Wastewater Treatment in the SF Bay Area: History & Future

October 10, 2019
Regional Monitoring Program Annual Meeting
Presentation Outline

1. History
2. Future Challenges
3. Solutions
Sanitation in the Bay Area

**BY THE NUMBERS**

- 7.1+ Million People
- 450+ Million Gallons Per Day
- 37+ Wastewater Treatment Plants
- $1.8 Billion Annual Capital Budget
“You have to know the past to understand the present.”

- Carl Sagan
American astronomer
1940s

The “Big Stench”

Strawberry Creek Outfall
1940s

Water Pollution Laws Enacted

Federal Water Pollution Control Act
Authorized Surgeon General to reduce pollution of interstate waters & tributaries

Dickey Water Pollution Act
Created the California State Water Pollution Control Board (later the State Water Quality Control Board)
Many Bay Area WWTPs Are Built with Primary Treatment

1934 Palo Alto
1948 Central Contra Costa Sanitation District
1950 Oro Loma Sanitary District
1951 EBMUD, San Francisco North Point, & Mountain View
1952 San Francisco Southeast
1954 Hayward
1956 San Jose/Santa Clara & Sunnyvale
1957 Los Altos
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FUNDING
OR
30% $250K
1960s
Low DO Leads to Fish Kills
Adopted Water Quality Objectives
Designated Beneficial Uses

Domestic Water Supply
Recreation
Fish & Wildlife Propagation
Aesthetic Value

Fish Kills 1965-70
Number of Fish Killed
Low DO Leads to Fish Kills

A Compilation of Water Quality Goals
January 2016

Cal Watchdog
1970s

Clean Water Act Requires Secondary Treatment

NPDES Permits

Funding Like Never Before

$1.2B To Bay Area by 1987

87.5% Of Project Costs Covered by Federal & State Funding

EBMUD

1972
1980s

BACTERIA in the SF BAY: 1980s

80% Non-Compliance ✗

20% Compliance ✓
RMP is Born

Goals

1. Provide unbiased science to support decision-making & improve the environmental health of the SF Bay
2. Empower stakeholders to create cost-effective solutions
1990s & 2000s

Regional Monitoring
Focuses on Legacy Contaminants

Hg, Cu, PCBs

Pollution Prevention

Mercury Strategy Team

Dental Mercury

International Academy of Oral Medicine & Toxicology
1980s

6.9-Magnitude Loma Prieta

East Bay Wildfire

1989 1991
2010s

Record-Breaking Drought  Recycled Water for Indirect Potable Reuse  Record-Breaking Wildfires

Dec. 22, 2015
2010s
Climate Change Awareness Grows... But Deniers Continue To Ignore Science

Donald J. Trump
@realDonaldTrump
It's snowing & freezing in NYC. What the hell ever happened to global warming?
❤️ 419 7:25 AM - Mar 21, 2013
2010s

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An Inconvenient Truth

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419 7:25 AM - Mar 21, 2013

Global temperature change (1850–2017)
Summary of Key Events

- 1940: Big Stench
- 1950: Primary Treatment
- 1960s: Funding
- 1972: Secondary Treatment & More Funding
- 2019: Present
- 2050: Typical Planning Horizon
- Future Challenges
“The past cannot be changed. The future is yet in your power.”

- Proverb
Future Challenges

- Population Growth
- Aging Infrastructure
- Changing Economics
- New Regulations (Sometimes Conflicting)
- Different Jurisdictions
- Limited Funds & Competing Priorities
- Sea Level Rise
- Pressing Need for Technological Innovation
- Climate Change
- Population Growth
Population Growth

Population in the Bay Area (million)
Aging Infrastructure
Infrastructural Vulnerability:

**Seismic Vulnerability**

- **1989**: Loma Prieta (6.9-Magnitude)
- Multiple Changes in Seismic Code
- **Present**: Present
- **2043**: 72% probability of a $\geq 6.7$ earthquake
Climate Change

- Sea Level Rise
- Drought
- Storm Surges
- Atmospheric Rivers
- Flooding
Contaminants of Emerging Concern

- Microplastics
- PFAS
- Pharmaceuticals
- Polyhalogenated Carbazoles
Limited Funds & Competing Priorities
“How can we turn challenges into opportunities?”
NOW IS THE TIME....

TO STEER OUR COURSE
Continue to improve water quality in the SF Bay & protect the environment

Build resilient infrastructure to support economic growth & protect public health
ONE SIZE DOESN’T FIT ALL
Solutions Must Work Together

Source Control

Infra-structure

Solutions

Source Control

- Pharmaceutical Drop Box
- Reduce Pesticide Use
- Control Littering
- Reduce Single-Use Plastics
- Implement Green Chemistry
- Develop Alternatives to PFAS
Infrastructure

- Green Infrastructure – Transbay Terminal
- Horizontal Levee – Oro Loma
- Recycled Water – Delta Diablo
- Resource Recovery – EBMUD
- Reduce Trash in Stormwater

SOLUTIONS

EPA
Oro Loma Sanitary District
Water Deeply
Resource Recovery Recovery for Wastewater

- Stormwater Treatment & Reuse
- Recycled Water
- Biosolids Reuse & Nutrient Recovery
- Energy Generation
- Stormwater Treatment & Reuse
- Recycled Water
- Biosolids Reuse & Nutrient Recovery
- Energy Generation

Images: 
2. https://ueat.utoronto.ca/diy-composting/
Regional Monitoring Program
Regional Monitoring Program

ACCOMPLISHMENTS

Reduce Loading to Bay with TMDLs

PCBs

PBDEs

FUTURE WORK

Collect Unbiased Data to Inform Future Management Decisions

Nutrients

CECs
START SMALL, THINK BIG
RISE UP

Rise to the Opportunity

1951 → 2019 → FUTURE

Collaboration is the Key

- Non-Profits
- Regulators
- Academia
- Wastewater Agencies
- Consultants
- Scientists
- Stormwater Agencies
- Drinking & Recycled Water Agencies
“Individually, we are one drop. Together, we are One Bay.”

- Ryunosuke Satoro
  Japanese writer
Thank you!
Any questions?
Appendix
2010s

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