** Conduct an assessment of future needs for Calaveras Reservoir hypolimnion oxygenation and an alternatives analysis for updated HOS.		3				3			9	Customer Satisfaction, Multiple WQ Parameters, Reduce Workload
NR 3.5	**Transmission System. San Joaquin Pipelines (SJPL).** Develop criteria and procedure for discharges at SJVH for WQ events and for periodically removing collected sediments.		3				3			9	Emergency Response

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 3.6	**Treatment. SVWTP.** Implement ozonation as planned at SVWTP to provide additional flexibility in treatment.		3				3			9	Customer Satisfaction, Multiple WQ Parameters, Improve Flexibility
NR 3.7	**Transmission System. SF Bay.** Implement Bay Tunnel sediment flushing.			2			3			6	Optimization
NR 3.8	**Watersheds. East Bay.** Identify areas of erosion in San Antonio and Calaveras Reservoirs watersheds for possible mitigation.			2			3			6	Optimization
NR 3.9	**Source Water.** Periodically evaluate emerging and new technologies for reservoir in situ or remote WQ monitoring.		3					2		6	Multiple WQ Parameters, Reduce Workload
NR 3.10	**Source Water. Peninsula.** Implement AMMP recommendation to use algaecide or install HOS in Lower Crystal Springs and Pilarcitos Reservoirs if algal bloom issues escalate.			2				2		4	Optimization
NR 3.11	**Source Water. Peninsula.** Evaluate feasibility of continuous breakpoint with existing infrastructure and operational constraints at Crystal Springs de-chloramination facility.			2				2		4	Optimization
NR 3.12	**Treatment. SVWTP.** Monitor and determine significance of recycle streams at SVWTP for manganese.			2				2		4	Optimization
NR 3.13	**Watersheds.** Investigate potential benefit of using WRF methodology for the local watershed assessment.				1				1	1	Emerging Technology

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
Focus Area #4: Distribution System Water Quality: Operations and Innovative Technologies											
NR 4.1	**SFWS. Cross Connection Control.** Implement upcoming SWRCB CCC Policy Handbook and update SFPUC Rules & Regulations Section G.	4				4				16	Regulatory Compliance
NR 4.2	**SFWS. Cross Connection Control.** Develop a process to improve annual cross connection testing rate.	4				4				16	Regulatory Compliance
NR 4.3	**SFWS. Microbial Regrowth/Biofilm.** Improve public messaging for distribution system flushing.		3			4				12	Customer Satisfaction
NR 4.4	**SFWS. Security.** Include fencing around facilities that experience recurring vandalism in capital budget request.		3				3			9	Security
NR 4.5	**SFWS. Disinfectants & DBPs.** Evaluate on-line monitoring technologies to automate chlorine-only trim stations.		3				3			9	Reduce Workload, Optimization
NR 4.6	**SFRWS & SFWS. T&O/Appearance.** Review aesthetic WQ monitoring program including other data sources, as these can provide important early warning.		3				3			9	Emergency Response, Customer Satisfaction
NR 4.7	**SFRWS & SFWS. T&O/Appearance.** Evaluate usefulness of an SFPUC-specific checklist for customers and staff to provide uniformity, increase awareness of aesthetic issues and provide means to categorize them systematically.		3				3			9	Customer Satisfaction
NR 4.8	**SFWS. Microbial Regrowth/Biofilm.** Consider using auto flushers or conveyance improvements for dead ends and other problem areas.		3					2		6	Reduce Workload

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 4.9	**SFWS. Microbial Regrowth/Biofilm.** SFPUC should participate in industry research on biostability and regrowth in the distribution system.			2			3			6	Optimization, Applied Technology
NR 4.10	**SFWS. Water Pressure.** Consider the benefits of installing additional pressure monitoring instruments in DS.			2			3			6	Optimization
NR 4.11	**SFWS. Microbial Regrowth/Biofilm.** Investigate the effectiveness and feasibility of using new technologies for pipe cleaning.			2				2		4	Optimization
NR 4.12	**SFWS. Water Flow.** Investigate the feasibility and benefits of district-area flow metering			2				2		4	Optimization
NR 4.13	**Microbial Regrowth/Biofilm.** Investigate the feasibility of using water flow velocities in distribution system to identify areas prone to periodic WQ events.				1				1	1	Emerging Technology
Focus Area #5: Extreme Water Quality Events											
NR 5.1	**East Bay. Extreme Rainfall or Fire.** Encourage expansion of SAPS pumping capacity to increase the ability of SVWTP to treat Hetch Hetchy or San Antonio Reservoir water during high turbidity events.		3				3			9	Emergency Response, Multiple WQ Parameters, Reduce Workload
NR 5.2	**East Bay and Peninsula. Extreme Rainfall.** Document lessons learned and jar test data from 2022-2023 wet weather events for future reference and incorporation in planning documents.		3				3			9	Emergency Response, Work Force Development

