

### 8E.1 Bromide Methodology

Bromide was modeled quantitatively for the Delta in two ways. First, a quantitative assessment utilizing a mass-balance approach (DSM2 fingerprinting data combined with historical source water quality data) was employed. Additionally, results of a second modeling approach utilizing DSM2-QUAL modeled EC, EC to chloride, and chloride to bromide relationships were used to supplement the results of the mass-balance approach. Section 8.3.1.3 and the bromide discussion under section 8.3.1.7 provide more detailed information regarding the assessment methodology for bromide and the details of the quantitative approaches. Figures and tables to support the assessment are provided below.

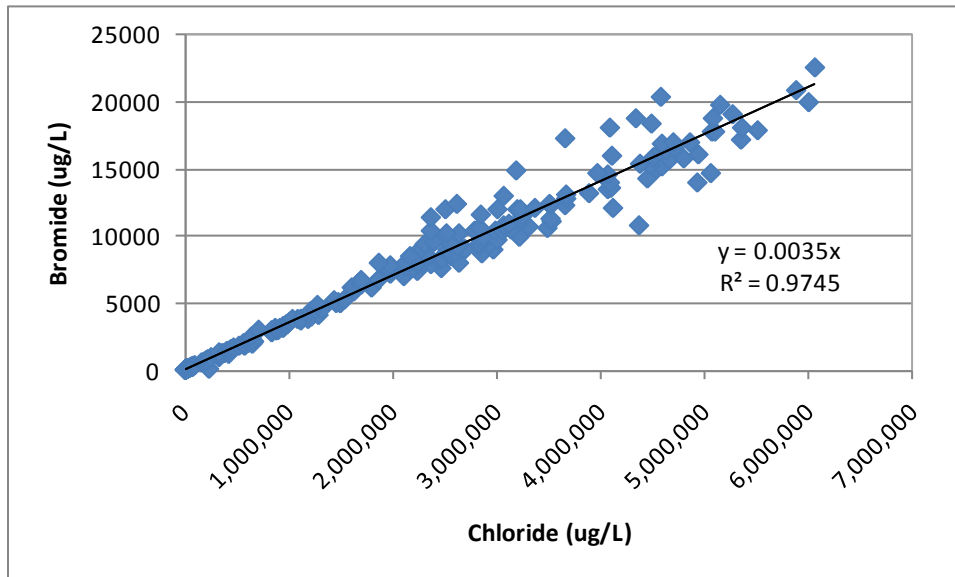


Figure 1. Bromide to chloride ratio for Mallard Island monitoring station.

1 **Bromide Table 1: Monthly Martinez Bromide Concentrations ( $\mu\text{g/L}$ ) Used in Assessment**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Mean (<math>\mu\text{g/L}</math>)</b>	22757	17592	13149	16013	18388	18069	23312	24481	27879	29723	32951	28088
<b>Minimum (<math>\mu\text{g/L}</math>)</b>	28	95	39	28	28	658	3283	13335	10500	7700	17465	767
<b>Maximum (<math>\mu\text{g/L}</math>)</b>	42700	43050	39200	39200	33985	34895	37800	36750	38500	38850	43750	44100
<b>75th Percentile (<math>\mu\text{g/L}</math>)</b>	34493	29820	22313	24150	27536	27703	29768	30223	33845	34913	38500	38150
<b>99th Percentile (<math>\mu\text{g/L}</math>)</b>	42438	42438	38763	38745	33749	34318	37254	36659	38227	38759	43295	44009
<b>Data Source</b>	BDAT											
<b>Station(s)</b>	See footnote in text											
<b>Date Range</b>	1980 - 2007											
<b>ND Replaced with RL</b>	No											
<b>Data Omitted</b>	None											
<b>No. of Data Points</b>	26	26	26	27	26	26	27	27	27	27	27	27

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- 1 **Bromide Table 2: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for the No Action Alternative**  
 2 **LLT using the Mass-Balance Modeling Approach.**

Bromide No Act. LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L		Other Relevant Threshold (50 µg/L) <sup>b</sup>		Other Relevant Threshold (100 µg/L) <sup>c</sup>	
			Frequency of Criterion/Objective Exceedance (%)		Frequency of Criterion/Objective Exceedance (%)		Frequency of Criterion/Objective Exceedance (%)	
			Ex. Cond.	No Act. LLT	Ex. Cond.	No Act. LLT	Ex. Cond.	No Act. LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	47	43	1	1
		DROUGHT	51	50	52	42	0	0
	SJR at Buckley Cove	ALL	259	242	100	100	100	100
		DROUGHT	272	243	100	100	100	100
	Franks Tract	ALL	598	502	99	99	82	85
		DROUGHT	737	660	100	98	78	80
Old R. at Rock Slough	ALL	520	444	99	100	91	94	
	DROUGHT	622	556	100	100	90	92	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	82	86	72	79
		DROUGHT	1800	1950	98	98	93	95
	SJR at Antioch	ALL	3798	3402	98	98	93	94
		DROUGHT	4896	4703	100	100	100	100
	Sac. R. at Mallard Island	ALL	8926	8436	98	98	91	93
		DROUGHT	11315	10927	100	100	100	100
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	49	40	0	1
		DROUGHT	54	54	55	57	0	0
	Contra Costa PP #1	ALL	501	432	100	100	96	97
		DROUGHT	608	555	100	100	98	98
	Banks PP	ALL	415	363	100	100	100	100
		DROUGHT	490	435	100	100	100	100
	Jones PP	ALL	387	339	100	100	100	100
		DROUGHT	446	396	100	100	100	100

