



Potential Impacts to Dischargers Associated with the Drinking Water Policy



CVCWA Annual Conference

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Presentation Overview

**Wastewater Control Measures Study
Objectives**

**Study Area/
Discharger Overview**

Current Treatment Levels

**Potential Future Discharge
Scenarios/Loadings**

Cost Estimates

What's Next

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Drinking Water Policy (DWP) Workgroup Overview

Lead Agency

Central Valley Regional Water Quality Control Board

Stakeholders

POTWs, drinking water agencies, municipal/urban runoff agencies, agricultural representatives, and State and Federal agencies

Goal

Develop a DWP that provides clear guidance for drinking water source protection in surface waters of the Central Valley

DWP could include development of narrative or numeric water quality objectives

DWP Timeline

July 29, 2011

Develop an outline for what should be contained in the DWP and a work plan/funding proposal

July 29, 2013

Bring a final DWP to the Board

How Will The Wastewater Loading and Cost Information Be Used?

**Wastewater
Loading
Information**



**Urban & Agricultural
Runoff Loadings
Information
(Developed by Others)**

**Models of the Delta and SF Bay
Define Water Quality Under
Potential Future Scenarios**



**Assess Cost of Water
Supply Treatment
(Developed by Others)**

Comparisons of costs for source control versus costs for treatment will drive the content of the new Drinking Water Policy

Wastewater Control Measures Study

Objectives

Evaluate current and planned 2030 flows and loads for drinking water constituents of concern discharged by major POTWs.

Evaluate load reductions and associated costs for two potential future control strategy scenarios.

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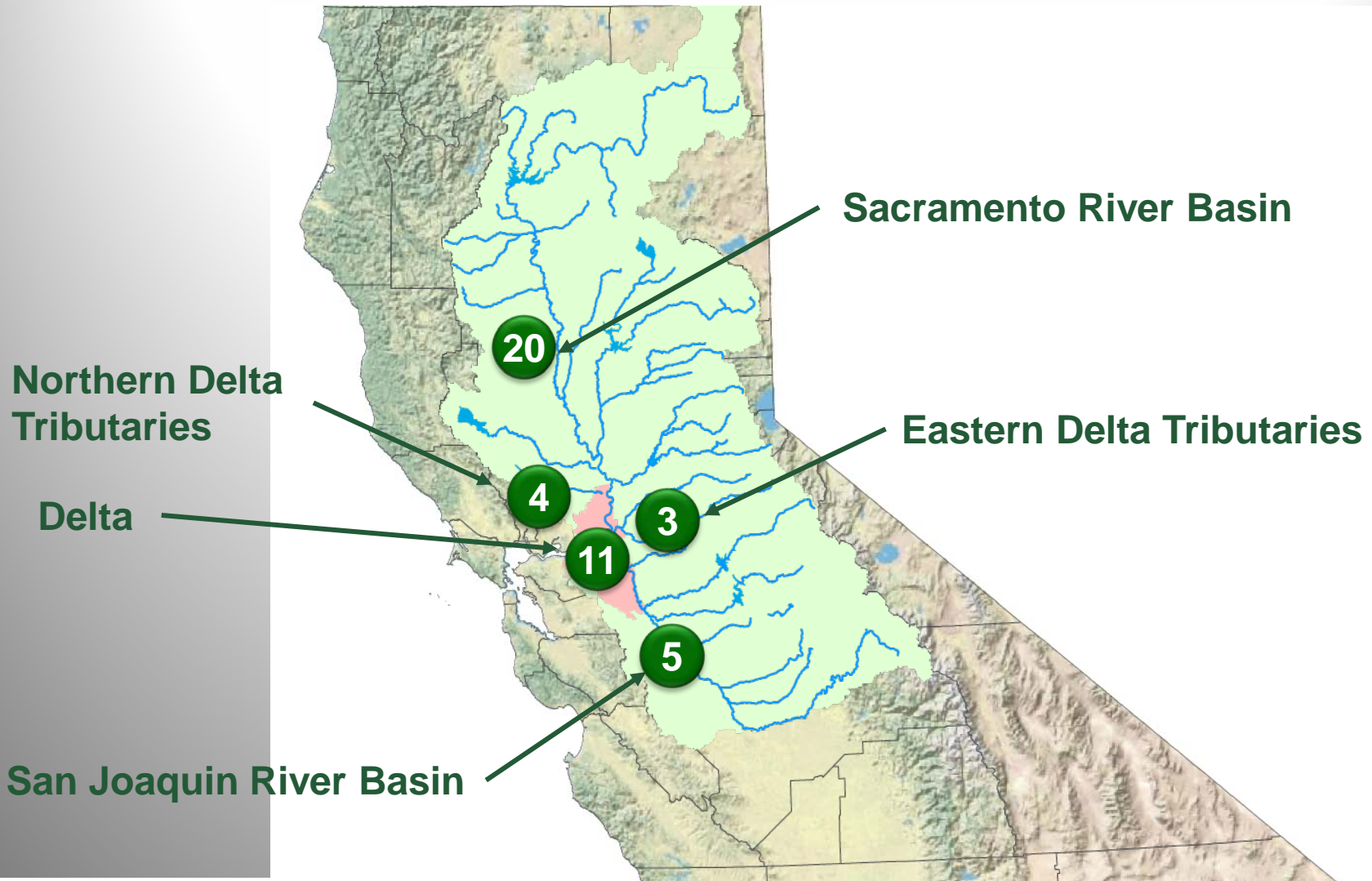
Cost Estimates

