CLEAN BAY

2017 POLLUTION PREVENTION PLAN

PALO ALTO REGIONAL WATER QUALITY CONTROL PLANT • 2501 EMBARCADERO WAY . PALO ALTO . CA 94303

OPERATED BY THE CITY OF PALO ALTO FOR THE EAST PALO ALTO SANITARY DISTRICT, LOS ALTOS, LOS ALTOS HILLS, MOUNTAIN VIEW, PALO ALTO AND STANFORD

FOR MORE INFORMATION

Additional program information is available at the City of Palo Alto Public Works–Watershed Protection Group website: www.cleanbay.org.

Questions about this document should be directed to the Regional Water Quality Control Plant, 2501 Embarcadero Way, Palo Alto, CA 94303, (650) 329-2122, cleanbay@cityofpaloalto.org.

ACKNOWLEDGEMENTS

The Clean Bay Plan is produced by the City of Palo Alto Public Works–Watershed Protection Group and describes its pollution prevention activities.

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EXECUTIVE SUMMARY

The City of Palo Alto owns and operates the Regional Water Quality Control Plant (RWQCP), a wastewater treatment facility that treats wastewater from the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Stanford University prior to discharging into the San Francisco Bay.

The City of Palo Alto maintains six permits associated with preventing water and air pollution:

- RWQCP Main NPDES Permit (Order No. R2-2014-0024, NPDES No. CA0037834);
- Mercury & PCB Watershed NPDES Permit (Order No. R2-2012-0096, NPDES No. CA0038849);
- Nutrient Watershed NPDES Permit (Order No. R2-2014-0014, NPDES No. CA0038873);
- RWQCP's Recycled Water Permit (Order No. 93-160)
- RWQCP's Air Permit;
- SF Bay Region Municipal Regional Stormwater NPDES Permit (Order No. R2-2015-0049, NPDES No. CAS612008).

Given the strict permit requirements, the RWQCP has conducted a comprehensive Pollution Prevention Program since 1989. The 2017 Clean Bay Plan is organized according to these permits. Each section describes details of the permit, environmental concerns, RWQCP program updates for the past year, and key goals and priorities for the program in the future. For all documents not listed in this report, requests can be made directly to the Watershed Protection Group.

Table 1 presents an overview of the City of Palo Alto's Pollution Prevention Plan, describing pollutant sources, program priorities, pollution prevention progress made in 2016, and plans for the coming year.

TABLE 1: CITY OF PALO ALTO POLLUTION PREVENTION PLAN AND ACCOMPLISHMENTS

Pollutant of Concern	Source(s)	2016 Highlights	2016 Outreach Highlights	2017 Main Goals	Program Evaluation Metrics
Main NPDES Permit					
Selenium	• Runoff/groundwater interaction with naturally-occurring selenium deposits • Crude oil • Coal-fired generation of electricity • Oil refining • Mining of phosphate, copper, and uranium	• Completed the Selenium Evaluation: Historical Review and Impact from Proposed EPA Regulations report • Collaborated with Lower South Bay (LBS) wastewater dischargers and Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) to comment on the proposed EPA amendments	**City Staff** • "Palo Alto – Impact of Proposed EPA Selenium Standards" Factsheet **Public** • "Lower South Bay – Impact of Proposed EPA Selenium Standards" Factsheet • "LSB POTWs and SCVURPPP Comments on the Proposed Water Quality Standards"	• Collaborate with the San Francisco Estuary Institute (SFEI) to evaluate selenium inputs/impacts on a regional scale • Collaborate with Bay Area Clean Water Agencies (BACWA) and LBS Publicly Owned Treatment Works (POTWs) on regulatory lobbying and advocacy	• Track regulatory progression • Completion of evaluations and studies • Collection of data • Communication of results from evaluations and data collection to POTW community and regulators • Participation in regional collaboration
Mercury and PCB Watershed NPDES Permit					
Mercury	• Fluorescent lights • Mercury-containing thermostats and thermometers • Scrap amalgam, chairside trap waste, filter waste, and amalgam sludge • Legacy pollution from gold-mining	• RWQCP Staff received amalgam self-certification forms from 158 dental offices • The City continued to recycle spent bulbs and purchase low mercury replacement bulbs and LED lights when available • Continued implementation of dental amalgam program, including annual self-certification forms and inspection of dental offices to confirm proper amalgam separator maintenance and BMP compliance • Collected and recycled thermometers and thermostats and accepted fluorescent lamps through the City's Household Hazardous Waste Station	**City Staff** • Palo Alto Community Health Fair tabling targeting both City Staff and the public **Public** • BAPPG educated 164 dental assistant and hygienist students at five different colleges throughout the Bay Area on mercury pollution prevention	• Continue to track new dental offices and annually inspect approximately 20% of offices in the RWQCP service area • Continue to promote the collection of mercury-containing waste (e.g., thermometers) through the City of Palo Alto's Household Hazardous Waste Station • Continue to educate dental assistant and hygienist students on mercury pollution prevention via Bay Area Pollution Prevention Group (BAPPG)	• Percentage of dental offices in compliance with amalgam separator maintenance and best management practices • Receipt of annual self-certification forms, confirmation of amalgam separator maintenance and BMP compliance through inspections. • Number of students reached through BAPPG program • Quantity of thermometers, thermostats, fluorescent lights, and other mercury-containing products collected at HHW events

TABLE 1: CITY OF PALO ALTO POLLUTION PREVENTION PLAN AND ACCOMPLISHMENTS (continued)

Pollutant of Concern	Source(s)	2016 Highlights	2016 Outreach Highlights	2017 Main Goals	Program Evaluation Metrics
Nutrient Watershed NPDES Permit					
Nutrients	• Human urine and feces • Food waste • Pet waste • Industrial discharges	• Completed the "Phosphorus Evaluation: Regional Comparison and Projections" report • Participated in San Francisco Bay Nutrient Management Strategy	**City Staff** • "Phun with Phosphorus: Phosphorus Evaluation" Presentation	• Finalize the "Nutrient Load Reduction Alternatives Cost Comparison" evaluation • Evaluate denitrification optimization opportunities • Continue participation in San Francisco Bay Nutrient Management Strategy • Participate in the reconvened California Association of Sanitation Agencies (CASA) Watershed Approach to Nutrients Focus Group	• Communication of results from evaluations and data collection to POTW community and regulators • Participation in regional collaboration efforts
Recycled Water Permit					
Salinity	• Human urine and feces • Inflow and infiltration of saline groundwater into broken sewer pipelines	• Began third reverse osmosis pilot plant to evaluate pretreatment options • Conducted 13 inspections of recycled water users • Completed the multi-year Redwood Tree Monitoring Study • Located large saline groundwater leak into the 72-inch Trunkline • Contracted and collaborated with Santa Clara Valley Water District (SCVWD) and City of Mountain View on joint recycled water projects	**Public** • "Redwood Tree Monitoring Study" Factsheet • Great Race to Save Water tabling • Recycled water utility bill insert • Recycled Water Reference Sheet	• Continue evaluations of salinity reduction opportunities • Finalize the Advanced Water Purification System Feasibility Study • Begin the Northwest County Recycled Water Strategic Plan • Repair and test 72-inch Trunkline to eliminate saline groundwater infiltration • Create recycled water informational brochure	• Completion of evaluations and studies • Reduction of salinity (TDS) in recycled water • Increased use of recycled water • Completion of pipeline repairs • Locate salt water inflow and infiltration into sewers

TABLE 1: CITY OF PALO ALTO POLLUTION PREVENTION PLAN AND ACCOMPLISHMENTS (continued)

Pollutant of Concern	Source(s)	2016 Highlights	2016 Outreach Highlights	2017 Main Goals	Program Evaluation Metrics
Air Regulations					
Ozone Precursors	• Sewage sludge incinerators • Emergency generators • Landfill flare	• Remained below limits for both NOx and NMOC	**City Staff** • "Clean Air Act §129 Operator Training"	• Conduct incinerator emissions test to prove compliance with emission limits • Conduct annual training	• Emissions below limits for all regulated pollutants • Annual testing
Federal Sewage Sludge Incinerator Regulated Pollutants	• Sewage sludge incinerators	• New regulation became effective with new reporting and testing requirements • Conducted incinerator emissions tests that optimized operating parameter limits while remaining below emission limits for all regulated pollutants • Had 6 reportable noncompliance events and no permit violations	**City Staff** • "Clean Air Act §129 Operator Training"	• Conduct incinerator emissions test to prove compliance with emission limits and set operating parameter limits to maximize operational flexibility • Conduct annual training	• Emissions below limits for all regulated pollutants • Annual testing • Annual training • Semi-annual and annual reporting of compliance status
Greenhouse Gases (GHGs)	• RWQCP sewage sludge incinerators • RWQCP office heating • RWQCP emergency generators • Wastewater treatment	• Adopted new City goal to reduce community and municipal emissions by 80% from 1990 levels by 2030 • Reduced emissions by more than 60% since 1990 • Used 100% green (carbon neutral) natural gas that has fewer associated anthropogenic greenhouse gas emissions when combusted • Completed design of the sludge dewater and haul facility to allow for incinerator decommissioning scheduled for 2019 • Completed the Energy Evaluation of Treatment Processes	**City Staff** • Internal summary report of GHG inventory for previous year **Public** • Electricity Factsheet	• Track, calculate, and report the RWQCP's emission inventory to numerous regulators • Update factsheet with new data and information • Commence construction of sludge dewater and haul facility to decommission incinerators by 2019	• Accurately quantify and report emissions inventory • Annual factsheet updates • Progress in sewage sludge incinerator decommissioning • Explore options to replace biosolids incineration with technology that requires less energy and emits less GHG emissions

TABLE 1: CITY OF PALO ALTO POLLUTION PREVENTION PLAN AND ACCOMPLISHMENTS (continued)

Pollutant of Concern	Source(s)	2016 Highlights	2016 Outreach Highlights	2017 Main Goals	Program Evaluation Metrics
SF Bay Municipal Regional Stormwater NPDES Permit					
Pesticides	• Use on golf courses, parks, and municipal facilities • Application by hired pest control operators • Application in residential homes	• Continued regional outreach and regulatory tracking/lobbying efforts through participation in Our Water, Our World (OWOW) and BAPPG • Continued participation in the Healthy Building, Healthy Families Integrated Pest Management (IPM) Pilot Program through the Department of Pesticide Regulations (DPR) and Bay Area Stormwater Management Agencies Association (BASMAA) • Continued to maintain 12 pesticide-free parks and facilities within Palo Alto • Continued partnership for residential outreach, including point-of-sale educational materials at hardware stores and training program for store employees	**Public** • SummerWinds Nursery IPM workshop • Sabotaging Snails, Slugs, and Plant-suckers IPM workshop • Fall Pest Prevention IPM workshop • Los Altos Hills (Westwind Barn) Earth Day Celebration tabling • Glyphosate factsheets for staff and public developed for regional use	• Continue participation in regional outreach and regulatory tracking/lobbying via BAPPG • Continue to provide outreach about IPM strategies and EcoWise Certified-pest control companies • Offer one IPM workshop or tabling event in RWQCP service area • Continue to include pesticide pollution as a topic in school education program • Complete the Healthy Building, Healthy Families IPM Pilot Program and evaluate effectiveness • Evaluate the City's pesticide use and pest management strategies	• Number of stores participating in OWOW program • Participants in IPM workshops • IPM results from the Healthy Building, Healthy Families IPM Pilot Program • Production of IPM Program report analyzing pesticide use trends and toxicity
Trash	• Plastic bags • Plastic bottles • Plastic foam • Uncovered vehicle loads • Litter	• Continued regional outreach efforts through participation in Santa Clara Valley Urban Runoff Pollution Prevention Programs (SCVURPPP) and the Zero Litter Initiative • Coordinated 2 creek cleanup events that removed 570 pounds of trash and 75 pounds of recyclables from Palo Alto creeks • Trash booms were deployed and maintained in both Adobe and Matadero Creeks • New ordinance requirements prohibiting the retail sale or distribution of plastic foam ice chests, foodware, packaging materials and egg cartons • Worked with Palo Alto Unified School District to expand water bottle filling stations	**City Staff** • Palo Alto High School's TapOut Club Bottled Water Presentation **Public** • Jordan Middle School Science Fair tabling • Tesla Earth Day tabling • The Great Race to Save Water tabling • PARC/Xerox Earth Day tabling • Creek Cleanup Events	• Implement Year 1 goals of ReThink Disposable Program at Palo Alto restaurants • Coordinate creek cleanups for National River Clean Up Day and Coastal Clean Up Day • Deploy and maintain trash booms in Adobe and Matadero Creeks • Attend corporate tabling events, neighborhood community events and school environmental programs to reach the community. • Continue participation in regional outreach via SCVURPPP and the Zero Litter Initiative • Continue conducting multi-media anti-litter, stormwater focused outreach (including radio, television and local bus tails) and focus more on social networking and the use of mobile apps through SCVURPPP	• Meet goal for number of target restaurants participating in ReThink Disposables program • Participation in creek cleanup events and amount of trash/recyclables collected • Reduction of plastic foam in creeks and retailer compliance with ordinance • Deployment and maintenance of creek trash booms • On-land visual assessments • Number of anti-litter campaigns

TABLE 1: CITY OF PALO ALTO POLLUTION PREVENTION PLAN AND ACCOMPLISHMENTS (continued)

Pollutant of Concern	Source(s)	2016 Highlights	2016 Outreach Highlights	2017 Main Goals	Program Evaluation Metrics
SF Bay Municipal Regional Stormwater NPDES Permit					
Fats, Oil, Grease (FOG)	• Grease from food handling (FOG) at residents and businesses	• Reviewed 52 plan sets for compliance with FOG pollution prevention and best management practices • Conducted 217 inspections at 118 food service establishments (FSEs) for FOG requirements	**Public** • Participated in 128 paid radio spots on Univision, coordinated by the Bay Area Pollution Prevention Group (BAPPG) • Streamed ads on Univision Hispanic radio website • Sent out utility bill inserts with FOG disposal information at Household Hazardous Waste (HHW) events	• Inspect one-third of Palo Alto FSEs • Conduct plan checks for FSEs being built or remodeled to ensure grease control devices are installed and appropriate fixtures connected • Continue distributing utility bill inserts and other outreach materials providing grease related messages	• Number of restaurants inspected; percent compliance with ordinance requirements; number of plan checks • Reduction in grease-related sewer overflows in commercial areas • Number of radio spots and impressions
Other Emerging Contaminants					
Pharmaceuticals and Personal Care Items	• Over-the-counter and prescribed medicines • Hospitals and other medical facilities • Hand soaps, shampoo, body wash	• Participated in regional outreach, regulatory tracking/ lobbying, and research via BAPPG • Collected 6,289 pounds of pharmaceutical waste	**City Staff** • Palo Alto Community Health Fair tabling targeting both City Staff and the public **Public** • Mountain View Senior Resource Fair	• Continue participation in regional outreach, regulatory tracking/ lobbying, and research via BAPPG and the SFEI • Continue to implement medicine collection program while advocating for a long-term solution to residential disposal of pharmaceutical waste • Continue outreach efforts regarding triclosan and fipronil • Continue existing onsite collection program and partnership with Palo Alto Medical Foundation, Los Altos Senior Center, and the Palo Alto Police Department • Continue to educate residents about proper pharmaceutical disposal using Facebook advertisements, utility bill inserts, Cleanbay.org website, and RWQCP staff attendance at local business and community events	• Amount of medicines collected • Number of disposal locations • Number of outreach pieces and events attended

1 BACKGROUND

The 2017 Clean Bay Plan describes pollutant sources, program priorities, pollution prevention progress made in 2016, and plans for the coming year. The Clean Bay Plan provides:

- required updates on efforts to reduce pollution from wastewater sources associated with the RWQCP's main NPDES permit; (Order NO. R2-2014-0024, Section VI.C.3);
- updates on stormwater pollution prevention efforts required in the Municipal Regional Stormwater permit;
- efforts to reduce air pollution associated with the RWQCP's wastewater treatment; and
- updates on recycled water generation and distribution.

A. CITY OF PALO ALTO: REGIONAL WATER QUALITY CONTROL PLANT

The City of Palo Alto operates the Regional Water Quality Control Plant (RWQCP), a wastewater treatment facility located on the shore of the San Francisco Bay in Palo Alto. The RWQCP service area includes the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Stanford University. The RWQCP treats wastewater from these communities prior to discharge to the Lower South San Francisco Bay (**Figure I-1**).

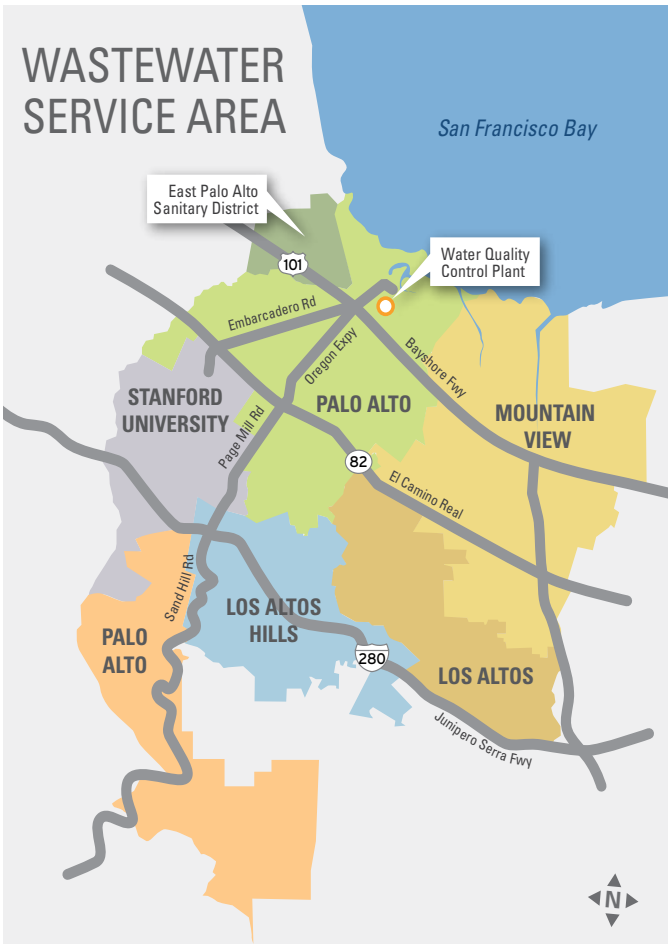


FIGURE I-1. RWQCP Service Area

Approximately 220,000 people live in this service area. In 2016, the plant treated an average of 18.8 million gallons per day (MGD) of wastewater, well below its permitted dry-weather capacity of 39 MGD (**Figure I-2**).

The RWQCP uses physical, biological, and chemical treatment to remove about 99 percent of the solids and organic materials from influent wastewater. Despite the Plant's excellent performance in removing most pollutants from the wastewater, increasing scrutiny is given to the discharge of nutrients and contaminants of emerging concern. While the Plant's treatment steps remove most of the metals found in wastewater prior to discharge, the RWQCP (like other municipal wastewater treatment plants) was not specifically designed to remove nutrients or contaminants of emerging concern from wastewater. Stormwater runoff in this service area, as well as in the Santa Clara Valley, flows untreated into the Bay. Runoff not absorbed through unpaved surfaces carries pollutants directly into the Bay.

B. CAPITAL IMPROVEMENT PROJECTS

The RWQCP has been in operation since 1934. Aging equipment, new regulatory requirements, and the movement to full sustainability requires rehabilitation, replacement, and new processes. These issues will be addressed through multiple capital improvement projects (CIPs) that will take place at the Plant. **Table I-1** summarizes the upcoming capital improvement projects, and locations of these projects can be found on the aerial map of the Plant in **Figure I-3**.

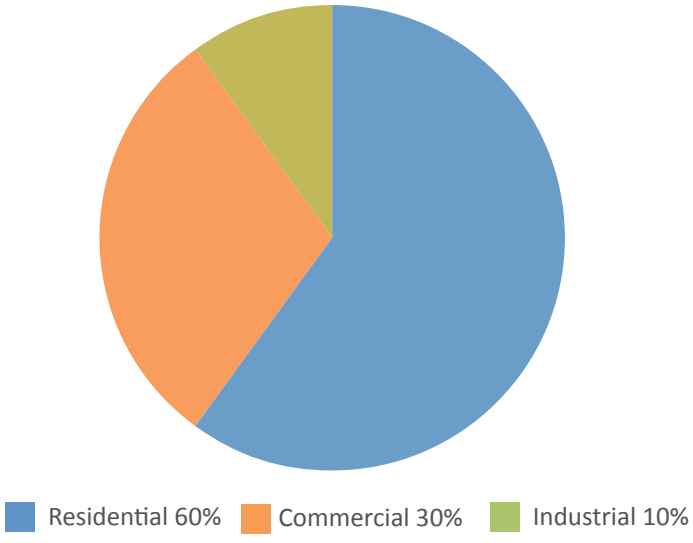


FIGURE I-2. Wastewater Sources to RWQCP

C. REGULATIONS REQUIRING RWQCP WASTEWATER AND STORMWATER PERMITS

The City of Palo Alto treats wastewater and manages stormwater to meet the standards and requirements contained in six permits that reflect requirements of the Federal Clean Water Act (CWA), the California Porter-Cologne Water Quality Control Act, and the Clean Air Act:

1. **RWQCP (main) NPDES Permit** (Order No. R2-2014-0024, NPDES No. CA0037834)

   Summary: This permit governs the majority of the wastewater discharge limitations and other requirements for the RWQCP. The permit includes reporting and monitoring

TABLE 1-1. RWQCP CAPITAL IMPROVEMENT PROJECTS

Project Name	Description	Location Number
Sludge Dewatering and Loadout Facility	New sludge dewatering, conveyance, solids storage, and loading facilities to replace belt filter presses and sewage sludge incinerators.	1
Lab/Environmental Services Building	New lab and environmental services building.	2
Primary Sedimentation Tank Rehabilitation	Structural /concrete repair for the primary sedimentation tank. Replace drive units, plastic chain and sludge scrapers, and scum skimmers.	3
Fixed Film Reactor Rehabilitation	Rehabilitation includes plastic media, distributor mechanism, superstructure, lift pumps, electrical distribution, and piping replacement.	4
Raw Sewage Headworks Replacement	New headworks will replace the New and Old Pumping Plants.	6
Meter Station Rehabilitation	Replace slide gates and recoat concrete (Note: Location is off-map on San Antonio Road).	7
Aeration Basin Valve Replacement	The Aeration Basin influent channel slide gates need to be replaced with new units.	8
Aeration Basin Blower #4 Replacement	Replace aeration basin blower #4 with new unit.	9
Old Pumping Plant Rehabilitation	Rehabilitation includes: replacing the pumps, motors, isolation valves, power distribution equipment, pump controls, and flow-meter; plugging leaking influent sewer pipes; recoating wet wells; repairing concrete; and installing corrosion protection.	10
New Outfall Line	Installation of new parallel pipeline and rehabilitation of existing line. Design is minor CIP and construction is major CIP.	11
Secondary Clarifier #3 and #5 Replacement	Replace center column and rotating mechanism with new stain-less steel rotating mechanism.	12
Palo Alto Flowmeter #1 Replacement	Flowmeter replacement.	14
Recycled Water Reverse Osmosis Facility	Build an advanced water purification facility that blends advanced treated wastewater with existing tertiary-treated recycled water (Note: Funded by the Santa Clara Valley Water District).	15

FIGURE I-3. Aerial Map of Locations of RWQCP Capital Improvement Projects

requirements as well as effluent limitations for conventional pollutants, effluent toxicity, and toxic pollutants.

2. **Nutrient Watershed NPDES Permit** (Order No. R2-2014-0014, NPDES No. CA0038873)

   Summary: The Nutrient Watershed Permit requires treatment plants discharging to the Bay to routinely monitor and report their effluent for key nutrient parameters, financially support scientific research into this topic, and conduct special studies evaluating the consequences of increased nutrient removal.

3. **Mercury & PCB Watershed NPDES Permit** (Order No. R2-2012-0096, NPDES No. CA0038849)

   Summary: The Mercury & PCB Watershed NPDES Permit covers industrial and municipal wastewater discharges of mercury and PCBs to the Bay. The Watershed Permit is an NPDES permit that implements the waste load allocations for these two source categories. It also implements other provisions of the total maximum daily loads (TMDL) requiring pollution prevention, special studies, and risk reduction actions to be conducted by the permittees.

4. **San Francisco Bay Municipal Regional Stormwater NPDES Permit** (Order No. R2-2015-0049, NPDES No. CAS612008)

   Summary: The Municipal Regional Stormwater NPDES Permit addresses the discharge of stormwater to the Bay. The Permit requires the RWQCP to carry out various activities and programs to prevent trash, pesticides, mercury, and other pollutants from entering local creeks, and ultimately the Bay.

5. **Recycled Water Permit** (Order No. 93-160)

   Summary: The Recycled Water Permit ensures that the quality of recycled water produced by the RWQCP meets strict standards for reuse in non-potable applications. The permit also restricts the use of recycled water to appropriate applications such as landscape irrigation, industrial cooling water, decorative fountains, and toilet flushing.

6. **Air Permit**

   Summary: The RWQCP maintains a Permit-to-Operate (PTO) that governs the operation, maintenance, and reporting of specific equipment to minimize air pollution

TABLE 1-2. RWQCP POLLUTANTS OF CONCERN

Pollutant	Reason for Selection
Copper	Effluent limitation; sludge management limits
Selenium	Proposed water quality criteria for South San Francisco Bay
Cyanide	Effluent limitation
Mercury	U.S. EPA 303(d) listing; effluent limitation; air emissions
Polychlorinated Biphenyls (PCBs)	U.S. EPA 303(d) listing
Nutrients	Progression of Nutrient Watershed NPDES permits
Salinity	Recycled water program expansion
Greenhouse Gases	State & Federal reporting regulations; climate change
Ozone Precursors	Bay Area in nonattainment for ozone; smog; respiratory and cardiopulmonary problems
Federal Sewage Sludge Incinerator Regulated Pollutants	Clean Air Act Section 129
Pesticides	U.S. EPA 303(d) listing
Trash	U.S. EPA 303(d) listing
Fats, Oils and Grease	Sanitary Sewer System Management Plan; sanitary sewer overflows
Contaminants of Emerging Concern	Risk to human health due to bioaccumulation

that is emitted during its daily treatment of wastewater. The RWQCP does not currently have a U.S. EPA Title V Major Facility Review Permit (Title V Permit), but has an application for one pending finalization. The Title V Permit when finalized will include all of the local air limits currently in the PTO as well as state and federal air regulations such as greenhouse gas reporting.

The RWQCP has led a comprehensive Pollution Prevention Program since 1989 to meet these strict regulatory requirements. A table that summarizes the historical highlights of the program can be found in Appendix-A.

1. HOW REGULATORY REQUIREMENTS ARE DEVELOPED

The Regional Water Board adopts and implements water quality criteria that apply to both wastewater and stormwater for the San Francisco Bay based on state and federal requirements. The water quality criteria are contained in the San Francisco Bay Water Quality Control Plan (Basin Plan). Additional water quality criteria may be required by the U.S. Environmental Protection Agency (U.S. EPA) or the California Toxics Rule (May 18, 2000). Similarly, the Regional Air District adopts and implements air quality criteria for the San Francisco Bay Area based on state and federal requirements and the specific issues facing this region.

2. POLLUTANTS OF CONCERN

Section 303(d) of the CWA requires states to identify those water bodies that do not meet water quality standards. The states rank these impaired water bodies by priority, taking into account the severity of the pollution and how the water body is used. Lists of prioritized impaired water bodies are known as the "303(d)" lists and must be submitted by each state to the U.S. EPA every two years.

The San Francisco Bay is listed as impaired by several pollutants, therefore all dischargers to the Bay are required to obtain and adhere to NPDES permits that are issued by the Regional Water Quality Control Board. **Table I-2** presents the 303(d) pollutants of concern for wastewater and stormwater in the RWQCP service area. While the list is primarily based on listings for Lower South San Francisco Bay and local urban creeks, the RWQCP has three additional reasons for prioritizing pollutants in wastewater:

1. Sludge Management Limits—The pollutant is subject to limits for the land disposal of incinerated sludge ash;

2. **Air Emissions**—The pollutant is a significant contributor to the air emissions from the RWQCP or is an air pollutant recognized by the U.S. EPA as impairing a local creek or the Bay;
3. **Recycled Water**—The pollutant interferes with the use of or lowers the quality of the RWQCP's recycled water.

D. SUSTAINABILITY PROGRAMS

The City of Palo Alto strives to go beyond permit compliance to be a leader in environmental protection and in so doing maintains an Office of Sustainability. The City has committed to reach Zero Waste by 2021, maintains a carbon neutral electric and natural gas portfolio for the public utilities it owns and operates, and green building requirements for municipal and residential buildings. Palo Alto is also a designated Tree City-USA, a League of American Bicyclists silver-ranked Bicycle Friendly Community, and has award-winning programs for the watershed protection services it provides to the RWQCP service area. The Office of Sustainability and RWQCP collaborate and support shared areas of concern. Current efforts include Climate Protection, Green Purchasing, Extended Producer Responsibility (discussed in Section IV) and Sea Level Rise (Section II-D).

E. REGIONAL COLLABORATIONS

The RWQCP strives to create and implement an effective pollution prevention program to target three communities: government agencies, residents, and industrial/commercial sectors. RWQCP staff acknowledges that collaborative working groups are often more effective at creating solutions for regional pollutants. RWQCP staff participates in a variety of state and regional workgroups, including, but not limited to:

- Aquatic Science Center/San Francisco Estuary Institute Board (SFEI)
- Bay Area Clean Water Agencies (BACWA)
- Bay Area Biosolids to Energy Coalition
- Bay Area Stormwater Management Agencies Association (BASMAA)
- California Association of Sanitation Agencies (CASA)
- California Product Stewardship Council
- California Water Environment Association (CWEA)
- California Wastewater Climate Change Group
- Copper Brake Pad Partnership
- Creek Connection Action Group
- Integrated Pest Management Partnership Committee
- Product Stewardship Institute
- Regional Monitoring Program Steering Committee
- Regional Monitoring Program Working Group Committees
- ReNUWIt (Reinventing the Nation's Urban Water Infrastructure)
- Silicon Valley Anti-Litter Group
- Santa Clara Water District: Salt and Nutrient Planning Stakeholders
- SCVURPPP (Santa Clara Valley Urban Runoff Pollution Prevention Program) and Workgroups/Ad-Hoc Groups
- Santa Clara Basin Watershed Management Initiative (SCBWMI)
- SCBWMI POTW Forum
- SCBWMI ZLI
- Tri-TAC
- Urban Pest Management Working Group
- Urban Pesticide Committee
- Water Environment Federation (WEF)
- Water Environment Research Foundation (WERF)
- Details of staff participation in these groups can be found in Appendix-B.

II POLLUTANTS WITH PERMIT REQUIREMENTS

A. RWQCP MAIN NPDES PERMIT

PERMIT DETAILS

In 2014, the San Francisco Bay Regional Water Quality Control Board (Regional Board) reissued the Regional Water Quality Control Plant's (RWQCP) National Pollutant Discharge Elimination System (NPDES) permit (Order No. R2-2014-0024, NPDES No. CA0037834) that covers the discharge of treated wastewater to the Bay. The Permit became effective on August 1, 2014 and is valid through July 31, 2019. The Permit includes reporting and monitoring requirements as well as effluent limitations for conventional pollutants (e.g. biochemical oxygen demand, ammonia, suspended solids, chlorine residual, enterococci), effluent toxicity, and toxic pollutants (e.g., metals, cyanide, and dioxin). Appendix C lists the effluent limits in the permit.

The discharge of mercury, ammonia, and pesticides are regulated by this Permit and also by regional watershed and municipal permits. Refer to subsequent sections for details on the RWQCP mercury, ammonia, and pesticide pollution prevention programs.

The Permit also requires a Pretreatment Program that reduces pollutants entering the sanitary sewer and storm drain systems by regulating industrial and commercial discharges within the RWQCP service area. Since its inception in 1981, the RWQCP Pretreatment Program has resulted in significant reductions in metals and other pollutants in the RWQCP influent, therefore making it easier for the RWQCP to meet the Permit effluent discharge limits. See the 2017 Pretreatment Program Annual Report for more information on this program.

ENVIRONMENTAL CONCERNS

In order to protect human health and the environment, the Permit includes effluent limitations for RWQCP discharges to the San Francisco Bay. Each pollutant is limited for different environmental concerns. Heavy metals such as copper and silver can have detrimental effects to aquatic organisms, including but not limited to reduced growth and reproduction rates, developmental abnormalities, bioaccumulation, paralysis and death. Inorganic pollutants such as selenium have been observed to cause neurological disorders, liver damage, reproductive failure, reduced growth rates, and bioaccumulate in aquatic organisms such as white sturgeon. San Francisco Bay is listed under section 303(d) of the Clean Water Act as impaired by selenium due to bioaccumulation in diving ducks, leading to health advisories on their consumption by hunters. Similarly, fish are extremely susceptible to cyanide toxicity in aquatic environments, exhibiting reduced reproductive capacity and mortality at low concentrations. Inorganic cyanides, which possess the polyatomic cyanide ion (CN-) such as sodium or potassium cyanide, are highly toxic. Industrial operations are the primary contributor of cyanide to the RWQCP.

2016 PROGRAM UPDATES

In 2016, the Regional Board inspected the RWQCP for Permit compliance. The RWQCP was found to be in compliance with only minor corrections needed to documentation. Refer to the RWQCP 2016 NPDES Annual Report for more details on 2016 compliance activities and status.

1. COPPER

The Permit requires the RWQCP to have a Copper Contingency Plan and Control Program to reduce the amount of copper entering the Bay (**Appendices D and E**). RWQCP influent and effluent loadings are tracked to evaluate the overall success of the Copper Control Program. Estimated contributions of copper sources to the RWQCP and stormwater are presented in **Figures II.A-1** and **II.A-2**. **Figure II.A-3** presents the annual copper mass loadings in the RWQCP's influent and effluent from 1989 through 2016. Influent and effluent copper mass loading decreased steadily from 1989 until about 1994 when it reached a plateau and has remained relatively stable since. The decrease in copper effluent during this time period may be attributed to a decrease in copper coming into the Plant and/or an increase in Plant performance. The reason for the recent increase in effluent loadings is most likely linked with increased solubility of copper from pH decreases in the Plant effluent. The decrease of pH is directly correlated with a higher strength of wastewater entering the plant. RWQCP incinerator ash continues to be sent to a hazardous waste landfill as the 2016 copper levels remain too high for alternative disposal options. Copper levels in stormwater are expected to decrease significantly beginning in 2021 when the newly adopted California Motor Vehicle Brake Friction Materials statute prohibitions on copper content becomes effective.

