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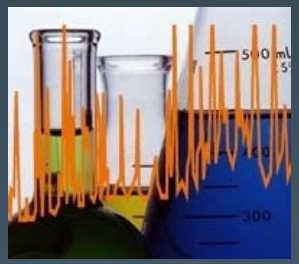

Exponent®

City of Antioch Rebuttal Testimony to SWRCB

Susan Paulsen, Ph.D., P.E.

Antioch-303

Rebuttal Opinion 1: The CCWD-DWR 2016 Agreement may have adverse impacts on water quality at Antioch's intake, but DWR's analysis is not sufficient to determine the magnitude or frequency of these impacts.

Antioch-300 p. 3

State of California

DWR-512
Department of Water Resources

Electrical Conductivity			OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Annual Avg. Change
ALT H3 CCWD V2	Location	Location	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3	ALT H3
Western Delta	Sac. R at Emmaton	ALL	-63	30	52	22	12	7	2	0	0	-64	-125	-138	-22
			(-3%)	(2%)	(4%)	(4%)	(3%)	(2%)	(1%)	(0%)	(0%)	(-4%)	(-6%)	(-5%)	(-2%)
		DROUGHT	-102	43	90	34	22	10	2	0	0	-110	-178	-232	-35
			(-4%)	(2%)	(4%)	(5%)	(4%)	(3%)	(1%)	(0%)	(0%)	(-5%)	(-7%)	(-6%)	(-2%)
	SJR at Jersey Point	ALL	-59	13	48	26	10	5	2	1	0	-72	-131	-143	-25
			(-5%)	(1%)	(4%)	(4%)	(2%)	(2%)	(1%)	(0%)	(0%)	(-7%)	(-9%)	(-8%)	(-3%)
		DROUGHT	-97	20	77	41	17	7	2	1	0	-122	-198	-247	-42
			(-6%)	(1%)	(4%)	(4%)	(4%)	(2%)	(1%)	(0%)	(0%)	(-8%)	(-10%)	(-9%)	(-3%)

DWR-512 Table 2 (Scenario B)

Antioch's Rebuttal Opinion No. 2: DWR did not demonstrate that the WaterFix Project will comply with existing D-1641 standards, or that complying with D-1641 will avoid "harm" to water users in the Delta. DWR's model results show that significant water quality degradation at Antioch's intake will occur as a result of the proposed WaterFix Project.

Antioch-300 p. 7:8-12

Antioch-202
Table 3

Table 3 **Number of days per year when water is not useable at the City's intake (i.e., when that the chloride concentration at Antioch's intake is greater than 250 mg/L at slack current after HHT), calculated from DWR simulation results.**

Water Year	Water Year Type	Number of Days Chloride > 250 mg/L		
		EBC2[b]	NAA[a]	B1[a]
1976	critical	332	340	361
1977	critical	365	365	365
1978	normal	204	200	206
1979	normal	220	220	261
1980	normal	206	192	226
1981	dry	280	268	291
1982	wet	140	118	162
1983	wet	45	0	65
1984	wet	131	114	180
1985	dry	270	280	326
1986	wet	209	202	239
1987	dry	286	297	311
1988	critical	306	325	331
1989	dry	291	288	299
1990	critical	356	341	357
1991	critical	325	326	326

[a] WaterFix model runs (05/2016)
[b] EIR/EIS model runs (2013), existing condition model run most representative of current conditions

Antioch-202
Table 8

Table 8 Number of days in each water year that the D-1641 WQO of 250 mg/L chloride for Municipal and Industrial Beneficial Uses at PP#1 is not met, based on DWR model results.