What's Next

Study Area



Major POTW Locations



Major POTW Flows

Discharge Area	Current Flow, mgd	Number
Sacramento River Basin	65	20
San Joaquin River Basin	46	5
Delta	203	11
Eastern Delta Tributaries	8	3
Northern Delta Tributaries	23	4
Total	344	43

Major POTWs comprise 98.6 percent of the total wastewater flow discharged to the Delta

Weighted Average Concentrations for Pollutants of Concern, mg/L

Discharge Area	Total Organic Carbon	Total Phosphorus as P	Total Nitrogen as N	Ammonia	Nitrate as N	Nitrite as N	Total Dissolved Solids
Sacramento River Basin	No data	1.5	15	5.0	5.2	0.29	332
San Joaquin River Basin	16	2.5	22	3.1	8.4	0.26	527
Delta	19	2.3	24	18	3.3	0.05	469
Eastern Delta Tributaries	No data	2.0	17	0.3	13	No data	364
Northern Delta Tributaries	12	4.2	14	1.9	8.8	0.20	853

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Treatment Levels

- Secondary Treatment
- Secondary Treatment with Nitrification
- Tertiary Treatment
- Tertiary Treatment with Nitrification
- Tertiary Treatment with Nitrification and Denitrification (NDN)

The Study also considered whether facilities provide UV Disinfection

Current POTW Treatment Levels

Treatment Level Category	Number	Flow, mgd
Secondary Treatment	7	182
Secondary Treatment w/ Nitrification	7	32
Tertiary Treatment	3	13
Tertiary Treatment with Nitrification	8	48
Tertiary Treatment with NDN	18	68
Total	43	344

Approximately 25% (82 mgd) of the wastewater currently discharged also receives UV disinfection

Average Concentration of Constituents (Actual Data), mg/L

Treatment Level Category	Total Organic Carbon	Total Phosphorus as P	Total Nitrogen as N	Ammonia	Nitrate as N	Nitrite as N
Secondary Treatment	18	3.8	21	14	1.6	0.47
Secondary Treatment with Nitrification	10	3.0	16	0.4	11	0.05
Tertiary Treatment	No data	No data	No data	12	No data	No data
Tertiary Treatment with Nitrification	11	3.5	21	0.4	17	0.09
Tertiary Treatment with NDN	8.9	0.8	10	0.3	6	0.2