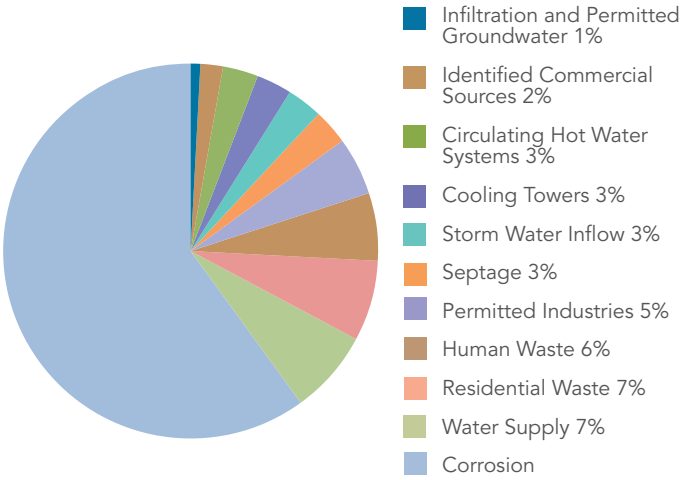


FIGURE II.A-1. Estimated Contributions of Copper Sources to the RWQCP[1]

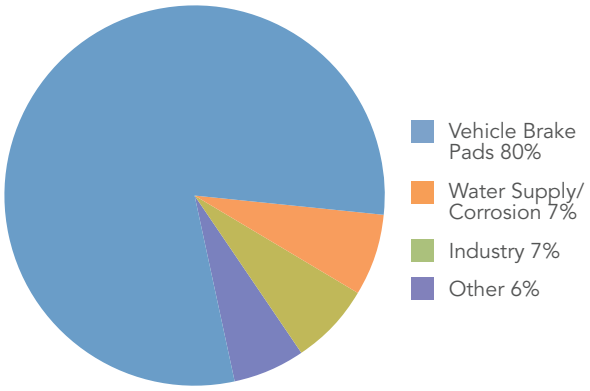


FIGURE II.A-2. Copper Sources in Urban Stormwater Runoff[2]

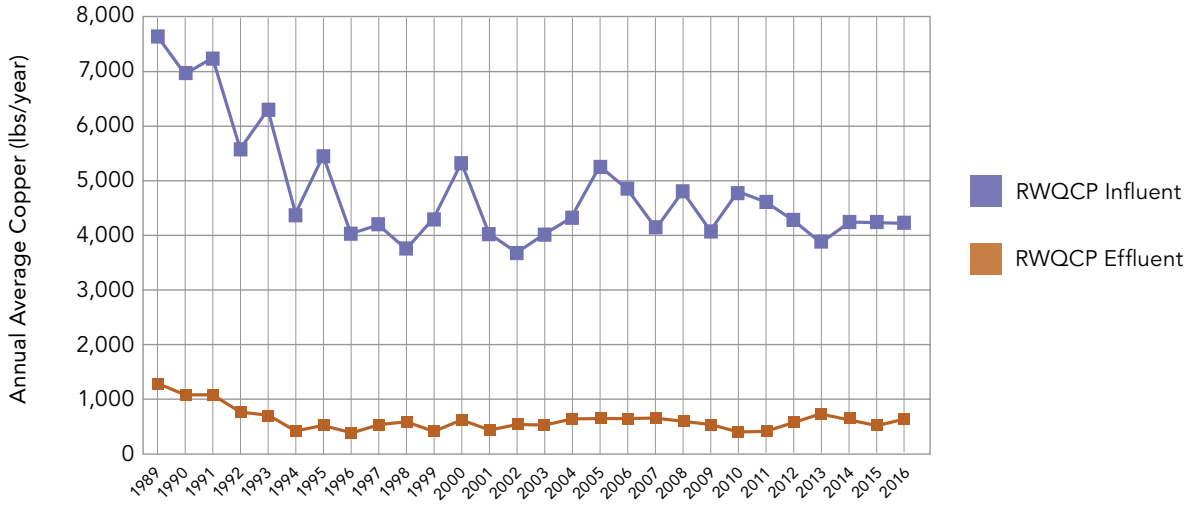


FIGURE II.A-3. RWQCP Copper Influent and Effluent Loading: 1989-2016

[1] Palo Alto Regional Water Quality Control Plant, Copper Source Identification, 2002 Santa Clara Valley Runoff Pollution Prevention Program, Metals Control Measures Plan and Evaluation of Nine Metals of Concern, February 1997

[2] Prevention Program, Metals Control Measures Plan and Evaluation of Nine Metals of Concern, February 1997

RWQCP COPPER POLLUTION PREVENTION HISTORY*

2016

- DTSC finalizes California Brake Pad Law requiring copper content reductions beginning in 2021; and
- BAPPG supports a presentation at Laney Community College about flux and flushing BMPs.

2015

- BAPPG conducts four copper pollution prevention presentations to a total of 300 plumbers and apprentices.

2014

- The first requirement of SB 346, to label brake pad copper content and eliminate lead, asbestos and toxic metals from all brake pads, takes effect; and
- BAPPG re-evaluates plastic alternatives to copper piping and finds PEX as a pollution prevention alternative.

2010

- 1994 Sewer Use Ordinance updated.
- The Brake Pad Partnership sponsors California law SB 346 to implement programs for elimination of copper in brake pads;
- RWQCP begins funding copper pollution prevention outreach through BAPPG; and
- RWQCP develops Copper Control Program per NPDES Permit (Appendix E).

2009

- The EPA approves Copper Site Specific Objectives and Copper Action Plan applicable to all of San Francisco Bay dischargers; and
- RWQCP assesses plastic alternatives to copper piping and determines them unsuitable as a pollution prevention alternative.

2007

- The RWQCP begins to send incinerator ash to a hazardous waste landfill due to the elevated copper levels.

2006

- Elevated copper levels found in RWQCP incinerator ash.

2003

- The City of Palo Alto prohibits the use of copper roofing.

1996

- The City of Palo Alto co-founds the Brake Pad Partnership, working with stakeholders to address copper water pollution from vehicle brake pads.

1994

- RWQCP service area adopts more stringent Sewer Use Ordinance requirements for metal finishers and printed circuit board manufacturers; and
- Influent and effluent copper mass loading decreases by about 50% from 1989 to 1994.

1990

- RWQCP develops Copper Contingency Plan (Appendix D).

*Refer to the 2016 Clean Bay Plan for more information.

2. SILVER

The RWQCP Silver Hauling Program has regulated the disposal of used photoprocessing chemicals containing silver since 1992. Businesses that collect their silver-bearing photoprocessing solutions for offsite disposal as hazardous waste are required to submit annual reports certifying that all such solutions were properly hauled offsite. Businesses that elect to treat their silver-bearing photoprocessing solutions and discharge them to the sanitary sewer are issued discharge permits and are required to conduct monthly sampling to verify that they meet a silver discharge standard. As in other years, annual reports were solicited and collected from businesses with permits, as well as those that have their silver waste hauled. In recent years, trends have shifted towards digital imaging, which does not involve the use of chemicals, for medical, dental, and photographical uses. In 2016, 40 businesses were signed up with the RWQCP Silver Hauling Program and only one business was required to maintain a discharge permit for silver with the RWQCP.

3. SELENIUM

In 2016, an evaluation was done by the RWQCP in response to a proposal from the U.S. Environmental Protection Agency (U.S. EPA) for lower selenium water quality (WQ) criteria for the San Francisco Bay and Delta. The U.S. EPA asserts that new research has determined the current chronic freshwater WQ criterion not effective in protecting aquatic life, and proposes to reduce the WQ criterion from 5 microgram per liter (µg/L) to a 30-day average concentration of 0.2 µg/L in the water column. The 2016 evaluation determined that Lower South San Francisco Bay wastewater dischargers, such as the RWQCP, would not be able to meet the proposed WQ criterion due to naturally-occurring sources of selenium from creeks and rivers, and selenium entering wastewater treatment plants through

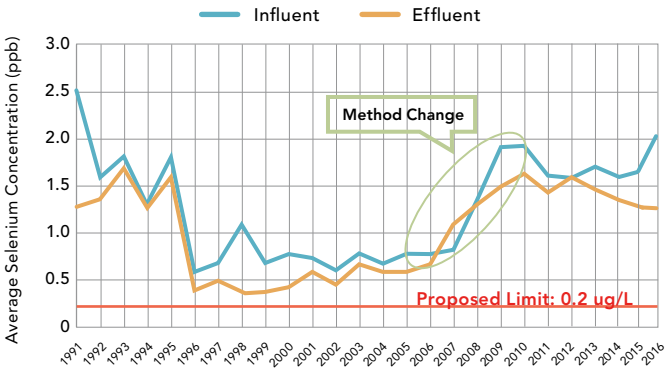


FIGURE II.A-4. RWQCP Selenium Influent and Effluent Concentrations: 1991-2016

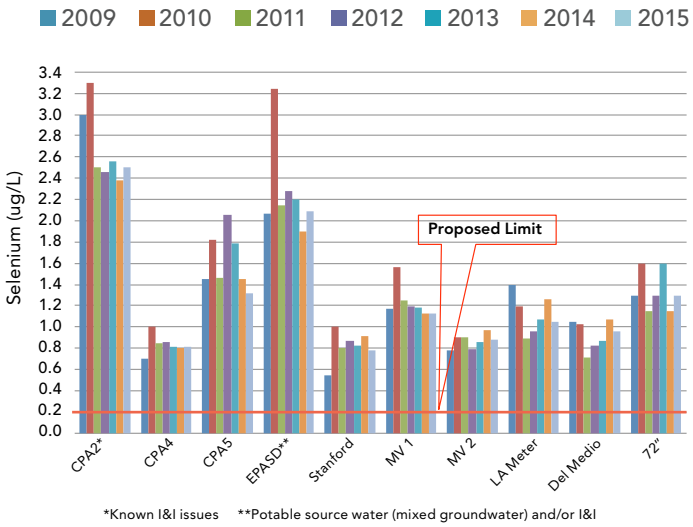


FIGURE II.A-5. RWQCP Historical Trunkline Concentrations

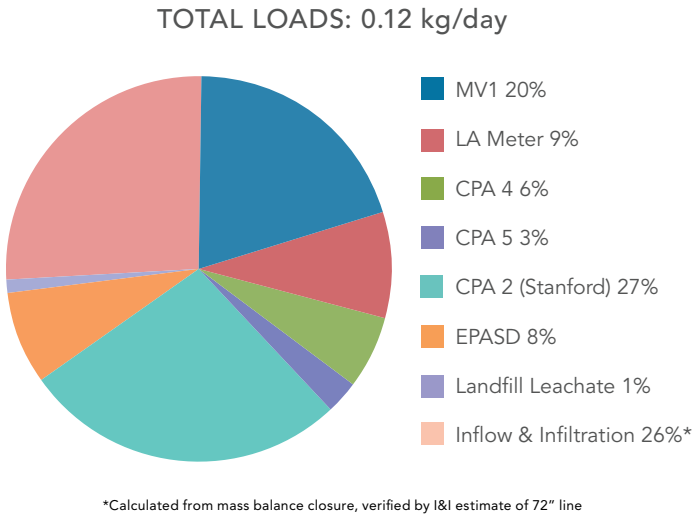


FIGURE II.A-6. Trunkline 2015 Average Selenium Loading to the RWQCP

inflow and infiltration (I&I) (**Figure II.A-7**). Mass balance calculations and trunkline analysis estimate that 26 percent, or 0.03 kilograms per day, of the selenium mass entering the RWQCP is from I&I (**Figure II.A-6**). Although data show that the proposed lower WQ criteria would not be met in the Lower South San Francisco Bay, selenium bioaccumulation was not seen in Lower South Bay aquatic organisms, such as white sturgeon. In October 2016, a comment letter was submitted to the U.S. EPA from the Lower South Bay wastewater treatment plants and regional collaboration groups on the proposed revised selenium water quality criteria. Refer to the Selenium Evaluation: Historical Review

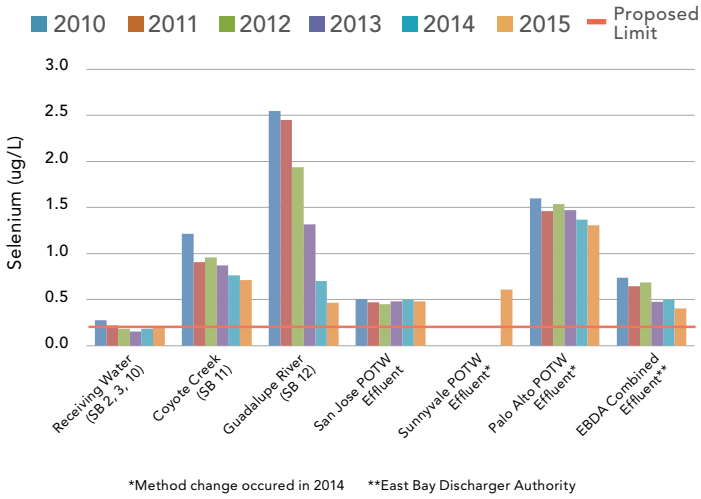


FIGURE II.A-7. Annual Average Selenium for South Bay Water Concentrations (refer to Figure II.A-8 for receiving water and tributary sampling locations).

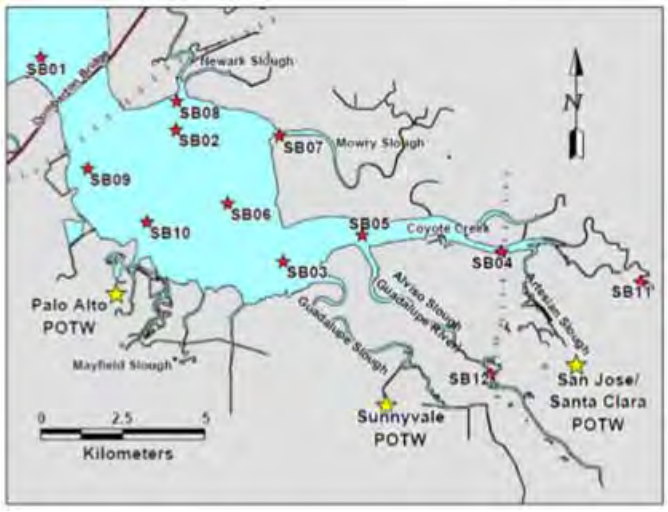


FIGURE II.A-8 Map of South Bay Monitoring Stations[3]

and Impact from Proposed EPA Regulations report and factsheet for more information (**Appendix F**).

4. CYANIDE

The Permit requires the RWQCP to have a Cyanide Action Plan and Control Program to reduce the amount of cyanide entering the Bay (**Appendices G and H**). The Cyanide Control Program requires that contributing sources be included in the control program, inspected at least annually, and provided with cyanide pollution prevention educational materials. During inspections, RWQCP staff stress the importance of proper cyanide control and confirm control measures are in place. Additionally, the RWQCP issues discharge permits with cyanide limits to contributing sources. These permits require contributing sources to properly segregate cyanide wastestreams and run any wastestreams to be discharged to the sanitary sewer through cyanide pretreatment systems. The permits also require contributing sources to perform sampling of process wastestreams to verify compliance with cyanide discharge limits. The RWQCP also performs monthly sampling of these wastestreams to verify cyanide discharge limits are being met. Enforcement action was taken in February 2016 by the RWQCP against one industrial facility for Pretreatment Program violations related to cyanide. The Pretreatment Program violations identified at the facility did not adversely affect the RWQCP, its treatment processes, or its Permit compliance status. The enforcement actions taken by the RWQCP proved effective in remedying the issues at the facility and the facility has remained in consistent compliance since. Additional information about the industrial facilities that are listed as contributing sources in the Cyanide Control Program is available in the 2017 Pretreatment Annual Report.

LOOKING FORWARD

In 2017, the RWQCP will:

- continue to focus on copper pollution prevention and the use of copper at metal finishing facilities;
- continue to research potential sources of selenium to the Lower South San Francisco Bay and the RWQCP;
- work with the San Francisco Estuary Institute to evaluate selenium inputs and impacts on a regional scale;
- work with Lower South Bay dischargers to request regulators remove selenium from the 303(d) list for the Lower South Bay; and
- continue to make progress toward decommissioning of the sewage sludge incinerators.

B. MERCURY AND POLYCHLORINATED BIPHENYL (PCB) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

PERMIT DETAILS

In 2006, due to the high levels of mercury and PCBs in the San Francisco Bay (Bay), the State identified the Bay as 'impaired' for both pollutants and listed on the 303(d) List–California's list of impaired waters per the Federal Clean Water Act (CWA). Per CWA requirements, The Regional Water Quality Control Board (Regional Board) developed total maximum daily loads (TMDLs) for both pollutants. A TMDL is the maximum amount of a pollutant that a body of water (e.g., San Francisco Bay) can receive while still meeting water quality standards. TMDL documents generally describe what must be done by the permittee(s) in order to meet wasteload allocation (the pollutant load allocated to current and future point sources) requirements. TMDLs were adopted for mercury and PCBs in 2006 and 2008, respectively. In turn, the Mercury and Polychlorinated Biphenyl (PCB) National Pollutant Discharge Elimination System (NPDES) Permit of 2012 identifies the wasteload allocations and describes the implementation requirements of both TMDLs.

The City of Palo Alto, along with other municipal and industrial dischargers in the Bay Area (e,g., wastewater treatment plants and certain industrial facilities) must adhere to the requirements of this permit, which regulates point source discharges of mercury and PCBs from dischargers' facilities to surface waters (e.g., San Francisco Bay). Therefore, the Mercury and PCB Permit describes what actions the City must carry out in order to minimize discharges of these two pollutants, including source control and risk reduction program (reducing risk to humans who may consume fish impacted by PCBs and mercury).

ENVIRONMENTAL CONCERNS

Mercury and PCBs are pollutants known to bioaccumulate in organisms and humans. Contamination of these pollutants also affect existing beneficial uses of the Bay such as sport fishing, preservation of rare and endangered species, and wildlife habitat. In addition, mercury concentrations in some bird eggs harvested from the

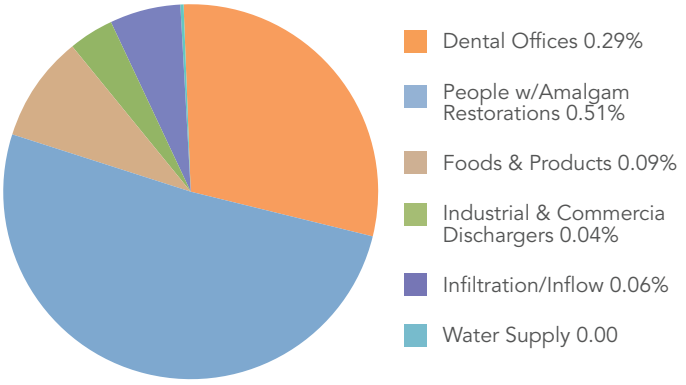


FIGURE II.B-1. RWQCP Mercury Loading Estimate, 2008

Bay shores are high enough to account for abnormally high rates of eggs failing to hatch. Sources of mercury discharged to the RWQCP include laboratory, hospital, and dental office wastewater; human waste and food waste; and stormwater inflow.

While PCB sources are unknown, they may be associated with human waste and wastewater generated from old industrial equipment that may contain PCBs. Mercury is present in wastewater and stormwater discharges to the Bay. **Figure II.B-1** presents the mercury mass loading estimates as a percent of the total influent mercury load. The mercury loading estimate was updated in 2008 to reflect the decreased contribution from dental offices and the greater importance of mercury in human waste from eroding amalgam. Mercury in South Bay stormwater discharges is known to originate from mobile combustion, stationary combustions, erosion (construction and naturally occurring), and abandoned mercury mine drainage. The estimated contributions of mercury to the San Francisco Bay are shown in **Figure II.B-2**.

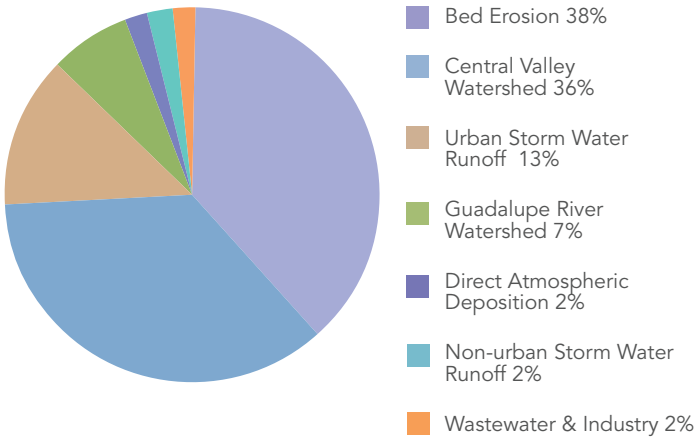


FIGURE II.B-2. Estimated Contributions of Mercury to the San Francisco Bay

2016 PROGRAM UPDATES

1. MERCURY

In 2016, the City of Palo Alto's Regional Water Quality Control Plant (RWQCP) Staff received amalgam self-certification forms from 158 dental offices. Staff inspected 29 dental offices to verify the accuracy of the self-certification forms and confirm compliance with required best management practices (BMPs). The annual amalgam reports coupled with inspections confirmed that the majority of the dental offices are in compliance with the ordinance and best management practices for dental amalgam. In 2016, the Bay Area Pollution Prevention Group (BAPPG), a committee of Bay Area Clean Water Agencies (BACWA), educated 164 dental assistant and hygienist students at five different colleges throughout the Bay Area on mercury pollution prevention. In December 2016, the U.S. EPA published a final rule establishing pretreatment standards to reduce discharges of mercury from dental offices to publicly owned treatment works. The RWQCP has begun to implement new program elements to address the rule, which is expected to be promulgated during the first quarter of 2017.

RWQCP MERCURY POLLUTION PREVENTION HISTORY*

2016
- U.S. EPA publishes final rule to reduce discharges of mercury from dental offices into publicly owned treatment works. Final rule promulgation is expected in the first quarter of 2017.

2015
- In 2015, BAPPG educates over 297 dental assistant and hygienist students at seven different colleges throughout the Bay Area on mercury pollution prevention.

2014
- RWQCP staff confirms the majority of dentists comply with amalgam separator maintenance through a combination of annual reports and inspections.
- Palo Alto educates two classes of dental hygienists at Foothill College about minimizing mercury pollution from dental offices.
- BAPPG educates over 272 students throughout the Bay Area about mercury pollution prevention.

2012
- BAPPG conducts four copper pollution prevention presentations to a total of 300 plumbers and apprentices.

2011
- City staff educates heating, ventilation, and air conditioning (HVAC) contractors and suppliers about the Thermostat Recycling Coalition, which collects mercury containing thermostats.

2010
- The cities of Palo Alto, Los Altos, Mountain View, East Palo Alto and Stanford conduct a second mercury takeback campaign.

2009
- RWQCP starts participating in BAPPG outreach efforts for mercury pollution prevention.

2006
- The Regional Water Quality Control Board adopts the mercury total maximum daily loads (TMDL) on August 9.

2004
- Adopts a new ordinance language requiring all owners and operators of dental vacuum suction systems to install ISO 11143 certified amalgam separators designed to remove at least 95% of amalgam by March 31, 2005.

2002
- Conducts a thorough investigation of mercury uses at RWQCP.

2003
- Removes/Replaces 84 mercury switches (approximately four pounds) from the RWQCP.

2000
- RWQCP partners with the MidPeninsula Dental Society (MPDS) to educate dentists on preventing mercury contamination in San Francisco Bay; and
- The City starts the Residential Fluorescent Lamp Recycling Program (transferred to the county in 2004). The RWQCP continues to accept mercury-containing lights from the entire service area at its Household Hazardous Waste Station.

1998
- RWQCP begins thermometer and thermostat takeback program.

1997
- Mercury loading evaluation is conducted using local sampling information, data from other wastewater treatment plants, and scientific literature to quantify the relative importance of sources.

*Refer to the 2016 Clean Bay Plan for more information.

2. POLYCHLORINATED BIPHENYLS (PCBS)

RWQCP staff is required to annually identify controllable sources of PCBs to the RWQCP according to the Mercury and PCB Watershed Permit Order No. R2-2012-0096. The RWQCP Pretreatment Staff confirmed that there are no industrial sources of PCB-containing material that may enter the sanitary sewer. In addition, RWQCP staff continues to participate in local and regional efforts to reduce PCBs entering storm drains.

PCBS FROM BUILDINGS

PCBs in older buildings are a potential stormwater pollutant because they can enter the stormwater conveyance system at improperly-managed construction sites where PCBs have been historically used. PCB sources include ballasts, window and door caulk, and high voltage equipment. In 2016, City staff participated in a regional effort to develop a PCBs Control Program for Building Demolition Activities. In addition, City of Palo Alto Park Rangers installed risk-reduction signage to encourage people to not eat fish with PCBs, Mercury and other contaminants of concern.

BASMAA AND SCVURPPP EFFORTS TO COMPLY WITH SECTION C.11 OF THE MUNICIPAL STORMWATER PERMIT (PCBS AND MERCURY)

Santa Clara Valley stormwater co-permittees conducted a PCB and Mercury opportunity area analysis. Information on current land uses was collected to create a database of areas that may contribute PCBs and mercury to the storm drain system. The project resulted in a map, and a sampling and analysis plan that is being implemented through the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). City of Palo Alto staff used this resource to update its database of opportunity areas and conducted related inspections throughout the City. City staff is also activein the Pollutants of Concern workgroup of SCVURPPP.

RWQCP PCB POLLUTION PREVENTION HISTORY*

2015

- In collaboration with BAPPG, the RWQCP presents at a regional regulatory and stakeholder meeting regarding updates to the website's information and a reminder of this online resource; and
- The demolition best practices were presented at a meeting on PCBs in Building Materials and Stormwater Demolition Requirements on September 30, 2015.

2013

- City of Palo Alto funds a regional project through the Bay Area Pollution Prevention Group (BAPPG), which creates a webpage that property owners, contractors, and residents can search to determine how to identify and properly dispose of hazardous materials from demolition sites;
- City building inspectors receives a training regarding the demolition brochure; and
- City Staff is involved in updating the Bay Area Clean Water Agency (BACWA) document titled *POTW PCBs Sampling, Analysis & Reporting Protocols Using EPA Method 1668c.*

2012

- City of Palo Alto hires a consultant to develop a Demolition Factsheet that focuses on the proper disposal of PCB-containing materials.

2008

- The Regional Water Board adopts the PCBs TMDL on February 13.

*Refer to the 2016 Clean Bay Plan for more information.

LOOKING FORWARD

RWQCP staff will continue to carry out mercury and PCB projects to meet the Mercury and PCB NPDES Permit requirements. In 2017, the City will:

- continue to track new dental offices and annually inspect approximately 20% of offices in the RWQCP service area;
- amend the dental amalgam program to meet new requirements of the dental amalgam rule after promulgation by EPA;
- continue to educate dental assistant and hygienist students on mercury pollution prevention via BAPPG;
- continue to work with the City's Development Services Staff to flag buildings within a certain age range that may have PCBs in caulk;
- update ordinance language regarding the demolition of buildings that may include PCBs and other hazardous materials;
- continue to participate in stormwater regional sampling efforts to determine the amount of PCBs entering stormwater conveyance systems in Santa Clara County and surrounding counties; and
- participate in the regional efforts regarding PCB load reduction efforts.

C. NUTRIENT WATERSHED NPDES PERMIT

PERMIT DETAILS

The San Francisco Bay Regional Water Quality Control Board (Regional Board) adopted a watershed permit on April 9, 2014 that covers discharge of nutrients from wastewater treatment plants, Order No. R2-2014-0014, National Pollutant Discharge Elimination System Permit (NPDES) No. CA0038873. The Nutrient Watershed Permit became effective July 1, 2014 and requires treatment plants discharging to the Bay to routinely monitor and report their effluent for key nutrient parameters, financially support scientific research into this topic, and conduct special studies evaluating the consequences of increased nutrient removal (e.g., capital improvements, financial burden, greenhouse gas emissions, etc.). The Regional Water Quality Control Plant (RWQCP) actively participates in regional collaborations on this topic organized by the Bay Area Clean Water Agencies (BACWA) and led by the San Francisco Estuary Institute (SFEI). The RWQCP has a discharge limit for ammonia under the main RWQCP NPDES Permit due to toxicity concerns. It is expected that all future nutrient limits will fall under the Nutrient Watershed Permit. The Nutrient Watershed Permit is up for reissuance in 2019 and again in 2024. Currently, new nutrient discharge limits may be in the 2024 permit reissuance, depending on the outcomes of scientific research and current special studies.

ENVIRONMENTAL CONCERNS

Nutrients, such as nitrogen and phosphorus, are essential elements to plant, animal, and microorganism growth. The San Francisco Bay has long been recognized as nutrient-enriched, and the Lower South San Francisco Bay in particular has had near constant or decreasing nutrient loads discharged from wastewater treatment plants since the 1990s.[1] Despite this, the Bay has historically exhibited resistance to typical environmental problems associated with nutrient enrichment, specifically large algal (phytoplankton) blooms which can lead to low dissolved oxygen conditions and fish kills. A large part of the scientific research required under the current Nutrient Watershed Permit tries to identify why the Bay's assimilative capacity for nutrients appears to be decreasing. Contributing factors may include: loss of the benthic bivalves (clams) that had previously regulated the phytoplankton biomass through grazing; decreased suspended sediment concentrations that have resulted in increased light penetration; new sources of phytoplankton to the Bay from exchange with the highly-productive, recently restored salt ponds in the South Bay; and/or mixing between low dissolved oxygen water from margin habitats (such as sloughs) with the open-Bay.[1] Although recent studies indicate that nutrient loading is not the primary driver of the newly increased phytoplankton biomass, it is still unclear whether control of nutrient loading (specifically from wastewater treatment plants) could be used as a way of mitigating potential algal blooms and associated low dissolved oxygen conditions in the future.[1] A 2014 study found that wastewater treatment plants are the major nutrient source to the Lower South San Francisco Bay and that stormwater does not substantially contribute nutrients to this subembayment on an annual scale.[2] A previous study indicated that 80 – 98 percent of nitrogen and phosphorus in wastewater stems from human urine and feces, and 3 – 10 percent from food waste disposal. Other minor contributions include pet waste and industrial ammonia discharge.[3]

2016 PROGRAM UPDATES (DATA)

The Nutrient Watershed Permit requires the RWQCP and other wastewater treatment plants to evaluate options for increased nutrient removal by optimization of current treatment processes. As part of this on-going effort, in 2016 RWQCP staff conducted the Phosphorus Evaluation: Regional Comparison and Projections. This evaluation found that the RWQCP's high effluent phosphorus load as described in the 2015 BACWA Annual

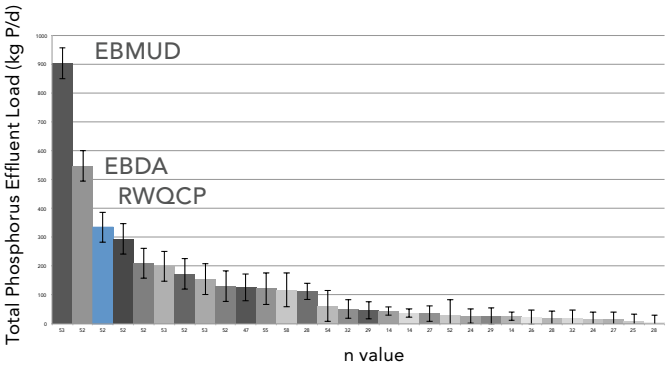


FIGURE II.C-1: Average effluent total phosphorus load for San Francisco Bay dischargers, from Jul 2012 – Jun 2015. Error bars represent plus and minus one standard deviation. (The actual RWQCP effluent total phosphorus load should be 3% lower than the value shown, due to miscalculation of effluent flow by RWQCP staff included in 2015 BACWA Annual Report).

[1]Crauder, J. Downing-Kunz, M.A., Hobbs, J.A., Manning, A.J., Novick, E., Parchaseo, F., Wu, J., Schoelhamer, D.H., Senn, D.B., Shellenbarger, G.G., Thompson, J. and D. Yee, *Lower South Bay Nutrient Synthesis*, Contribution No. 732, San Francisco Estuary Institute & Aquatic Science Center, 2016.

[2]Novick, E. and Senn, D.B., *External Nutrient Loads to San Francisco Bay*, Contribution No. 704, San Francisco Estuary Institute, 2014.

[3]Hughes, S., *Source Reduction and Related Strategies to Reduce Nutrient Loading to San Francisco Bay*, prepared for the Bay Area Pollution Prevention Group, 2014.

Report (**Figure II.C-1**) is not a result of abnormally high influent concentrations (**Figure II.C-2**), but rather a lack of phosphorus removal processes within the wastewater treatment process (**Figure II.C-3**). Historical data indicated a significant impact from the recent prolonged drought period that increased phosphorus concentrations entering the RWQCP mainly from water conservation efforts; concurrently, mass loading of phosphorus increased significantly as well, mainly due to economic growth in the RWQCP service area (**Figure II.C-4**). The 2016 average total phosphorus influent and effluent concentrations were seven and five milligrams per liter (mg/L) respectively. A similar trend occurred for total nitrogen, where the concentrations and loads increased due to water conservation and economic growth respectively (**Figure II.C-5**). The 2016 average total nitrogen influent and effluent concentrations were 64 and 32 mg/L respectively; 2016 total nitrogen influent data is incomplete and accounts for August – December 2016.

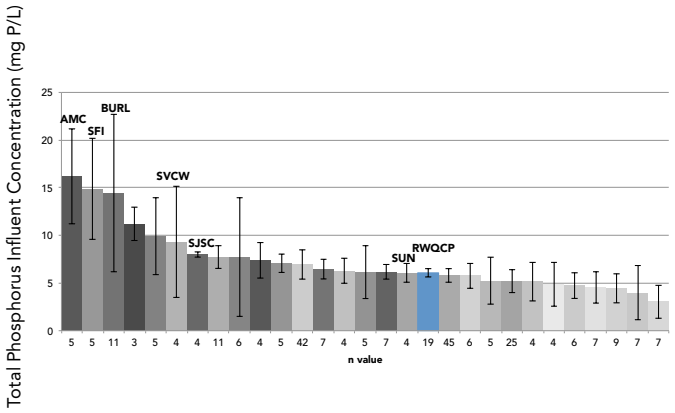


FIGURE II.C-2: Average influent total phosphorus concentration for San Francisco Bay dischargers, from Jul 2012 – Jun 2014. Error bars represent plus and minus one standard deviation.

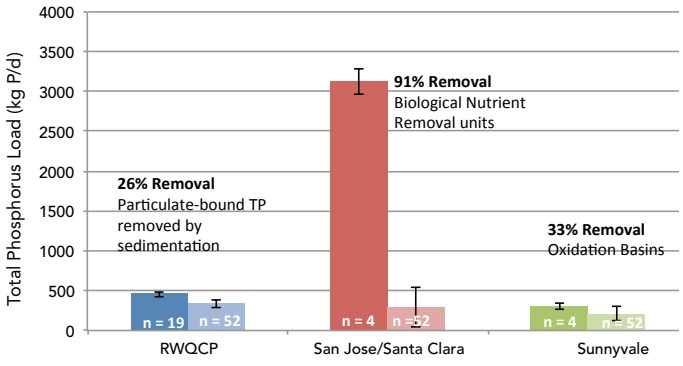


FIGURE II.C-3: Average total phosphorus removal for Lower South San Francisco Bay wastewater treatment plants (2012 – 2014).