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 3: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for the No Action Alternative**  
 2 **LLT using the EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide No Act. LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)		Other Relevant Threshold (50 µg/L) <sup>b</sup>		Other Relevant Threshold (100 µg/L) <sup>c</sup>	
			Frequency of Criterion/Objective Exceedance (%)		Frequency of Criterion/Objective Exceedance (%)		Frequency of Criterion/Objective Exceedance (%)	
			Ex. Cond.	No Act. LLT	Ex. Cond.	No Act. LLT	Ex. Cond.	No Act. LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	97	98	3	1
		DROUGHT	68	67	100	100	3	0
	SJR at Buckley Cove	ALL	405	356	100	99	89	89
		DROUGHT	542	450	100	100	100	100
	Franks Tract	ALL	420	355	100	100	76	72
		DROUGHT	535	490	100	100	93	88
Old R. at Rock Slough	ALL	378	328	100	100	86	83	
	DROUGHT	476	438	100	100	98	97	
Western Delta	Sac. R. at Emmaton	ALL	903	909	100	100	69	75
		DROUGHT	1273	1422	100	100	90	93
	SJR at Antioch	ALL	2648	2393	100	100	82	86
		DROUGHT	3507	3465	100	100	98	98
	Sac. R. at Mallard Island	ALL	6182	5861	100	100	87	89
		DROUGHT	8211	8113	100	100	100	100
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	100	100	1	2
		DROUGHT	65	66	100	100	0	0
	Contra Costa PP #1	ALL	422	367	100	100	95	94
		DROUGHT	500	466	100	100	98	98
	Banks PP	ALL	356	319	100	100	91	90
		DROUGHT	469	430	100	100	100	100
	Jones PP	ALL	381	355	100	100	92	91
		DROUGHT	507	476	100	100	100	100

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 4: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 1A LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 1 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 1 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act._LLT	Alt 1 LLT	Ex. Cond.	No Act._LLT	Alt 1 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	61	47	43	73	1	1	3
		DROUGHT	51	50	62	52	42	75	0	0	2
	SJR at Buckley Cove	ALL	259	242	247	100	100	100	100	100	100
		DROUGHT	272	243	253	100	100	100	100	100	100
	Franks Tract	ALL	598	502	571	99	99	100	82	85	93
		DROUGHT	737	660	663	100	98	100	78	80	88
Old R. at Rock Slough	ALL	520	444	503	99	100	100	91	94	97	
	DROUGHT	622	556	568	100	100	100	90	92	95	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	1504	82	86	89	72	79	84
		DROUGHT	1800	1950	2036	98	98	98	93	95	98
	SJR at Antioch	ALL	3798	3402	3740	98	98	100	93	94	99
		DROUGHT	4896	4703	4688	100	100	100	100	100	100
Sac. R. at Mallard Island	ALL	8926	8436	9245	98	98	100	91	93	95	
	DROUGHT	11315	10927	11225	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	71	49	40	51	0	1	22
		DROUGHT	54	54	104	55	57	77	0	0	48
	Contra Costa PP #1	ALL	501	432	503	100	100	100	96	97	99
		DROUGHT	608	555	550	100	100	100	98	98	100
	Banks PP	ALL	415	363	277	100	100	77	100	100	70
		DROUGHT	490	435	366	100	100	95	100	100	88
	Jones PP	ALL	387	339	244	100	100	78	100	100	76
		DROUGHT	446	396	306	100	100	93	100	100	90

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 5: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 1A LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 1 LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 1 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act._LLT	Alt 1 LLT	Ex. Cond.	No Act._LLT	Alt 1 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	69	97	98	98	3	1	4
		DROUGHT	68	67	71	100	100	100	3	0	2
	SJR at Buckley Cove	ALL	405	356	345	100	99	100	89	89	90
		DROUGHT	542	450	457	100	100	100	100	100	100
	Franks Tract	ALL	420	355	402	100	100	100	76	72	82
		DROUGHT	535	490	495	100	100	100	93	88	97
Old R. at Rock Slough	ALL	378	328	364	100	100	100	86	83	90	
	DROUGHT	476	438	447	100	100	100	98	97	100	
Western Delta	Sac. R. at Emmaton	ALL	903	909	1067	100	100	100	69	75	80
		DROUGHT	1273	1422	1496	100	100	100	90	93	97
	SJR at Antioch	ALL	2648	2393	2656	100	100	100	82	86	92
		DROUGHT	3507	3465	3481	100	100	100	98	98	98
Sac. R. at Mallard Island	ALL	6182	5861	6574	100	100	100	87	89	91	
	DROUGHT	8211	8113	8416	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	74	100	100	100	1	2	10
		DROUGHT	65	66	89	100	100	100	0	0	22
	Contra Costa PP #1	ALL	422	367	416	100	100	100	95	94	99
		DROUGHT	500	466	456	100	100	100	98	98	100
	Banks PP	ALL	356	319	251	100	100	99	91	90	71
		DROUGHT	469	430	352	100	100	100	100	100	95
	Jones PP	ALL	381	355	287	100	100	99	92	91	73
		DROUGHT	507	476	393	100	100	100	100	100	92

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 6: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 2A LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 2 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 2 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act. LLT	Alt 2 LLT	Ex. Cond.	No Act. LLT	Alt 2 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	62	47	43	74	1	1	4
		DROUGHT	51	50	63	52	42	80	0	0	2
	SJR at Buckley Cove	ALL	259	242	248	100	100	100	100	100	100
		DROUGHT	272	243	253	100	100	100	100	100	100
	Franks Tract	ALL	598	502	465	99	99	100	82	85	93
		DROUGHT	737	660	624	100	98	100	78	80	87
Old R. at Rock Slough	ALL	520	444	422	99	100	100	91	94	97	
	DROUGHT	622	556	544	100	100	100	90	92	98	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	1264	82	86	89	72	79	82
		DROUGHT	1800	1950	1911	98	98	98	93	95	97
	SJR at Antioch	ALL	3798	3402	3128	98	98	100	93	94	99
		DROUGHT	4896	4703	4362	100	100	100	100	100	100
Sac. R. at Mallard Island	ALL	8926	8436	8452	98	98	100	91	93	95	
	DROUGHT	11315	10927	10801	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	63	49	40	38	0	1	17
		DROUGHT	54	54	94	55	57	63	0	0	38
	Contra Costa PP #1	ALL	501	432	416	100	100	100	96	97	98
		DROUGHT	608	555	512	100	100	100	98	98	100
	Banks PP	ALL	415	363	225	100	100	74	100	100	64
		DROUGHT	490	435	343	100	100	91	100	100	86
	Jones PP	ALL	387	339	208	100	100	75	100	100	70
		DROUGHT	446	396	296	100	100	90	100	100	86