Total Dissolved Solids data is not shown as it is independent of treatment level

Water Quality Assumed If No Data Was Available, mg/L

Treatment Level Category	Total Organic Carbon	Total Phosphorus as P	Total Nitrogen as N	Ammonia	Nitrate as N	Nitrite as N
Secondary Treatment	20	5	26	20	3	0.1
Secondary Treatment w/ Nitrification	10	5	18	0.5	15	0.1
Tertiary Treatment	10	3	26	18	5	0.1
Tertiary Treatment with Nitrification	8	3	18	0.5	15	0.1
Tertiary Treatment with NDN	8	1	10	0.5	7	0.1

Total Dissolved Solids data was obtained for each POTW

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Discharge Scenarios

2030

Planned Changes

Currently mandated treatment (i.e., current and/or planned treatment required by adopted NPDES discharge permits)

Plausible

Mandated treatment

- + enhanced biological nutrient removal
- + chemical phosphorus removal with tertiary clarification
- + tertiary filtration (if not currently mandated)
- + UV disinfection (if not currently mandated)

Outer Boundary

Mandated treatment

- + microfiltration (if not currently provided or planned)
- + reverse osmosis
- + UV disinfection (if not currently mandated)

2030 Wastewater Flows

Discharge Area	Predicted 2030 Flow, mgd			
	No Reduction	2% Reduction	5% Reduction	10% Reduction
Sacramento River Basin	96	94	92	87
San Joaquin River Basin	70	70	68	63
Delta	287	277	269	255
Eastern Delta Tributaries	18	17	17	16
Northern Delta Tributaries	36	36	35	33
Total	507	495	481	454

2030 Planned Changes POTW Treatment Levels

Treatment Level Category	Current		Planned	
	Number	Flow, mgd	Number	Flow, mgd
Secondary Treatment	7	182	4	25
Secondary Treatment w/ Nitrification	7	32	1	5
Tertiary Treatment	3	13	2	6
Tertiary Treatment with Nitrification	8	48	7	63
Tertiary Treatment with NDN	18	68	29	409
Total	43	344	43	507

2030 Central Valley wastewater discharged to surface waters:

- 94 percent will be tertiary treated
- 80 percent will receive tertiary treatment with NDN