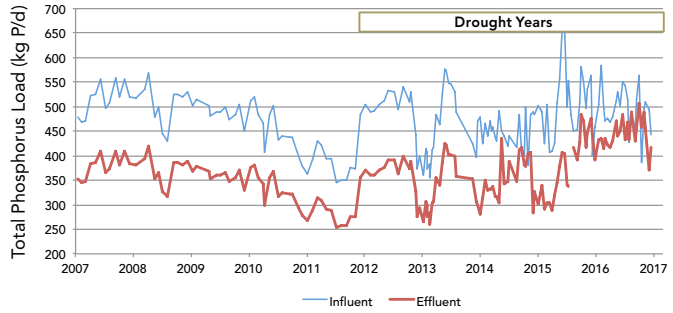


FIGURE II.C-4: Historical RWQCP total phosphorus mass influent and effluent loads (influent data from 2007 – July 2013 are estimated total phosphorus loads based on effluent concentrations and estimated RWQCP percent removal).

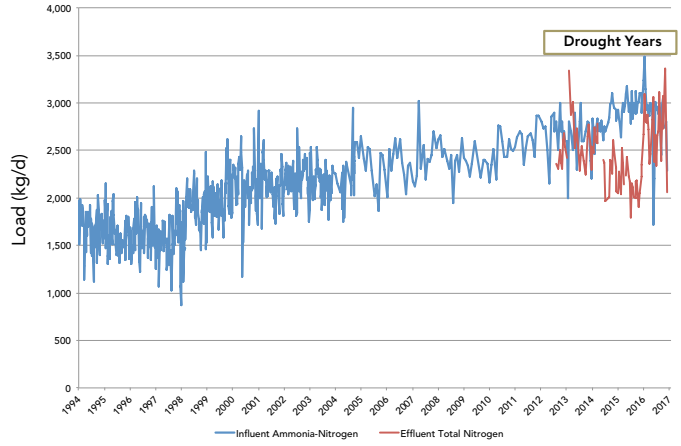


FIGURE II.C-5: Historical RWQCP total nitrogen mass influent and effluent loads. Influent ammonia-nitrogen is used as a surrogate for influent total nitrogen as the data is currently unavailable.

RWQCP NUTRIENTS POLLUTION PREVENTION HISTORY*

2016

- RWQCP completes the Phosphorus Evaluation: Regional Comparison and Projections;
- Bay Area Clean Water Agencies (BACWA) publishes Group Annual Report summarizing nutrient discharges to the Bay from the 34 wastewater treatment plants; and
- San Francisco Estuary Institute (SFEI) publishes the Lower South Bay Nutrient Synthesis summarizing known nutrient interactions within the subembayment.

2015

- RWQCP completes optimization evaluation of belt press filtrate, septage, and Renzel Marsh for nutrient removal; 21% of phosphorus and 40% of nitrogen incidentally removed in current process; Renzel Marsh may be optimized but needs further study;
- RWQCP completes optimization evaluation of Recycled Water Program and Phase II of Renzel Marsh; Recycled Water Program is identified as possible optimization option over marsh due to size and maintenance constraints; and
- BACWA published Group Annual Report summarizing nutrient discharges to the Bay from the 34 wastewater treatment plants.

2014

- Regional Board adopts the Nutrient Watershed Permit;
- RWQCP completes trunkline analysis of ammonia; no significant industrial dischargers are found despite a 17% increase in ammonia load between 2005 and 2014; major nitrogen species entering RWQCP are found to be ammonia and organic nitrogen;
- RWQCP constructs magnesium hydroxide addition system to counter insufficient alkalinity in nitrification process and subsequent pH decreases; and
- BAPPG publishes Source Reduction and Related Strategies to Reduce Nutrient Loading to San Francisco Bay report.

2012

- San Francisco Bay Regional Water Quality Control Board (Regional Board) implements Water Code Section 13267 Technical Report Order; requires municipal wastewater dischargers to collect and report nutrient concentrations and mass loadings; and
- RWQCP completes Long Range Facilities Plan.

2011

- RWQCP completes Ammonia Characterization Study; indicating receiving waters meet water quality objectives for ammonia.

1980

- RWQCP constructs nitrification processes to transform ammonia to nitrate prior to discharge.

*Refer to the 2016 Clean Bay Plan for more information.

LOOKING FORWARD

In 2017, the RWQCP will continue to work with BACWA, SFEI, and the Regional Board to continue research and fully inform the next versions of the Nutrient Watershed Permit. As part of this ongoing effort, the RWQCP will:

- continue to collect nutrient data;
- continue to participate in the San Francisco Bay Nutrient Management Strategy;
- participate in the reconvened California Association of Sanitation Agencies Watershed Approach to Nutrients Focus Group;
- engage Stanford University and consultants in research partnership opportunities;
- re-evaluate the RWQCP nutrient removals and characterization now that a larger dataset has been compiled;
- evaluate incidental denitrification that may be occurring within the existing wastewater treatment process;
- identify where in the treatment process phosphorus is removed;
- evaluate historical phosphorus data for impacts from detergent bans; and
- finalize the Nutrient Load Reduction Alternatives Cost Comparison evaluation that began in 2016.

D. RWQCP'S RECYCLED WATER PERMIT

PERMIT DETAILS

The San Francisco Bay Regional Water Quality Control Board (Regional Board) adopted the Water Reclamation Requirements for the Regional Water Quality Control Plant (RWQCP), Order No. 93-160, otherwise referred to as the Recycled Water Permit, in 1993. The Recycled Water Permit ensures that the quality of the recycled water produced by the RWQCP meets strict standards for biochemical oxygen demand, dissolved oxygen, dissolved sulfide, turbidity, total coliform bacteria and chlorine residual. The Recycled Water Permit also restricts the use of recycled water to appropriate applications such as landscape irrigation, industrial cooling water, decorative fountains, and toilet flushing. Applications for the use of recycled water are reviewed by the RWQCP, and sometimes by the State Water Resources Control Board Division of Drinking Water, for appropriateness.

In addition to the permit, the City of Palo Alto adopted a Recycled Water Salinity Reduction Policy in 2010 with the ultimate goal of reducing salinity to below 600 mg/L of total dissolved solids (TDS).

ENVIRONMENTAL CONCERNS

Recycled water is a safe, environmentally sustainable alternative to potable (drinking) water for non-potable applications. Recycled water contains salinity, for which TDS is a surrogate parameter, mainly from drinking water contents that are expelled through human waste and from saline groundwater inflow and infiltration (I&I) into broken/aging sewer pipelines. At elevated levels, salinity can negatively impact salt-sensitive vegetation as well as limit the use of recycled water in industrial cooling towers. Recycled water also contains chlorine from the disinfection process that could make it harmful to aquatic life if applied or spilled in a waterbody. As such, the application of recycled water is highly regulated and spills are reported immediately to the regulators.

2016 PROGRAM UPDATES (DATA)

1. RECYCLED WATER USE

In 2016, the RWQCP produced 217.8 million gallons per day (mgd) of recycled water, a one percent decrease from the previous year (**Figure II.D-1**). Despite relatively equal usage, active recycled water use permits increased by 40 percent, from 61 to 85 permits in 2015 and 2016 respectively. This data suggests that customer demand has increased over the year but usage has been tempered by increases in water efficiency practices. RWQCP staff conducted 13 inspections of the current recycled water users and found no major enforcement issues. Refer to the 2016 Annual Recycled Water Report for further information.

Although not reflected in the current recycled water use statistics, RWQCP staff worked very hard in 2016 to expand the Recycled Water Program. In particular, RWQCP staff worked closely with the City of Mountain View and the Santa Clara Valley Water District to evaluate appropriate technologies to be added to the treatment process for TDS reduction through the Advanced Water Purification System Feasibility Study as well as evaluating regional expansion opportunities through the Northwest County Recycled Water Strategic Plan. Both projects were advanced in 2016 but not finalized.

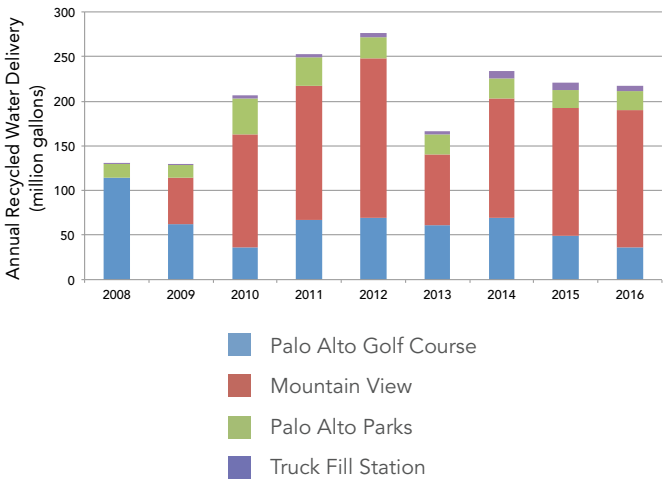


FIGURE II.D-1: Historical RWQCP Recycled Water Production.

2. SALINITY

In 2016, the RWQCP in collaboration with HortScience, Inc. completed a multi-year study of the impacts of recycled water irrigation on coast redwood trees located within the City of Mountain View. Redwoods have survived in this area on potable water despite not being native to the area or naturally adapted to the hot, dry climate. Ten trees were monitored during this study: three irrigated with potable water and seven irrigated with recycled water. This study found that after being irrigated with recycled water for six years, and concurrent with a multi-year drought, studied redwood trees irrigated with recycled water showed moderate to severe foliage damage and defoliation (**Figure II.D-2**). Foliage damage was attributed to salts in the foliage from recycled water irrigation. Gypsum

Site #7: Potable water

Site #8: Recycled water

FIGURE II.D-2: Foliage damage from salt content of recycled water used to irrigate redwood trees in the City of Mountain View.

treatments temporarily reduced the impacts from recycled water irrigation but were not sufficient to reduce the severity of the tree damage. Refer to the Redwood Tree Monitoring Study Factsheet for more information, **Appendix O**.

Since 2010, the RWQCP and its partner cities have repaired and replaced sewer pipelines to decrease the amount of salts entering via I&I. Cumulatively, these efforts reduced recycled water salinity by roughly 15 percent (**Figure II.D-3**). In 2016, the City of Palo Alto continued this effort by performing additional conductivity testing on a large 72-inch diameter interceptor located near the Baylands. A large source of saline groundwater infiltration, estimated between 30 to 40 gallons per minute, was found as a result of the testing. The groundwater is slightly saltier than Bay water and efforts are underway to repair the problem in early 2017.

In addition, RWQCP staff also collaborated with ReNew Water,

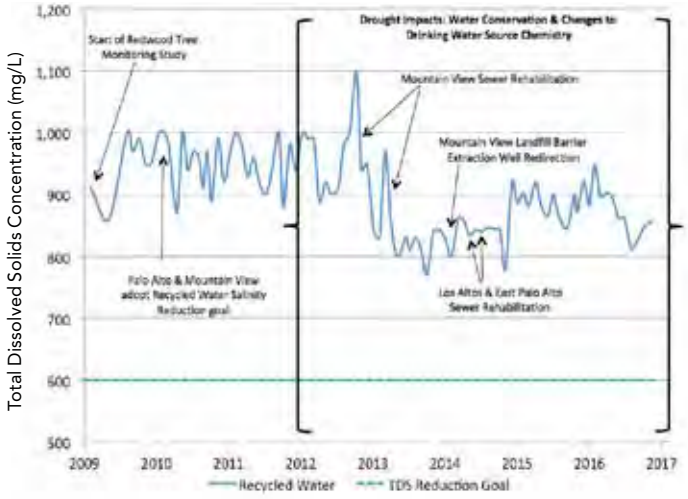


FIGURE II.D-3: Historical RWQCP recycled water TDS concentrations.

FIGURE II.D-4: RWQCP staff conducting evaluation of the 72" Trunkline for saline groundwater inflow & infiltration.

LLC. to conduct a third reverse osmosis pilot project. Reverse osmosis is one technology that is currently being evaluated for use at the RWQCP to reduce TDS in recycled water. This pilot project is evaluating different pretreatment options that would provide easier and more consistent operations and maintenance of the reverse osmosis membranes. The pilot began in 2016 and will be completed in 2017.

LOOKING FORWARD

In 2017, the RWQCP will continue to strive for expansion of the Recycled Water Program. As part of this ongoing effort, the RWQCP will:

- continue to collaborate with other municipalities and the Santa Clara Valley Water District on the Northwest County Recycled Water Strategic Plan to evaluate regional expansion opportunities;
- finalize the Advanced Water Purification System Feasibility Study to determine appropriate technology for TDS removal at the RWQCP;
- complete the third reverse osmosis pilot project;
- update the RWQCP and City of Palo Alto websites for enhanced public outreach on recycled water;
- finalize the Recycled Water Factsheet for public outreach;
- continue to promote and run the Recycled Water Truck-Fill Stations;
- inspect recycled water permittees for appropriate use; and
- perform additional conductivity testing of 72-inch Trunkline.

RWQCP RECYCLED WATER PROGRAM HISTORY*

2016

- RWQCP completes analysis of 72" Trunkline conductivity testing and provides information to Engineering department to facilitate repair of infiltration identified.
- Redwood Tree Monitoring Study is completed; indicates that redwood trees irrigated with recycled water are showing signs of salt damage.
- RWQCP starts 3rd reverse osmosis pilot project to evaluate pretreatment options

2015

- Environmental Impact Report for Recycled Water Pipeline Expansion to Stanford Research Park (Phase 3) is completed.

2014

- City of Mountain View Landfill Barrier Extraction Well Removal Project removes two wells that previously discharged saline water into the sewer;
- EPASD replaces sewer mains on several streets to address saline groundwater intrusion problem and repairs leak at the bottom of a manhole on their main trunkline, which was allowing saline groundwater to enter the sewer;
- City of Los Altos Trunk 101 to Meter Station sewer rehabilitation; and
- RWQCP completes 2nd reverse osmosis pilot project that evaluates hydrogen peroxide as a biofouling control agent.

2013

- City of Mountain View Shoreline Sewer Rehabilitation Project repairs sewer lines with known infiltration of saline groundwater.

2012

- Beginning of the California Drought.

2010

- City of Palo Alto passes a Recycled Water Salinity Reduction Policy, with goal of lowering TDS to less than 600 ppm; and
- RWQCP completes 1st reverse osmosis pilot project that evaluates total dissolved solids reduction ability of reverse osmosis.

2009

- New recycled water pipeline to Mountain View is constructed (Phase 2);
- Redwood Tree Monitoring Study starts to monitor the effects of recycled water irrigation on redwood trees in the Mountain View Shoreline area; and
- Infiltration and Inflow Conductivity Study of the wastewater collection system is started.

2008

- City of Palo Alto passes Recycled Water Ordinance;
- Initial Study and Mitigated Negative Declaration for the Recycled Water Pipeline Expansion to Stanford Research Park (Phase 3) is completed; and
- Recycled Water Pump Station is upgraded; goal to deliver 489 million gallons of recycled water.

2007

- Facility Plan for Recycled Water Pipeline Expansion to Stanford Research Park (Phase 3) is completed.

2005

- Recycled Water Market Survey is completed.

1995

- City Council certifies the Programmatic Environmental Impact Report for the Master Plan projects.

1993

- Recycled water pipeline extends to the Palo Alto Golf Course and Palo Alto's Municipal Services Center yard (Phase 1).

1992

- Water Reclamation Master Plan is completed.

1990

- Recycled water extends to Greer Park (Phase 1).

1986

- Beginning of Palo Alto's Recycled Water Program; and
- SCVWD decommissions advanced treatment system and sells recycled water treatment facility to Palo Alto; Palo Alto continues to operate recycling facilities for landscape irrigation in Mountain View.

1975

- Santa Clara Valley Water District (SCVWD) builds recycled water facility at the RWQCP which produces highly treated water for groundwater recharge and lesser treated water for landscape irrigation.

*Refer to the 2016 Clean Bay Plan for more information.

E. AIR REGULATIONS

PERMIT DETAILS

The Regional Water Quality Control Plant (RWQCP) requires the use of energy and equipment that emits air pollution in its daily treatment of wastewater. This equipment, also referred to as stationary sources of air pollution, includes emergency generators, the sewage sludge incinerators, and heating/cooling of office buildings. In addition, the wastewater itself can emit certain air pollutants during treatment. For example, mercury that is removed from the wastewater by settling with the solids will be burned in the sewage sludge incinerators and can become air-borne mercury. Consequently, the RWQCP has a Permit-to-Operate (PTO) issued by the Bay Area Air Quality Management District (BAAQMD). The PTO restricts equipment operation in such a manner as to limit the amount of air pollution emitted. In comparison to other industrial facilities, the RWQCP is a low air pollution emitter and does not qualify as a Major Source Facility per BAAQMD definitions. Despite this, the RWQCP had to apply for a United States Environmental Protection Agency (U.S. EPA) Title V Major Facility Review Permit (Title V Permit) due to the new federal sewage sludge incinerator regulations. The new federal sewage sludge incinerator (SSI) regulations are not in the RWQCP PTO but will be once the Title V Permit is issued. The RWQCP submitted a Title V Permit Application in 2014 and has been working with the BAAQMD to finalize the permit. In the meantime, the RWQCP has complied with the SSI regulation that includes meeting strict new emission limits, annual testing, annual training, and many other documentation and reporting requirements.

Currently greenhouse gas (GHG) emissions are not covered by the RWQCP PTO; however, current federal and state GHG emissions reporting requirements will be included in the Title V Permit. Despite not being covered by the PTO, the RWQCP has been reporting its GHG emission inventory to both the federal and state governments per the U.S. EPA and California Air Resources Board (CARB) mandatory GHG reporting regulations. Additionally, the City of Palo Alto as a whole (including the RWQCP) has voluntarily reported its GHG emissions since 2005 to the California Climate Action Registry and the Climate Registry. Since 2007, the City of Palo Alto has had progressive sustainability goals that have included significant decreases in GHG emissions both from the community and municipal operations.

ENVIRONMENTAL CONCERNS

Air pollution can take many forms and have different environmental impacts based on the specific pollutants that make up the air pollution in that area. Environmental impacts of air pollution include the formation of acid rain from sulfur dioxide and nitrogen oxides emissions; smog from ozone, sulfur dioxide, nitrogen oxides, and particulate matter emissions; as well as inducing man-made climate change and associated sea level rise from GHG emissions of carbon dioxide, nitrous oxide, and methane. In addition to environmental impacts, air pollution has been linked to many serious health conditions, including strokes, heart disease, lung cancer, and respiratory diseases such as asthma.[1]

Air pollution can come from both human activities (anthropogenic) and natural sources (biogenic). Air pollutants of greatest concern for the San Francisco Bay Area are ozone (and its precursors nitrogen oxides, carbon monoxide, and volatile organic compounds), fine particulate matter, toxic pollutants associated with diesel engine exhaust, and GHGs.[2]

2016 PROGRAM UPDATES

1. OZONE PRECURSORS

The RWQCP PTO requires annual emission testing for nitrogen oxides (NOx) and non-methane organic compounds (NMOC), which includes volatile organic compounds. NOx emissions from the sewage sludge incinerators are tested annually and then added to estimates of NOx emissions from the emergency generators. In 2016, the RWQCP total NOx inventory was 34 tons per year, just under the PTO limit of 35 tons per year. Similarly, in 2016, Sewage Sludge Incinerator No. 1 NMOC emissions were 8.7 parts per million, volume basis, dry, as methane at three percent oxygen (ppmvd as CH4 @ 3% O2), well below the 20 ppmvd as CH4 @ 3% O2 PTO limit.

[1] World Health Organization. "Ambient (outdoor) air quality and health." September 2016. Web (http://www.who.int/mediacentre/factsheets/fs313/en/). 22 December 2016.

[2] Bay Area Air Quality Management District. "About Air Quality." 12 December 2016. Web (http://www.baaqmd.gov/about-air-quality). 22 December 2016.

2. FEDERAL SEWAGE SLUDGE INCINERATOR REGULATION

Clean Air Act, Section 129 (CAA 129) required the U.S. EPA to develop and adopt emission limits for solid waste incineration units, including sewage sludge incinerators. The emission limits applicable to existing sewage sludge incinerators became effective in 2016. As a result, 2016 held many new air regulatory challenges for the RWQCP. The RWQCP tested the emissions from both sewage sludge incinerators in 2016 and found that both were well below the new emission limits for all CAA 129 pollutants (**Table II.E-1**). In addition to the new air pollutant emission limits, many new administrative and operating requirements became effective. For example, the RWQCP now has limits on key operating parameters of the incinerators' air pollution control devices, specifically wet scrubber flow, pH, and pressure drop as well as afterburner temperature. These operating limits are to act as surrogates for, and in place of continuous monitoring of, air pollutant emissions to prove compliance throughout the year. In 2016, the RWQCP had six reportable noncompliance events under CAA 129: four were for use of the emergency incinerator bypass stack and two were for instances when the wet scrubber effluent pH dropped below the minimum limit. None resulted in violations or enforcement actions. Refer to the CAA 129 Annual Compliance Report for further information.

3. GREENHOUSE GASES

In 2016, the City of Palo Alto adopted a new goal to further reduce the City's GHG emissions, including that emitted by residential, commercial, and municipal operations, by 80 percent from 1990 levels (a new baseline) by 2030, also referred to as the "80 x 30" goal. The RWQCP emitted approximately 17,000 metric tons (MT) of carbon dioxide equivalents (CO2e) in 2016 as calculated by the Local Government Operations Protocol, Version 1.1 (2010). Note that these values differ from

TABLE II.E-1: SEWAGE SLUDGE INCINERATOR EMISSIONS TEST RESULTS AS COMPARED TO FEDERAL SEWAGE SLUDGE INCINERATOR EMISSION LIMITS

Air Pollutant	CAA 129 Emissions Limit	2016 Incinerator No. 1		2016 Incinerator No. 2	
		Average Source Test Result*	% of Limit	Average Source Test Result*	% of Limit
Cadmium (mg/dscm @ 7% O_2)	0.095	0.01	11	0.011	12
Carbon Monoxide (ppmvd @ 7% O_2)	3,800	1,243	33	315	8
Hydrogen Chloride (ppmvd @ 7% O_2)	1.2	0.75	63	0.79	66
Mercury (mg/dscm @ 7% O_2)	0.28	0.046	16	0.042	15
Nitrogen Oxides (ppmvd @ 7% O_2)	220	205	93	148	67
Lead (mg/dscm @ 7% O_2)	0.30	0.055	18	0.091	30
Dioxins/Furans - Total Equivalency Basis (ng/dscm @ 7% O_2)	0.32	0.02	6	0.0028	1
Dioxins/Furans - Total Mass Basis (ng/dscm @ 7% O_2)	5	0.24	5	0.091	2
Particulate Matter (mg/dscm @ 7% O_2)	80	21	26	26	32
Sulfur Dioxide (ppmvd @ 7% O_2)	26	7.3	28	1.8	7
Fugitive Emissions from Ash Handling (%)	5	0	0	0	0

[1] World Health Organization. "Ambient (outdoor) air quality and health." September 2016. Web (http://www.who.int/mediacentre/factsheets/fs313/en/). 22 December 2016.

[2] Bay Area Air Quality Management District. "About Air Quality." 12 December 2016. Web (http://www.baaqmd.gov/about-air-quality). 22 December 2016.

that reported to CARB and U.S. EPA due to the inclusion of different emission sources as well as the use of different emission factors, high heat values, and/or global warming potentials. **Figure II.E-1** shows more than 60 percent decrease in RWQCP total GHG emissions since 1990; while **Figure II.E-2** shows that the conversion of nitrogen within the wastewater to nitrous oxide gas once it hits the Baylands (or Baylands Conversion) was the major RWQCP anthropogenic GHG source. GHG emissions are projected to decrease significantly once the incinerators are decommissioned. In 2016, the design of the sludge dewater and haul facility was completed and the RWQCP is on track for incinerator decommissioning by 2019. Refer to the *Internal Greenhouse Gas Report – Emission Year 2016* for further information.

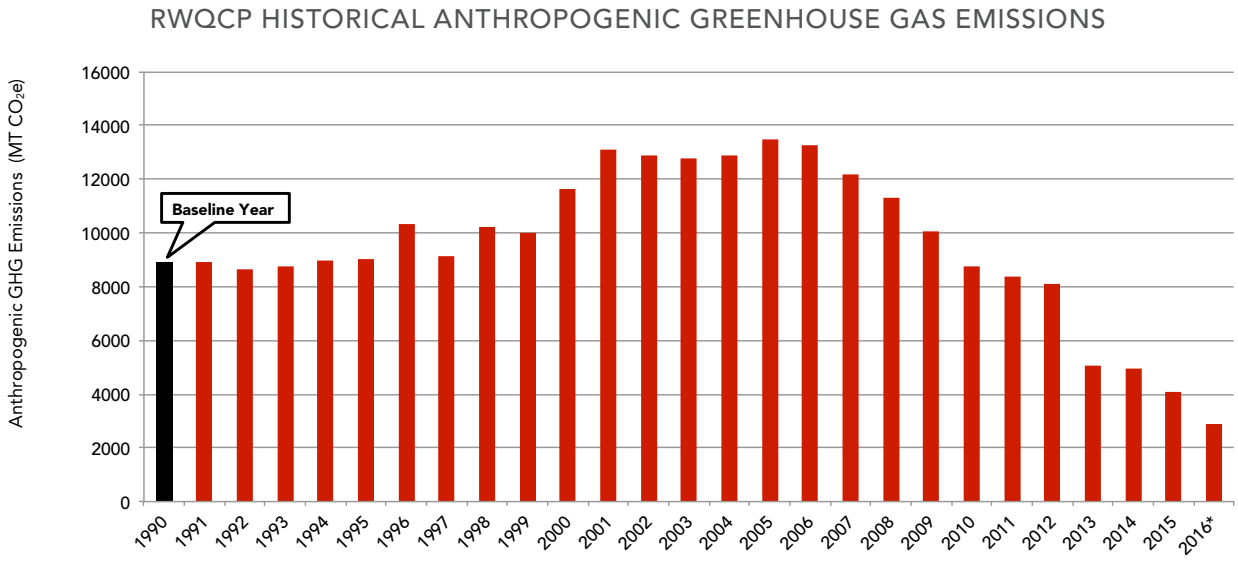


FIGURE II.E-1: RWQCP Historical Anthropogenic GHG Emissions.

Also conducted in 2016 was the Energy Evaluation of Treatment Processes, 2015 – 2016 that identified the wastewater treatment processes that utilized the most electricity; data showed that the aeration basin blowers, fixed film reactors, and sewage sludge incinerators are the largest electricity users at the RWQCP (**Figures II.E-3 and 4**). Since 2013, the RWQCP has been using 100 percent green (carbon neutral) electricity that has no GHG emissions associated with it, so there are no GHG implications from this evaluation. However, efficient electricity use is important for reducing costs and promoting sustainability. *Refer to the Energy Evaluation of Treatment Processes, 2015 – 2016* or the associated factsheet for further information including seasonal, weekly, and diurnal variability in electrical usage.

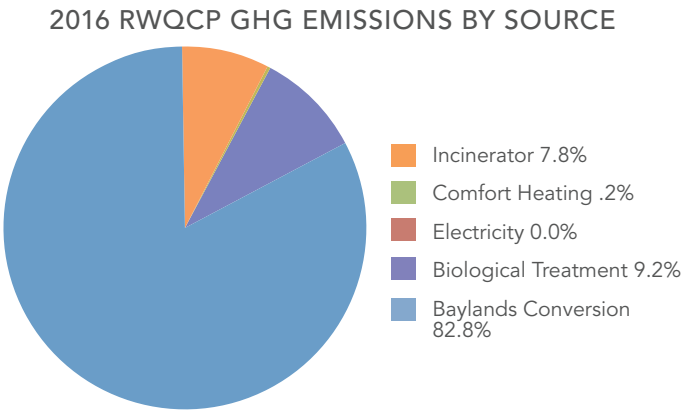


FIGURE II.E-2: RWQCP Anthropogenic Greenhouse Gas Emissions By Source

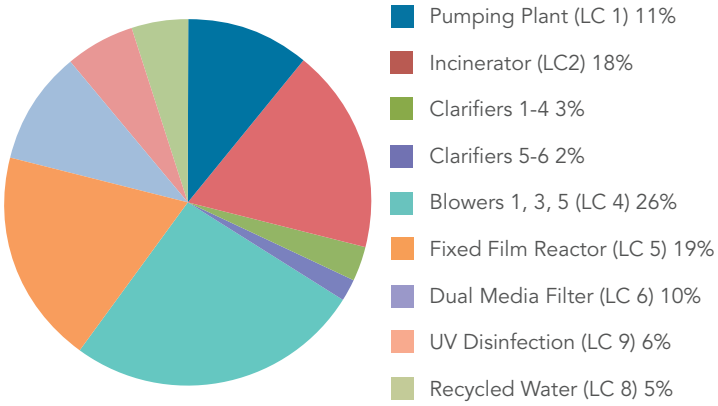


FIGURE II.E-3: 2015 – 2016 RWQCP Electricity Use by Treatment Process

**Power meter was not installed at the Recycled Water Plant. Utility bills, rather than power meter data, were used to estimate electricity use at the Recycled Water Plant.*

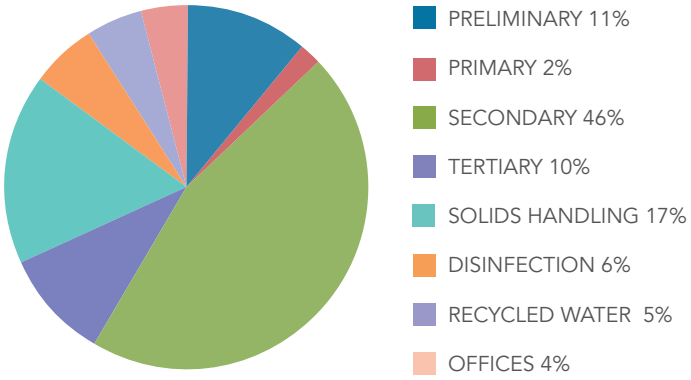


FIGURE II.E-4: 2015 – 2016 RWQCP Electricity Use by Treatment Process Type

4. SEA LEVEL RISE RESPONSE

In 2016, Palo Alto continued participation in regional partnerships that coordinate sea level rise planning, funding and responses. Groups included the Coastal Hazards Resources Agency (CHARG) meetings, Strategy to Advance Flood Protection, Ecosystems and Recreation (SAFER) meetings, and Joint Venture Silicon Valley working groups of cities, counties, and other stakeholders. RWQCP and Public Works–Engineering staff also met with the City of Mountain View to discuss coordination of levy enhancements in the Palo Alto and Mountain View border.

Locally, RWQCP staff provided a City Council study session on sea level rise planning, in May 2016. In November 2016, Palo Alto's City Council unanimously adopted a Sustainability and Climate Action Plan (S/CAP) Framework. The Framework included Palo Alto's sea level rise strategies which are to:

- build resilience considerations into City planning and capital projects, policies, and building codes, especially near the San Francisco Bay Shoreline;
- ensure appropriate forecasting of water supply and energy security into the future;
- optimize and preserve ecosystem services to reduce flooding and sea level rise;
- secure funding for coastal protection projects;
- adopt policies to support adaptation;
- consider managed retreat where needed or where opportunities present; and
- participate in regional alliances for policy advocacy.

LOOKING FORWARD

In 2017, the RWQCP will continue to strive for compliance with its many air regulations. In particular, the RWQCP will:

- continue to work with the BAAQMD in finalizing its Title V Permit;
- test Sewage Sludge Incinerator No. 2 emissions for PTO and CAA 129 compliance;
- reset the operating parameter limits for Sewage Sludge Incinerator No. 2;
- continue to make progress in decommissioning the incinerators by 2019;
- commence construction of the sludge dewater and haul facility;
- continue to track, report, and evaluate GHG emissions and energy usage for optimization opportunities;
- collaborate with regional sea level rise efforts including tracking the Local Hazard Mitigation and Adaptation Plan and new FEMA Flood Insurance Rate Maps;
- coordinate City of Palo Alto sea level rise adaptation efforts;
- assess Palo Alto's specific sea level rise and climate risks;
- develop a sea level rise policy in 2017;
- develop an implementation plan in 2017 for sea level rise tasks outlined in the S/CAP;
- ensure sea level rise is included in the City's Comprehensive Plan Update; and
- modify zoning and floodplain ordinances as needed.

RWQCP AIR POLLUTION PREVENTION HISTORY*

2016
- City of Palo Alto adopts new GHG reduction goals under the Sustainability and Climate Action Plan and related sea level rise adaptation strategies;
- Evaluation of RWQCP energy usage by treatment process;
- Evaluation of new GHG baseline (1990) for emission comparisons;
- New federal sewage sludge incinerator regulations becomes effective; and
- Participates in regional and local sea level rise planning.

2015
- RWQCP begins reporting its GHG emissions to the U.S. Environmental Protection Agency;
- RWQCP begins purchasing green (carbon neutral) natural gas;
- Evaluates incinerator afterburner landfill gas use; and
- 41% decrease in the RWQCP total GHG emissions since 2005.

2014
- Installs individual power meters throughout the treatment process to identify efficiency opportunities;
- Submitted Title V Permit Application due to new federal Sewage Sludge Incinerator regulations; and
- Replaces two old emergency generators with new ones.

2013
- RWQCP begins reporting its GHG emissions to the California Air Resources Board; and
- Decommissions two old emergency generators.

2012
- Installs new aeration basin process control system; and
- City of Palo Alto meets initial GHG reduction goals.

2011
- RWQCP evaluates GHG emissions from disposal of household food waste;
- Begins annual tuning of incinerators for efficient fuel usage; and
- New federal sewage sludge incinerator regulations are codified.

2010
- Evaluation of wastewater flowrate on electricity demand;
- RWQCP installs solar panels to offset increased energy demand from ultraviolet disinfection;
- City of Palo Alto begins reporting its GHG emissions to the Climate Registry; and
- City of Palo Alto adopts updated Climate Protection Plan with new GHG reduction goals.

2009
- RWQCP evaluates process emissions and equipment electricity usage (largest energy users were aeration basin blowers, trickling filter lift pumps, and raw sewage pumps).

2007
- City of Palo Alto adopts Climate Protection Plan with GHG reduction goals.

2006
- RWQCP purchases green (carbon neutral) electricity.

2005
- Starts use of landfill gas (a biogenic fuel) in place of natural gas in the incinerator afterburner.

1999
- Incinerator Rehabilitation Project begins, which includes upgrades to air pollution control devices.

1985
- Centrifuges are replaced with belt press filters for sludge dewatering prior to incineration.

1972
- RWQCP builds sewage sludge incinerators.

*Refer to the 2016 Clean Bay Plan for more information.

F. SAN FRANCISCO BAY MUNICIPAL REGIONAL STORMWATER NPDES PERMIT

PERMIT DETAILS

The City of Palo Alto must adhere to requirements addressed in the 2015 Municipal Regional Stormwater NPDES Permit (MRP) (Order No. R2-2015-0049, NPDES Permit No. CAS612008), a San Francisco Bay Area-wide permit issued by the San Francisco Bay Regional Water Quality Control Board (Regional Board). The Permit requires a Stormwater Management Plan to reduce the discharge of pollutants to the maximum extent practicable (MEP), the performance standard in the Federal Clean Water Act (CWA) Section 402(p).