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 7: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 2A LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 2 LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 2 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act. LLT	Alt 2 LLT	Ex. Cond.	No Act. LLT	Alt 2 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	70	97	98	98	3	1	5
		DROUGHT	68	67	72	100	100	100	3	0	3
	SJR at Buckley Cove	ALL	405	356	365	100	99	100	89	89	90
		DROUGHT	542	450	484	100	100	100	100	100	100
	Franks Tract	ALL	420	355	336	100	100	100	76	72	87
		DROUGHT	535	490	474	100	100	100	93	88	98
Old R. at Rock Slough	ALL	378	328	322	100	100	100	86	83	90	
	DROUGHT	476	438	440	100	100	100	98	97	100	
Western Delta	Sac. R. at Emmaton	ALL	903	909	893	100	100	100	69	75	78
		DROUGHT	1273	1422	1401	100	100	100	90	93	95
	SJR at Antioch	ALL	2648	2393	2193	100	100	100	82	86	92
		DROUGHT	3507	3465	3216	100	100	100	98	98	100
Sac. R. at Mallard Island	ALL	6182	5861	5785	100	100	100	87	89	91	
	DROUGHT	8211	8113	7947	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	70	100	100	100	1	2	10
		DROUGHT	65	66	84	100	100	100	0	0	20
	Contra Costa PP #1	ALL	422	367	361	100	100	100	95	94	99
		DROUGHT	500	466	437	100	100	100	98	98	100
	Banks PP	ALL	356	319	221	100	100	98	91	90	64
		DROUGHT	469	430	331	100	100	100	100	100	90
	Jones PP	ALL	381	355	239	100	100	99	92	91	69
		DROUGHT	507	476	353	100	100	100	100	100	88

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 8: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 3 LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 3 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 3 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act._LLT	Alt 3 LLT	Ex. Cond.	No Act._LLT	Alt 3 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	60	47	43	71	1	1	3
		DROUGHT	51	50	62	52	42	73	0	0	2
	SJR at Buckley Cove	ALL	259	242	247	100	100	100	100	100	100
		DROUGHT	272	243	252	100	100	100	100	100	100
	Franks Tract	ALL	598	502	567	99	99	100	82	85	93
		DROUGHT	737	660	673	100	98	100	78	80	87
Old R. at Rock Slough	ALL	520	444	499	99	100	100	91	94	96	
	DROUGHT	622	556	572	100	100	100	90	92	93	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	1481	82	86	87	72	79	83
		DROUGHT	1800	1950	1979	98	98	98	93	95	97
	SJR at Antioch	ALL	3798	3402	3715	98	98	99	93	94	97
		DROUGHT	4896	4703	4609	100	100	100	100	100	100
Sac. R. at Mallard Island	ALL	8926	8436	9197	98	98	100	91	93	95	
	DROUGHT	11315	10927	11074	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	69	49	40	48	0	1	22
		DROUGHT	54	54	99	55	57	77	0	0	47
	Contra Costa PP #1	ALL	501	432	489	100	100	100	96	97	98
		DROUGHT	608	555	564	100	100	100	98	98	98
	Banks PP	ALL	415	363	300	100	100	91	100	100	83
		DROUGHT	490	435	370	100	100	97	100	100	90
	Jones PP	ALL	387	339	266	100	100	90	100	100	85
		DROUGHT	446	396	308	100	100	97	100	100	90

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 9: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 3 LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 3 LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 3 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act. LLT	Alt 3 LLT	Ex. Cond.	No Act. LLT	Alt 3 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	69	97	98	98	3	1	2
		DROUGHT	68	67	71	100	100	100	3	0	2
	SJR at Buckley Cove	ALL	405	356	344	100	99	100	89	89	90
		DROUGHT	542	450	455	100	100	100	100	100	100
	Franks Tract	ALL	420	355	398	100	100	100	76	72	82
		DROUGHT	535	490	500	100	100	100	93	88	95
Old R. at Rock Slough	ALL	378	328	360	100	100	100	86	83	91	
	DROUGHT	476	438	449	100	100	100	98	97	97	
Western Delta	Sac. R. at Emmaton	ALL	903	909	1049	100	100	100	69	75	80
		DROUGHT	1273	1422	1443	100	100	100	90	93	95
	SJR at Antioch	ALL	2648	2393	2627	100	100	100	82	86	90
		DROUGHT	3507	3465	3394	100	100	100	98	98	98
Sac. R. at Mallard Island	ALL	6182	5861	6520	100	100	100	87	89	90	
	DROUGHT	8211	8113	8231	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	72	100	100	100	1	2	9
		DROUGHT	65	66	85	100	100	100	0	0	18
	Contra Costa PP #1	ALL	422	367	399	100	100	100	95	94	98
		DROUGHT	500	466	463	100	100	100	98	98	100
	Banks PP	ALL	356	319	265	100	100	100	91	90	76
		DROUGHT	469	430	358	100	100	100	100	100	93
	Jones PP	ALL	381	355	291	100	100	100	92	91	82
		DROUGHT	507	476	374	100	100	100	100	100	97

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 10: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Scenarios H1-H4 of**  
 2 **Alternative 4 LLT using the Mass-Balance Modeling Approach.**