2030 Planned Changes Advanced UV Disinfection

Current		Planned	
Number	Flow, mgd	Number	Flow, mgd
15	87	26	366

72%

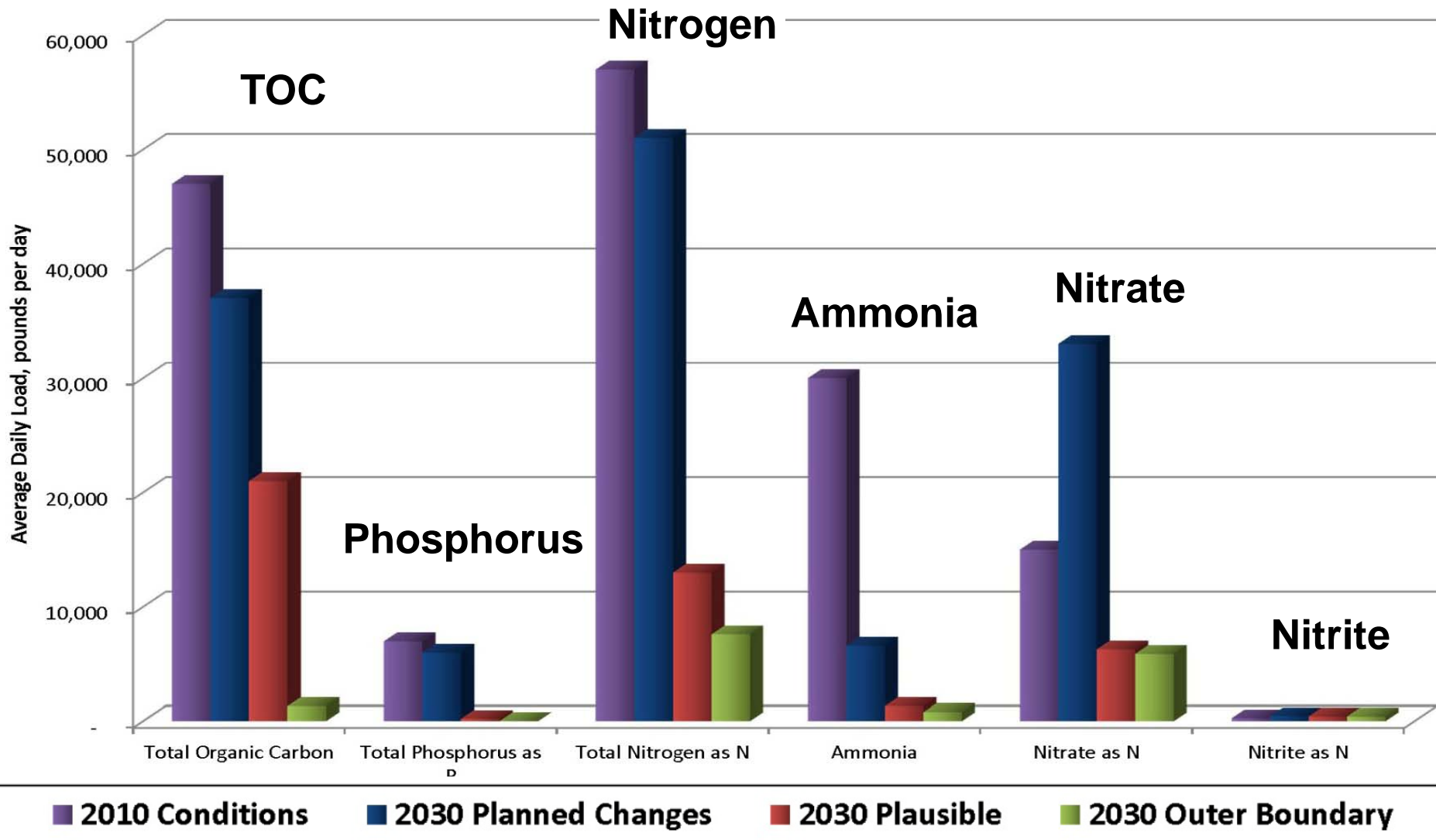
of Central Valley wastewater discharged to surface water will receive advanced UV Disinfection by 2030