The Regional Board has identified particular activities and pollutants in the MRP that the City must address in order to manage discharges into creeks, the Bay, and other waterbodies. Activities that must be regulated and monitored by the City of Palo Alto include, but are not limited to:

- private and public development and construction;
- municipal infrastructure maintenance;
- industrial and commercial businesses (e.g., restaurants and auto servicing);
- illegal (illicit) dumping or discharges;
- creek/watershed monitoring; and
- pesticide application.

In addition, requirements are listed regarding the following pollutants and the amount of each that can be discharged to the Bay: trash; polychlorinated biphenyls (PCBs); mercury; copper; and pesticides. Despite these specificities, only rain is allowed in the City's stormwater conveyance systems, also known as the municipal separate storm sewer system (MS4), and creeks.

Due to the high levels of particular pesticides and trash in sections of the San Francisco Bay, the State has placed both on its 303(d) List, California's list of impaired waters, and therefore identifying the Bay as 'impaired" to these pollutants. More information can be found at swrcb.ca.gov/rwqcb4/water_issues/programs/303d_list.shtml. As a result, the Regional Board has identified amounts of certain pesticides that can be discharged to the Bay by adopting a total maximum daily load (TMDL) in November 2005 to address pesticide toxicity in Bay Area urban creeks. The CWA defines a Total Maximum Daily Load (TMDL) as a value of the maximum amount of a pollutant (e.g., pesticide) that a body of water can receive while still meeting water quality standards.

The City of Palo Alto partners with regional efforts to reduce both stormwater and wastewater sources of pesticide pollution in Bay Area creeks and San Francisco Bay to meet TMDL requirements. Through these efforts, the City has maintained an award-winning integrated pest management program.

The State has also identified particular creeks that flow through the City as highly impacted in regards to trash. In 2009, the Regional Board listed Matadero and San Francisquito Creeks on the 303(d) list for trash, indicating the need for particular focus on these watersheds as well the section of the Bay in which they discharge. Furthermore, in November 2015, the Regional Water Board's reissuance of the updated MRP included requirements to reduce trash loads from MS4s of all permittees (e.g., Santa Clara, San Mateo, Alameda, and Contra Costa Counties, as well as the Fairfield-Suisun and Vallejo areas). These municipalities must reduce trash loads to the Bay by 70% (as compared to their estimated baseline load) by 2017, 80% by 2019, and 100% (or no adverse impact) by 2022. The City's trash reduction plan consists of various activities to reduce trash loads and meet these compliance goals. Activities include source control efforts such as product bans and outreach; trash removal from the MS4 and receiving water bodies such as litter booms and full trash capture devices; and staff and volunteer clean ups on-land and in creeks.

ENVIRONMENTAL CONCERNS

A watershed is an area of land that drains rain to a single point, such as a creek or other waterbody. In forested or unpaved areas, rain falls on trees and vegetation and replenishes groundwater aquifers by infiltrating into the soil. In a non-urban watershed, rainwater is slowly discharged to downstream creeks where surface water generally flows downhill from higher elevation points. However, in urban watersheds, rain travels rapidly via paved surfaces such as roads, driveways, rooftops, and parking lots (i.e., stormwater runoff). Once on paved surfaces, rain flows to gutters and ditches and into storm drain inlets, entering the MS4. The MS4 drains stormwater runoff to receiving waters rapidly to minimize flooding. However, rainwater first picks up various pollutants from the paved areas throughout the City, which travel directly to our local creeks and the Bay without any treatment.

The RWQCP Staff are particularly concerned about pollutants that originate from residential, commercial and industrial sources. These include trash, fertilizers, automotive fluids, pesticides, sediment, hazardous materials, cleaning supplies, and wash waters. As a permittee, the City must enforce the MRP in order to minimize stormwater runoff impacts and prevent these pollutants from discharging into our local creeks and Bay.

2016 PROGRAM UPDATES

1. PESTICIDES

REGULATORY ACTION

Pesticides reach the sanitary sewer system via stormwater inflow, indoor application, post-application cleanup, laundry graywater, human waste, food waste, hazardous waste management and water supply. In 2016, the highest pesticide priority for Bay Area wastewater treatment plants was source control research for fipronil and pyrethroids. Fipronil is a Contaminant of Emerging Concern (CEC). Fipronil and pyrethroids are often found in lice, flea and other household pest treatments. Their application usually requires people and pets to wash the products off after application and/or laundry, resulting in these active ingredients entering wastewater. RWQCP supported consultants who engaged in scientific and management conversations with both the Environmental Protection Agency (U.S. EPA) and Department of Pesticide Regulation (DPR) regarding new scientific evidence linking pet flea control treatments and fipronil and imidacloprid in wastewater treatment plant effluent.

RWQCP also partners with other publicly owned treatment works (POTWs) throughout the Bay Area to address pesticide pollution through state and federal pesticide regulatory review. This is usually coordinated through the Bay Area Pollution Prevention Group (BAPPG) – a committee of Bay Area Clean Water Agencies (BACWA). Actions to date include: educating staff from DPR and U.S. EPA about local pesticide pollution data and concerns, recommending analytical processes, and submitting comment letters during the pesticide re-registration process through BAPPG.

In 2016, BAPPG submitted comment letters to the U.S. EPA explaining the pesticide transport route to the sanitary sewer and related scientific studies for priority pesticides. These included:

- Malathion: a pesticide used for lice treatment that may impact activated sludge systems. The letter identified this indoor use that was not included in the draft analysis. It also included detailed comments on a problematic new pesticide risk assessment format, including a discussion identifying the need for a typical risk assessment in addition to the Endangered Species Act biological evaluation that was submitted for public comment.
- Spinetoram: a pesticide used in a spot-on treatment for cats.
- Flumethrin: a pesticide in pet collars.

More discussion regarding the data collection is in the Emerging Contaminants Section of this report.

CITY OF PALO ALTO INTEGRATED PEST MANAGEMENT

Since 2001, the City of Palo Alto's integrated pest management (IPM) policy and program has quantified pesticides used at all City operations. The program strives to reduce pesticides that are used in large amounts, specifically ones that pose water quality and other environmental impacts. A tier system evaluates the chemical toxicity of chemicals used, which considers: (1) acute human toxicity and chronic health risks; (2) the level of training required to use the product; (3) inclusion of Clean Water Act (303d) listed chemicals; (4) environmental toxicity; and (5) a chemical's persistence and mobility in soil. Tier 1 chemicals are of highest concern, Tier 2 are of moderate concern, Tier 3 are of lowest concern, and Tier 4 are chemicals for which there is insufficient information to analyze their toxicity. The City does not use spray insecticides for structural pest control, which are a primary contributor to urban creek toxicity throughout the State, on its property. The City was also the first agency to require EcoWise certification, which sets rigorous standards to reduce environmental and human health toxicity, for its structural pest control contractors. Palo Alto received the Department of Pesticide Regulation IPM Innovator Award in both 2003 and 2011.

REGIONAL PARTICIPATION IN THE OUR WATER, OUR WORLD PROGRAM

The Our Water, Our World (OWOW) program is a consortium of local water pollution prevention agencies and the nine-member Bay Area Stormwater Management Agencies (BASMAA), working to protect local creeks and San Francisco Bay from pesticide pollution. Established in 1997, OWOW raises awareness about the connection between residential pesticide use and water quality. The program provides consumers with:

- Seventeen pest and gardening fact sheets in English and Spanish that are annually updated for product changes;
- A state-wide network of hardware and garden supply stores that carry pest management fact sheets, "shelf talker" tags that identify less-toxic products for sale, and OWOW-trained staff trained to answer common customer pest control questions; and
- A comprehensive ourwaterourworld.org website and an Ask the Expert Service, which allows residents to submit specific pest control questions to pest management experts at the Bio-Integral Resource Center.
- OWOW is promotion by participating agencies at special events, workshops and participating stores.

Six stores within the RWQCP service area participate in the OWOW program. The RWQCP continues to contribute both monetary and staff support to OWOW. In 2016 staff also:

- Assisted with 2016 OWOW rebranding and material updates;
- Assisted SCVURPP in restocking OWOW materials at stores;
- Distributed OWOW information at special events, including Earth Day, neighborhood gatherings, and gardening workshops;
- Maintained Cleanbay.org and Baywise.org with current OWOW program information; and
- Provided pest management advice to RWQCP residents.

LOCAL RESIDENTIAL IPM WORKSHOPS

In 2016 the City of Palo Alto held three IPM workhops - two in partnership with Common Ground Garden and one at SummerWinds Nursery. Thirty people in total attended the workshops. In addition, the County's Master Gardener program continued to offer IPM workshops in north Santa Clara County that are available to RWQCP service area residents.

ECOWISE CERTIFIED

Green Gardener Program

EcoWise Certified is an IPM certification for structural pest control operators. Since 2007, the City has required its structural pest control contractor to be EcoWise Certified (or comparable with City approval). The City is scheduled to hire a new IPM structural pest control contractor in 2017. Palo Alto assists with local outreach about IPM service providers as EcoWise graduates become available. Currently, seven companies with 12 branches in total are certified. The City will continue to provide outreach to residents encouraging EcoWise-Certified pest control companies.

ECO GARDENER AND GREEN GARDENER PROGRAMS

Eco Gardener is a project of the Santa Clara County Recycling and Waste Reduction Technical Advisory Council in collaboration with water quality agencies. Eco Gardener maintains the website bayareaecogardens.org to centralize numerous environmentally-friendly gardening efforts occurring throughout Santa Clara County. The website provides a cost effective public education tool that is flexible to the needs and budgets of public agencies.

The Green Gardener Program is a training and certification program for small commercial landscapers and maintenance workers. In 2016, 37 students completed the training; 21 graduated from the Spanish class and 16 from the English class (the English language class is taught by RWQCP staff). The program is coordinated by SCVURPPP and consists of ten classes that emphasize water conservation, integrated pest management, waste reduction, soil protection and business practices. Because pesticide reduction relies on establishing healthy landscapes as the first step in pest prevention, the integrated course work aids regional pesticide reduction efforts. Participants who attend 80% of the classes and successfully complete an exam will receive a certificate of completion and a Santa Clara Valley Green Gardener Card. Information is available at mywatershedwatch.org.

HEALTHY BUILDINGS, HEALTHY FAMILIES IPM PILOT PROGRAM

In 2016, the City of Palo Alto, along with the cities of East Palo Alto, San Jose, San Pablo, and San Francisco, continued its participation in the Healthy Buildings, Healthy Families IPM Pilot Program. Working together with Pestec Pest Management and BASMAA staff, participating City representatives formed working relationships with building owners, property management companies, and tenants to evaluate the application of IPM in multi-family dwellings. The City's designated multi-family dwelling is a small two-building complex on Curtner Avenue in Palo Alto with 13 units. The buildings have a mixture of seniors, adults, and children living in either one or two bedroom units. Pests found in these units include cockroaches, mice, spiders, ants, and bed bugs. Participating complexes received:

- One year of free IPM services;
- Two cleaning supply kits with buckets and a new high-efficiency particulate air (hepa) vacuum cleaner (for communal use);
- Free minor building repairs to help exclude pests;
- A two-hour bilingual workshop for tenants, management, and maintenance staff about IPM principles and practices; and
- Documentation of the program's effectiveness at the end of the pilot.

To date, the monthly IPM services have shown a reduction in pest communities within the majority of units in the Palo Alto complex. The pilot also identified the importance of property management having keys for consistent access to the units during scheduled IPM services.

RWQCP PESTICIDE POLLUTION PREVENTION HISTORY*

2016
- Fipronil and pyrethroids pollution are a priority for the Bay Area POTWs;
- Regional collaboration on glyphosate (RoundUp™) response to the International Agency for Research on Cancer listing it as a probable carcinogen.

2015
- The U.S. EPA prepares a joint risk assessment for pyrethroids;
- A work group is formed to update the Our Water Our World (OWOW) program;
- The City begins participation in Health Buildings, Healthy Families Pilot Program.

2011
- Ecotoxic pesticide use recorded at a historic low;
- Poison rodent bait use discontinued;
- The City receives second DPR IPM Innovator Award;
- The City expands pesticide-free parks to include 12 parks and several facilities.

2010
- Palo Alto adopts Bay-Friendly Landscaping requirements for City landscape maintenance companies.

2009
- City of Palo Alto begins phasing in pesticide-free parks.

2007
- Palo Alto requires EcoWise Certified standards for its structural pest control contractor.

2005
- The Regional Board adopts a TMDL addressing diazinon and pesticide toxicity in Bay Area urban creeks.

2003
- The City receives the DPR IPM Innovator Award;
- RWQCP offers IPM workshops to its service area as an on-going program.

2001
- Organophosphate pesticides are banned from retail sale. Palo Alto coordinates collection event from stores; and
- City of Palo Alto IPM policy and program.

1997
- OWOW program is established. The City provides initial program funding, which provides consumers with information about less toxic pest control.

*Refer to the 2016 Clean Bay Plan for more information.

1. TRASH

REGULATORY ACTION

To reduce plastic litter, the City of Palo Alto has adopted single-use bag and plastic foam ordinances for City retailers and restaurants. It has also adopted an internal policy prohibiting use or purchase of single-use plastic bags, bottled water and plastic foam packaging. The impact of the Single Use Bag Ordinance, combined with those of surrounding communities, resulted in a 90% and 85% reduction of bag litter on streets and in Matadero Creek, respectively. Additional details are discussed in the 2015 Clean Bay Plan. In 2010, the City adopted an ordinance to restrict the use of expanded polystyrene and other non-recyclable disposable. In January 2016, City Council expanded this ordinance to prohibit the retail sale or distribution of plastic foam ice chests, packaging materials, foodware and egg cartons. The RWQCP Restaurant Inspection Program provides ordinance enforcement.

In 2016, the City of Palo Alto also:

- revised its Single-use Plastic Policy that addresses bottled water, plastic foam foodware, ice chests, and

plastic packaging. The policy now also prohibits vendor shipments of plastic foam and other non-recyclable plastic shipping packaging in goods purchased by the City. If plastic foam packaging is present, the vendor must take it back for disposal or recycling at no cost to the City, or pay City costs for disposal (See Appendix I–Single-use Plastic Policy);

- improved education and enforcement of the above policy. Petty cash forms and procurement procedures were revised to alert staff to the policy requirements.

RETHINK DISPOSABLES

In 2016, Palo Alto contracted with Clean Water Action to provide ReThink Disposables program services to Palo Alto restaurants. ReThink Disposables is an award-winning program that helps businesses reduce single-use disposable foodware and related packaging that are often associated with marine litter and non-recyclable solid waste. In the first year of its three year contract, ReThink will recruit businesses to participate and begin outreach. Additional businesses will be recruited in subsequent years.

BASE PROGRAMS FOR TRASH CONTROL

The City also operates the following trash control programs through various divisions:

- Street sweeping;
- Enforcement of litter laws;
- Trash, recycling, and organics collection and disposal; and
- Trash removal and clean-up of City parking lots, parks, and other City property
- Inspections of dumpster areas during food service establishment inspections.

STORMWATER TRASH MANAGEMENT PROGRAM

a. Participation in Creek Cleanups

Working in conjunction with the Creek Connections Action Group, the City participated in two creek cleanup events at both Matadero and Adobe creeks in 2016: the National River Cleanup Day on May 21st and the Coastal Cleanup Day on September 17th. Volunteer turnout for this year's National River Cleanup was higher than in 2015, with a total of 27 volunteers removing trash from both creeks. In addition, volunteer turnout for this year's Coastal Cleanup Day was also higher than in 2015, with a total of 33 volunteers cleaning both creeks.

All trash removed during the creek cleanup is categorized and tallied. At the completion of the event, trash is bagged,

and a group photo is taken. Both annual events are opportunities for students to gain community service time, experience a cleanup event, and see what trash items end up in the City's local creeks and waterways.

In the 2016 events, small Styrofoam™ pieces, plastic bottles, paper products, fast food and candy wrappers, sport balls and plastic pieces were the most prevalent trash items removed (**Table II. F-1**).

TABLE II.F-1: 2016 CREEK CLEAN UP COLLECTED ITEMS.

EVENT	ITEM TYPE							TOTAL (LBS)	
	Paper Products (news-papers, wrappers, misc.)	Plastic Bottles (single-use, juice, etc.)	Plastic Food Wrappers	Plastic Foam Pieces	Sport Balls	Ciga-rette Butts	Plastic Shopping Bags	Trash	Recycled Items
River Cleanup	318	212	251	916	582	21	22	250	45
Coastal Cleanup	22	111	206	253	103	84	71	320	30

b. Trash Booms

The City of Palo Alto operates two trash booms for Matadero and Adobe Creeks with permission from the Santa Clara Valley Water District. The booms collect floating litter and debris.

Matadero's trash boom is located upstream of Highway 101 and West Bayshore Road, where the creek is tidally influenced, but is maintained at a stable level by tide gates during dry weather. The second boom is located across Adobe Creek.

Trash and debris are removed during May and September volunteer Cleanup events and by RWQCP staff as needed before they are removed in December each year to reduce potential flooding hazards.

c. Trash Capture Devices

The City has installed large trash capture devices - two Contech CDS hydro-dynamic vortex separators (HDS) - in order to meet MRP trash reduction requirements. These HDS intercept and capture trash from a 180-acre tributary drainage area that includes a section of the El Camino Real commercial corridor. The two HDS units were maintained on January 20 and June 7, 2016.

COLLABORATIVE TRASH REDUCTION EFFORTS

The City of Palo Alto Staff actively participates in SCVURPPP and BASMAA meetings to provide technical input, collaborate, and share resources on County and regional trash reduction efforts. Municipal representatives share lessons learned from pilot projects and other various trash reduction programs. In addition, staff participates in the Watershed Management Initiative (WMI), part of the regional Zero Litter Initiative (ZLI). ZLI brings together multiple cities and agencies with a common interest in preventing litter and its impacts on our local streets and transportation corridors, creeks, and neighborhoods. Key participants include staff from the cities of Palo Alto, San Jose, and Campbell; the Santa Clara Valley Water District, Caltrans, the Santa Clara Valley Transportation Authority (VTA), CLEAN South Bay and SCVURPP. Initiatives identified in ZLI's strategic plan include engagement with the business community, legislative advocacy, managing the impacts of trash from homeless encampments, and actions to reduce highway litter. Through ZLI, the City participates in the Right Size Right Service (RS2) campaign, a regional effort addressing consistently overflowing garbage and recycling containers to prevent street and creek litter.

RWQCP TRASH POLLUTION PREVENTION HISTORY*

2016
- Plastic foam ordinance expanded to prohibit retail sale of ice chests, foodware, and packaging.
- City's Single-Use Plastic Policy revised to include plastic foam packaging.

2014
- City Council approves a Long-term Trash Management Plan;
- RWQCP partners with a tennis club to reduce tennis ball litter in Matadero Creek.

2013
- Palo Alto expands Bag Ordinance, prohibiting single-use plastic checkout bags at retail and restaurants;
- The City installs a second trash boom across Adobe Creeks.

2012
- Two full-capture trash devices are installed in South Palo Alto (MRP Section C.10.a.iii requirement).

2011
- City leads Plastic Pollution Prevention Summit for Bay Area Cities.

2010
- City adopts ordinance prohibiting plastic foam use at restaurants;
- The City includes plastic foam reduction in City contracts.

2009
- City installs a trash boom across Matadero Creek;
- Palo Alto's single-use plastic bag ban ordinance goes into effect at grocery stores.

*Refer to the 2016 Clean Bay Plan for more information.

3. FATS OILS GREASE (FOG)

Fats, oils, and grease (FOG) discharges cause or contribute to sanitary sewer blockages that may result in discharges of untreated wastewater to storm drains, creeks and the San Francisco Bay. Sanitary Sewer Overflows (SSOs) pose a risk to human health and the environment. Reduction of SSOs and FOG programs are components of the City's adopted Sanitary Sewer System Management Plan (SSMP) and for this reason, FOG is considered a pollutant of concern. However, it is not a concern for treatment by the RWQCP.

FOG SOURCES AND SOURCE CONTROL

The primary sources of FOG entering the RWQCP are from commercial and residential sectors. Commercial businesses that contribute FOG are food service establishments (FSEs) including restaurants, grocery stores, food courts, and cafeterias. The City has several high density and high volume restaurant areas, including Downtown, Midtown, Town and Country Village, Stanford Shopping Center and the California Avenue Business Districts. These areas and high risk FSEs have been the primary targets for increased inspection, enforcement, and preventative sewer line cleaning. The City's FOG Program Staff review plans and specifications for

proposed new and remodeled FSEs. Requirements state:

- all grease generating drainage fixtures must be plumbed to an approved and properly sized Grease Control Device (GCD);
- all non-grease generating drainage fixtures, including high temperature discharges, shall be plumbed directly to the sanitary sewer system; and

- new buildings constructed to house food service establishments shall include a covered trash enclosure large enough to accommodate all garbage, recycling, compost and tallow containers.

FOOD SERVICE ESTABLISHMENT INSPECTIONS

There are over 350 FSEs in the City of Palo Alto. Because each facility cannot be visited annually, facility compliance checks are prioritized based on potential SSO risk and past compliance performance. Facilities located near creeks or that have had past compliance problems receive more frequent inspections. Facilities that demonstrate on-going compliance receive fewer inspections. FSEs are prioritized into the following categories:

- problem FSEs (those that have had prior violations) in hot spot areas (highly visited or commercial areas);
- problem FSEs;
- FSEs in hot spots;
- FSEs that have only had minor issues in the past;
- FSEs with potential to generate FOG; and
- FSEs without significant potential to generate FOG (juice bars, coffee shops, etc.).

FOG CONTROL PROGRAM GOALS

The goals of the FOG program are to reduce the number, severity, and frequency of SSOs linked to FOG, and reduce the environmental impact, cleanup costs, and liability to the City associated with SSO clean ups (**Table II.F-2**). RWQCP staff will continue to contribute to regional programs such as the statewide California Water Environment Association (CWEA) and BAPPG workgroups. While the FOG program's main focus is commercial areas, the program also addresses multi-family buildings with persistent issues related to grease that may contribute to fewer SSOs.

TABLE II.F-2: ANNUAL SANITARY SEWER OVERFLOWS (SSOs)

SSOs					
	COMMERCIAL		RESIDENTIAL		TOTAL
	SSO CAUSED ONLY BY FOG	FOG RELATED SSO	SSO CAUSED ONLY BY FOG	FOG RELATED	
2013	1	4	3	7	15
2014	2	2	-	6	10
2015	2	1	3	4	10
2016	1	1	2	2	6

Inspections and Compliance

The 2017 Clean Bay Pollution Prevention Plan includes the long-standing goal of inspecting at least one-third of the FSEs each year (**Table II.F-3**). The table includes violations and inspections related to both FOG program and stormwater violations.

Potential violations include:

- Excessive FOG on and around tallow bins;
- Actual or potential storm drain discharges such as washing kitchen equipment outside or dumping mop wash washwater, allowing wastewater to flow to the stormwater conveyance system;
- Failure to keep a maintenance log that documents GCD clean out activities;
- Failure to maintain a GCD by not cleaning the contents out frequently to prevent excess FOG from entering the sanitary sewer;
- Failure to have an adequate and/or properly functioning GCD;
- Contributing to at least one sanitary sewer overflow (SSO);
- The presence of food waste grinders that were to be removed by January 1, 2007; and
- (For large cafeterias and markets) Not submitting an appropriate floor finish materials safety data sheet (MSDS) by a given due date to ensure use of a Zinc-Free Floor Finish, or treatment of the floor finish as hazardous waste.

City staff prioritized FSEs in problem areas where FOG build-up has been identified. All larger FSEs have received initial visits. Feedback from collection system maintenance management indicates that efforts in these areas have been effective in reducing the number of FOG-related overflows.

TABLE II.F-3: SUMMARY OF FOG INSPECTION PROGRAM – 2016 EVALUATION

Evaluation Criteria	2016 Evaluation (number inspected)
Facilities Inspected	118
Inspections	217
Verbal Warnings	70
Warning Letters	7
Notices of Noncompliance	3
Compliance Agreements	0
Percent Compliance related to Total Inspections	63%
Plan Sets Reviewed	38
Number of grease related SSOs	6
Number of grease related SSOs in commercial areas	2

FOG Acceptance at RWQCP and Maximizing Energy Recovery

In 2008, City Staff investigated the FOG acceptance procedures at the RWQCP. The goal was to evaluate the potential to receive all hauler loads associated with the Grease Waste Hauler Contract in the City of Palo Alto and possibly the other Cities in the RWQCP's service area, including non-contracted haulers. At this time, there is limited capacity for accepting more than the current amount (approximately 6,000 gallons) of waste grease per day. The RWQCP's acceptance of GCD waste material cannot exceed 130,000 gallons per month or 1.56 million gallons per year. The RWQCP Long-Term Facilities Plan discussed the benefits of adding FOG to digesters, if digesters are chosen as a biosolids handling technology. FOG addition can significantly increase energy production.

REGIONAL FOG OUTREACH

The RWQCP, as a member of the BAPPG, promoted proper disposal of kitchen FOG on Univision Hispanic Radio stations between Thanksgiving week and New Year's Day. Univision aired a total of 128 paid radio spots (30-second and 15-second) on radio station KBRG, generating 1,383,900 impressions. Additionally, Univision broadcasted streaming ads on their radio website (www.univision.org) featuring a banner directing the audience to www.baywise.org with more than 13 thousand gross impressions. Refer to the 2016 BAPPG Annual Report for more information.

Outreach for residents continues to be an important component of the FOG program. In past years the RWQCP focused on providing residents with helpful tools, such as free grease scrapers, and utility bill inserts with disposal information regarding residential cooking oil and grease. Household Hazardous Waste (HHW) events are now held weekly (rather than monthly) to collect oil, grease, and other hazardous materials after the construction of a new Household Hazardous Waste Facility in 2013. HHW information will continue to be included in outreach materials, emphasizing that disposal events are now every Saturday and the first Friday of the month.

SECTION II

RWQCP FOG POLLUTION PREVENTION HISTORY*

2012
- City Staff creates a FSE requirement factsheet, which is distributed to FSEs during the permitting process.

2010
- The Food Service Program incorporates a database system to track FSE stormwater compliance inspections and generate "Inspection Notification and Warning" letters.

2009
- City Staff creates new Best Management Practice posters to distribute during inspections.

2008
- The City hires their first full-time FOG inspector.

2006
- The City hires their first full-time FOG inspector.

2002
- An ordinance passes that prohibits the installation of food waste disposers (garbage disposals), and requires existing disposers be removed by January 1, 2007.

1992
- The City adopts the Sewer Use Ordinance, which requires food service establishments with grease generating activities to install grease control devices.

*Refer to the 2016 Clean Bay Plan for more information.

4. VEHICLE SERVICE FACILITIES

The RWQCP's Clean Bay Business Program has regulated vehicle service facilities and promoted the reduction of pollutant discharges to the sanitary sewer and storm drain systems for more than 20 years. Vehicle service facilities with process discharges to the sanitary sewer are permitted and inspected at least twice annually. All other vehicle service facilities are inspected at least once per year. The Clean Bay Business Program:

- requires Palo Alto Municipal Code and best management practices to minimize pollutant discharges into the sanitary sewer and the storm drain systems;
- issues permits to automotive and vehicle service facility wastewater dischargers;
- recognizes compliant vehicle service facilities; and
- identifies and enforces wastewater and storm water violations.

RWQCP VEHICLES POLLUTION PREVENTION HISTORY*

2016

- RWQCP distributes "best practices" posters to vehicle service facilities to educate and promote pollution prevention best management practices at vehicle service facilities;
- The City temporarily suspends the Clean Bay Business Program to assess its effectiveness and reorganize the program.

2015

- Eliminates requirements for vehicle service facilities to perform self-sampling of wastewater. The RWQCP continued to collect wastewater samples twice per year at all permitted vehicle service facilities;
- 15 businesses within the RWQCP service area are identified as having participated in the Clean Bay Business Program for 20 years.

2012

- The City celebrates 20 years of the Clean Bay Business Program.

1992

- Clean Bay Business Program is created to regulate and encourage pollution prevention at vehicle service facilities.

*Refer to the 2016 Clean Bay Plan for more information.

5. HOUSEHOLD HAZARDOUS WASTE HHW COLLECTION PROGRAMS

Several options are available for residents and businesses in the RWQCP service area to safely dispose of household hazardous waste (HHW). These include the:

- County HHW Programs: Santa Clara and San Mateo Counties operate HHW drop off programs serving most residents and businesses in their respective counties. The San Mateo County program serves the East Palo Alto Sanitary District, while the Santa Clara County program serves Los Altos, Los Altos Hills, Mountain View, and Stanford. The Santa Clara County program does not serve Palo Alto residents because the City of Palo Alto funds its own HHW program.
- City of Palo Alto HHW Program: Drop-off events for Palo Alto residents and businesses occur every Saturday during the hours of 9 am – 11 am and on the first Friday of the month between 3 pm – 5 pm. Mercury-containing items such as thermometers, thermostats, and silver-containing photo processing solutions can be brought to the HHW facility as well as other household hazardous waste. The household hazardous waste program was expanded in September 2013 to include a permanent facility located at the RWQCP with expanded station hours. The City also participates in the American Coatings Association Paint Care program.
- RWQCP drop-off for pharmaceuticals and sharps: The RWQCP has an outdoor drop-off container for sharps and prescription and over-the-counter medicines, except controlled substances. Since 2015, controlled substances, such as pain medicines and antidepressants, have been accepted at the Palo Alto Police station (pharmaceuticals are discussed in Section III).
- Curbside Collection: Palo Alto offers limited curbside collection of household hazardous wastes including batteries, electronic waste, used oil, and oil filters.

Palo Alto's HHW program submits an annual report to the Department of Resources Recycling and Recovery detailing the amount of each type of waste collected and how each waste was managed. These reports cover fiscal year periods that span from July through June. **Figure II. F-1** summarizes the amounts of the waste types collected, in pounds, for fiscal year 2015/2016. The HHW program collected 250,655 pounds of hazardous waste from its permanent collection facility in fiscal year 2015/2016. For more information, please view the CalRecycle 303 Household Hazardous Waste Collection Report.

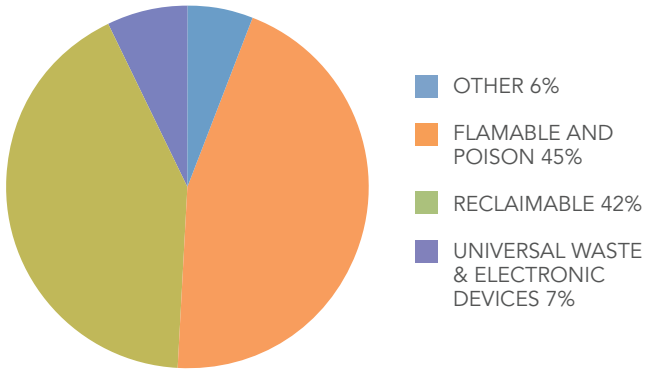


FIGURE II.F-1. Summary of Household Hazardous Waste Collected in Fiscal Year 2015/2016

LOOKING FORWARD

The RWQCP provides programs that reduce both stormwater and wastewater sources of pollution.

1. Pesticide pollution prevention

To address IPM tasks in 2017, the RWQCP will:

- continue to review comment letters regarding pesticide registration and evaluation activities by the EPA and DPR. RWQCP will work with BAPPG to develop the regional pitch on the toxicity of fipronil in flea and tick treatment products;
- submit a comment letter with BACWA members on EPA's 2015 draft joint risk assessment for pyrethroids;
- complete monthly pest treatments, as a project partner, in February 2017 for The Healthy Buildings, Healthy Families pilot project. Final results will be compiled and summarized in a report completed by end of the calendar year;
- evaluate the amount and toxicity of the pesticides used throughout City operations during the last several years, monitor the effectiveness of during the last several years current pest management, and revise the City's policy, best practices, and priority projects based on this data;
- continue to provide training and technical consultation on pest management issues and product assessments;
- work with City of Palo Alto facilities to release a new contract for structural IPM services; and
- evaluate its IPM workshops and determine the ideal frequency and locations for increased attendance.

2. Trash reduction

It is important to note that the City of Palo Alto has already met the 2017 MRP 70% trash reduction requirement. City staff will continue to concentrate on individual trash reduction efforts as well as participate in collaborative efforts to meet the long-term MRP trash requirements. In 2017, the RWQCP will:

- continue to operate and maintain the City's two trash booms and two trash capture devices as well as classify and quantify collected trash;
- conduct regular inspections of the creeks and bay lands to identify trash issues;
- identify trash issues through other inspections, including construction projects and commercial and industrial businesses/facilities;
- continue to work with the Creek Connections Action Group and participate in creek cleanup efforts; and
- fund the ReThink Disposables program services to Palo Alto restaurants.

3. FOG reduction

The Restaurant Inspection program will:

- inspect any businesses that generate FOG that have not yet been inspected;
- improve communication between Environmental Services and the City of Palo Alto's Building Department to ensure that any new/remodeled FSEs are inspected for FOG-related issues during early construction; and
- distribute mailers to all FSEs prior to the holiday season reminding them to properly maintain all GCDs as outlined in the City's Sewer Use Ordinance.

4. Vehicle Recognition Program

In 2017, this program will:

- continue to inspect all vehicle service facilities at least once per year;
- assess and revamp Clean Bay Business Program, including design of new BMP materials and development of new training program.
- update education and outreach materials;
- update the Vehicle Service Facility section in the City of Palo Alto's Sewer Use Ordinance.

5. Household Hazardous Waste

In 2017, the City will:

- continue to collect household hazardous waste from the RWQCP service area;
- provide HHW information via the City's Zero Waste outreach program (utility bills, advertisements, etc.), the RWQCP cleanbay.org website, and the RWQCP's School Outreach Program.

III CONTAMINANTS OF EMERGING CONCERN

PERMIT DETAILS

Contaminants of emerging concern (CECs) are currently not regulated by the San Francisco Bay Regional Water Quality Control Board (Regional Board). However, the Regional Board is concerned about emerging contaminants entering local waterbodies and recycled water, and in 2016, developed a new permit

The City of Palo Alto's Regional Water Quality Control Plant (RWQCP) participates in the Regional Monitoring Program (RMP). The RMP conducts research on emerging contaminants, analyzes potential risks to the San Francisco Bay from CECs, and has developed a management strategy. A summary of RMP's priority pollutants, management options, and future monitoring recommendations are included in **Table III-1** below.