Bromide Alt 4 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L						Other Relevant Threshold (50 µg/L) <sup>b</sup>						Other Relevant Threshold (100 µg/L) <sup>c</sup>					
			Frequency of Criterion/Objective Exceedance (%)						Frequency of Criterion/Objective Exceedance (%)											
			Ex. Cond.	No Act. LLT	H1	H2	H3	H4	Ex. Cond.	No Act. LLT	H1	H2	H3	H4	Ex. Cond.	No Act. LLT	H1	H2	H3	H4
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	62	63	62	62	47	43	73	76	73	70	1	1	3	3	3	3
		DROUGHT	51	50	63	63	63	63	52	42	80	83	80	80	0	0	2	2	2	2
	SJR at Buckley Cove	ALL	259	242	248	248	248	248	100	100	100	100	100	100	100	100	100	100	100	100
		DROUGHT	272	243	252	252	252	253	100	100	100	100	100	100	100	100	100	100	100	100
	Franks Tract	ALL	598	502	537	522	456	450	99	99	100	100	100	100	82	85	92	94	91	93
		DROUGHT	737	660	654	648	599	597	100	98	100	100	100	100	78	80	85	93	83	90
Old R. at Rock Slough	ALL	520	444	475	464	411	407	99	100	100	100	100	100	91	94	97	98	96	96	
	DROUGHT	622	556	562	560	520	517	100	100	100	100	100	100	90	92	97	98	97	97	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	1461	1488	1268	1271	82	86	88	86	88	87	72	79	82	81	82	81
		DROUGHT	1800	1950	1993	1986	1881	1886	98	98	98	98	98	98	93	95	97	97	97	97
	SJR at Antioch	ALL	3798	3402	3586	3590	3131	3131	98	98	100	100	100	100	93	94	98	98	98	97
		DROUGHT	4896	4703	4569	4548	4315	4331	100	100	100	100	100	100	100	100	100	100	100	100
	Sac. R. at Mallard Island	ALL	8926	8436	9054	9032	8453	8435	98	98	100	100	100	100	91	93	95	94	95	95
		DROUGHT	11315	10927	11099	11064	10779	10796	100	100	100	100	100	100	100	100	100	100	100	100
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	69	72	62	63	49	40	48	56	39	40	0	1	20	20	18	16
		DROUGHT	54	54	101	106	92	95	55	57	75	83	63	67	0	0	43	47	37	38
	Contra Costa PP #1	ALL	501	432	479	458	410	406	100	100	100	100	100	100	96	97	98	99	98	98
		DROUGHT	608	555	545	543	501	498	100	100	100	100	100	100	98	98	98	100	98	100
	Banks PP	ALL	415	363	261	257	234	224	100	100	83	83	82	76	100	100	69	71	65	64
		DROUGHT	490	435	352	334	326	312	100	100	92	90	88	83	100	100	85	80	83	77
	Jones PP	ALL	387	339	245	225	224	217	100	100	90	85	85	80	100	100	83	77	76	73
		DROUGHT	446	396	328	300	306	304	100	100	100	97	98	93	100	100	97	88	92	86

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 11: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Scenarios H1-H4 of**  
 2 **Alternative 4 LLT using the EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 4 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L						Other Relevant Threshold (50 µg/L) <sup>b</sup>						Other Relevant Threshold (100 µg/L) <sup>c</sup>					
			Frequency of Criterion/Objective Exceedance (%)						Frequency of Criterion/Objective Exceedance (%)											
			Ex. Cond.	No Act. LLT	H1	H2	H3	H4	Ex. Cond.	No Act. LLT	H1	H2	H3	H4	Ex. Cond.	No Act. LLT	H1	H2	H3	H4
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	70	70	70	70	97	98	98	98	98	98	3	1	3	3	4	4
		DROUGHT	68	67	72	72	72	72	100	100	100	100	100	100	3	0	2	3	3	3
	SJR at Buckley Cove	ALL	405	356	365	366	365	365	100	99	100	100	100	100	89	89	90	90	90	90
		DROUGHT	542	450	484	485	484	485	100	100	100	100	100	100	100	100	100	100	100	100
	Franks Tract	ALL	420	355	380	373	328	330	100	100	100	100	100	100	76	72	88	88	87	87
		DROUGHT	535	490	494	492	455	460	100	100	100	100	100	100	93	88	98	98	98	98
Old R. at Rock Slough	ALL	378	328	348	346	311	317	100	100	100	100	100	100	86	83	91	93	90	93	
	DROUGHT	476	438	448	452	420	427	100	100	100	100	100	100	98	97	98	100	98	100	
Western Delta	Sac. R. at Emmaton	ALL	903	909	1035	1052	901	903	100	100	100	100	100	100	69	75	78	77	78	77
		DROUGHT	1273	1422	1466	1451	1381	1381	100	100	100	100	100	100	90	93	95	97	95	97
	SJR at Antioch	ALL	2648	2393	2534	2538	2204	2210	100	100	100	100	100	100	82	86	90	89	90	89
		DROUGHT	3507	3465	3387	3354	3183	3196	100	100	100	100	100	100	98	98	100	100	100	100
Sac. R. at Mallard Island	ALL	6182	5861	6364	6351	5803	5799	100	100	100	100	100	100	87	89	91	90	91	90	
	DROUGHT	8211	8113	8280	8226	7934	7951	100	100	100	100	100	100	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	73	74	70	71	100	100	100	100	100	100	1	2	9	11	9	10
		DROUGHT	65	66	89	90	84	85	100	100	100	100	100	100	0	0	22	25	20	22
	Contra Costa PP #1	ALL	422	367	391	384	349	356	100	100	100	100	100	100	95	94	99	99	99	99
		DROUGHT	500	466	453	459	427	434	100	100	100	100	100	100	98	98	100	100	100	100
	Banks PP	ALL	356	319	241	242	226	222	100	100	99	99	99	98	91	90	71	71	66	66
		DROUGHT	469	430	338	319	320	304	100	100	100	100	100	100	100	100	88	83	86	80
	Jones PP	ALL	381	355	272	255	254	248	100	100	99	99	98	98	92	91	78	73	74	68
		DROUGHT	507	476	387	351	362	351	100	100	100	100	100	100	100	100	100	93	97	88

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 12: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 5 LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 5 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
			Ex. Cond.	No Act. LLT	Alt 5 LLT	Ex. Cond.	No Act. LLT	Alt 5 LLT	Ex. Cond.	No Act. LLT	Alt 5 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	59	47	43	67	1	1	2
		DROUGHT	51	50	62	52	42	77	0	0	2
	SJR at Buckley Cove	ALL	259	242	247	100	100	100	100	100	100
		DROUGHT	272	243	253	100	100	100	100	100	100
	Franks Tract	ALL	598	502	503	99	99	100	82	85	90
		DROUGHT	737	660	632	100	98	100	78	80	82
Old R. at Rock Slough	ALL	520	444	452	99	100	100	91	94	96	
	DROUGHT	622	556	546	100	100	100	90	92	93	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	1300	82	86	86	72	79	81
		DROUGHT	1800	1950	1931	98	98	100	93	95	97
	SJR at Antioch	ALL	3798	3402	3314	98	98	99	93	94	97
		DROUGHT	4896	4703	4448	100	100	100	100	100	100
	Sac. R. at Mallard Island	ALL	8926	8436	8651	98	98	99	91	93	94
DROUGHT		11315	10927	10899	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	63	49	40	38	0	1	18
		DROUGHT	54	54	98	55	57	68	0	0	38
	Contra Costa PP #1	ALL	501	432	443	100	100	100	96	97	98
		DROUGHT	608	555	536	100	100	100	98	98	97
	Banks PP	ALL	415	363	291	100	100	94	100	100	90
		DROUGHT	490	435	356	100	100	95	100	100	90
	Jones PP	ALL	387	339	285	100	100	93	100	100	91
		DROUGHT	446	396	339	100	100	97	100	100	95