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 5.3	**HHS. Accidents & Security.** Develop emergency response and mitigation plan for potential Tuolumne wastewater spills.		3				3			9	Emergency Response
Focus Area #6: Long-Term Water Quality Sustainability											
NR 6.1	**WQ Sustainability.** Develop a strategy/plan for staff recruitment and retention.		3			4				12	Work Force Development
NR 6.2	**Alternative Water Supplies (IPR/DPR).** Support implementation of future supplies through participation in operation/treatment/compliance studies and public outreach activities.		3			4				12	Future WQ Regulations, Customer Satisfaction
NR 6.3	**Alternative Water Supplies.** Include SFPUC water quality goals in the planning, evaluation, cost development and ranking for AWS, as well as public acceptance and customer satisfaction.		3				3			9	Future WQ Regulations, Customer Satisfaction
NR 6.4	**Alternative Water Supplies (IPR/DPR).** Establish Water Enterprise expert panel to review SFRWS and SFWS alternative water supplies from a sustainability perspective (economic, environmental and social), including public health and customer satisfaction.		3				3			9	Future WQ Regulations, Customer Satisfaction
NR 6.5	**Alternative Water Supplies.** Dedicate WQD staff to focus on AWS projects to meet the workload increases.		3				3			9	Future WQ Regulations, Optimization

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 6.6	**East Bay Source Water Supply. WQ Sustainability.** Monitor water quality and invasive species issues of the South Bay Aqueduct (SBA) at Bay Area water providers.			2			3			6	CEC
NR 6.7	**Source Water. WQ Sustainability.** Evaluate potential to expand monitoring program to include the tributaries in the local watersheds.			2				2		4	Optimization
NR 6.8	**HHS. WQ Sustainability.** Evaluate ozonation (long-term planning) at Tesla Treatment Facility for TOC reduction.		3						1	3	Future WQ Regulation, Multiple WQ Parameters
Focus Area #7: Customer Communication and Satisfaction with Water Quality											
NR 7.1	**SFWS Communication. LCRR.** Prepare for future LCRI, SWRCB CCC Policy Handbook, and other potential regulatory requirements governing customer communication issues.	4				4				16	Regulatory Compliance
NR 7.2	**SFWS. WQ Satisfaction.** Investigate methods/procedures for reducing number of retail customers complaints of "unknown" cause.		3				3			9	Customer Satisfaction
NR 7.3	**SFWS. WQ Satisfaction.** Monitor complaints related to groundwater, and blend percentages and its related impact on specific WQ parameters.		3				3			9	Customer Satisfaction
NR 7.4	**SFWS. Communication.** Evaluate options for making WQ information, construction activities, etc. more accessible on the SFPUC website and its content more understandable.		3				3			9	Customer Satisfaction

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 7.5	**SFWS Maintenance. Communications.** Implement text and/or social media alerts as a mode of communication for distribution system maintenance and operational activities and other relevant information.		3				3			9	Customer Satisfaction
NR 7.6	**SFWS Maintenance. Communications.** Pursue agreement with DPW/WWE to only use specific, marked hydrants to reduce potential for WQ complaints.		3				3			9	Customer Satisfaction, Reduce Workload
NR 7.7	**SFWS Maintenance. Communications.** Investigate methods/procedures for issuing localized WQ alerts and advisories.		3				3			9	Customer Satisfaction
NR 7.8	**Source Water. WQ Protection.** Review how other water providers communicate protection of water supplies and implement new communication approaches to improve customer perception.		3				3			9	Customer Satisfaction
NR 7.9	**SFWS Maintenance. Communications.** Consider using hydraulic modeling to evaluate impending shutdowns and operations that could affect WQ.		3				3			9	Customer Satisfaction, Optimization
NR 7.10	**SFRWS & SFWS. Communication.** Prepare fact sheets and informational videos for educating public on routine WQ sampling, laboratory testing of water, and distribution system cross-connection control activities.			2			3			6	Customer Information, Customer Relations
NR 7.11	**SFRWS & SFWS Communication.** Review WRF resources for communicating CECs and include them on the website and/or have on hand for reference in answering customer questions.			2			3			6	Customer Information, Customer Relations

Prioritized 2024 WQSP Recommendations		Importance Score				Urgency/Timeline Score				Priority	Importance Criteria
Number	New Recommendations (NR) Identified During the Discussions	4 Mandatory	3 High	2 Important	1 Desirable	4 Short-Term	3 Near-Term	2 Mid-Term	1 Long-Term	I x U	
NR 7.12	**SFWS Communications.** Find out what other top ranked water providers (e.g., based on J.D. Power Survey) are doing for customer communications.			2			3			6	Customer Information, Customer Relations
NR 7.13	**SFWS Communication.** Review WRF's social media guidance and AWWA's communication resources to build brand recognition and communicate with consumers.				1		3			3	Emerging Technology
Focus Area #8: Water Quality at the Tap											
NR 8.1	**Microbial Pathogens.** When feasible, support beyond-the-meter investigative microbiological monitoring activities, such as, survey of *Legionella* and other opportunistic pathogens in premise plumbing.			2			3			6	CEC
NR 8.2	**Stagnation & Water Age.** Develop a fact sheet on microbial regrowth in premise plumbing that would also emphasize importance of water age management along with water efficiency efforts in buildings.			2			3			6	Customer Information
NR 8.3	**Disinfectants & DBPs.** Develop outreach and education information regarding local disinfectant boosting and potential DBP issues with weblinks to resources (e.g., SWRCB and Health Departments) for campuses and large buildings.			2			3			6	Customer Information
NR 8.4	**Medical Facilities.** Work with SFDPH and selected San Francisco hospital(s), clinics or skilled nursing homes to learn about their practice to control microorganisms in premise plumbing to prevent infections.			2			3			6	Customer Information, Customer Relations

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