TABLE III-1: TIERS, MANAGEMENT, AND MONITORING FOR EMERGING POLLUTANTS FROM THE 2013 PULSE OF THE BAY

LEVEL	TIER ASSIGNMENTS	MANAGEMENT	MONITORING
Tier 4 High Concern	No CECs currently in this tier	303(d) listing TMDL for alternative management plan Aggressive control actions for all controllable source	Studies to support TMDL or an alternative management plan
Tier 3 Moderate Concern	PFOS	Action plan for strategy Aggressive pollution prevention Low cost control actions	Consider including in Status and Trends Monitoring Special studies of fate, effects, and sources, pathways, and loadings
Tier 2 Low Concern	Fipronil	Low cost source identification and control Low level pollution prevention Track product use and market trends	Discontinue screening or periodically screen in water, sediment, or biota Periodic screening in wastewater effluent or urban runoff to track trends
Tier 1 Possible Concern	Nonylphenol and Nonylphenol Ethoxylates	Identify and prioritize contaminants of potential concern, track international efforts Develop targeted and non-targeted analytical methods	Screening in water sediment, biota, wastewater effluent, urban runoff

ENVIRONMENTAL CONCERNS

A CEC is defined by the San Francisco Estuary Institute (SFEI) as any chemical not regulated or monitored that has the potential to enter the environment and harm people or wildlife.[1] When present in aquatic ecosystems, human health is at risk due to bioaccumulation in fish and shellfish. CECs detection is increasing in urban water bodies such as San Francisco Bay where aquatic organisms are exposed to "a dilute soup of antibiotics, beta blockers, stimulants, pain relievers, lipid reducers, antidepressants, anxiety reducers, hypertension relievers, insect repellents, stain repellents, detergents, flame retardants, insecticides, herbicides, fungicides, rodenticides, lubricants, polymers, plasticizers, nanomaterials, and many other chemicals, not to mention byproducts and degradation products".[2]

Understanding the CECs that RWQCP discharges into the Bay is the first step towards identifying source control measures that protect aquatic organisms.

2016 PROGRAM UPDATES

In 2016, RWQCP staff continued to participate in regional and national groups that study and analyze emerging contaminants data.

1. PHARMACEUTICAL AND PERSONAL CARE

Pharmaceutically active compounds (pharmaceuticals) are a class of chemicals that include hormones, antibiotics, and drugs. Wastewater treatment plants are designed to remove conventional pollutants such as suspended solids and biodegradable organic material, but they are not designed to remove low concentrations of synthetic pollutants such as pharmaceuticals. Limited testing suggests that certain types of treatment substantially remove some pharmaceuticals. Removal efficiencies of pharmaceuticals appear to be chemical-specific, especially since many synthetic compounds are designed to be resistant to biological degradation. There appears

[1]San Francisco Estuary Institute (SFEI), *The RMP Emerging Contaminants Program*, May 2016.

[2]San Francisco Estuary Institute (SFEI). 2013. The Pulse of the Bay: Contaminants of Emerging Concern. SFEI Contribution 701. San Francisco Estuary Institute, Richmond, CA.

to be no single cost-effective wastewater treatment technology that will remove all of these compounds, therefore pollution prevention alternatives must be used.

For more than a decade RWQCP worked with hospital, hospice care givers, and residents to reduce the amount of pharmaceuticals entering the wastewater treatment plant. RWQCP staff assisted in getting EPR ordinances passed in Santa Clara and San Mateo Counties and anticipates take-back containers will be provided throughout the region in the near future.

Until County EPR programs are operational, pharmaceuticals will be accepted at the RWQCP, the Palo Alto Household Hazardous Waste Program, Palo Alto Police Department, County drop-off programs, and local participating pharmacies. In 2016, the RWQCP's Household Hazardous Waste Program and participating collection sites diverted 6,289 pounds of pharmaceutical waste (**Figure III-1**). In addition, tear off sheets listing collection sites are maintained at pharmacies, veterinarian clinics, and pet stores throughout the service area. The RWQCP pays for pharmaceutical disposal costs at most of these facilities. The Palo Alto Police Department is currently the only medicines drop-off bin available for controlled substances. When EPR programs are fully operational, the RWQCP will evaluate if it should continue to pay for the collection and disposal of pharmaceutical waste.

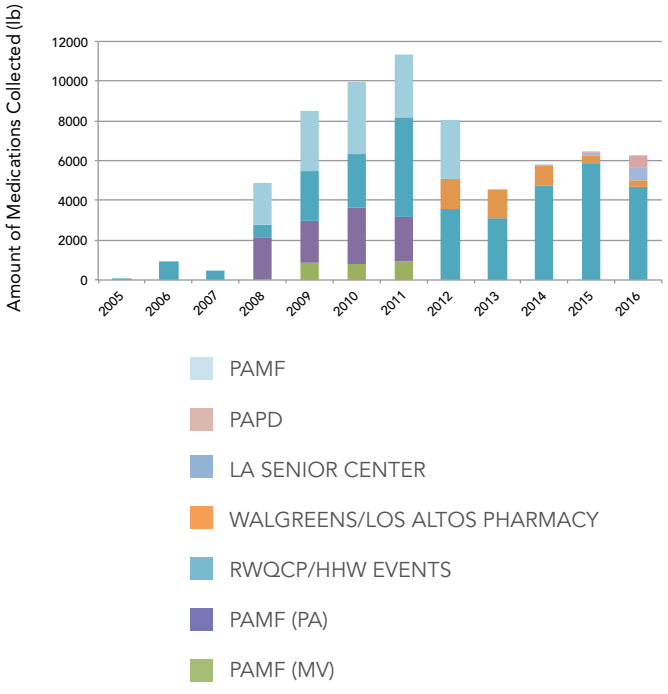


FIGURE III-1. Summary of Pharmaceuticals Collected from Palo Alto's Program 2005-2016

A. TRICLOSAN

Triclosan is registered as a pesticide and an antimicrobial chemical widely used in personal care products such as hand soap, toothpaste, cosmetics, and deodorants. According to the Regional Monitoring Program (RMP) Management Strategy, triclosan is a Tier 2 compound (low concern). Triclosan, as well as other antibacterial agents and their degradation byproducts, are now found throughout the environment including surface waters, soil, fish tissue, and human breast milk. Despite increasing data reflecting the presence of triclosan in surface water, no data was found to support the necessity or efficacy of antibacterial agents in consumer products.

Palo Alto continues to educate residents regrading purchasing triclosan-free products through utility bill inserts and Facebook advertisements. In 2016, the US Food and Drug Administration (FDA) issued a requirement for manufacturers to remove 19 common antibacterial agents–including triclosan and triclocarban–within the year from their products. The ban comes after manufacturers failed to present sufficient evidence to the agency that these antibacterial ingredients are safe for long-term daily use. RWQCP will monitor triclosan in effluent and biosolids after the ban goes into effect to ensure that the amount has declined.

B. PERFLUORINATED ORGANIC COMPOUNDS

Perfluorinated organic hydrocarbons are commonly used in carpet and textile coatings (e.g. ScotchGard) and surfactants (e.g. fire-fighting foams). The most common perfluorinated organic hydrocarbon is perfluorooctane sulfonate (PFOS). PFOS is used as the key ingredient in Scotchgard, the 3M-made fabric protector, and has been part of consumer culture for over 40 years, valued for its ability to protect materials from stains because it repels both water and oil. It is widely used in a variety of industrial and consumer products, ranging from fire extinguishing foams to wrapping for microwave popcorn and other food products. Despite its many uses, little is known about the environmental behavior or persistence of PFOS. In 2002, Scotchgard's manufacture, 3M, eliminated their line of PFOS-related products.

The RWQCP has partnered with universities and SFEI since 2005 to understand the fate and transport of PFOS

chemicals within the San Francisco Bay. In 2014, the RWQCP participated in an RMP Emerging Contaminant Workgroup study of perfluorinated organic compounds; the report was completed and released in 2016. In 2016, RWQCP will continue to seek opportunities to learn more about the fate and transport of PFOS in the wastewater treatment plant.

C. POLYBROMINATED DIPHENYL ETHERS

Polybrominated diphenyl ethers (PBDEs) are a class of compounds that bioaccumulate in the food web and are considered potential endocrine disruptors. PBDEs are flame retardants that are ubiquitous in consumer products. Over time products that contain PBDEs break down and release PBDEs to the environment.

RMP scientists published a study documenting declines in a toxic flame retardant family, polybrominated diphenyl ethers (PBDEs), in wildlife and sediment following an industry phase-out and state ban (Sutton et al. 2015). More recent studies show that PBDEs are declining in sediment and biota (Sutton et al. 2015), and there is reduced concern with sport fish consumption and adverse effects in bird populations (Sutton et al. 2014). However, the potential for low-level risks for seals, fish, and benthic organisms described in Sutton et al. (2014) have led to the classification of PBDEs as a moderate concern (Tier III) contaminant for the Bay. Therefore the RMP is still monitoring for PBDEs to make sure that the contaminant stays as a moderate concern for the Bay.

D. FIPRONIL AND IMIDOCLOPRID

Fipronil is a broad-spectrum insecticide that is of particular concern due to increased urban uses and its detection in Bay sediment and urban creeks. Concentrations of fipronil and its degradation products in sediment have exceeded effect thresholds on occasion, suggesting these compounds may pose risks to Bay aquatic life. The 2014 sediment monitoring data featured detections of one degradant at levels comparable to a toxicity threshold reported by Maul et al. (2008), indicating its designation as a moderate concern (RMP Tier III contaminant) for the Bay is still warranted.

Residential & Urban Uses

Fipronil has limited registered uses in residential and urban settings, including flea and tick treatments for pets, gels for crack and crevice treatment, ant and cockroach baits, outdoor perimeter sprays for ant control, and outdoor subsurface/soil injection for termite control. Some of these uses can impact wastewater though the pathways to the sanitary sewer. See **Figure III-2** Infographic to the right.

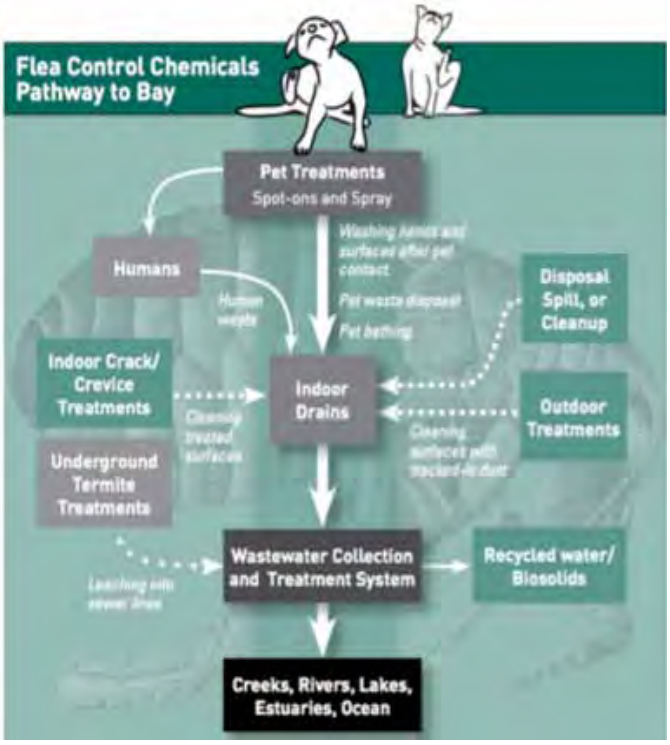


FIGURE III-2. How flea control chemicals enter the Bay.

Data Review

RWQCP staff did an initial study in 2013 to determine the amount of fipronil in RWQCP effluent and stormwater pump station wet wells that pump into local creeks. The Plant's effluent value was 31 nanogram per liter (ng/L) and the wet wells varied from 4.4 to 35 ng/L. It appears that the stormwater wet well values are less than the wastewater treatment effluent values. According to Environmental Protection Agency (EPA) the benchmark value is 11 ng/L and the RWQCP effluent is greater than this benchmark. In 2015, RWQCP participated in a regional study to determine the amount of fipronil and imidacloprid making its way through wastewater treatment plants; the results were published in 2016.[3]

[3]Sadaria, Sutton et al. (2016) Passage of Firproles and Imidacloprid from Urban Pest Control Uses through Wastewater Treatment Plants in Northern California, USA, *Environmental Chemistry* Vol 9999.

Next Steps

Wastewater treatment plants cannot remove fipronil and imidacloprid, therefore, the Department of Pesticide Regulation (DPR) to regulate the use of these pesticides. The RWQCP is partnering with the DPR and conducting a sewershed sampling for fipronil; results are expected in 2017.

2. MICROPLASTICS

Microplastic contamination (plastic fragments that are five millimeters or smaller) in aquatic ecosystems is associated with a number of potential concerns. Due to the hydrophobic properties of the plastic material, persistent organic chemicals including polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), dioxins, and pesticides such as DDT preferentially sorb to microplastics.[4] Lower trophic organisms can mistake microplastics for food; ingestion can lead to physical harm, exposure to sorbed contaminants, and bioaccumulation of microplastics in higher trophic organisms.[5, 6] However, no clear toxicity thresholds yet exists for this contaminant, leading to its assignment as a possible concern (Tier I contaminant) for San Francisco Bay.

Motivated by recent state and federal efforts to ban microbeads in personal care products, the RWQCP participated with the RMP to characterize Bay surface waters and wastewater treatment plant effluents for microplastic contaminants. Nine Central and South Bay surface water samples were collected and samples of effluent were collected from eight facilities discharging to the Bay. Microplastics in samples were characterized by size, type, and abundance.

In 2014 the RWQCP participated in a RMP Emerging Contaminant Workgroup study analyzing wastewater treatment plant effluent for microbead concentrations. Microbeads are polyethylene (i.e., plastic) microspheres that are widely used as exfoliating agents in cosmetics, skin care, and other personal care items. Study results documented the amounts of microplastics in wastewater discharges from the different wastewater treatment plants around the Bay.[5] BACWA is currently developing a testing and analysis protocol for the purpose of conducting additional testing and documentation of microplastics in wastewater plant effluent. The RWQCP will continue to actively participate in the RMP microplastic strategy in 2017.

LOOKING FORWARD

In 2017, the RWQCP will:

- finalize an evaluation of pharmaceutical data collected at the RWQCP in collaboration with RMP and other wastewater treatment plants;
- continue to track the progress being made by the Drug Enforcement Agency and the Santa Clara County pharmaceutical collection ordinance;
- actively participate in national workgroups to establish manufacturer funded takeback of pharmaceuticals;
- participate in studies of emerging pollutants issues focusing on pharmaceutically active compounds and fipronil;
- participate in the Department of Pesticide sewershed analysis (fipronil is also discussed in Section IIF);
- continue partnership with the San Francisco Estuary Institute's Regional Monitoring Program– Emerging Contaminants Group, specifically the microplastic strategy for the SF Bay;
- track and comment on the new Department of Substances Control Green Chemistry Regulations, the use of nanoparticles, and advocate for regulations that place the burden on manufactures to create products that do not pollute; and monitor triclosan in effluent and biosolids after the Federal Drug Administration ban goes into effect to ensure that the amount has declined.

[4]Seltenrich, N. 2015. New Link in the food chain? Marine plastic pollution and seafood safety. Environmental Health Perspectives 123(2):A34-41.

[5]Fendall, L. S., Sewell, M. A. 2009. Contributing to marine pollution by washing your face: Microplastics in facial cleansers. Marine Pollution Bulletin 58, 1225-1228.

[6]Desforges, J. W., Galbraith M., Ross, P. S. 2015. Ingestion of microplastics by zooplankton in the North Pacific Ocean. Archives of Environmental Contamination and Toxicology.

RWQCP PHARMACEUTICAL AND PERSONAL CARE POLLUTION PREVENTION HISTORY*

2015

- 17 hospice and wastewater professionals participate in a one hour webinar funded by the Bay Area Pollution Prevention Group (BAPPG) and Sac Regional through statewide training through the California Hospice and Palliative Care Association (CHAPCA);
- RWQCP partners with San Francisco Estuary Institute (SFEI) to analyze fipronil in wastewater;
- RWQCP works with the United States Consumer Product Safety Commission (CPSC) and the Palo Alto Police Department to install a new medicines drop-off bin in the lobby of the Police Station; and
- Results from an RMP study of PBDEs in the San Francisco Bay are published in the journal, *Environmental Science and Technology.*

2014

- RWQCP participates in an RMP Emerging Contaminant Workgroup study of perfluorinated organic compounds in final effluent;
- RWQCP participates in an RMP Emerging Contaminant Workgroup study of microbead concentrations in final effluent; and
- Results from an RMP study of PBDEs in the San Francisco Bay after the PBDE ban is submitted to a peer-reviewed journal and publishes in early 2015 in the journal, *Environmental Science and Technology.*

2013

- RWQCP receives the Dr. Teng Chung Wu Pollution Prevention Award for emerging contaminants pollution prevention programs; and
- Polybrominated diphenyl ethers (PBDEs) were featured in Pulse of the Bay.

2010

- The RWQCP switches from chlorine disinfection to ultra-violet light disinfection.

2007

- RWQCP hires contractor to annually educate teachers about triclosan.

2006

- Santa Clara Basin Watershed Management Emerging Contaminants Workgroup, chaired by RWQCP staff, finalizes a whitepaper titled *Environmental Emergence of Triclosan*; and
- Palo Alto adopts a policy to no longer purchase triclosan-containing hand soaps.

2005

- The disinfectant for most of the potable water supplied throughout the RWQCP's service area is changed from free chlorine to chloramine.

2004

- RWQCP participates in a WaterReuse study "Removal and Destruction of N-nitrosodimethylamine (NDMA) and NDMA Precursors during Wastewater Treatment.

2003

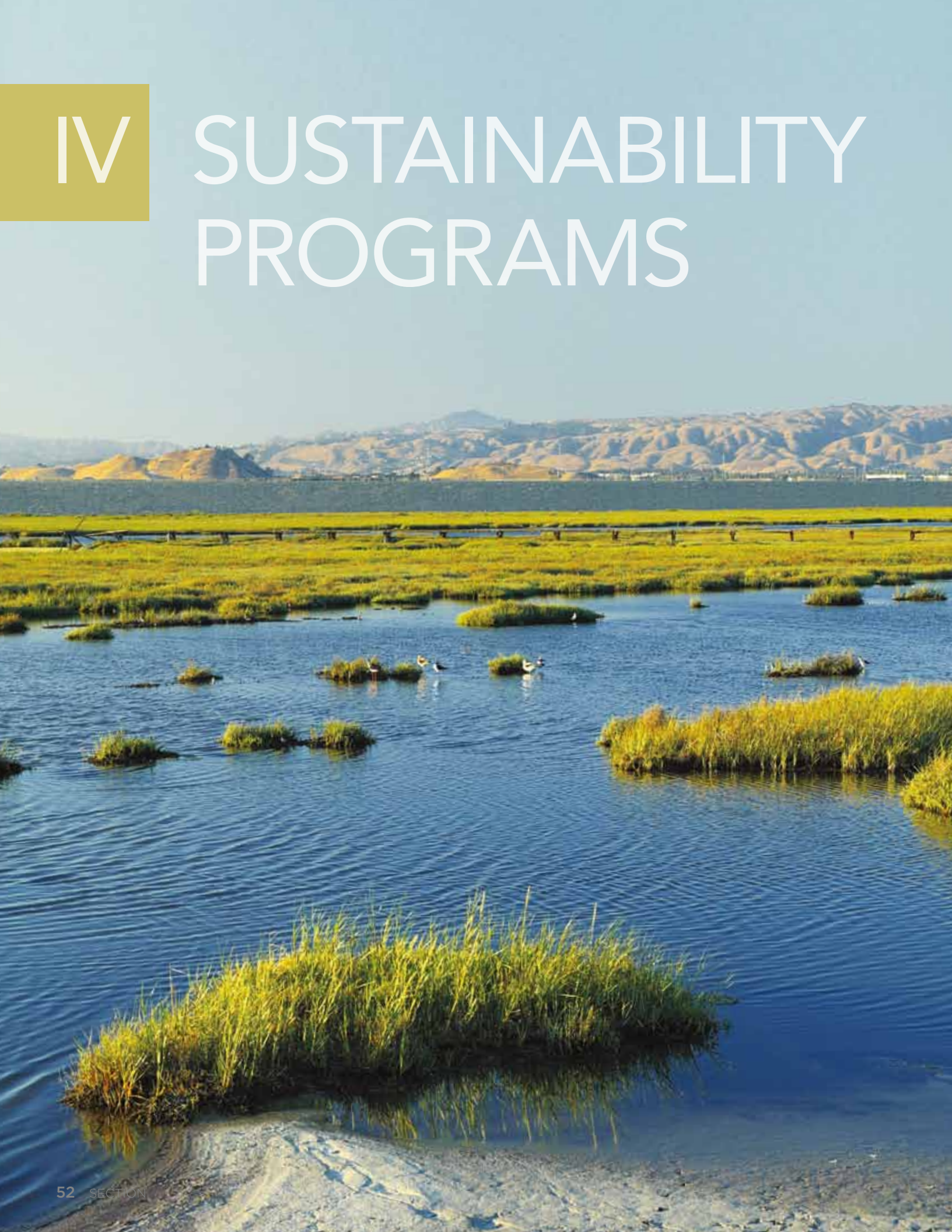
- RWQCP staff begins effort to reduce pharmaceuticals from hospitals.

2002

- RWQCP establishes an interim pharmaceutical waste collection infrastructure; and
- RWQCP begins accepting pharmaceuticals in its Household Hazardous Waste Program and establishes six additional "drop off" locations in its service area.

*Refer to the 2016 Clean Bay Plan for more information.

IV SUSTAINABILITY PROGRAMS



PERMIT DETAILS

The City of Palo Alto is a leader in environmental sustainability. Its commitment to environmental protection includes a plan to reach Zero Waste by 2021, a carbon neutral electric and natural gas portfolio for the public utilities it owns and operates and green building requirements for municipal and residential buildings. Palo Alto is also a designated Tree City-USA, a League of American Bicyclists silver-ranked Bicycle Friendly Community, and has award-winning programs for the watershed protection services it provides to the Regional Water Quality Control Plant (RWQCP) service area. While there are no permit requirements for the RWQCP to maintain broader sustainability programs, many of the City of Palo Alto's Office of Sustainability goals and the RWQCP permit requirements are mutually supportive and therefore the programs work together.

ENVIRONMENTAL CONCERNS

Palo Alto's Sustainability Programs primarily address environmental concerns although environmental issues impact quality-of-life, the economy, and social equity concerns associated with sustainability. The sustainability programs discussed below are not specific permit requirements, but are concerns that must be addressed and intersect with the RWQCP responsibilities, e.g., climate protection, sea level rise, extended producer responsibility, and green purchasing.

2016 PROGRAM UPDATES

1. CLIMATE ACTION PLAN

In 2014, the City launched its Sustainability and Climate Action Plan (S/CAP) initiative to reduce greenhouse gas (GHG) emissions. On April 18, 2016 the Palo Alto City Council unanimously approved the primary goal of the S/CAP - achieving an 80% reduction in GHGs below 1990 levels by 2030 (80x30). The S/CAP coordinates with other City planning efforts including the Comprehensive Plan Update and included significant community input.

On November 28, 2016 the City Council unanimously adopted the S/CAP Framework which includes guiding principles, decision criteria, design principles, goals and strategies. This Framework will serve as the road map for achieving Palo Alto's 80 x 30 GHG reduction goal, and for developing the Sustainability Implementation Plans (SIPs) which will guide the City in the coming years.

The City of Palo Alto Staff have formed seven

interdepartmental teams to develop SIPs covering key S/CAP sections: Mobility, Efficiency and Electrification, Water, Zero Waste, Municipal Operations, Natural Environment, and Adaptation/Sea Level Rise. SIPs for the other S/CAP chapters- Community Behavior and Culture Change, Utility of the Future, Information Systems, and Funding Strategies - will be developed in future work phases.

The RWQCP is the City's largest source of municipally-generated GHG emissions, therefore its role in achieving the 80x30 goal is essential. The Plant's efforts to reduce GHG emissions and related planning for sea level rise is discussed in Section II.E of this report. RWQCP staff also leads the City's Green Purchasing program which is a component of Municipal Operations, and supports local, state, and national Extended Producer Responsibility (EPR) efforts. Green Purchasing and EPR accomplishments and plans are discussed below.

2. GREEN PURCHASING

Products and services acquired by the City have environmental impacts during their manufacture, distribution, use and disposal. Incorporating environmental performance criteria into procurement decisions can reduce pollution and benefit other environmental protection goals. RWQCP staff has led the effort to green the City of Palo Alto's purchase of goods and services to forward pollution prevention. Palo Alto has greened many of its goods and services and received the 2011 Green California Summit and Exposition Award for leadership in green purchasing. The City's green purchasing program:

- discontinued purchase of hand soaps containing triclosan (a Contaminant of Emerging Concern);

- discontinued use of spray insecticides and poison rodenticides;
- maintains landscape maintenance contracts that require: locally-sourced mulches, organic fertilizers certified by the Organic Materials Review Institute, and Bay-Friendly landscaping standards;
- low-mercury fluorescent lighting;
- requires EcoWise Certification for most structure pest control services and additional requirements for local reporting and bee protection;
- requires GreenSeal™ Certified products for use by the City's custodial contractor. These products place an emphasis on reduced-toxicity and higher recycled content;
- specifies that the City's printing vendor must use a minimum 30% recycled-content paper for most printing applications and utility inserts are printed on 100% post-consumer content paper;
- targets plastic reduction measures including:
  - Contract Terms and Conditions require extended producer responsibility and prohibit the use of expanded foam plastics as packaging material;
  - Plastic foam foodware (e.g. Styrofoam™) and plastic bags are not distributed at City-sponsored events;
  - Bottled water purchase is prohibited except for emergency conditions;
- requires environmental performance standards for office supply standards in its contract with Staples. Using the company's website where supplies are purchased, prohibited items are blocked from purchase and greener items are posted first for viewing.

In 2016, the City of Palo Alto continued to institutionalize green purchasing into its operations. Projects included:

- a new "managed print service" contract which will monitor paper use and provide sophisticated scanning services to archive and retrieve files thereby reducing paper consumption. The City is targeting the use of 100% recycled content paper in copier machines that are provided for this service;
- the Purchasing Department is greening custodial products that are centrally distributed from its warehouse for staff use (this is separate from the contracted services previously discussed);
- the City concluded its participation in the Urban Sustainability Directors Network project to draft a Green Purchasing Guide. This project received an $86,000 grant to complete the task. Agency partners included the cities of Palo Alto, San Francisco, Chicago, Washington D.C. and others;
- RWQCP staff served the first year of a three year term on the Advisory Committee for Electronic Product Environmental Assessment Tool (EPEAT) program. Staff will seek opportunities to discuss plastic packaging reduction in electronics;
- a revision of the City's single-use plastic policy to address plastic foam primary packaging (most commonly found in computer purchases);
- updated procedures to prohibit City purchases of bottled water and plastic packaging material;
- commencement of the City's Auditor's review of the Green Purchasing program to determine what resources and recommendations should be considered to maximize the implementation of the City's Green Purchasing Policy.

3. PRODUCER RESPONSIBILITY

The RWQCP contributes financial support to the California Product Stewardship Council (CPSC) and the Product Stewardship Institute (PSI) to expand extended producer responsibility (EPR) partnerships and legislation. EPR places the primary responsibility for ethical end-of-life disposal

of goods on the manufacturer who profits from their sale. This reduces the financial and operational burden of collecting products such as electronic, pharmaceutical, and other wastes on local government. Support of these organizations also benefits the RWQCP directly. One example is CPSC's Don't Rush To Flush campaign which has set up pharmaceutical collection bins throughout Santa Clara County, expanding RWQCP's existing network of safe pharmaceutical disposal options. RWQCP funding contributes to CPSC staff resources so that grant funding for these types of programs can be identified until broader EPR legislation exists.

LOOKING FORWARD

In 2017, Staff will:

- serve on the City of Palo Alto S/CAP committee;
- evaluate City of Palo Alto Auditor recommendations to improve the staffing and funding for the City's Green Purchasing program;
- implement Green Purchasing program tasks as staff and funding allow;
- serve on the EPEAT Advisory Council with the goal of influencing use of plastics as packaging;
- continue to support EPR organizations, legislation, and internal programs e.g., via green purchasing and related contract requirements.

SECTION IV

RWQCP SUSTAINABILITY PROGRAMS POLLUTION PREVENTION HISTORY*

2016
- Palo Alto achieves 37 percent reduction in GHG from 1990 levels; and
- Palo Alto City Council adopts new goal to reduce GHG emissions 80% below 1990 levels by 2030.

2015
- City of Palo Alto receives Acterra (nonprofit) Business Environmental Award for Sustainability Leadership.

2011
- The City receives the Green California Summit and Exposition Award for its Green Purchasing Program.

2007
- City Adopts Climate Action Plan and pledges to reduce GHG emissions (City and Community) by 15% below 2005 levels by 2020; and
- Green Purchasing Policy is adopted.

2006
- RWQCP helps form California Product Stewardship Council.

2001
- City of Palo Alto adopts Sustainability Policy.

1990's
- Recycled content paper and policies is adopted.

*Refer to the 2016 Clean Bay Plan for more information.

V OUTREACH

PERMIT DETAILS

The City of Palo Alto's Regional Water Quality Control Plant (RWQCP) is required to provide public outreach for wastewater pollutants as part of its National Pollutant Discharge Elimination System (NPDES) Permit, and for stormwater pollutants as part of the Municipal Regional Stormwater (MRP) Permit. The objectives of these Permits are to increase pollution prevention best practices in residential, business, school and other target communities, and to inspire an understanding of how daily activities at home, work or school can protect the Bay. Outreach can include, but is not limited to, community events, school outreach programs, and education campaigns. Outreach may include best practices that address multiple pollutants (e.g., household hazardous waste and pharmaceutical disposal), and topics related to local watershed protection and enhancement such as the expansion of recycled water services.

ENVIRONMENTAL CONCERNS

Pollution prevention education that inspires behavior change is the most effective technique for reducing pollution and repairing damaged ecosystems. Stormwater education programs aim to reduce pollutants such as trash, pesticides and automobile fluids, while wastewater education strives to prevent sanitary sewer overflows from FOG and wipes, and the disposal hazardous materials into the sanitary sewer.

2016 PROGRAM UPDATES

The RWQCP provided extensive outreach in 2016 to schools, residents, and businesses.

1. SCHOOL PROGRAMS

A) ELEMENTARY AND MIDDLE SCHOOL PROGRAMS

The RWQCP contracts with the nonprofit Grassroots Ecology to offer programs for elementary and middle school classes in the RWQCP service area, which includes: East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Stanford University. The RWQCP 2015-2016 school outreach goal was to provide 115 presentations to 3000 students. The program exceeded its target by providing 145 school programs to 3,820 students at 19 schools. The average teacher rating for the school year was 4.9 out of 5 both for quality of program and clarity of presenter.

Teachers stated that students in 96% of classes showed an increased understanding of the difference between the storm drain and the sewer systems and of what they can do to prevent water pollution.

RWQCP schools are offered presentations aligned with state curricula standards. Program offerings include:

- Grade 2–What's Bugging you?

Through the basic introduction of the concept of "IPM" (Integrated Pest Management) students learn what insects and bugs have to do with water pollution.

- Grade 3–Who Dirtied the Bay?

Students learn about the impact of plastic bags when bags enter the watershed through human use and misuse.

- Grade 3 and up–Watershed Warriors!

Students use the exciting Enviroscape® interactive relief model to understand what defines a watershed and where pollution comes from.

- Grade 4–Mercury Past and Present

Students discover the history of mercury, how it was mined in Silicon Valley, used during the Gold Rush, and how this toxic metal is transferred throughout the Bay ecosystem.

- Grade 7-Microbes in Sewage

Students use microscopes and lab skills to view and identify active microbes in wastewater sludge.

- ZunZun–RWQCP service area schools are also offered free assembly programs provided by ZunZun via SCVURPP. The school education assembly program is in its fourteenth year of implementation.

B) HIGH SCHOOL PROGRAMS

High school outreach is currently provided upon request and is usually project-based or via a mentoring program that is offered to students through school districts in the RWQCP service area. The RWQCP has suspended its high school program Sewer Science due to the time-intensive nature of the week-long lab program. The RWQCP will consider leveraging Grassroots Ecology's existing high school outreach program as it evaluates outreach priorities in 2017 and will continue to run annual litter-reduction ads in high school newspapers that are created by Santa Clara Valley Urban Pollution Prevention Program.

See Appendix J RWQCP Classroom Presentations 2015-2016 for a complete list of schools who received RWQCP school programs during the 2015-16 School Year, and Appendix K: RWQCP School Programs Brochure for more description about classroom programs.

C) STORM DRAIN STENCILING

RWQCP partners with students, youth groups, and school organizations to update the storm drain stencils around their schools. The storm drain stenciling program runs on a four year cycle; the first year City crews paint over the old stencil with white paint and then the volunteers repaint the stencil message. After four years it is time to start the process again. The eye-catching red paint and stenciled words "Only Rain Down Our Drain!" in school neighborhoods promotes a sense of ownership to the participants. In 2016, no stencils were placed. In 2017, staff will work with its school outreach contractor to reenergize participation in this program.

D) CAR WASHING KIT PROGRAM

The RWQCP has provided car washing kits for loan to school groups that have used car washing events as fund raisers. The kits diverted soapy, oily water to nearby landscaped areas or a sanitary sewer line. The Palo Alto Utilities Department provided "water wise" high efficiency nozzles for the kits and a laminated information sheet was placed inside the kit reminding the borrow of drought conditions. The RWQCP will continue to offer the kit, but will first encourage the public to use commercial carwash businesses. Carwash businesses are preferred because they conserve water and ensure that dirty wash water is sent to the sanitary sewer for treatment. In 2017, staff will review how and when to publicize this kit.

2. WASTEWATER TREATMENT PLANT TOURS

In 2016, RWQCP staff conducted 54 plant tours for a total of 614 students and public groups. Tours are provided to children ages 11 and older. See Appendix L RWQCP Plant Tours 2016 for a list of groups served. Tours discuss the importance of wastewater treatment to protect San Francisco Bay. In 2016, new signage was created to explain wastewater treatment overview that is discussed at the start of tours.

3. RAISING AWARENESS THROUGH ART

Art provides an opportunity for dialogue and learning. The RWQCP and City of Palo Alto commissioned Bay Area artist Martin Webb to do two art projects for the Plant, enhancing the completion of a landscaping project on the Plant grounds and along Embarcadero Road. A sculpture

titled "Riding the Currents" stands at the Plant entrance and a mural titled "Currents" is a colorful backdrop to a new gathering area for tour groups. Both depict life in the Baylands and the role of the RWQCP in protecting San Francisco Bay.

4. CLEAN BAY BUSINESS PROGRAM

In 2016, RWQCP staff distributed "best practices" posters to vehicle service facilities to educate and promote pollution prevention. The Clean Bay Business Program is on-hold while RWQCP assesses program goals and needs and effectiveness. Possible improvements may include new outreach materials, a training program, and an update to the Vehicle Service Facility section in the Sewer Use Ordinance.

5. RESIDENTIAL OUTREACH

In 2016, the RWQCP developed new outreach materials for its residential and school programs. Accomplishments include:

a) **Utility bills inserts and utility announcements:** Palo Alto residents received seven utility bills outreach inserts in 2016 related to watershed protection. Topics included: pool draining, less-toxic ant control, green infrastructure, stormwater fee services, and a series of infographics that explained processes for stormwater, wastewater treatment, and recycled water. In addition, utility announcements printed on the top of the utility bills ran monthly. Utility bills and inserts reach 26,000 residents each month. See Appendix M for a list of all print materials created in 2016.

b) **New Cleanbay.org website.** The RWQCP's new cleanbay.org website is easier to use, beautiful, interactive, and features more videos and event information. The new RWQCP video is featured prominently and used by school groups as an overview to wastewater treatment processes.

c) **Staff provided 20 tabling events and workshops.** Details are provided in Appendix N.

d) **Highlighted topics:** Recycled water and the value of monthly stormwater management fees. As the RWQCP seeks expansion of recycled water pipelines and services, more outreach is needed to answer common questions about availability, health, and safety of recycled water.