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 13: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 5 LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 5 LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 5 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act. LLT	Alt 5 LLT	Ex. Cond.	No Act. LLT	Alt 5 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	68	97	98	98	3	1	2
		DROUGHT	68	67	71	100	100	100	3	0	0
	SJR at Buckley Cove	ALL	405	356	354	100	99	100	89	89	90
		DROUGHT	542	450	469	100	100	100	100	100	100
	Franks Tract	ALL	420	355	357	100	100	100	76	72	83
		DROUGHT	535	490	474	100	100	100	93	88	95
Old R. at Rock Slough	ALL	378	328	332	100	100	100	86	83	90	
	DROUGHT	476	438	431	100	100	100	98	97	98	
Western Delta	Sac. R. at Emmaton	ALL	903	909	926	100	100	100	69	75	79
		DROUGHT	1273	1422	1413	100	100	100	90	93	97
	SJR at Antioch	ALL	2648	2393	2341	100	100	100	82	86	89
		DROUGHT	3507	3465	3278	100	100	100	98	98	100
Sac. R. at Mallard Island	ALL	6182	5861	6005	100	100	100	87	89	90	
	DROUGHT	8211	8113	8044	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	70	100	100	100	1	2	9
		DROUGHT	65	66	86	100	100	100	0	0	20
	Contra Costa PP #1	ALL	422	367	366	100	100	100	95	94	98
		DROUGHT	500	466	441	100	100	100	98	98	100
	Banks PP	ALL	356	319	261	100	100	100	91	90	75
		DROUGHT	469	430	358	100	100	100	100	100	93
	Jones PP	ALL	381	355	301	100	100	100	92	91	83
		DROUGHT	507	476	400	100	100	100	100	100	97

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 14: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 6A LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 6 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 6 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act. LLT	Alt 6 LLT	Ex. Cond.	No Act. LLT	Alt 6 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	70	47	43	85	1	1	10
		DROUGHT	51	50	70	52	42	88	0	0	5
	SJR at Buckley Cove	ALL	259	242	247	100	100	100	100	100	100
		DROUGHT	272	243	251	100	100	100	100	100	100
	Franks Tract	ALL	598	502	244	99	99	100	82	85	99
		DROUGHT	737	660	287	100	98	100	78	80	97
Old R. at Rock Slough	ALL	520	444	278	99	100	100	91	94	100	
	DROUGHT	622	556	295	100	100	100	90	92	100	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	951	82	86	88	72	79	76
		DROUGHT	1800	1950	1503	98	98	98	93	95	90
	SJR at Antioch	ALL	3798	3402	2100	98	98	100	93	94	98
		DROUGHT	4896	4703	3130	100	100	100	100	100	100
Sac. R. at Mallard Island	ALL	8926	8436	7344	98	98	100	91	93	95	
	DROUGHT	11315	10927	9605	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	61	49	40	38	0	1	17
		DROUGHT	54	54	92	55	57	63	0	0	37
	Contra Costa PP #1	ALL	501	432	294	100	100	100	96	97	100
		DROUGHT	608	555	304	100	100	100	98	98	100
	Banks PP	ALL	415	363	16	100	100	0	100	100	0
		DROUGHT	490	435	16	100	100	0	100	100	0
	Jones PP	ALL	387	339	16	100	100	0	100	100	0
		DROUGHT	446	396	16	100	100	0	100	100	0

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 15: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 6A LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
			Ex. Cond.	No Act. LLT	Alt 6 LLT	Ex. Cond.	No Act. LLT	Alt 6 LLT	Ex. Cond.	No Act. LLT	Alt 6 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	73	97	98	98	3	1	5
		DROUGHT	68	67	75	100	100	100	3	0	5
	SJR at Buckley Cove	ALL	405	356	367	100	99	100	89	89	90
		DROUGHT	542	450	487	100	100	100	100	100	100
	Franks Tract	ALL	420	355	235	100	100	100	76	72	90
		DROUGHT	535	490	293	100	100	100	93	88	100
Old R. at Rock Slough	ALL	378	328	362	100	100	100	86	83	92	
	DROUGHT	476	438	453	100	100	100	98	97	100	
Western Delta	Sac. R. at Emmaton	ALL	903	909	678	100	100	100	69	75	70
		DROUGHT	1273	1422	1090	100	100	100	90	93	88
	SJR at Antioch	ALL	2648	2393	1476	100	100	100	82	86	91
		DROUGHT	3507	3465	2276	100	100	100	98	98	100
Sac. R. at Mallard Island	ALL	6182	5861	4759	100	100	100	87	89	90	
	DROUGHT	8211	8113	6686	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	69	100	100	100	1	2	6
		DROUGHT	65	66	82	100	100	100	0	0	17
	Contra Costa PP #1	ALL	422	367	436	100	100	100	95	94	99
		DROUGHT	500	466	503	100	100	100	98	98	100
	Banks PP	ALL	356	319	50	100	100	98	91	90	0
		DROUGHT	469	430	50	100	100	100	100	100	0
	Jones PP	ALL	381	355	50	100	100	98	92	91	0
		DROUGHT	507	476	50	100	100	100	100	100	0