Water Quality Under Potential Future Scenarios*, mg/L

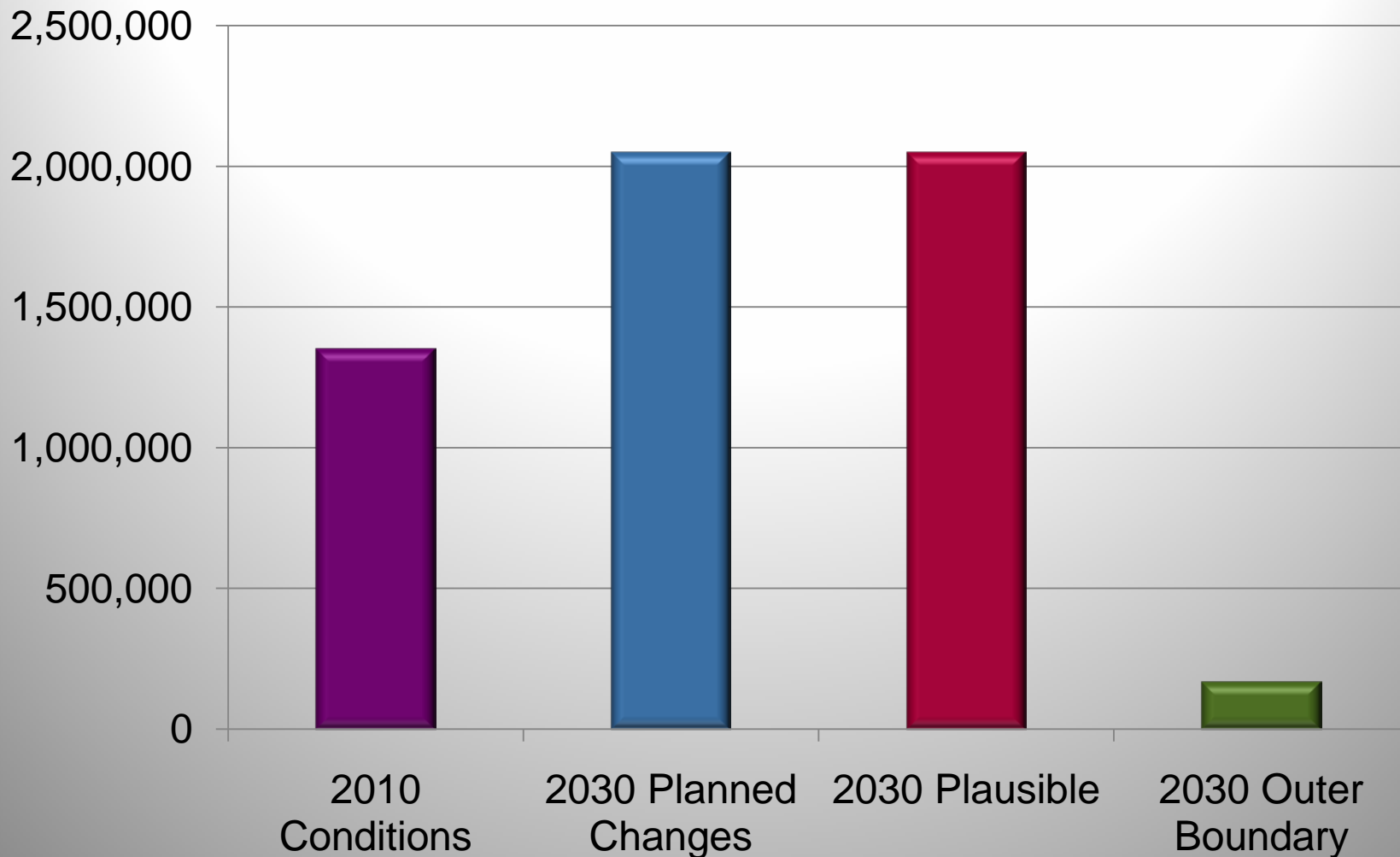
Scenario	Total Organic Carbon	Total Phosphorus as P	Total Nitrogen as N	Ammonia	Nitrate as N	Nitrite as N	Total Dissolved Solids
2030 Plausible	5	0.05	3	0.3	1.5	0.1	Varies
2030 Outer Boundary	0.3	0.003	1.8	0.1/1.5	1.5 /0.1	0.1	40

*Values Represent Anticipated Average Discharge Conditions – Not Prescribed Limitations

Predicted Changes in Daily Discharge Loads, pounds per day



Total Dissolved Solids Loadings, pounds per day



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Costs Associated with 2030 Planned Changes Scenario

- Improvements provided are independent of the DWP
- Estimated Range: ***\$3.3 to \$5.3 billion***
- Based on cost per gallon associated with 13 known upgrade projects
- Range of estimated costs includes upgrades for all *existing or planned* tertiary facilities