Stormwater management fees included in Palo Alto utility bills fund many of the stormwater and outreach permit requirements. Palo Alto's fee sunsets in 2017 and a new fee must be approved by voters to continue most services. Outreach development and planning for this ballot commenced in 2016 and will continue in 2017. The vote will occur in 2017 and will be reported on in the 2018 Clean Bay Plan.

e). **Outreach collaboration with SCVURPPP and BAPPG.**

The RWQCP continues to participate in regional outreach efforts with SVCURPPP, BAPPG, and others that benefit the RWQCP service area.

LOOKING FORWARD

In 2017, the RWQCP will evaluate and prioritize current outreach needs. Outreach topics, audiences, and priorities are changing for RWQCP: federal legislation is phasing out triclosan use in some products so less or different outreach on this topic will be needed; Zero Waste and regional outreach programs are providing more information about on pharmaceutical and household hazardous waste disposal; and new priorities such as the need for recycled water expansion require outreach services.

In 2017, RWQCP staff will:

- Ensure that permit requirements for outreach are met;
- Assess and prioritize additional current residential, school, and business RWQCP outreach needs. Areas to consider include the current needs for IPM workshops and how to prioritize requests for tabling events;
- Leverage and supplement regional outreach efforts when appropriate (e.g., SCVURPPP, BAPPG) to enhance reach in the RWQCP service area;
- Increase outreach for recycled water expansion;
- Continue updates to the school outreach program:
  a) Expand school programs in underserved schools in the RWQCP service area. Target areas include East Palo Alto Sanitary District and Mountain View partners;
  b) Consider leveraging Grassroots Ecology high school programs which would support RWQCP outreach;
  c) Consider how to use the excellent, but time-intensive Sewer Science High School Curriculum (program currently on-hold in RWQCP service area);
  d) Finish updates to elementary school programs focusing on new props and updated, engaging activities.
- Advertise new cleanbay.org website and video;
- Evaluate needs and outreach tasks for stormwater stenciling and car wash kit services;
- Evaluate needs for the Vehicle Inspection Clean Bay Business Program; and
- Update RWQCP tour start area to integrate signage and props. This will include an interpretive sign installed at the effluent outfall.

RWQCP OUTREACH POLLUTION PREVENTION HISTORY*

2016
- RWQCP launches new website, www.cleanbay.org.

2015
- RWQCP launches new educational video about RWQCP wastewater treatment processes.

2007
- RWQCP receives Friends of the Estuary Comprehensive Conservation and Management Plan (CCMP) Award for Clean Bay Campaign.

2001
- Sewer Science program is developed.

2000
- Watershed Watch program is developed.

2000
- Elementary School Program Begins.

1998
- The City of Palo Alto initiates *Our Water, Our World* program funding.

1995
- Clean Bay Auto Recognition Program starts.

1992
- Clean Bay Business Recognition Program is launched.

1992
- RWQCP launches Vehicle Inspection Program.

*Refer to the 2016 Clean Bay Plan for more information.

VI APPENDIX

APPENDIX A: SUMMARY OF RWQCP POLLUTION PREVENTION PROGRAM

YEAR	ACTIONS
1989	• Pollution Prevention Program initiated
1990	• Storm drain permit issuance-began to direct wastewater discharges to sewer • Increased industrial enforcement • Large dischargers required to prepare pollution prevention plans
1991	• Silver reduction program initiated • Community outreach on copper-based root control products
1992	• Launched Clean Bay Business Program for vehicle service facilities • Local ban on sale and use of copper-based root control products
1993	• Cooling water systems program • Laboratory program • Education on selenium toner • Clean Bay Business Program for hardware stores and plumbers started • Sewer line through Superfund site begins to receive high levels of arsenic
1994	• Regional outreach on copper-based root control products • Pool, spa and fountain outreach program • Machine shop program started • Automobile parts stores Clean Bay Business Program initiated
1995	• Reduced local discharge limit for nickel • Expanded cooling water systems efforts • Regional mobile cleaner outreach • Hospital and medical facility program • Sewer line through Superfund site repaired • Copper dumping incident • Final ban on sale of lead-containing gasoline takes effect • Intensive enforcement on silver program, vehicle service facility program
1996	• Regional ban on copper-based root control products • Regional mobile cleaner certification • Metal finishing program • Vehicle Clean Bay Business program five-year anniversary; 88% participation
1997	• Auto body shop BMPs distributed • School program enhanced • Record 92% of vehicle service facilities become Clean Bay Businesses
1998	• Laboratory improves mercury analysis • IPM Partnership launched • Began collection of mercury thermometers and other products; collected 34 pounds mercury • Printers and dentists receive BMPs
1999	• Launched mercury thermostat drop-off program • Began education campaign regarding residential woodsmoke pollution • Expanded the IPM Partnership program • Sewage sludge incinerator rehabilitation for enhanced pollution prevention.

APPENDIX A: SUMMARY OF RWQCP POLLUTION PREVENTION PROGRAM (CONTINUED)

YEAR	ACTIONS
2000	• City of Palo Alto adopts a Mercury and Dioxin Elimination Policy; participating in and funding the Association of Bay Area Governments (ABAG) dioxin group[1] • Initiated dental stakeholder group regarding amalgam management • Mercury product legislation drafted • Piloted a residential drop-off program for fluorescent lamps • City of Palo Alto adopts fireplace ordinance • Sewage sludge incinerator rehabilitated for enhanced pollution prevention.
2001	• Initiated and drafted SB 633, the CA Mercury Reduction Act • Conducted mercury audits at three local hospitals • Successful expansion of pilot residential recycling of fluorescent lamps at 5 hardware stores and at RWQCP • Led BAPPG in creation of an inspection checklist for dental offices and a set of PowerPoint presentations for dental community outreach • Began using 20% biodiesel in City's diesel landfill and golf course equipment • Began purchasing process-chlorine-free office paper and letterhead and unbleached paper towels • Completed the City pesticide policy and implementation plan • Assisted the Palo Alto Unified School District (PAUSD) with the "Healthy Schools Act" compliance
2002	• The Mercury Elimination Policy resulted in new City purchasing specifications to require low-mercury lamps • Created first annual report of City pesticide use • Initiated copper pollution prevention program, educating local plumbers and designers about copper pipe corrosion • New Sewer Use Ordinance passed that: • Lowered the mercury limit for industrial dischargers • Prohibited sewer disposal of zinc-containing floor waxes • Banned new and replaced copper roofs • Required covered carwash facility for new and remodeled buildings with 25 units or more • Added boilers and heat exchangers to the requirement of wastewater collection and analysis if one is doing scouring and cleaning. • Led Emerging Contaminants Workgroup of the Watershed Management Initiative to compile and finalize an Endocrine Disrupting Compounds Information Sheet. • Distributed a "drug free sewers" utility bill notice to describe proper disposal of expired prescriptions • Initiated chemical root control applicator permitting program
2003	• Completed work plan for an advanced mercury source control study that focuses on (1) improving amalgam collection and pretreatment at dental offices and (2) continuing identification of on-site RWQCP mercury uses and alternatives • Palo Alto has developed seven IPM plans and extensive training for weeds, gophers, ground squirrels, yellow jackets, ants, rats, and mice • From inception through 2003, the fluorescent lamp program collected over 7,575 lamps at four drop off sites in our service area • In the 2002/2003 school year, RWQCP school program visited 151 classrooms which reached approximately 3,682 students. This was a 41% increase over the previous year • Palo Alto staff educated approximately 350 people regarding Endocrine Disruptor Compounds by presenting at seven different conferences/ meetings throughout California

[1]Association of Bay Area Governments, *Bay Area Dioxins Project*, February 2004.

APPENDIX A: SUMMARY OF RWQCP POLLUTION PREVENTION PROGRAM (CONTINUED)

YEAR	ACTIONS
2004	• Palo Alto and Mountain View adopted dental amalgam pretreatment ordinances requiring dentists to install amalgam separators by March 31, 2005 • City of Palo Alto fluorescent lamp collection program was expanded throughout Santa Clara County and is now operated by the Santa Clara County Household Hazardous Waste Program • Implemented two new successful, non-chemical ground squirrel control strategies: the use of shade cloth along the municipal golf course fence line to deter ground squirrel population expansion, and a new trap design which captures up to four ground squirrels per trap. The traps have proven immediately successful • Published: *Tracking the Fate of Polybrominated Diphenyl Ethers releases in a Wastewater Treatment Plant Effluent*, concluding that the RWQCP discharges 2 pounds per year of PBDEs to the Bay[2]
2005	• Dentists required to install amalgam separators in service area by March 31, 2005; 98% of dentists complied • City of Palo Alto collected 8,481 pounds of fluorescent lights at the recycling center. • Analyzed City pesticide use; designed a prioritization process for annual workplan; drafted IPM Scope of Services for structural pest control contract • Made pesticide use reporting system for City staff available electronically and integrated database with GIS to map pesticide use • Served as chair of the Emerging Contaminants Workgroup of the Santa Clara Basin Watershed Management Initiative, which in 2005 produced two white papers titled "Discussion of Pharmaceutical Disposal to Sewer Systems" and "Environmental Emergence of Triclosan" • In 2004/2005 school years, RWQCP school program visited 151 classrooms, which reached approximately 4025 students
2006	• City of Palo Alto led a BAPPG/CWEA Dental Amalgam Training that was attended by approximately 90 people • Inspected 113 of 300 food service facilities within the first 6 months of the program • Co-led a regional pharmaceutical disposal event at 39 locations throughout the Bay Area that diverted over 3,500 lbs of pharmaceutical waste. In Palo Alto, collected approximately 960 lbs of pharmaceuticals at pharmacies, local senior centers, and the wastewater treatment plant within the RWQCP service area. Authored a report titled "Report on the San Francisco Bay Area's Safe Medicine Disposal Days"
2007	• In 2006-2007 fiscal year collected 270 pounds of thermometers and thermostats and 13,498 lbs of fluorescent lights • Hired and began using and EcoWise Certified IPM contractor for City facilities to ensure reduced dependence on pesticide use and discontinued use of structural pesticides associated with water quality impacts and ecotoxicity • In 2006/2007 school years, RWQCP school program visited 163 classrooms, which reached approximately 3,961 students at twenty-six schools. Expanded our microbes in sewage program to educate all seventh graders in our service area
2008	• Updated Mercury Loading Estimate (previous Estimate was for 2000) to reflect new loadings after full implementation of Dental Amalgam Program. Dental office mercury loading, as a percentage of the total, decreased from 56% to 29%, and it is estimated that 11 pounds per year of mercury that would have been discharged to the sanitary sewer is now captured by amalgam separators • Completed analysis of salinity (total dissolved solids, sodium, and chloride) in RWQCP partner trunklines, influent, and recycled water • Expanded food service facility program to include expanded stormwater, polystyrene activities in addition to more rigorous enforcement of grease control device maintenance and sizing requirements
2009	• Adopted and implemented an ordinance restricting single-use plastic checkout bags at large grocery stores, which became effective on September 18, 2009 • Performed annual evaluation of City's pest management and pesticide use, which demonstrated that the City's ecotoxic pesticide use has decreased to the lowest levels since the program's inception in • Adopted ordinance provision restricting molybdenum use in cooling systems and developed a brochure on cooling system additive restrictions in the RWQCP service area

[2]North, K.D., Environmental Science and Technology, 2004: 38, 4484-4488

APPENDIX A: SUMMARY OF RWQCP POLLUTION PREVENTION PROGRAM (CONTINUED)

YEAR	ACTIONS
2010	• In 2010, the Brake Pad Partnership was instrumental in passing the California Brake Pad Reformulation Bill (SB 346) which requires brake manufacturers to reduce the amount of copper in brake pads to no greater than 5 percent by 2021, then to no greater than 0.5 percent 2055 • Adopted and implemented an ordinance that restricts the use of expanded polystyrene disposable food service containers by Food Vendors • Implemented energy efficiency projects for the activated sludge aeration basins and trickling filter lift pumps that resulted in an 11% reduction in electricity use in 2010 compared to the average of the previous four years
2011	• Received the Department of Pesticide Regulation 2011 IPM Innovator Award • Led and coordinated 2011 Plastic Reduction Summit attended by multiple Bay Area public agencies and nonprofits • City staff determined the locations of saline groundwater infiltration to the sewer trunklines by using continuous monitoring equipment • Expanded number of pharmaceutical collection sites to five permanent collection locations
2012	• Reduced mercury entering the environment by more than 50 percent since installation of amalgam separators in 2005 • Palo Alto has a combined total of 12 pesticide free parks and facilities, in addition there was no pesticides used for rodent control • Completed EIR to expand plastic checkout bag ordinance to include all retailers including food service establishments • RWQCPs 2011 CO2 emissions are 13% lower than the 2005 emissions
2013	• Single use plastic bag ban was expanded to include all retail and food service establishments, which has reduced the amount of plastic bag sightings throughout the City • Installed trash booms in both Matadero and Adobe Creeks which capture a significant amount of trash prior to the flood basin • Received the 2013 Teng-Chung Wu Pollution Prevention Award from the Water Board for the City's work on reducing emerging contaminants at the source
2014	• Phil Bobel, the Assistant Director for Public Works–Environmental Services receives Dr. Teng-Chung Wu Pollution Prevention Award for Lifetime Achievement
2015	• City approved expansion of existing Plastic Foam Ordinance to prohibit retail sale/distribution of plastic foam ice chests, packaging materials, foodware, and egg cartons • RWQCP reduced greenhouse gas emissions by 41% since 2005, maintaining compliance with the City's emission reduction goals • Release request for proposals on the Advanced Water Purification System Feasibility Study
2016	• See Table 1 in Executive Summary.

APPENDIX B: RWQCP REGIONAL COMMITMENTS

GROUP	BRIEF DESCRIPTION	RWQCP ROLE
Aquatic Science Center/San Francisco Estuary Institute Board	Provides water quality science support and information management for governments and nonprofits.	Alternate Board Member
Bay Area Clean Water Agencies (BACWA)	BACWA works with state and federal regulatory agencies, 39 municipal wastewater agencies, and non-governmental organizations, to improve the health of San Francisco Bay. It provides technical expertise, financial support, and a public utility perspective to ensure that regulations affecting members are well-informed, thoughtful, and effective.	Member, Support Financially
• BACWA- Air	Shares information about air regulations that impact wastewater treatment plants.	Member, support financially
• BACWA- Bay Area Pollution Prevention Group (BAPPG	Develops regional pollution prevention programs.	Steering Committee Member, support financially
• BACWA - Nutrients	Shares information about nutrients in the San Francisco Bay.	Participant
• BACWA -Permits Committee	Shares information on NPDES permitting and pollutant issues.	Participant
• BACWA- Biosolids	Shares information about biosolids disposal.	Participant
• BACWA- Recycled Water	Shares information about recycled water regulations.	Participant
• BACWA –Pretreatment Committee	Shares information about pretreatment issues.	Co-Chair
Bay Area Biosolids to Energy Coalition	A consortium of wastewater treatment plants working to develop a regional biosolids-to-energy facility.	Member
Bay Area Stormwater Management Agencies Association (BASMAA)	Coordinates regional stormwater public education and outreach messages and services.	Participant
• BASMAA–Integrated Pest Management Partnership Committee	Regional group that creates *Our Water, Our World* fact sheets and public displays that are used throughout the state.	Participant, support financially
California Association of Sanitation Agencies (CASA)	State-level voice for public wastewater agencies regarding regulatory, legislative, and legal issues.	Member, Support financially
California Product Stewardship Council	Statewide nonprofit leads product stewardship legislation, information and projects.	Participant, support financially
California Water Environment Association (CWEA)	Statewide professional organization that trains wastewater professionals.	Conference Session Organizers

APPENDIX B: RWQCP REGIONAL COMMITMENTS (CONTINUED)

GROUP	BRIEF DESCRIPTION	RWQCP ROLE
California Wastewater Climate Change Group	Shares information and represents the wastewater perspective on regulations and regional projects regarding climate change and greenhouse gas emissions.	Member, Support financially
Copper Brake Pad Partnership	A consortium of government regulators, brake pad manufacturers, stormwater management agencies, and environmental professionals that evaluate the potential effects of brake wear debris on water quality.	Support Financially
Creek Connection Action Group	County-wide effort to coordinate two creek clean up days in conjunction with National River Day and Coastal Cleanup Day	Participant, support financially
Product Stewardship Institute	A national organization that works with state and local government agencies, manufacturers, retailers, environmental groups, federal agencies, and other stakeholders to reduce the health and environmental impacts of consumer products.	Participant, Support financially
Regional Monitoring Program (RMP) Steering Committee	Regional Monitoring Program is run and operated by the San Francisco Estuary Institute. The steering committee guides the goals of the Regional Monitoring Program.	Vice-Chair
Regional Monitoring Program–Emerging Contaminants Committee	This RMP subgroup guides research on emerging contaminants in the San Francisco Bay.	Participant
ReNUWIt (Reinventing the Nation's Urban Water Infrastructure)	An interdisciplinary, multi-institution research center whose goal is to create a sustainable urban water infrastructure.	Participant
Silicon Valley Anti-Litter Group	County-wide group of local agencies and elected officials who work together to clean up trash in Santa Clara County.	Participant
Santa Clara Valley Water District: Salt and Nutrient Planning Stakeholders	Manages future ground water quality.	Participant
SCVURPPP (Santa Clara Valley Urban Runoff Pollution Prevention Program) and Workgroups/Ad-Hoc Groups	SCVURPPP is an association of 13 Santa Clara Valley cities and towns, together with Santa Clara County and the Santa Clara Valley Water District that collaborate on meeting shared Municipal Regional Stormwater Permit requirements via regulation, monitoring and outreach. The City participates in all workgroup/ad hoc groups, including Commercial/Industrial/Illegal Discharge, C.3, Pollutant of Concern, Watershed Education and Outreach, Trash, Municipal Operations, Construction, etc.	Participant
Santa Clara Basin Watershed Management Initiative (SCBWMI)	Coordinates existing regulatory framework on basin wide scale with representatives from regional and local public agencies; civic, environmental, resource conservation and agricultural groups; professional and trade organizations; business and industrial sectors; and the public.	Co-chair
SCBWMI POTW Forum	Coordinate South Bay Dischargers permit renewal.	Participant

APPENDIX B: RWQCP REGIONAL COMMITMENTS (CONTINUED)

GROUP	BRIEF DESCRIPTION	RWQCP ROLE
SCBWMI ZLI	The Zero Litter Initiative (ZLI) aims to reduce litter in Santa Clara County.	Co-lead
Tri-TAC	Tri-TAC is a technical advisory committee that works with regulatory agencies and interest groups to improve the effectiveness and accountability of environmental programs that impact California wastewater treatment plants. Tri-TAC is a joint program of the League of California Cities, the California Association of Sanitation Agencies, and the California Water Environment Association.	Participant
Urban Pesticide Committee	Public agency and NGO representatives group that discuss pesticide-related legislation, research and trends in urban pesticide use and pest management.	Participant
Water Environment Federation (WEF)	Provides water quality professionals around the world with the latest in water quality education, training, and business opportunities.	Member
Water Environment Research Foundation (WERF)	National independent research organization on wastewater and stormwater issues.	Member

APPENDIX C: EFFLUENT LIMITATIONS

Desire to comply with the RWQCP's toxic pollutant effluent limitations provide significant motivation for the programs described in this plan. The RWQCP's NPDES permit issued in August 2014 (Order No. R2-2014-0024) has both concentration limits (**Tables A-1**) and the Mercury and PCB Watershed Permit (Order No. R2-2012-0096) has mass limits (**Table A-3**).

TABLE A-I: EFFLUENT LIMITS

CONSTITUENT	UNITS	MONTHLY AVERAGE	DAILY MINIMUM	AVERAGE WEEKLY	INSTANTANEOUS MINIMUM	INSTANTANEOUS MAXIMUM
Biochemical Oxygen Demand	mg/L	10	20	--	--	--
Total Suspended Solids	mg/L	10	20	--	--	--
pH	Standard units	--	--	--	6.5	8.5
Oil and Grease	mg/L	5	10	--	--	--
Turbidity	NTU	--	--	--	--	10
Total Ammonia	mg/L as nitrogen	2.7	9.5	--	--	--
Copper, Total Recoverable	µg/L	21	36	--	--	--
Mercury	µg/L	0.025	--	0.027	--	--
Nickel, Total Recoverable	µg/L	26	31	--	--	--
Cyanide, Total	µg/L	6.2	14	--	--	--
Dioxin - TEQ	µg/L	1.4×10^{-3}	2.8×10^{-8}	--	--	--
PCBs	µg/L	0.00039	0.00049	--	--	--

TABLE A-I: EFFLUENT LIMITS

CONSTITUENT	AVERAGE ANNUAL LIMIT (KG/YR)
Mercury	0.31
Total Suspended Solids	mg/L

APPENDIX D: COPPER CONTINGENCY PLAN

CONTINGENCY ACTION	DISCHARGE REDUCTION
Add corrosion inhibitor to local drinking water supplies	Reduce copper piping corrosion by an estimated 30% if inhibitor addition was implemented in all SFPUC water supplies in the RWQCP service area.
Create financial incentives for implementation of copper pollution prevention measures at private businesses, emphasizing measures for largest copper dischargers	Reduce copper wastewater discharge from industrial copper use, from cooling towers, and from circulating hot water systems. Some additional reductions in industrial process copper discharge (currently about 5% of RWQCP influent copper), cooling water copper corrosion discharges (currently 3% of influent copper) and circulating hot water system discharges (which may be as much of 3% of influent copper) are possible.
Advocate use of CPVC piping and/or restrict use of copper piping in new construction and remodeling	Reduce copper discharges from corrosion of copper piping. Rate of reduction is uncertain as the current pipe replacement rate in the service area is unknown. Since replacement rate is probably slow, significant reductions would probably not be achieved for 5 to 10 years.
Implement regional training and certification program for plumbers. Require use of recommended fluxes and solders and adherence to IAPMO best management practices during all copper plumbing installation	Reduce copper discharges from corrosion of copper piping due to poor installation practices. The amount of reduction that would be achieved is unknown. Reduction would slowly increase as piping is replaced.
Adopt copper pipe flow velocity restrictions as part of city building codes	Reduce copper discharges from corrosion and erosion of copper piping. The amount of discharge reduction is unknown, but could be measurable depending on current average flow velocities. Reduction would slowly phase in as piping is replaced.
Recommend lower operating temperatures for home and business hot water systems (while maintaining user safety and sanitation)	Reduce copper discharges from corrosion of hot water piping (which occurs at an accelerated rate). The amount of discharge reduction is unknown.
Prohibit installation of open cooling towers and prohibit towers with copper piping and parts	Reduce copper discharges from cooling towers (3% of RWQCP copper influent) as the restriction phased in. Preliminary data suggest that at least half of the cooling water systems in the service area are open systems or contain copper, and that copper discharge reductions of more than 50% are possible if such systems are replaced with copper-free closed systems.
Expand wastewater recycling programs	Reduce the amount (but not the concentration) of copper discharged to San Francisco Bay by an amount proportional to the amount of wastewater diverted from Bay discharge.
Investigate and consider implementing chemical addition to increase copper removal at the RWQCP	Increase copper removal efficiency at the RWQCP, decreasing copper discharge concentration. Copper discharge reduction (if any) is unknown. (Full-scale testing would be required to determine the potential reductions).
Expand water conservation education and incentive programs	Reduce copper discharges associated with water use, primarily from water supply and corrosion. The amount of reduction would be proportional to the decrease in indoor water use achieved.

APPENDIX E: COPPER CONTROL PROGRAM

COPPER CONTROL PROGRAM ITEM NUMBER	ITEM DESCRIPTION	IMPLEMENTATION PLAN	IMPLEMENTATION DATE
i.	Provide education and outreach to the public (e.g., focus on proper pool and spa maintenance and plumbers' roles in reducing corrosion)	The RWQCP will conduct public outreach on pool and spa maintenance, and plumbers' roles in reducing corrosion, via a new web page on the baywise.org website. The RWQCP will continue to distribute the SCVURPPP pool brochure to residents upon request or in response to illicit discharges. The RWQCP will also participate in any copper public education and outreach efforts initiated by the Bay Area Pollution Prevention Group	7/1/2010 and ongoing
ii.	If corrosion is determined to be a significant copper source, work cooperatively with local water purveyors to reduce and control water corrosivity as appropriate, and ensure that local plumbing contractors implement best management practices to reduce corrosion in pipes	A detailed description of the RWQCP's efforts to assess corrosivity of potable water supply in the service area is provided in Section II.A.3.a . RWQCP staff has met with San Francisco Public Utilities Commission (SFPUC) staff to discuss SFPUC's corrosion control strategy, which was approved by the California Department of Public Health. RWQCP staff will continue to monitor influent copper concentration on a monthly basis to assess whether any significant increases in influent copper concentrations are caused by potable water corrosivity	Ongoing
iii.	Educate plumbers, designers, and maintenance contractors for pools and spas to encourage best management practices that minimize copper discharges	A detailed description of the RWQCP's efforts to educate plumbers and designers about best management practices to minimize copper is provided the 2016 Clean Bay Plan. This effort, which is now a regional program of BAPPG, was initiated by the RWQCP in 2001. RWQCP staff will continue to support BAPPG's efforts to reach plumbers' and designers' groups. An effort is also planned by BAPPG to work with the California State Licensing Board to direct plumbing contractors to the baywise.org website for information on copper corrosion	Ongoing

Attachment F--Palo Alto Selenium Factsheet

REGIONAL WATER QUALITY CONTROL PLANT

Operated by the City of Palo Alto for the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto and Stanford

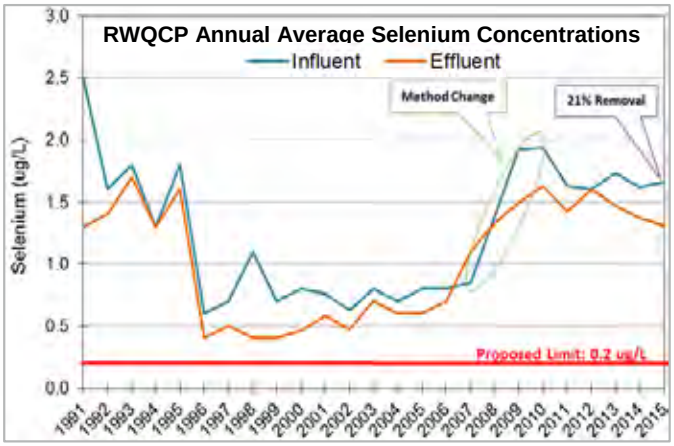
PALO ALTO— IMPACT OF PROPOSED EPA SELENIUM STANDARDS

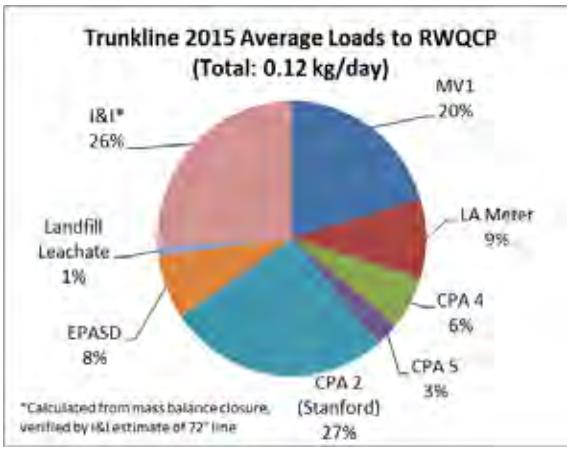
October 2016

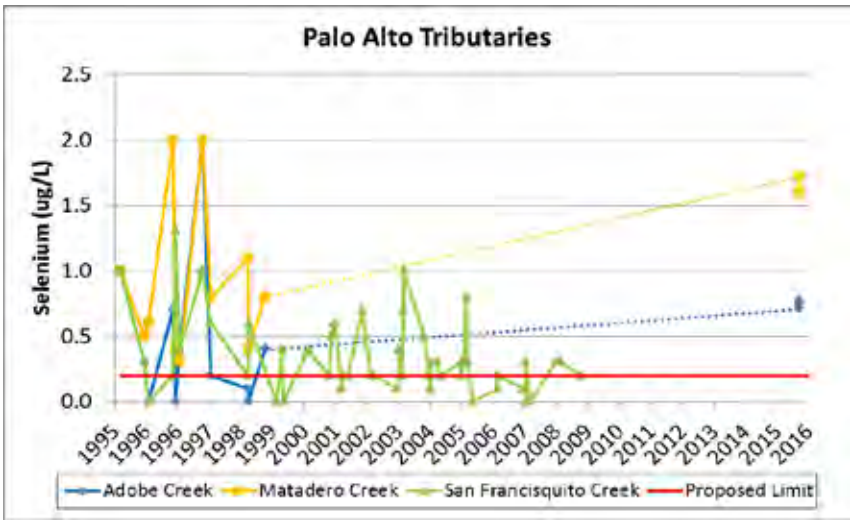
The Environmental Protection Agency (EPA) has proposed lower selenium water quality (WQ) criteria for the San Francisco Bay and Delta. Through this new regulation, South Bay POTW's would not be able to meet the WQ objectives as proposed[1]:

- The current **WQ criteria** of 5 ppb would be reduced to a 30-day average concentration of 0.2 µg/L (based on North Bay food web)
- **Proposed fish criteria:** 11.3 µg/g dry weight (muscle); 8.5 µg/g dry weight (whole body)
- **Proposed clam tissue criteria:** 15 mg/kg dry weight
- These are recommendations for states and regional water boards to consider for implementation
- EPA has approved of a North Bay TMDL that includes monitoring early warning indicators.
- Next for development is a South Bay TMDL.

Despite higher WQ concentrations than the proposed criteria, clam and fish tissue concentrations do not suggest impairment or bioaccumulation at current Lower South Bay (LSB) WQ levels.







A large source of selenium to the LSB is naturally-occurring and comes from tributaries and inflow/infiltration, which flows into wastewater collection pipes.

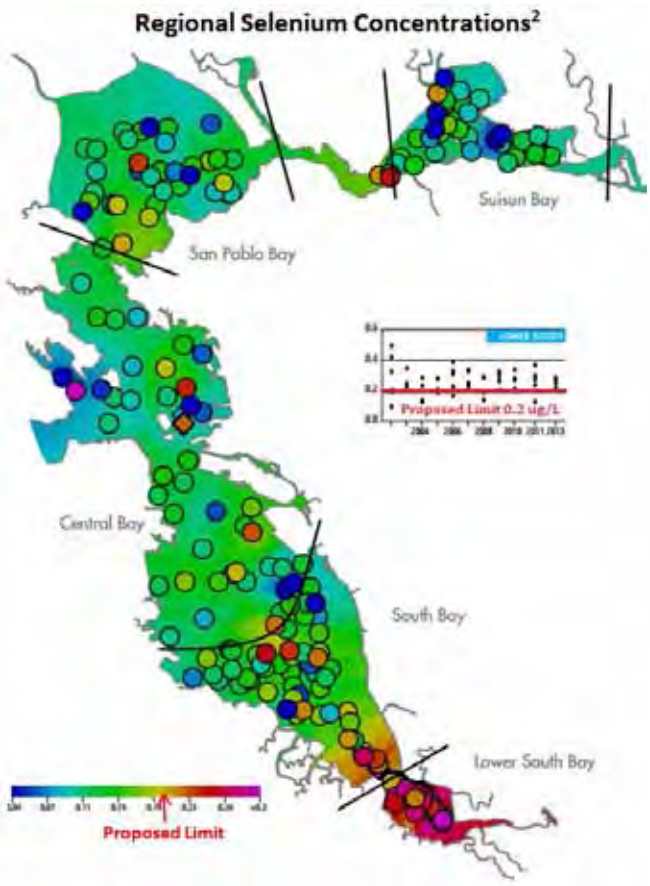
[1] Tran, J. (2016). *Selenium Evaluation: Historical Review and Impact from Proposed EPA Regulations.* Palo Alto: Palo Alto Regional Water Quality Control Plant.

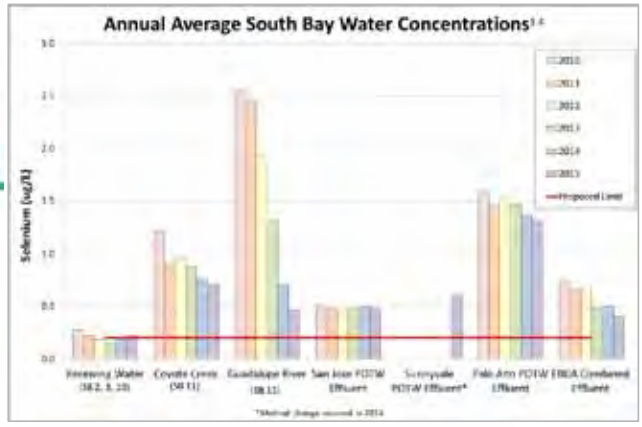
REGIONAL WATER QUALITY CONTROL PLANT

Operated by the City of Palo Alto for the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto and Stanford

PALO ALTO— IMPACT OF PROPOSED EPA SELENIUM STANDARDS

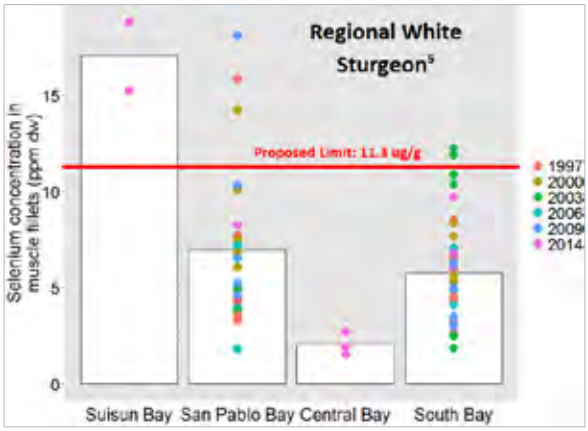
October 2016

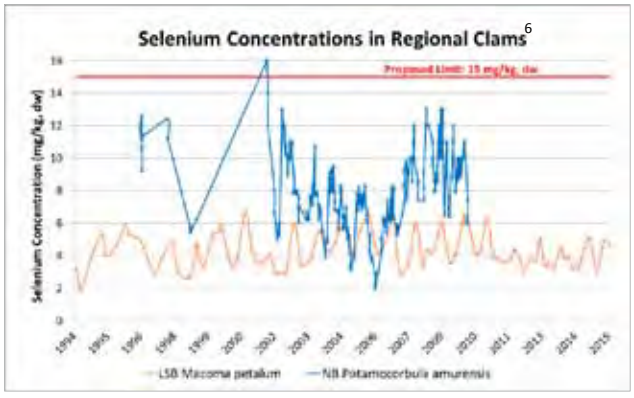




Proposed criteria do not account for varying food webs in subembayments. LSB clams accumulate selenium at lower rates than *P. amurensis.*

Exceedance in proposed WQ criteria is not indicative of bioaccumulation in LSB food web.