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 16: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 7 LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 7 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Ex. Cond.	No Act. LLT	Alt 7 LLT	Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
						Ex. Cond.	No Act. LLT	Alt 7 LLT	Ex. Cond.	No Act. LLT	Alt 7 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	63	47	43	80	1	1	2
		DROUGHT	51	50	64	52	42	88	0	0	0
	SJR at Buckley Cove	ALL	259	242	250	100	100	100	100	100	100
		DROUGHT	272	243	263	100	100	100	100	100	100
	Franks Tract	ALL	598	502	405	99	99	100	82	85	99
		DROUGHT	737	660	495	100	98	100	78	80	97
Old R. at Rock Slough	ALL	520	444	391	99	100	100	91	94	100	
	DROUGHT	622	556	469	100	100	100	90	92	100	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	1028	82	86	86	72	79	77
		DROUGHT	1800	1950	1529	98	98	98	93	95	90
	SJR at Antioch	ALL	3798	3402	2532	98	98	100	93	94	97
		DROUGHT	4896	4703	3479	100	100	100	100	100	100
	Sac. R. at Mallard Island	ALL	8926	8436	7621	98	98	100	91	93	95
DROUGHT		11315	10927	9764	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	50	49	40	29	0	1	8
		DROUGHT	54	54	72	55	57	57	0	0	22
	Contra Costa PP #1	ALL	501	432	420	100	100	100	96	97	100
		DROUGHT	608	555	493	100	100	100	98	98	100
	Banks PP	ALL	415	363	143	100	100	37	100	100	30
		DROUGHT	490	435	199	100	100	29	100	100	27
	Jones PP	ALL	387	339	111	100	100	31	100	100	28
		DROUGHT	446	396	130	100	100	25	100	100	25

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 17: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 7 LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 7 LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
			Ex. Cond.	No Act. LLT	Alt 7 LLT	Ex. Cond.	No Act. LLT	Alt 7 LLT	Ex. Cond.	No Act. LLT	Alt 7 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	71	97	98	98	3	1	4
		DROUGHT	68	67	73	100	100	100	3	0	5
	SJR at Buckley Cove	ALL	405	356	354	100	99	100	89	89	90
		DROUGHT	542	450	468	100	100	100	100	100	100
	Franks Tract	ALL	420	355	320	100	100	100	76	72	90
		DROUGHT	535	490	416	100	100	100	93	88	100
Old R. at Rock Slough	ALL	378	328	400	100	100	100	86	83	92	
	DROUGHT	476	438	532	100	100	100	98	97	100	
Western Delta	Sac. R. at Emmaton	ALL	903	909	720	100	100	100	69	75	71
		DROUGHT	1273	1422	1091	100	100	100	90	93	90
	SJR at Antioch	ALL	2648	2393	1758	100	100	100	82	86	89
		DROUGHT	3507	3465	2501	100	100	100	98	98	100
Sac. R. at Mallard Island	ALL	6182	5861	5004	100	100	100	87	89	90	
	DROUGHT	8211	8113	6802	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	65	100	100	100	1	2	2
		DROUGHT	65	66	75	100	100	100	0	0	7
	Contra Costa PP #1	ALL	422	367	473	100	100	100	95	94	99
		DROUGHT	500	466	580	100	100	100	98	98	100
	Banks PP	ALL	356	319	138	100	100	98	91	90	30
		DROUGHT	469	430	174	100	100	100	100	100	29
	Jones PP	ALL	381	355	124	100	100	98	92	91	25
		DROUGHT	507	476	140	100	100	100	100	100	25

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 18: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 8 LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 8 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
			Ex. Cond.	No Act. LLT	Alt 8 LLT	Ex. Cond.	No Act. LLT	Alt 8 LLT	Ex. Cond.	No Act. LLT	Alt 8 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	49.7	48.1	63.9	47	43	80	1	1	2
		DROUGHT	51.4	49.8	64.9	52	42	87	0	0	0
	SJR at Buckley Cove	ALL	259.0	242.2	245.8	100	100	100	100	100	100
		DROUGHT	272.0	242.6	247.7	100	100	100	100	100	100
	Franks Tract	ALL	597.8	502.1	375.0	99	99	100	82	85	98
		DROUGHT	736.9	660.1	464.5	100	98	100	78	80	93
Old R. at Rock Slough	ALL	519.8	444.3	363.2	99	100	100	91	94	100	
	DROUGHT	622.1	555.8	434.6	100	100	100	90	92	100	
Western Delta	Sac. R. at Emmaton	ALL	1283.7	1275.2	1099.7	82	86	84	72	79	72
		DROUGHT	1800.0	1950.3	1616.2	98	98	93	93	95	85
	SJR at Antioch	ALL	3797.7	3401.7	2548.9	98	98	100	93	94	97
		DROUGHT	4895.9	4703.1	3489.1	100	100	100	100	100	100
	Sac. R. at Mallard Island	ALL	8926.3	8436.1	7563.7	98	98	99	91	93	95
		DROUGHT	11314.6	10926.5	9630.5	100	100	100	100	100	100
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51.5	49.9	53.8	49	40	34	0	1	10
		DROUGHT	53.5	53.6	80.2	55	57	62	0	0	27
	Contra Costa PP #1	ALL	500.9	432.2	385.2	100	100	100	96	97	100
		DROUGHT	608.3	554.9	443.0	100	100	100	98	98	100
	Banks PP	ALL	415.0	362.9	113.5	100	100	35	100	100	29
		DROUGHT	490.2	435.2	148.9	100	100	30	100	100	30
	Jones PP	ALL	386.9	339.2	97.6	100	100	31	100	100	28
		DROUGHT	445.9	396.0	109.5	100	100	25	100	100	25

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 19: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 8 LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 8 LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
			Ex. Cond.	No Act. LLT	Alt 8 LLT	Ex. Cond.	No Act. LLT	Alt 8 LLT	Ex. Cond.	No Act. LLT	Alt 8 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	70	97	98	98	3	1	3
		DROUGHT	68	67	73	100	100	100	3	0	2
	SJR at Buckley Cove	ALL	405	356	359	100	99	100	89	89	90
		DROUGHT	542	450	471	100	100	100	100	100	100
	Franks Tract	ALL	420	355	303	100	100	100	76	72	89
		DROUGHT	535	490	392	100	100	100	93	88	100
Old R. at Rock Slough	ALL	378	328	386	100	100	100	86	83	92	
	DROUGHT	476	438	508	100	100	100	98	97	100	
Western Delta	Sac. R. at Emmaton	ALL	903	909	769	100	100	100	69	75	68
		DROUGHT	1273	1422	1143	100	100	100	90	93	82
	SJR at Antioch	ALL	2648	2393	1770	100	100	100	82	86	89
		DROUGHT	3507	3465	2485	100	100	100	98	98	98
Sac. R. at Mallard Island	ALL	6182	5861	4941	100	100	100	87	89	89	
	DROUGHT	8211	8113	6610	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	67	100	100	100	1	2	4
		DROUGHT	65	66	80	100	100	100	0	0	12
	Contra Costa PP #1	ALL	422	367	456	100	100	100	95	94	99
		DROUGHT	500	466	546	100	100	100	98	98	100
	Banks PP	ALL	356	319	129	100	100	99	91	90	27
		DROUGHT	469	430	165	100	100	100	100	100	30
	Jones PP	ALL	381	355	118	100	100	99	92	91	27
		DROUGHT	507	476	124	100	100	100	100	100	25

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).