General Approach to Cost Estimating for Potential Future Scenarios

Base Construction Cost =

$$\text{Example Project Cost} \times \frac{\text{ENR CCI}_{20 \text{ Cities Avg.}}}{\text{ENR CCI}_{\text{Ex. Project}}} \times \left(\frac{\text{Treated Flow}_{\text{POTW}}}{\text{Treated Flow}_{\text{Ex. Project}}} \right)^{\text{Economy of Scale Power Factor}}$$

where:

$\text{ENR CCI}_{20 \text{ Cities Avg.}}$ = 20 City Average Engineering New Record Construction Cost Index

$\text{ENR CCI}_{\text{Ex. Project}}$ = Engineering New Record Construction Cost Index for the Example Project

$\text{Treated Flow}_{\text{POTW}}$ = Average or Peak Flow that is projected to require treatment at a given POTW

$\text{Treated Flow}_{\text{Ex. Project}}$ = Average or Peak Flow that is treated for the Example Project

General Approach to Cost Estimating for Potential Future Scenarios

Total Construction Cost = 1.4 × Base Construction Cost

Total Project Capital Cost = 1.65 × Total Construction Cost

Added Cost of Treatment – 2030 Plausible

Mandated Level of Treatment	Predicted 2030 Treated Flow, mgd	Total Project Capital Costs, \$ million	Estimated Capital Cost per Gallon ADWF, \$/gallon	Annual O&M Costs, \$ million	O&M Cost per Gallon Treated, \$/mg treated
Secondary Treatment	25	260	10.4	10	1,096
Secondary Treatment w/ Nitrification	4.4	42	9.5	1.9	1,183
Tertiary Treatment	5.6	47	8.4	2.6	1,272
Tertiary Treatment with Nitrification	61	320	5.2	20	894
Tertiary Treatment with NDN	398	1,100	2.8	60	413
Total	495	1,800	3.6	95	526

Average Values

Added Cost of Treatment – 2030 Outer Boundary

Mandated Treatment Level	Predicted 2030 Treated Flow, mgd	Total Project Capital Costs, \$ million	Estimated Capital Cost per Gallon ADWF, \$/gallon	Annual O&M Costs, \$ million	O&M Cost per Gallon Treated, \$/mg treated
Secondary Treatment	25	710	28.4	25	2,740
Secondary Treatment w/ Nitrification	4	130	29.5	4.0	2,491
Tertiary Treatment	6	170	30.4	5.5	2,691
Tertiary Treatment with Nitrification	61	1,500	24.5	60	2,682
Tertiary Treatment with NDN	398	7,000	17.6	320	2,202
Totals	495	9,500	19.2	400	2,216

Average Values

Items Possibly Not Included In Estimates

- Expansion of Power Distribution Systems,
- Flow Equalization and/or Associated Odor Control,
- Variability in Site-Specific Costs for Reverse Osmosis Treatment,
- pH Adjustment and Re-Mineralization, and
- Laboratory, Maintenance and Administrative Facilities.

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So Then What Happened?

Modeling: The process works, but additional work is needed to address identified issues

Water Supply Costs:

- DWP Workgroup determined TOC is the primary constituent of concern to be addressed by the DWP
- Water Treatment evaluation showed that source control-related reductions in TOC is not large enough to translate to significant savings

What's Next?

DWP Workgroup:

- Work Plan Due by July 2011
- Funding needed to update modeling – *possible delay?*
- Direction/Content of the DWP is still up in the air
- Unknown whether the DWP will include new water quality objectives for TOC



Thank You!

- Debbie Webster and Tom Grovehog, CVCWA
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 - Data and Review
- Lysa Voight and Stan Dean, Sacramento Regional County Sanitation District
 - Data, Cost Information, and Review
- Elaine Archibald, CUWA
 - Funding and Review
- Lynda Smith, MWD
 - Review
- Jeff Pelz, West Yost Associates
 - Contributing Report Author



Questions?

More information, including a copy of the Wastewater Control Measures Study report, can be found here:

http://www.swrcb.ca.gov/rwqcb5/water_issues/drinking_water_policy