[2]Adapted from SFEI. 2015. The Pulse of the Bay: The State of Bay Water Quality, 2015 and 2065. SFEI Contribution #759. San Francisco Estuary Institute, Richmond, CA.
[3]Data obtained from San Jose, Sunnyvale, Palo Alto, & East Bay Dischargers Authority (EBDA) POTWs.
[4]East Bay Dischargers Authority (EBDA) discharges effluent from City of Hayward, City of San Leandro, Oro Loma Sanitary District, Union Sanitary District, Dublin San Ramon Services District, and City of Livermore.
[5]SFEI. Se Work Group Data. Received by Jennifer Sun, 8 Aug. 2016.
[6]USGS. (2016). U.S. Geological Survey Open-File Report 2016-1118. U.S. Geological Survey, Reston, VA.
[6]USGS. (2010). U.S. Geological Survey Open-File Report 2010-1252. U.S. Geological Survey, Reston, VA.

APPENDIX G: CYANIDE CONTROL PROGRAM IMPLEMENTATION PLAN

COPPER CONTROL PROGRAM ITEM NUMBER	ITEM DESCRIPTION	IMPLEMENTATION PLAN	IMPLEMENTATION DATE
i.	Inspect each potential contributor to assess the need to include that contributing source in the control program	The following three facilities were identified as potential contributors of cyanide to the RWQCP: Communications and Power Industries, Hammon Plating Corporation, and Space Systems/Loral, LLC. Each of these facilities was inspected by the RWQCP's Pretreatment Program, and all three are included in the cyanide control program	Complete
ii.	Inspect contributing sources included in the control program annually. Inspection elements may be based on USEPA guidance, such as Industrial User Inspection and Sampling Manual for POTWs	The contributing sources identified above will be inspected at least annually. Communications and Power Industries, Hammon Plating Corporation, and Space Systems/Loral, LLC are typically inspected semiannually, with compliance monitoring, including cyanide analysis, conducted monthly by the RWQCP	Ongoing
iii.	Develop and distribute educational materials to contributing sources and potential contributing sources regarding the need to prevent cyanide discharges	The RWQCP will utilize the educational materials developed by the Bay Area Pollution Prevention Group. Distribution of educational materials began in 2011. Pretreatment program inspectors regularly stress the importance of proper cyanide control during industrial facility inspections	Complete
iv.	Prepare an emergency monitoring and response plan to be implemented if a significant cyanide discharge occurs	The emergency monitoring and response plan is located in Appendix H	Complete
v.	If ambient monitoring shows cyanide concentrations of 1.0 µg/L or higher in the main body of the San Francisco Bay, undertake actions to identify and abate cyanide sources responsible for the elevated ambient concentrations	Monitoring of San Francisco Bay is conducted through the Regional Monitoring Program. The RWQCP will identify necessary actions if cyanide concentrations reach 1.0 µg/L or greater	On hold

Public Works Department
Water Quality Control Plant

Environmental Compliance Division

Date: **08/13/10 (Updated 02/14/11)**
To: **File, Clean Bay Plan**
From: **Ken Torke, Environmental Control Programs Manager**
Phone: **(650) 329-2421**
RE: **Cyanide Sampling and Response**

Influent and effluent monitoring are conducted per the requirements of the Palo Alto Regional Water Quality Control Plant's NPDES permit. This plan sets out sampling and investigative measures to be taken in any instance of influent sampling analysis results that are above the typical range (non-detect at <0.002 mg/L – 0.005 mg/L).

1. **Sample results greater than 0.005 mg/L CN**
    a. Re-sample influent (grab), deploy composite sampler.
    b. Re-sample effluent (grab), deploy composite sampler.
    c. Contact each of the identified and potential cyanide contributors; discuss any recent activities that could have caused a high value.
        i. Hammon Plating Corporation
        ii. Communications and Power Industries
        iii. Specific Plating
    d. Standard follow-up sampling and enforcement response will be implemented for non-compliant activities or IU discharges above the applicable Federal categorical limits and/or local limits.

2. **Additional sample results greater than 0.005 mg/L CN**
    a. Inspect, collect grab samples, and deploy composite samplers for each of the identified and potential cyanide contributors.
        i. Hammon Plating Corporation
        ii. Communications and Power Industries
        iii. Specific Plating
    b. Standard follow-up sampling and enforcement response will be implemented for IU discharges above the applicable Federal categorical limits and/or local limits.
    c. Collect grab samples from each of the partner's trunk lines
    d. Deploy composite samplers at each of the partner's trunk lines
    e. If cyanide is detected above the typical non-detect range then further sampling will be conducted upstream of the location in order to narrow down the potential source area.

3. **Sample Results greater than 0.02 mg/L CN**
    a. Conduct all activities in Cases 1. and 2.

All findings will be reported in a letter to Regional Board for Cases 2. and Case 3. or if effluent limits are exceeded. Follow up actions, and summarized program results will be reported in the Pretreatment Program Annual Report.

APPENDIX I: SINGLE USE PLASTIC POLICY

Attachment I-Single-use Plastic Policy

POLICY AND PROCEDURES 5-05/PWD
September 2016

CITY OF PALO ALTO

CITY OF PALO ALTO SINGLE-USE PLASTICS POLICY

The purpose of this Policy is to reduce pollution, solid waste and greenhouse gas emissions associated with City purchases of plastic products. In addition, the intent of this policy is to demonstrate leadership by going beyond the requirements imposed via City Ordinance which apply to City of Palo Alto retailers and food service establishments.

The City recognizes that single-use plastics including plastic bags, single-use plastic water bottles, and expanded plastic foam food and beverage containers, ice chests and packaging materials are high-volume components of plastic litter found in local creeks and San Francisco Bay which harm wildlife and water quality, and which contribute to the City's solid waste stream. If plastic is released to the environment by wind or improper disposal, it does not biodegrade and removal from the environment is difficult, expensive and has limited success. Plastic foam products cannot be recycled in Palo Alto's recycling program.

Single-use plastic water bottles and plastic foam are included because of their frequent occurrence in ecosystem litter and readily available alternatives. Eliminating single-use plastics:

1. Aligns with the City's policy to achieve Zero Waste by 2021;
2. Aids compliance with the Municipal Regional Permit which requires "no adverse impact" from stormdrain sources of litter in local creeks by 2022; and
3. Conforms with the City's Sustainability/Climate Action Plan goal to reduce Greenhouse gas emissions associated with the manufacture, transport and disposal of products purchased by the City.

The following items shall be phased out of City Operations by the dates indicated:

1. Single-use plastic bags shall not be purchased or distributed, effective September 18, 2009;
2. Plastic foam ice chests, packaging materials and food and beverage containers as defined by Palo Alto's Plastic Foam Ordinance 5371 shall not be purchased, used or distributed at City sponsored events after December 31, 2009;
3. Single-use plastic water containers shall not be purchased, distributed or sold after December 31, 2009;
4. The City will require its vendors and contractors to eliminate the use of plastic foam used for primary, secondary and shipping packaging in goods by January 1, 2017 unless individual contract specifications list an earlier date. Contract specifications and terms and conditions will include language requiring that:

Page 1 of 3

a. All primary, secondary and shipping (tertiary) packaging be minimized to the maximum extent feasible while balancing the need to protect the product being shipped;
b. Expanded foam plastics (e.g., foam or cushion blocks, trays, packing "peanuts"), such as but not limited to polystyrene (aka Styrofoam™), polypropylene, or polyurethane shall not be used as primary, secondary or tertiary/shipping packaging with the following exceptions:
    i. Primary packaging made from these materials may be used if the vendor, manufacturer, contractor individually or collaboratively does one of the following:
        1. Takes the material back at the City's convenience and at no cost to the City, or
        2. Pays the City's costs for handling and disposal.
c. Bioplastics that meet ASTM D6400 standards for compostability may be accepted with approval from the City's Environmental Services Division subject to local municipal compost facility requirements;
d. If approved by the City's Environmental Services Division, a packaging requirement may be waived if no other viable packaging alternative exists; and
e. The City will include the above standards when relevant in City contract specifications, Purchase Order Terms and Conditions, and policies related to cash handling and procurement card use.

Applicability of this Policy

This Policy shall apply to all City operations, with the exception of emergency response actions as needed. City contractors, lessees and vendors shall also adhere to the Policy when providing a service or attending City-sponsored events, meetings or other gatherings. All events sponsored or co-sponsored by the City shall also be in compliance with the Policy. This Policy will also be included in the Environmentally Preferable Purchasing Chapter of the Palo Alto Purchasing Manual and shall be implemented via contracts, purchase orders and agreements.

Procedures

City staff, vendors, lessees and event managers shall all be responsible for adherence to the Policy and ensuring that non-conforming plastic containers are not distributed at City facilities or City sponsored (or co-sponsored) events. Purchasing staff shall also assist in ensuring that non-conforming plastic containers are not purchased. Changes to this Policy must be coordinated through the City Manager's Office. Questions and/or clarifications of this Policy should be directed to the Public Works Department.

Definitions:

1. **Primary packaging** designates the layer of packaging in immediate contact with the product;

2. **Secondary Packaging** protects the product and the primary packaging, which often is the packaging most visible to the consumer in retail displays such as cardboard cartons, cardboard boxes and cardboard/plastic crates.
3. **Tertiary or Shipping Packaging:** Shipping containers used for transport of products that may be wrapped in primary and/or secondary packaging.

Recommended: _____ Public Work Director — 9/22/16 Date

Approved: _____ City Manager — 9.30.16 Date

APPENDIX J: SCHOOL OUTREACH 2015-2016 SUMMARY

PROGRAM DETAILS	FOCUS & SHORT DESCRIPTION	NUMBER OF STUDENTS/ TEACHERS REACHED	EVALUATION OF EFFECTIVENESS
What's Bugging You? (2nd Grade)	In this interactive program, students work together to create a visual habitat for insects. By learning about insects and the food chain students are introduced to the concept of pesticides, as well as the impacts of pesticides on water pollution. Students also learn: the difference between waste water and storm water (where it comes from, where it goes); the water cycle; the definition and function of a watershed; and "reduce/reuse/recycle/rot/respect."	Los Altos: 1 class, 24 students Mountain View: 2 classes, 94 students Palo Alto: 7 classes, 168 students	The teachers' rating of classes for this school year averaged 4.9 out of 5 both for quality of program and clarity of presenter. In addition, teachers stated that students in 96% of classes showed an increased understanding of the difference between the storm drain and the sewer systems and of what they can do to prevent water pollution. Unfortunately, the return rate of for the postage paid evaluation cards dropped from last year to this year, with cards coming in for only 37% of classes. This is mostly due to several teachers who hosted multiple 7th grade classes failing to return the cards. We will make a greater effort next year to ensure teachers understand the importance to our program of returning the evaluation cards.
What's Up with the Bags? (2nd grade)	In this program students practice their reading and comprehension skills by reading a story out loud as they learn about the impact of plastic bags when they enter the watershed through human use and misuse. Plastic bag alternatives are discussed. Students are given a re-usable bag, encouraged to decorate it with a message about water pollution or something else they learned from the lesson, and then take the bag home to be reused. Students also learn: the difference between waste water and storm water (where it comes from, where it goes); the water cycle; the definition and function of a watershed; and "reduce/reuse/recycle /rot/respect."	Los Altos: 1 class, 24 students Mountain View: 4 classes, 94 students Palo Alto: 11 classes, 254 students	See above
Watershed Warriors! (3rd grade)	In this program students utilize a hands-on, simulated model called The Enviroscape. This model represents various environments such as a farm and a neighborhood. Students learn the sources of pollution & solutions to reduce or eliminate pollution. Students also learn: the difference between waste water and storm water (where it comes from, where it goes); the water cycle; the definition and function of a watershed; and "reduce/reuse/recycle/rot/respect."	Palo Alto: 9 classes, 216 students	See above
Who Dirtied the Bay? (3rd Grade)	Moving through time from past to present the focus of this program is on storm water and how pollutants impact the Baylands and H2O environment. Pollution prevention solutions are discussed with an emphasis on what the students can do right now, at their age, to impact water pollution Students also learn: the difference between waste water and storm water (where it comes from, where it goes); the water cycle; the definition and function of a watershed; and "reduce/reuse/recycle/rot/respect."	Los Altos: 4 classes, 96 students Mountain View: 2 classes, 45 students Palo Alto: 10 classes, 223 students	See above

APPENDIX J: SCHOOL OUTREACH 2015-2016 SUMMARY (CONTINUED)

PROGRAM DETAILS	FOCUS & SHORT DESCRIPTION	NUMBER OF STUDENTS/ TEACHERS REACHED	EVALUATION OF EFFECTIVENESS
Mercury (4th grade)	In this program students learn how mercury from the past (California Gold Rush) and the present, accumulates and impacts the waters of San Francisco Bay. Bio- accumulation of mercury is also demonstrated with a participatory activity Pollution prevention strategies are discussed. Students also learn: the difference between waste water and storm water (where it comes from, where it goes); the water cycle; the definition and function of a watershed; and "reduce/ reuse/recycle/rot/respect"	Los Altos: 3 classes, 72 students Palo Alto: 7 classes, 168 students	See Above
Microbes in Sewage (7th grade)	In a laboratory setting, students practice their microscope skills as they observe, document and identify microbes from water samples drawn from the aeration basin as part of the wastewater treatment process. This program directly relates since students study protist in the 7th grade as part of the science biology curriculum, Students also learn to understand the sense of place and the role of a wastewater treatment plant in their community. Impact of pollution on the Baylands and water environment, as well as prevention solutions that the students can currently engage in are discussed	East Palo Alto: 6 classes, 154 students Los Altos: 13 classes, 364 students Mountain View: 25 classes, 730 students Palo Alto: 38 classes, 1,094 students	See Above
ZunZun Musical Assembly (K- 6th Grade)	Interactive, musical school assemblies educating K-6 children about watersheds and pollution prevention.	Report TBD	Evaluations distributed and collected by ZunZun. See Watershed Watch Campaign Academic Year Final Report

APPENDIX K: RWQCP SCHOOL OUTREACH BROCHURE

YOUR STUDENTS CAN

make an impact in preventing water pollution to help keep San Francisco Bay healthy.

Our free programs provide a fun and engaging way for each student to better understand their community and their important role in it. Each program is correlated to State Standards in support of your curricula. Contact us today to schedule a program at:

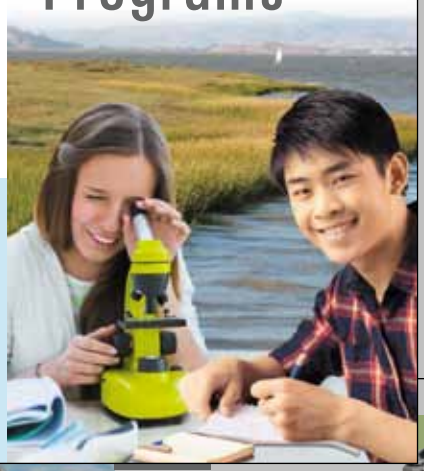
cleanbayeducation@cityofpaloalto.org

REGIONAL WATER QUALITY CONTROL PLANT

2501 EMBARCADERO WAY
PALO ALTO · CA 94403

The Regional Water Quality Control Plant (RWQCP) protects San Francisco Bay by treating 20 million gallons of wastewater daily. Operated by the City of Palo Alto, the RWQCP serves its six partner communities of East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto and Stanford. The RWQCP provides award-winning educational programs to thousands of students throughout its service area each year with the goal of educating and inspiring young people to understand, value and protect their watershed.

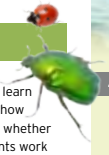
Free Water Pollution Prevention Education Programs



Students dive into the watery world of San Francisco Bay and meet its inhabitants as they take part in a "reader's theater" story which supports reading skills and story comprehension. Students learn about the impact of plastic bags when bags enter the watershed through human use and misuse. They'll learn alternatives to plastic and how to be part of the pollution solution. Students finish by decorating a reusable bag made from recycled plastic to take home (The bag can also serve as a year-end "take-home" bag!).

WHAT'S BUGGING YOU?

2ND GRADE



Students crawl into the world of insects as they learn about the importance of insects in the food chain, how pesticides pollute our water and environment, and whether there really are "good bugs" or "bad bugs." Students work together to assemble a large insect habitat puzzle on the floor while reading aloud fascinating facts about insects. Listening and focusing skills are emphasized while practicing teamwork. The program concludes with giving the students the opportunity, with no pressure, to eat "edible bugs."

WHO DIRTIED THE BAY?!?

3RD GRADE

Students step into a time machine and roll back the clock as they trace the history of San Francisco Bay, from the Ohlone to present day, to learn about the impact of humans on our Bay environment. A hands-on activity builds their understanding of how runoff flows into creeks and the Bay, both directly and through the storm drain system, as they "dirty" a simulated Bay with pollutants from past and present. Students learn what they can do to be solutions to the pollution that impacts this vital ecosystem.

Photo: Susanne Mulcahy

MERCURY: PAST & PRESENT

4TH GRADE

Students take a hands-on look at the impact of mercury on San Francisco Bay through the lens of the Gold Rush by tracing the history of how mercury was mined in southern Santa Clara County, used in the gold mining process, and subsequently washed into San Francisco Bay. Through the interactive "Fish-Eat-Fish" game, students experience how this toxic metal is transferred through the Bay ecosystem and food chain through bio-accumulation. Students learn what we do now to prevent more mercury from entering our local environment.

WATERSHED WARRIORS

3RD AND 5TH GRADES

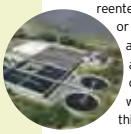
Using an interactive tabletop relief model called the "Enviroscape™", students learn what defines a watershed. After building out the Enviroscape model with props to create residential, commercial and agricultural communities, students simulate how rain moves pollutants through the watershed to a river, bay and ocean. The simulation concludes with a discussion of pollution sources and best practices to keep pollutants from entering the watershed.

Utilizing activated sludge from the water treatment plant, this lab gives students the unique, real-world experience of finding, observing, documenting, and identifying the microbes that play a vital role in wastewater treatment and observing how they remove pollutants and clean the water. This lab always gets an audible "WOW" from the students when they first look in the microscope.

Preceding the distribution of slides, we review the wastewater treatment process, proper lab procedures, and microscope technique. We provide all lab supplies, lab worksheets, and very active microbes from the wastewater treatment plant.

TOUR YOUR WATER TREATMENT PLANT

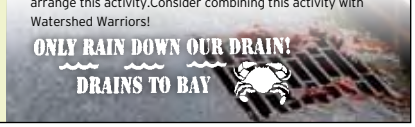
GRADES 6 TO ADULT



Just how DO we clean 20 million gallons a day, 365 days a year? At the RWQCP you'll see and learn about the multiple treatment processes that wastewater undergoes before reentering the water cycle in the Bay. Call **650.329.2396** or email **cleanbayeducation@cityofpaloalto.org** to arrange a tour. Tour content is modified for age appropriateness. Consider preceding this tour with a classroom program or watch our online video of the wastewater treatment process (visit cleanbay.org for this and other videos).

STORM DRAIN STENCILING

Somewhere around your school campus, or in the immediate neighborhood, there's a storm drain! Whether you're looking for a service project or a direct and memorable way to teach water pollution prevention, stenciling storm drains around your school with the *Only Rain Down Our Drain* logo can be the way to go. We provide all the materials and instructions. Call **650.329.2122** or email **cleanbayeducation@cityofpaloalto.org** to arrange this activity.Consider combining this activity with Watershed Warriors!



APPENDIX L: 2016 RWQCP TOURS

DATE	ATTENDANCE	TOUR DETAILS
2/23/2016	20	College Students
2/23/2016	13	Grass Roots Ecology
2/23/2016	Data not recorded	High School Teachers
3/21/2016	Two tours-30 students	Independence High School
3/22/2016	Two tours-30 students	Independence High School
3/23/2016	Two tours-30 students	Independence High School
3/29/2016	Three tours-75 students	Homestead High School
4/12/2016	Two tours-60 students	East Palo Alto Middle School
4/13/2016	Two tours-60 students	East Palo Alto Middle School
4/15/2016	8	Stanford Sustainability Club
4/19/2016	Three tours provided–data not recorded	Palo Alto High School
4/20/2016	Three tours provided–data not	Palo Alto High School
4/26/2016	Two tours-18 students	Independence High School
4/27/2016	Two tours-18 students	Independence High School
4/27/2016	7	Palo Alto Art Center Staff
5/2/2016	Two tours-28 students	Independence High School
5/4/2016	Two tours-28 students	Independence High School
5/5/2016	13	Dr. Wuo, Stanford
5/11/2016	8	MIT Alumni
5/25/2016	Two tours-60 students	East Palo Alto Middle School
6/11/2016	4	Residential Tour
6/18/2016	4	Residential Tour
6/24/2016	Three tours–data not recorded	Environmental Volunteers Summer
6/25/2016	24	Residential Tour
7/5/2016	8	5th Grade Students
7/12/2016	10	Environmental Volunteers Docents
7/20/2016	2	Palo Alto City Interns
7/20/2016	22	AP Environmental Science Teachers
8/2/2016	3	Steve, Jill, & Jackson Moody
8/3/2016	13	Summer Camp
8/25/2016	15	ISA
11/2/2016	3	Residential Tour
Total	**614**	

January 2016

Polystyrene Retail Letter/FAQ

FEBRUARY, 2016

Dear Palo Alto Retailer:

The City of Palo Alto recently adopted ordinance revisions to prohibit the retail sale or distribution of plastic foam ice chests, egg cartons, foodware and packaging materials.*

Plastic foam (e.g., Styrofoam™ and similar products) used in some single-use plastic products breaks down into tiny pieces and is one of the most prevalent forms of litter found in streets, creeks and the Bay. Plastic foam does not decompose and has well documented environmental hazards.

STARTING MARCH 1, 2016 RETAILERS MAY NOT SELL OR DISTRIBUTE:

PLASTIC FOAM POLLUTES

1,300 pieces of foam litter were found during creek cleanups in two small locations during 2015 creek cleanups.

114 tons of nonrecyclable plastic foam—equivalent to 556,000 cubic foot ba were landfilled in 2014 Palo Alto's waste stre

8% of the microp pollution found in Sa Francisco Bay is plas foam based on a 201 San Francisco Estua Institute study.

80% of ocean pollution comes from based sources world Most of it is plastic a enters the food chai

90 California citie counties have adopt ordinances restrictin plastic foam.

* Municode 5.30 Plastic Foam and Non-Recyclable Food Service Containers and Packaging Items

January 2016

Polystyrene Placard

Starting March 1, 2016

RETAILERS MAY NOT SELL OR DISTRIBUTE*:

Plastic foam breaks into one of the most common forms of litter and pollution that blows or flows into streets, creeks and San Francisco Bay. Opt for reusable, recyclable and compostable products instead.

TO LEARN MORE visit **www.cityofpaloalto.org/plasticfoam** or contact the City of Palo Alto Public Works—Watershed Protection at **650.329.2122, cleanbay@cityofpaloalto.org.**

* Municode 5.30 Plastic Foam and Non-Recyclable Food Service Containers and Packaging Items

January 2016

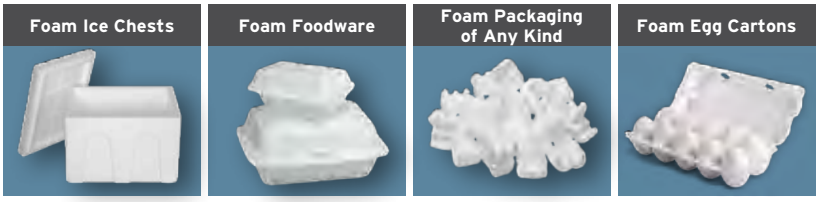
Polystyrene Reminder Postcard

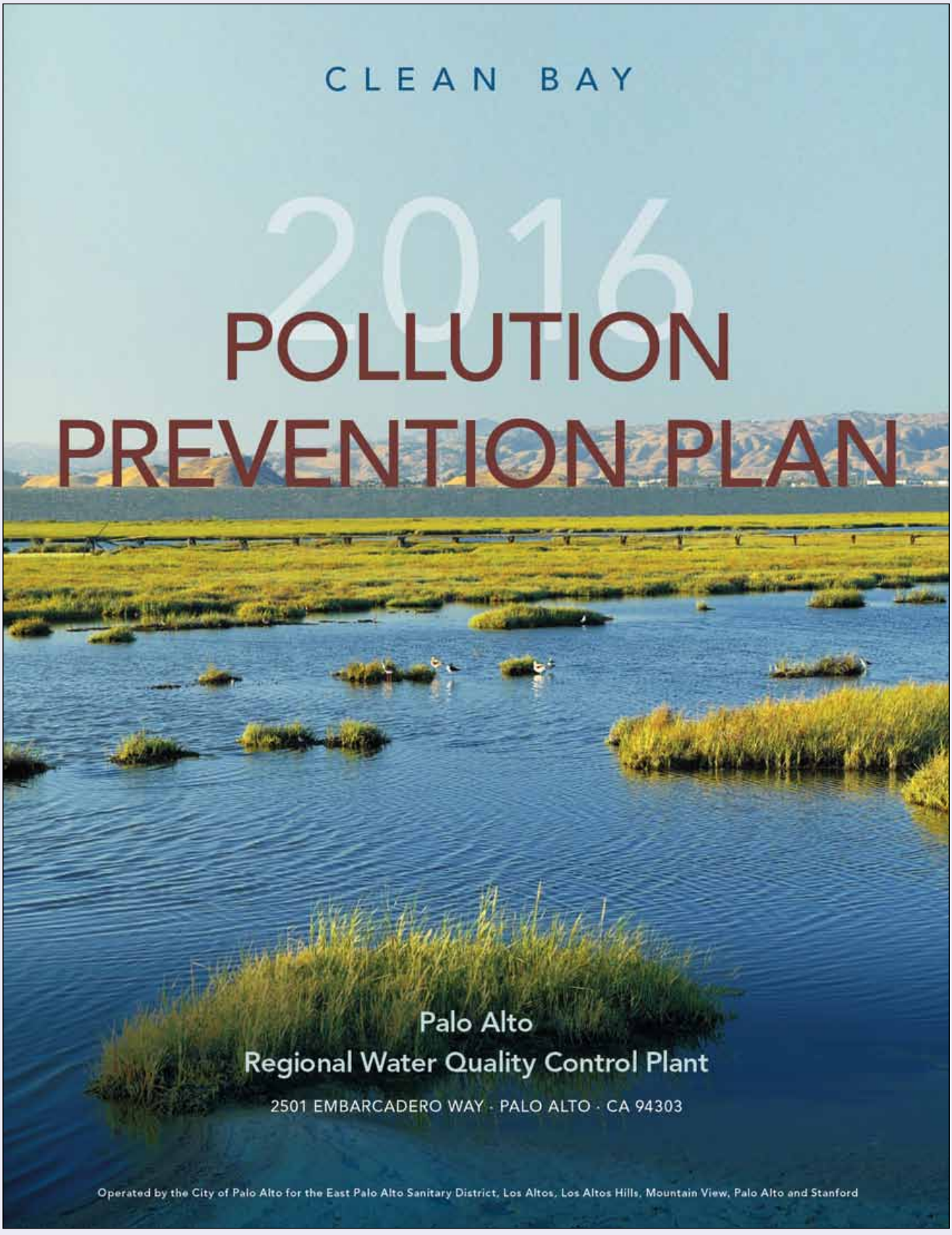
The City of Palo Alto is committed to eliminating plastic pollution and litter in local creeks and San Francisco Bay.

Reminder: New Plastic Foam Ordinance Requirements Now In Effect.

Visit **cityofpaloalto.org/plasticfoam** or call **650.329.2117** for more information about the ordinance and to learn how plastic pollution affects Palo Alto.

STARTING MARCH 1, 2016 RETAILERS MAY NOT SELL OR DISTRIBUTE:



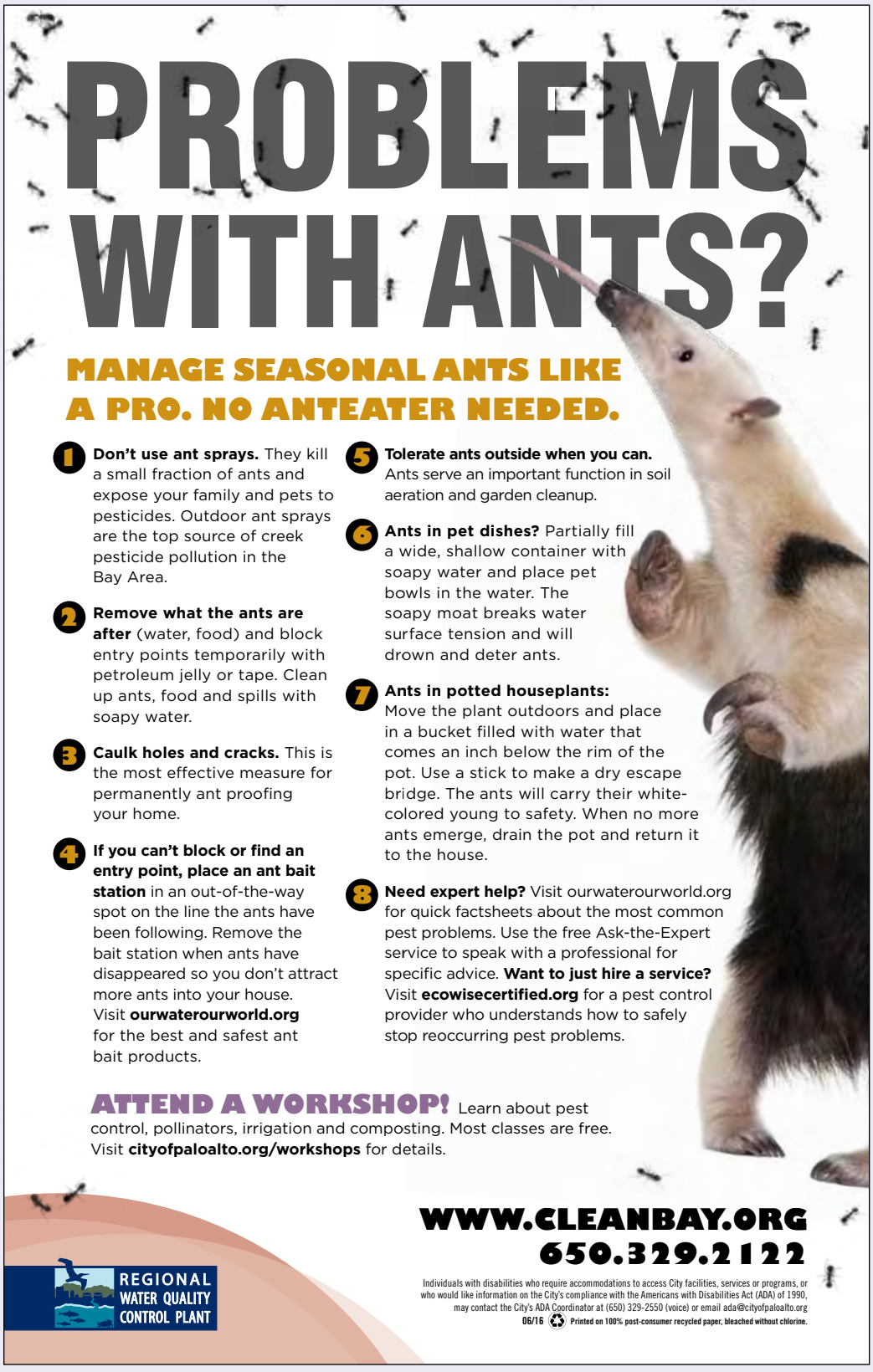


February 2016/**2016 Pollution Prevention Plan**

March 2016/**Drain Smart Utility Bill Insert**

April 2016
Medications Disposal Tear Sheet

April 2016
Pet Medications Disposal Tear Sheet



June 2016

Pest Control Utility Bill Insert

June 2016

'Best Practices' Pesticide/ Herbicide Usage Templates

RoundUp® use on (City Name) parks

How the (City Name) reduces glyphosate and other herbicide exposure

The International Association for Research on Cancer announced in 2015 that glyphosate–the active ingredient in Roundup® and other herbicides–was identified as a "probable carcinogen." This conclusion was based on cell studies, a link between tumors in mice and rats who were fed glyphosate, and a possible link to non-Hodgkins lymphoma in studies of agricultural workers who mix and apply glyphosate many times each year. The study did not look at the limited incidental public exposure that might occur in a park setting.

Bermuda grass, poison oak and yellow star thistle are common weeds that may be controlled, in part, by herbicides such as glyphosate.

Should I be concerned about glyphosate exposure in (Insert City name) parks?

A detailed review of scientific literature by the Pesticide Research Institute–a service that several Bay Area public agencies consults with to identify least-toxic pest management options–concluded that for the general public, exposure to glyphosate from food poses a higher risk than incidental exposure than from contact with glyphosate-treated vegetation (Susan Kegley, Pesticide Research Institute, *The Studies Behind the IARC Cancer Listing for Glyphosate, 2015* (insert City website for presentation location).

Insert Logo

City of (insert City name) staff use glyphosate only when necessary, in spot treatments (never an entire park or field), and only in areas where public contact is unlikely. Treated areas are closed during herbicide application. Glyphosate breaks down chemically in approximately 90 days.

(Insert City-specific name · Address · URL)

How pesticide applicators can reduce exposure risks from glyphosate and other herbicide use.

Glyphosate–the active ingredient in Roundup and other marketed herbicides–was identified as a "probable carcinogen" by the International Association for Research on Cancer– a World Health Organization agency. This conclusion was based on cell studies, a link between tumors in mice and rats who were fed glyphosate, and a possible link to non-Hodgkins lymphoma in agricultural workers who mix and apply glyphosate many times each year.

There is controversy over the IARC decision. European and the United States Environmental Protection Agency do not consider glyphosate to be a carcinogen, but the California Environmental Protection agency has stated that it will list is as such. Despite this mixed response, there is agreement that reducing pesticide exposure reduces risk to staff who apply pesticides.

Bermuda grass, poison oak and yellow star thistle are common weeds that may be controlled, in part, by herbicides such as glyphosate.

What you need to know

…ticide exposure is to stop
…o that the need for chemical
… wear personal protective
…ate applications are absolutely
…policy to (insert agency policy
…d other pesticide use).

(Insert City-specific name · Address · URL)

RoundUp® use on City of Palo Alto parks

How the City of Palo Alto reduces glyphosate and other herbicide exposure

The International Association for Research on Cancer announced in 2015 that glyphosate–the active ingredient in Roundup® and other herbicides–was identified as a "probable carcinogen." This conclusion was based on cell studies, a link between tumors in mice and rats who were fed glyphosate, and a possible link to non-Hodgkins lymphoma in studies of agricultural workers who mix and apply glyphosate many times each year. The study did not look at the limited incidental public exposure that might occur in a park setting.

Bermuda grass, poison oak and yellow star thistle are common weeds that may be controlled, in part, by herbicides such as glyphosate.