<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.

<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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- 1 **Bromide Table 20: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 9 LLT using the**  
 2 **Mass-Balance Modeling Approach.**

Bromide Alt 9 LLT	Location	Period <sup>a</sup>	Period Average Concentration ug/L			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
			Ex. Cond.	No Act. LLT	Alt 9 LLT	Ex. Cond.	No Act. LLT	Alt 9 LLT	Ex. Cond.	No Act. LLT	Alt 9 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	50	48	48	47	43	33	1	1	1
		DROUGHT	51	50	49	52	42	40	0	0	0
	SJR at Buckley Cove	ALL	259	242	259	100	100	100	100	100	90
		DROUGHT	272	243	330	100	100	100	100	100	87
	Franks Tract	ALL	598	502	472	99	99	100	82	85	100
		DROUGHT	737	660	689	100	98	100	78	80	100
Old R. at Rock Slough	ALL	520	444	293	99	100	100	91	94	100	
	DROUGHT	622	556	340	100	100	100	90	92	100	
Western Delta	Sac. R. at Emmaton	ALL	1284	1275	1550	82	86	86	72	79	81
		DROUGHT	1800	1950	2374	98	98	100	93	95	97
	SJR at Antioch	ALL	3798	3402	2953	98	98	100	93	94	97
		DROUGHT	4896	4703	4296	100	100	100	100	100	100
Sac. R. at Mallard Island	ALL	8926	8436	8749	98	98	98	91	93	93	
	DROUGHT	11315	10927	11278	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	51	50	61	49	40	41	0	1	16
		DROUGHT	54	54	100	55	57	80	0	0	42
	Contra Costa PP #1	ALL	501	432	303	100	100	100	96	97	100
		DROUGHT	608	555	336	100	100	100	98	98	100
	Banks PP	ALL	415	363	329	100	100	99	100	100	81
		DROUGHT	490	435	442	100	100	100	100	100	77
Jones PP	ALL	387	339	330	100	100	99	100	100	80	
	DROUGHT	446	396	442	100	100	100	100	100	77	

<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 21: Period Average Bromide Concentration and 50 µg/L and 100 µg/L Frequency of Exceedance for Alternative 9 LLT using the**  
 2 **EC to Chloride and Chloride to Bromide Relationship Modeling Approach.**

Bromide Alt 9 LLT	Location	Period <sup>a</sup>	Period Average Concentration (µg/L)			Other Relevant Threshold (50 µg/L) <sup>b</sup>			Other Relevant Threshold (100 µg/L) <sup>c</sup>		
			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)			Frequency of Criterion/Objective Exceedance (%)		
			Ex. Cond.	No Act. LLT	Alt 9 LLT	Ex. Cond.	No Act. LLT	Alt 9 LLT	Ex. Cond.	No Act. LLT	Alt 9 LLT
Delta Interior	Moke. R. (SF) at Staten Island	ALL	65	64	64	97	98	99	3	1	1
		DROUGHT	68	67	65	100	100	100	3	0	0
	SJR at Buckley Cove	ALL	405	356	222	100	99	100	89	89	84
		DROUGHT	542	450	310	100	100	100	100	100	95
	Franks Tract	ALL	420	355	458	100	100	100	76	72	90
		DROUGHT	535	490	673	100	100	100	93	88	100
Old R. at Rock Slough	ALL	378	328	393	100	100	100	86	83	91	
	DROUGHT	476	438	519	100	100	100	98	97	100	
Western Delta	Sac. R. at Emmaton	ALL	903	909	1132	100	100	100	69	75	78
		DROUGHT	1273	1422	1797	100	100	100	90	93	97
	SJR at Antioch	ALL	2648	2393	2148	100	100	100	82	86	91
		DROUGHT	3507	3465	3289	100	100	100	98	98	100
Sac. R. at Mallard Island	ALL	6182	5861	6199	100	100	100	87	89	89	
	DROUGHT	8211	8113	8625	100	100	100	100	100	100	
Major Diversions (Pumping Stations)	NBA at Barker Slough PP	ALL	66	66	72	100	100	100	1	2	9
		DROUGHT	65	66	94	100	100	100	0	0	23
	Contra Costa PP #1	ALL	422	367	451	100	100	100	95	94	99
		DROUGHT	500	466	545	100	100	100	98	98	100
	Banks PP	ALL	356	319	269	100	100	100	91	90	76
		DROUGHT	469	430	385	100	100	100	100	100	90
	Jones PP	ALL	381	355	91	100	100	85	92	91	36
		DROUGHT	507	476	85	100	100	100	100	100	0