Water Year	Water Year Type	Total Days	Number of Days 250 mg/L Chloride Threshold is Not Met at PP#1		
			EBC2[b]	NAA[a]	B1[a]
1976	Critical	366	37	0	0
1977	Critical	365	8	50	16
1978	Normal	365	10	87	105
1979	Normal	365	0	17	64
1980	Normal	366	87	57	44
1981	Dry	365	0	0	0
1982	Wet	365	3	12	10
1983	Wet	365	34	0	0
1984	Wet	366	0	0	0
1985	Dry	365	0	0	15
1986	Wet	365	23	26	6
1987	Dry	365	0	0	46
1988	Critical	366	1	4	14
1989	Dry	365	77	106	124
1990	Critical	365	40	60	25
1991	Critical	365	76	107	117

[a] WaterFix model runs (05/2016)
[b] EIR/EIS model run EBC2 (2013), the existing condition model run most representative of current conditions

Table 4 **Average number of days per year in each year type when water is not useable at the City's intake (i.e., when that the chloride concentration at Antioch's intake is greater than 250 mg/L at slack current after HHT), calculated from DWR simulation results**

	Average Number of Days Chloride > 250 mg/L		
Water Year Type	**EBC2[b]**	**NAA[a]**	**B1[a]**
Wet	131	109	162
Normal	210	204	231
Dry	282	283	307
Critical	337	339	348

[a] WaterFix model runs (05/2016)
[b] EIR/EIS model runs (2013), existing condition model run most representative of current conditions

Antioch-202 Table 4

In spite of information introduced into the record by Antioch and by others, DWR did not provide information to the State Board or to Protestants sufficient to establish whether or not the proposed WaterFix project will comply with D-1641 objectives, or whether water quality will be impacted at Antioch as a result of the proposed WaterFix Project. I respectfully offer to the State Board that more accurate methodologies exist to assess D-1641 compliance and evaluate water quality impacts within the Delta and at Antioch. One such methodology would include:

- DWR could use existing DSM2 model runs and model output to average model output for salinity on an hourly basis to evaluate the change in salinity that would occur as a result of the proposed WaterFix Project.
- DWR could use established thresholds (e.g., the 250 mg/L chloride threshold that applies at slack current after higher high tide, as described in the 1968 Antioch Agreement) to evaluate water quality impacts.
- DWR could evaluate salinity at municipal drinking water intakes (including Antioch) in addition to evaluating D-1641 objectives at select locations.
- DWR could use a more accurate baseline scenario.

Antioch-300 p. 8:13-28

Antioch's Rebuttal Opinion No. 3: DWR has stated that the WaterFix Project will not cause harm to Antioch. My analysis shows that water quality impacts will be greater than described in DWR's Case-in-Chief.

Antioch-300 p. 9:6-8

For that reason, Appendix 5E, *Supplemental Modeling Requested by the State Water Resources Control Board Related to Increased Delta Outflows,* also presents a broader operational boundary analysis, as well as an additional operational scenario requested by the State Water Board that results in increased Delta outflow and decreased SWP/CVP exports (Modified Alternative 8). As shown in Appendix 5E, the operation of the future conveyance facility under a possible adaptive management range represented by Boundary 1 and Boundary 2 will be consistent with the impacts discussed for the range of alternatives considered in this document (see Appendix 5E, Section 5E.2, for additional information on these boundaries). Boundary 1 and Boundary 2 also encompass the full range of impacts found in the analysis prepared for H1 and H2(as well as H3 and H4). For modeling information on H1 and H2, please see Appendix 11G, *Supplemental Modeling Results at ELT for Alternative 4 at H1 and H2*.

FEIR 3-288 (Antioch-301 p. 15)

5E.5 Environmental Effects

The modeling provides important information that is used to determine the similarities of the results to alternatives evaluated in this Final EIR/EIS to understand the potential environmental effects of these scenarios. These similarities are described below, by resource topic as organized for alternatives in this Final EIR/EIS. The scenarios evaluated in this appendix (Boundary 1, Boundary 2, and Scenario 2) assume the same facilities and associated construction as Alternative 4A and therefore, the construction-related impacts of these scenarios is the same as described for Alternative 4A. Consistent with the goals of this analysis, the nature and severity of the impacts generally fall within the range of impacts disclosed under Alternatives 1A and 3 for Boundary 1, Alternative 4H3,Alternative 4H3+, and Alternative 8 for Boundary 2, and Alternative 4H4 and Alternative 8 for Scenario 2. However, the analyses and conclusions derived for each of the scenarios below also relied on other EIR/EIS alternatives as noted in the analyses.