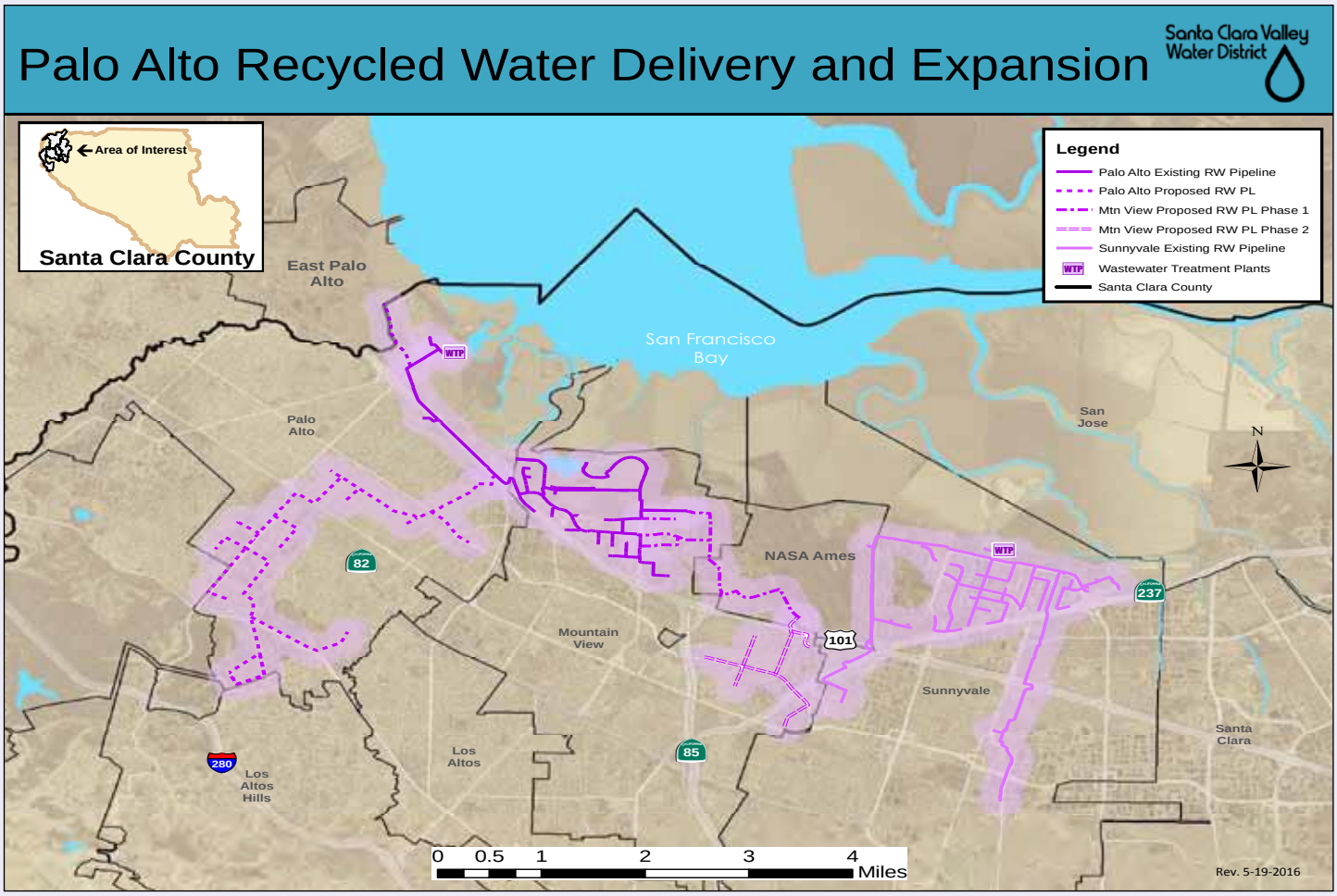
Should I be concerned about glyphosate exposure in Palo Alto parks?

A detailed review of scientific literature by the Pesticide Research Institute–a service that the City consults with to identify least-toxic pest management options–concluded that for the general public, exposure to glyphosate from food poses a higher risk than incidental exposure than from contact with glyphosate-treated vegetation (*Susan Kegley, Pesticide Research Institute, The Studies Behind the IARC Cancer Listing for Glyphosate, 2015*–see City website presentation).

PALO ALTO

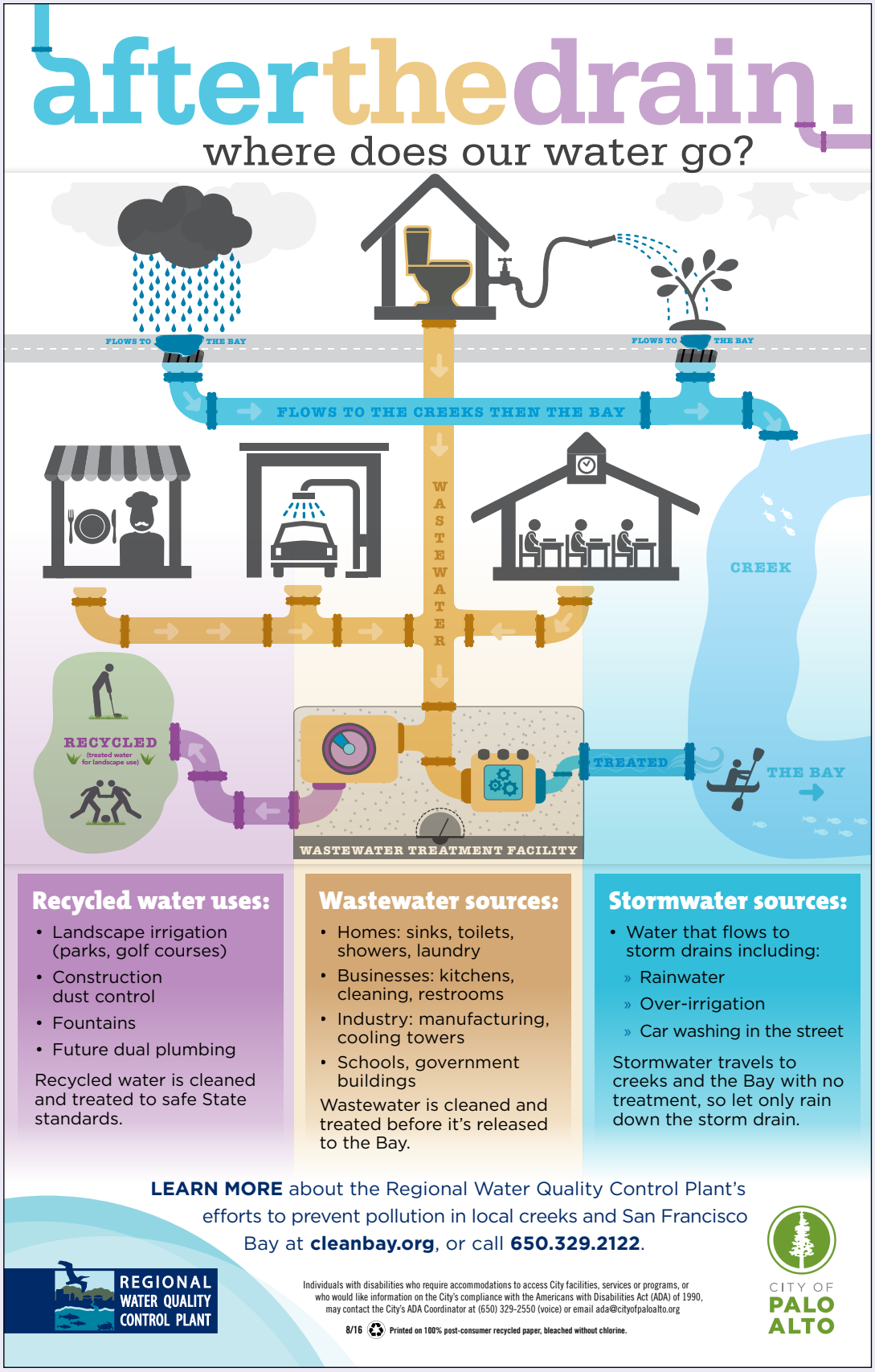
City of Palo Alto staff use glyphosate only when necessary, in spot treatments (never an entire park or field), and only in areas where public contact is unlikely. Treated areas are closed during herbicide application. Glyphosate breaks down chemically in approximately 90 days.

City of Palo Alto, Public Works Watershed Protection 2501 Embarcadero Way Palo Alto, CA 94303 · www.cleanbay.org



July 2016

Recycled Water Delivery Poster

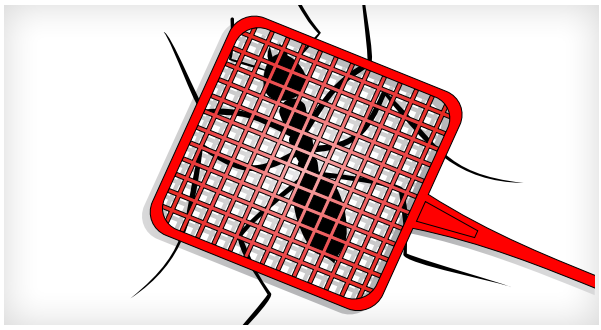


August 2016/**'Where Does Our Water Go'**
Recycled Water, Stormwater, and Wastewater Infographic

A

PROBLEMS WITH ANTS?
Manage seasonal ants like a pro. No anteater needed! Attend our workshop.

B

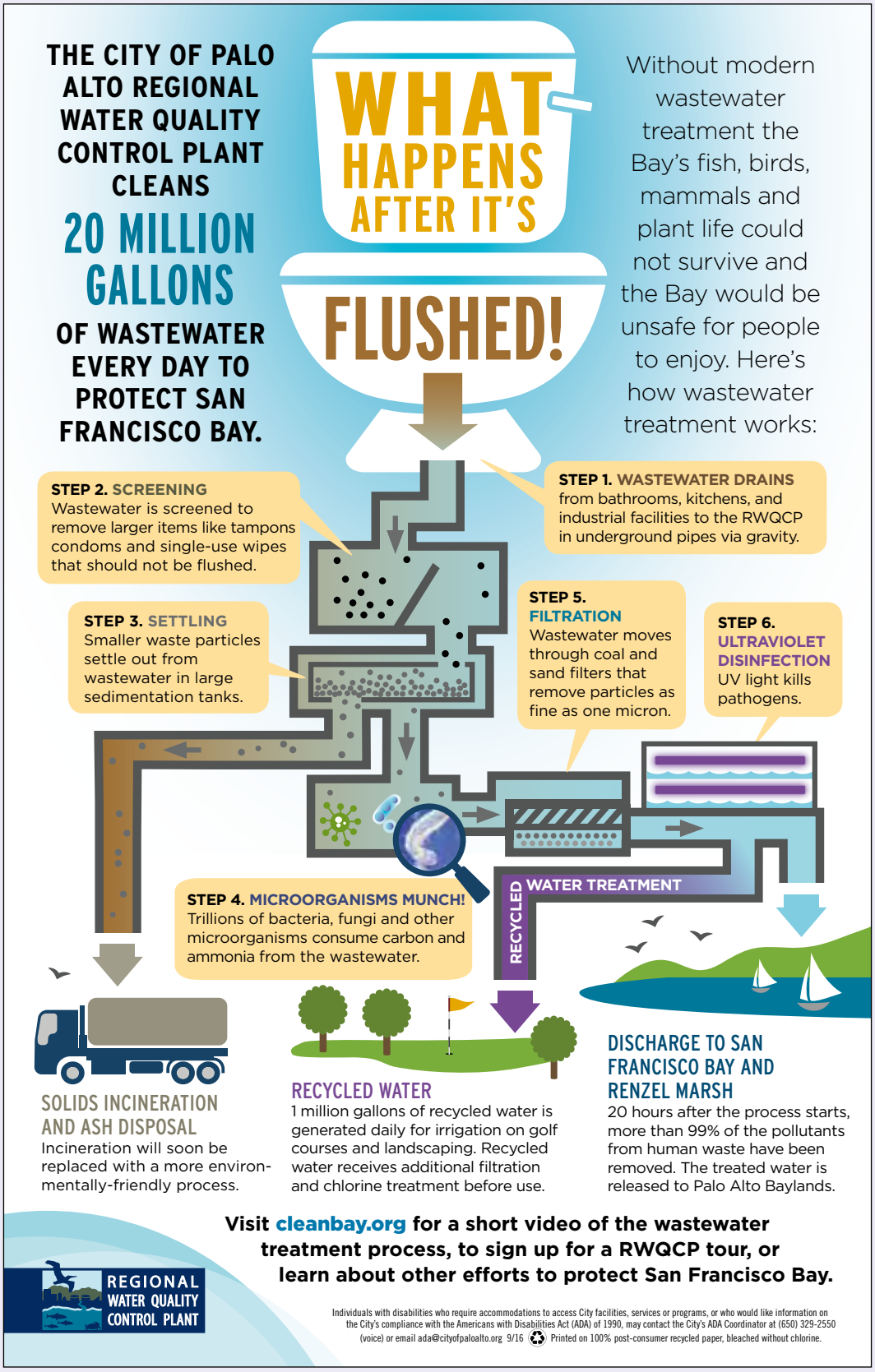


NO BUG WAS HARMED IN...
...the making of this ad. Learn kinder, eco-friendly ways to rid of pests at our workshop.

C

WHAT THEY HAVE IN COMMON:
Learn how to stop ants fast without toxic pesticide runoff into creeks & Bay.

September 2016
Pest Control Facebook Ads



October 2016

'What Happens When It's Flushed?' Infographic

Utility Bill Insert

November 2016

Storm Water Management Program

Utility Bill Insert

WHAT IF PALO ALTO STREETS WERE DESIGNED TO REDUCE STORM RUNOFF AND WATER POLLUTION WHILE ADDING BEAUTY?

In natural landscapes, rain soaks into the soil which slows the speed of runoff and filters pollutants. In urban areas, "impervious" surfaces such as roofs, concrete and asphalt interrupt this natural process. This increases flooding risks and pollution that washes into creeks and San Francisco Bay. "Green storm water infrastructure" mimics nature by slowing, spreading, sinking and filtering runoff. The Municipal Regional Stormwater Permit requires Palo Alto and other Bay Area agencies to develop a Green Storm Water Infrastructure (GSI) Plan by September 30, 2019 and identify locations for GSI implementation.

What Green Storm Water Infrastructure Looks Like.

PERVIOUS concrete, asphalt, and pavers reduce runoff by letting rain percolate into soil below. These surfaces can be used in crosswalks, sidewalks, plazas, driveways, parking spaces and emergency vehicle access lanes.

BIORETENTIO

are areas landscaped with na
with layers of soil and crushe
and treat storm runoff that is

RAINWATER CISTERN

Cisterns capture rainwater so that it can be used for irrigation.

Rainwater Cistern in Coldwater Canyon Park, Beverly Hills. Photo courtesy of TreePeople.org

GREEN ROOF

rainwater to soak into veget
off the building. Green roof
cooling costs and reduce he

Green roof installation on Mitchell Park Libr

CITY OF PALO ALTO

The City of Palo Alto offers commercial ar
install pervious surfaces, rain barrels and c
Visit **cityofpalaalto.org/stormwater** or call **(65**

Individuals with disabilities who require accommodations to access City facilities, services or program
with the Americans with Disabilities Act (ADA) of 1990, may contact the City's ADA Coordinator at (650
♻ Printed on 100% post-consumer recycled paper, bleached without chlorine.

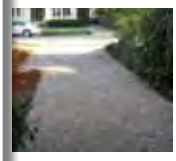
Palo Alto's Storm Water Management Program Reduces Street Flooding and Protects Creeks.

PREVENTING STREET FLOODING relies on the smart design of City storm drain infrastructure and streetscapes that slow, spread and sink storm water runoff. The health of Palo Alto creeks depends on programs that keep litter, leaf debris, sewer overflows, and construction and industrial pollutants from entering our watershed.

Since 2005, Palo Alto's Storm Water Management Program fees have funded seven high-priority storm drain pipeline and pump station capital improvement projects, a precedent-setting green infrastructure project (see reverse side), and more than 100 rebates to property owners for rainwater catchment, permeable driveways, and green roofs.

The San Francisquito Creek Storm Water Pump Station installed in 2009 clears storm water from streets in a 1,250 acre neighborhood in northeastern Palo Alto.

New storm drain pipes were installed along Channing Avenue in 2011 to reduce frequent street flooding along this important vehicle and bike corridor.



Storm Water Management Program fees funded commercial and residential rebate programs for permeable walkways and parking lots, rain barrels, cisterns and green roofs.

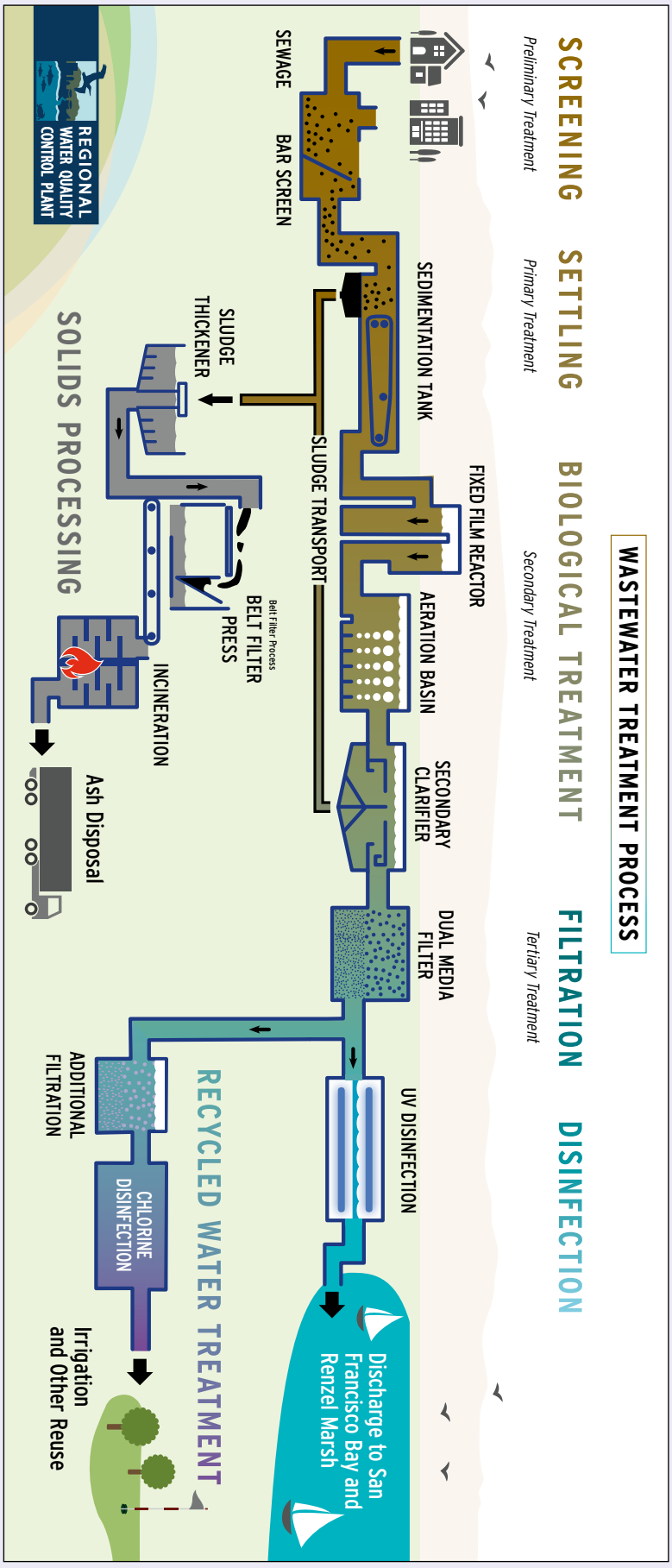
Engineered bioretention beds mimic nature by slowing, spreading, sinking and filtering storm water.

School programs, volunteer creek clean-up events and construction and industrial inspection services prevent storm water pollution.

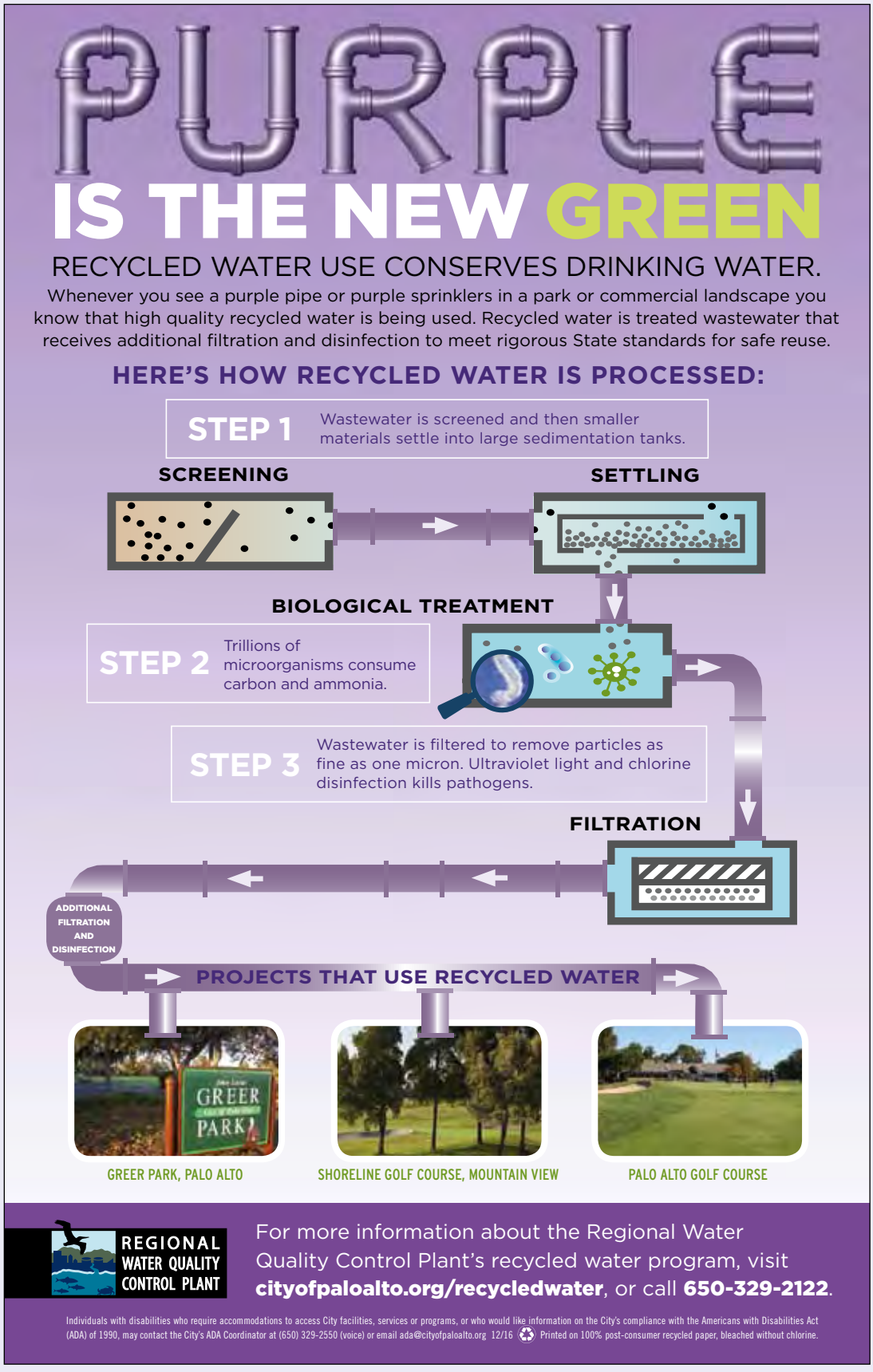
For more information visit
cityofpaloalto.org/stormwaterfee or call **(650) 329-2295.**

Individuals with disabilities who require accommodations to access City facilities, services or programs, or who would like information on the City's compliance with the Americans with Disabilities Act (ADA) of 1990, may contact the City's ADA Coordinator at (650) 329-2550 (voice) or email ada@cityofpaloalto.org 11/16 ♻ Printed on 100% post-consumer recycled paper, bleached without chlorine.

CITY OF PALO ALTO



November 2016/**Regional Water Quality Control Plant Process Infographic/Signage**



December 2016

'Purple is the New Green' Recycled Water Infographic Utility Bill Insert

MONTH	PRINT
July	**Greenhouse Gas Factsheet** Evaluation of RWQCP greenhouse gas emissions.
August	**Energy Use Factsheet** Evaluation of RWQCP energy use.
August	**Phosphorous Factsheet** Regional comparison of total phosphorous loads, and evaluation of phosphorous in RWQCP effluent.
September	**Recycled Water Reference Sheet** Detailed document that defines commonly used terminology for recycled water, describes its general treatment processes, lists the allowable uses, and states the regulations for recycled water.
September	**Redwood Tree Factsheet** Detailed factsheet for a redwood tree monitoring study in Mountain View.
October	**Lower South Bay Selenium Factsheet** Regional comparison of selenium concentrations among Lower South Bay dischargers and water quality effects to the San Francisco Bay.
October	**Palo Alto Selenium Factsheet** Evaluation of selenium in RWQCP effluent.

APPENDIX N: 2016 PUBLIC OUTREACH EVENTS

DATE	EVENT	ATTENDANCE
1/14/2016	**Jordan Middle School Science Fair** Student science project competition and vendor tabling event.	600
1/28/2016	**Get Involved Palo Alto Intern Program** Last official meeting to discuss webpage and storm drain stenciling project.	3
2/24/2016	**SummerWinds Nursery** IPM Staff workshop.	6
3/14/2016- 4/6/2016	**CAA §129 Operator Training** Training for Plant Staff regarding air regulations.	47
3/21/2016	**Sabotaging Snails, Slugs, & Plant-suckers** IPM workshop.	21
4/15/2016	**Palo Alto High School Service Day Campus Storm Drain Stencil Project** Student interns lead student volunteers in storm drain stenciling on campus. Used chalk paint and stencils provided by RWQCP.	17
4/17/2016	**Los Altos Hills (Westwind Barn) Earth Day Celebration** Los Altos Hills annual event for residents, vendors tables, and large wild cat show.	500
4/19/2016	**Wilson, Sonsini, Goodrich, & Rosati Earth Day Event** Medicine takeback annual event.	200
4/21/2016	**Tesla Earth Day** Tabling event for corporate staff.	300
4/30/2016	**The Great Race to Save Water** City of Palo Alto run event to raise awareness of water conservation & other water-related issues.	100
5/3/2016	**PARC/Xerox Earth Day Event** Tabling event for corporate staff.	100
5/21/2016	**River Clean Up Day** Volunteer trash removal event at two Palo Alto Bayland creeks: Matadero and Adobe.	35
5/24/2016	**Mountain View Senior Resource Fair** Medicine takeback and tabling event for seniors and caretakers.	150
8/10/2016	**Phun with Phosphorus: Phosphorus Evaluation** RWQCP intern presentation to City Staff, presented by Kateline Lin.	20
8/10/2016	**"Green Stormwater Infrastructure & S/CAP"** RWQCP intern presentation to City Staff, presented by Desiree De Rossi.	20
9/10/2016	**Palo Alto Community Health Fair** Tabling event hosted by the Palo Alto Family YMCA and City of Palo Alto as a part of the *Healthy Cities, Healthy Community Initiative.*	450
9/17/2016	**Coastal Cleanup Day** Volunteer trash removal event at two Palo Alto Bayland creeks: Matadero and Adobe.	41
10/1/2016	**Fall Pest Prevention** IPM workshop.	7
10/26/16	**Green Gardener Training** RWQCP staff taught IPM class to SCVURPP Green Gardener Program.	20
11/10/2016	**Palo Alto High School Tap Out Club** Student lead presentation on bottled water use, and Utilities Department presenting Palo Alto's drinking water quality. Hosted by RWQCP.	20
	Total	**2,657**

REGIONAL WATER QUALITY CONTROL PLANT

Operated by the City of Palo Alto for the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto and Stanford

Redwood Tree Monitoring Study 2009–2016

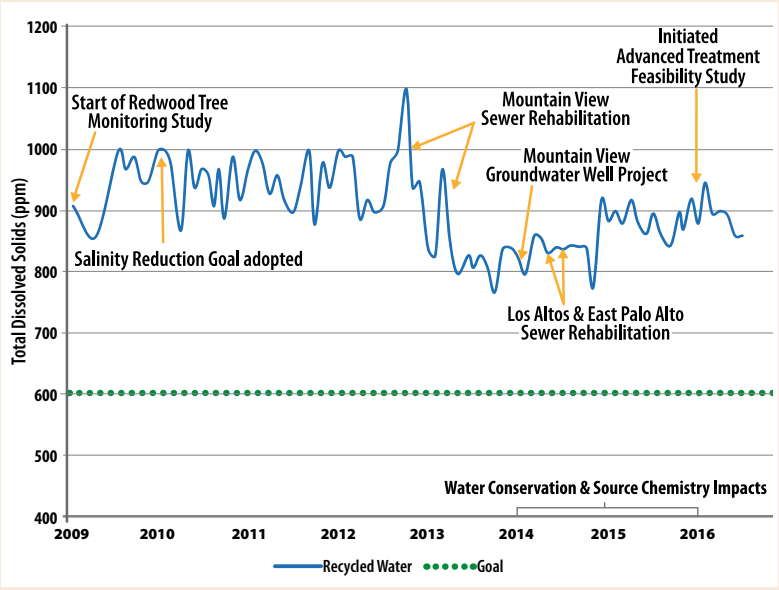
HORT SCIENCE

Introduction

In 2009, the Palo Alto Regional Water Quality Control Plant (RWQCP) began delivering recycled water to Mountain View as a sustainable and local alternative to potable water use for landscape irrigation. Mountain View is home to many coast redwood trees, and the RWQCP contracted with HortScience Inc. to monitor the status of these trees and recommend adaptive management strategies. Redwoods have survived locally on potable water despite not being native to the area or naturally adapted to the hot, dry climate. Experience throughout the Bay Area has shown that redwoods are sensitive to recycled water, which typically has a higher salt content than potable water. During this multi-year study the RWCQP and its partners undertook several projects to reduce recycled water salinity.

Monitoring Protocol

Ten trees were monitored through this study: three irrigated with potable water (M2, M3, and M7) and seven irrigated with recycled water (M1, M4–M6, and M8–M10). Three times per year—spring, summer and fall—researchers photographed the study trees and rated their visual appearance. Trees were rated on a scale of 1-4 based on foliage density, color, and presence of dead branches. Researchers also collected soil and tree tissue samples and retrieved data from continuously monitoring soil moisture sensors buried 8" and 18" deep.

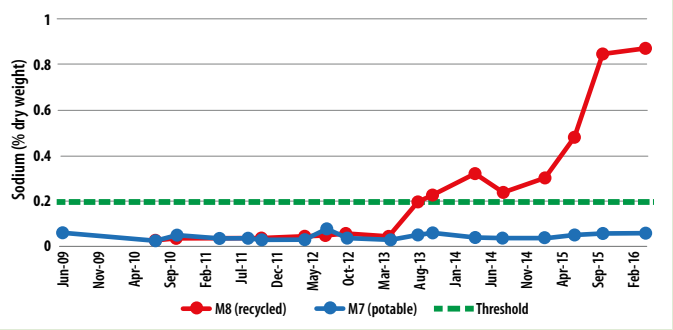


Salinity Reduction Efforts

In 2010, several RWQCP partner agencies adopted a Salinity Reduction Policy with the goal of lowering recycled water salinity to less than 600 parts per million (ppm) of total dissolved solids (TDS). Following adoption of this policy, Mountain View, East Palo Alto, Los Altos, and Palo Alto collaborated on multiple projects to limit the inflow of saline groundwater into the sewer collection systems, a major cause of the recycled water's high salinity. Projects included pipeline repairs, manhole repairs, and redirection of groundwater well discharge away from the sanitary sewers. Cumulatively, these efforts reduced recycled water salinity by approximately 15%. However, severe drought conditions have recently caused salinity levels to increase again. Since the attempted salinity reduction efforts were insufficient to reach the TDS goal, a feasibility study for advanced treatment has been initiated, evaluating new options for reducing recycled water salinity.

Sodium and Chloride in Redwood Foliage Was Greater at Sites Irrigated With Recycled Water

As tree roots absorb water they also absorb chloride and sodium (salts) from the surrounding soil. Salt is transported in the water as it moves upward in the plant and into the foliage. When water exits the tree leaf as vapor, the salt is left behind. Over time, salt accumulates in redwood foliage, and can cause browning and foliage loss (see photos). Each year the new spring foliage may appear healthy and green, but during the summer salt accumulates and the tissue becomes damaged. Within a few years, salt-affected redwoods may defoliate, as shown in the photo of M8. During the study period, salt concentration (sodium and chloride) exceeded the estimated safe threshold for redwood trees at all sites receiving recycled water.

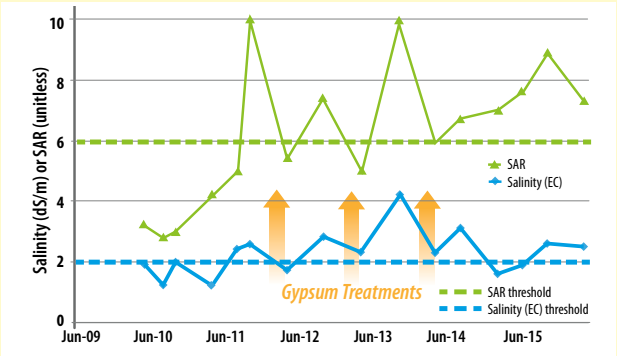


Soil Salinity and Sodium Were Higher at Sites Irrigated With Recycled Water

During the study period soil salinity (measured as electrical conductivity, EC) at sites irrigated with recycled water increased and, in most cases, exceeded the maximum threshold for redwoods. Soil salinity remained below the threshold at all sites irrigated with potable water. The sodium adsorption ratio (SAR) measured in soils from recycled water sites also exceeded the maximum threshold for redwoods, indicating an imbalance of certain elements (more sodium, less calcium and magnesium).

Adaptive Management Sought to Mitigate Sodium Buildup

A high SAR value is correlated with soil drainage problems and limits the ability to leach salts from soil. Landscape managers typically address this problem by applying gypsum before the rainy season to reduce the SAR and move sodium below the tree roots. This adaptive management strategy was applied at two sites in the winters of 2012-2014. While these actions reduced soil salinity, there was inadequate rainfall for the treatment to be fully effective.



Site M7 Potable Water

Site M8 Recycled Water

Trees located on the north or east side of the site exhibited fewer symptoms of decline than those located on the south or west side. This difference is assumed to be due to sun and wind exposure increasing evapotranspiration rates and thus increasing the volume of water (and salt) absorbed by each tree. Salt concentrations were also higher in dry, water stressed foliage than in well hydrated foliage.

(Left) Redwood tree with southern exposure; (Right) redwood tree with northern exposure. Both were irrigated with recycled water.

Key Findings

- **After being irrigated with recycled water for six years, and concurrent with a multi-year drought, test site redwood trees showed moderate to severe foliage damage and defoliation.**
- **The foliage damage is attributed to salts in the foliage, specifically chloride and sodium, which both exceeded the tolerance of the redwoods.**
- **Changes to tree foliage (color and density) were only visible after about 4 years of recycled water irrigation.**
- **Gypsum treatments temporarily reduced the soil salinity and SAR, but did not appear to reduce the severity of tree damage.**
- **Winter rainfall during these drought years was inadequate to maintain soil salinity below thresholds acceptable to redwood trees.**
- **Trees in high exposure microclimates (i.e., south or west-facing) were more impacted than those in shaded, protected areas.**
- **Efforts to reduce the RWQCP's recycled water salinity were insufficient to reach the 600ppm TDS goal.**