FEIR 5E-170 (Antioch-301 p. 17)

FEIR Ch. 8 (Antioch-301 p. 13)

Chapter 8 – Water Quality	Existing Condition	Alternative: No Action	1A	1B	1C	2A	2B	2C	3	4	5	6A	6B	6C	7	8	9	4A	2D	5A
WQ-5:Bromide (CM1) - Percent increase in long-term average concentration at Barker Slough	-	~2%	38/43%	38/43%	38/43%	22/26%	22/26%	22/ 26%	34/38%	40/44%	23/27%	19/22%	19/22%	19/22%	2/1%	4/8%	9/23%	-2/2%	-2/2%	-4/0%
		LTS	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A[a]	S/A[a]	S/A	LTS/NA	LTS/NA	LTS/NA
WQ-7:Chloride - Percent of years when 150 mg/L water quality objective exceeded at CCP P#1[b]	7%	0	13%	13%	13%	13%	13%	13%	7%	7%	13%	13%	13%	13%	20%	13%	13%	0%	0%	0%
		S	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	LTS/NA	LTS/NA	LTS/NA
WQ-1: EC- Percent of days Emmaton objective would be exceeded	6%	14	31%	31%	31%	26%	26%	26%	30%	27-29%[c]	25%	32%	32%	32%	19%	22%	18%	16%[c]	7%[c]	10%[c]
		S	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	S/A	LTS/NA	LTS/NA	LTS/NA
WQ-1: Mercury (CM1) - Maximum percent increase in fish tissue concentrations at Delta locations	6%	6%	8/10%	8/10%	8/10%	13/11%	13/11%	13/11%	6/8%	15/12%	8/7%	64/58%	64/58%	64/58%	46/39%	46/41%	46/59%	8/7%	10/9%	5/3%
		LTS	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	S/A	S/A	S/A	S/A	S/A	S/A	LTS/NA	LTS/NA	LTS/NA

Notes

[a] While the long-term average increases in bromide would be low, the drought period increases would be 34% for Alternative 7 and 50% for Alternative 8, relative to Existing Conditions and the No Action Alternative. These increases in the drought period were considered significant/adverse.

[b] Water quality degradation as measured by use of available assimilative capacity also played a significant role in determining effects by alternative, and degradation varied by alternative.

[c] Alternative 4 does not include a change in compliance location from Emmaton to Threemile Slough, but the modeling used to evaluate the alternative did include the change. Thus, although the percent of days the Emmaton objective was exceeded is high, it is expected that under the alternative it would be similar to the No Action.

Key

Level of significance or effect **before** mitigation
(Quantity of impact: number of sites, structures, acres, etc. affected)

Increasing level of significance →

Bromide - Percent increase (%)	<0	1 - 20	21 - 40	>40
Chloride – % of years objective exceeded (%)	0	1-12	13-19	>20
EC - percent of days objective exceeded (%)	<10	11 -20	20 - 30	>30
Mercury (CM1) - Percent increase (%)	<10	10 -20	21 - 50	>50
Mercury (CM2-CM22) - restoration acres	0	1 - 100	25,000	65,000
Organic Carbon (CM1) - mg/L	<0.1	0.1 -0.5	0.6 - 1.0	>1.0
Organic Carbon (CM2-CM21) - restoration acres	0	1 - 100	25,000	65,000
Selenium - Exceedance Quotient	0.87	0.88 -0.93	0.94 - 0.99	>1.0
Microcystis - relative rank	1	2	3	4

Level of significance or effect **after** mitigation
(CEQA Finding / NEPA Finding)

CEQA Finding		NEPA Finding	
NI	No Impact	B	Beneficial
LTS	Less than significant	NE	No Effect
S	Significant	NA	Not Adverse
SU	Significant and unavoidable	A	Adverse

n/a not applicable
> greater than
< less than
≈ about equal to

Continued on Figure 8-0b

Figure 8-0a
Comparison of Impacts on Water Quality

Rebuttal Opinion No. 4: Despite DWR's assertions to the contrary, the water quality degradation that we expect to occur at Antioch will not be mitigated by the 1968 Agreement.

Antioch-300 p. 12

Rebuttal Opinion No. 5: DWR continues to use an inappropriate baseline condition in its evaluation of the WaterFix Project.

Antioch-300 p. 14

END OF SLIDES