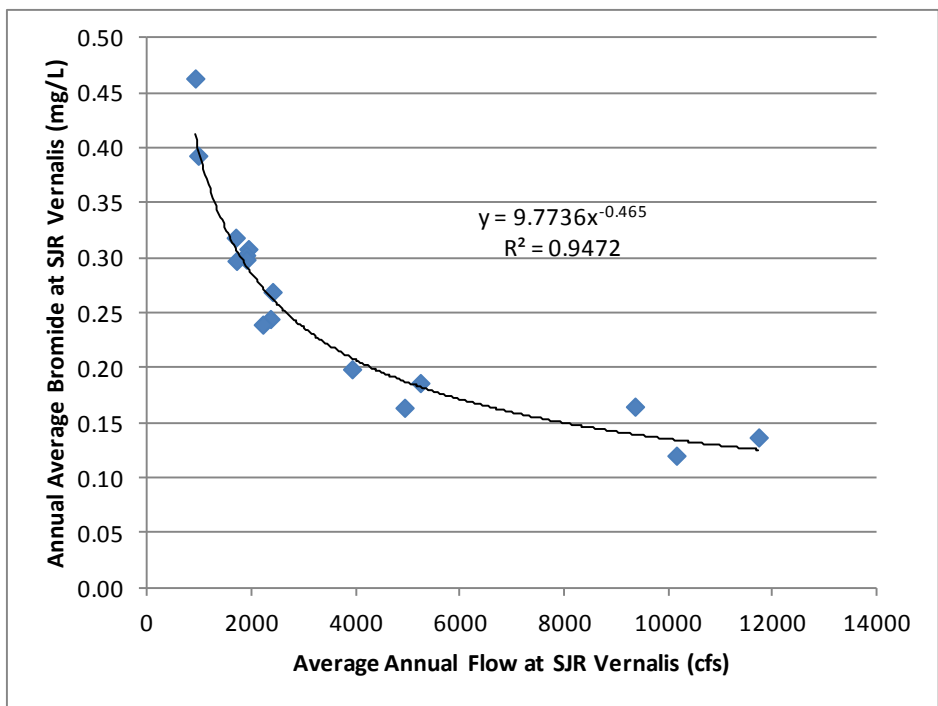
<sup>a</sup> ALL: Water years 1975-1991 represent the 16-year period modeled using DSM2. DROUGHT: Represents a 5 consecutive year (water years 1987-1991) drought period consisting of dry and critical water year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).  
<sup>b</sup> CALFED Drinking Water Program goal for bromide of 50 µg/L as a long-term average as applied to municipal drinking water intakes drawing water from the Delta.  
<sup>c</sup> Minimum bromide concentration believed to be sufficient to meet currently established drinking water criteria for disinfection byproducts.

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1 **Bromide Table 22. Flow-Bromide Concentration Regression for San Joaquin River at Vernalis – Data Used in Assessment and Results**

Baseline Flows (Average all Years)		$Br^- = B_1(\text{annual flow})^{B_2}$							
EC	LLT	$B_1$	9.7736						
4237	3987	$B_2$	-0.465						
Baseline Conc. (Average All Years)									
EC	LLT								
0.201	0.207								
	Flow	Concentration	% Change in Flow		Change in Concentration (mg/L)		% Change in Concentration		
Alternative	LLT	LLT	Alt - EC	Alt - LLT	Alt - EC	Alt - LLT	Alt - EC	Alt - LLT	
NA	3987	0.207	-5.9%	0.0%	0.006	0.000	2.9%	0.0%	
1	3994	0.207	-5.7%	0.0%	0.006	0.000	2.8%	-0.1%	
2	3985	0.207	-5.9%	-0.1%	0.006	0.000	2.9%	0.0%	
3	3993	0.207	-5.8%	0.2%	0.006	0.000	2.8%	-0.1%	
4 H1	3988	0.207	-5.9%	0.0%	0.006	0.000	2.9%	0.0%	
4 H2	3991	0.207	-5.8%	0.1%	0.006	0.000	2.8%	0.0%	
4 H3	3987	0.207	-5.9%	0.0%	0.006	0.000	2.9%	0.0%	
4 H4	3992	0.207	-5.8%	0.1%	0.006	0.000	2.8%	-0.1%	
5	3990	0.207	-5.8%	0.1%	0.006	0.000	2.8%	0.0%	
6	3989	0.207	-5.9%	0.1%	0.006	0.000	2.8%	0.0%	
7	3987	0.207	-5.9%	0.0%	0.006	0.000	2.9%	0.0%	
8	3989	0.207	-5.9%	0.1%	0.006	0.000	2.8%	0.0%	
9	3992	0.207	-5.8%	0.1%	0.006	0.000	2.8%	-0.1%	

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1 **Bromide Table 23. Estimated Bromide Concentrations at San Joaquin River at Antioch and Sacramento**  
 2 **River at Mallard Island for February through April of Wet and Above Normal Water Year Types (i.e.,**  
 3 **Periods of Historically Acceptable Water Quality for Withdrawal) Using the Mass-Balance Modeling**  
 4 **Approach.**

		San Joaquin River at Antioch			Sac. River at Mallard Island	
		Bromide Concentration (µg/L)			Bromide Concentration (µg/L)	
		Feb	Mar	Apr	Feb	Mar
Existing Condition	Wet	83	104	133	132	109
	Above Normal	91	92	112	263	94
No Action	Wet	79	103	156	150	141
	Above Normal	91	92	125	195	89
Alternative 1A	Wet	138	155	243	207	185
	Above Normal	145	157	197	292	132
Alternative 2A	Wet	129	155	208	203	187
	Above Normal	143	157	199	319	135
Alternative 3	Wet	107	133	234	199	184
	Above Normal	117	127	174	292	127
Alternative 4 H1	Wet	114	146	204	206	191
	Above Normal	124	145	196	315	130
Alternative 4 H2	Wet	118	150	163	204	191
	Above Normal	129	150	154	260	126
Alternative 4 H3	Wet	114	150	204	206	193
	Above Normal	122	145	195	316	130
Alternative 4 H4	Wet	119	151	163	206	191
	Above Normal	125	148	154	276	126
Alternative 5	Wet	96	118	182	195	177
	Above Normal	102	110	160	283	122
Alternative 6A	Wet	129	155	198	197	183
	Above Normal	145	157	190	277	140
Alternative 7	Wet	116	143	197	198	189
	Above Normal	124	143	189	291	139
Alternative 8	Wet	112	143	184	207	190
	Above Normal	122	141	172	244	130
Alternative 9	Wet	107	123	201	152	138
	Above Normal	127	129	154	193	100

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1 **Bromide Table 24. Estimated Bromide Concentrations at San Joaquin River at Antioch and Sacramento**  
 2 **River at Mallard Island for February through April of Wet and Above Normal Water Year Types (i.e.,**  
 3 **Periods of Historically Acceptable Water Quality for Withdrawal) Using the EC to Chloride and**  
 4 **Chloride to Bromide Modeling Approach.**

	Water Year Type	San Joaquin River at Antioch			Sac. River at Mallard Island	
		Bromide Concentration (µg/L)			Bromide Concentration (µg/L)	
		Feb	Mar	Apr	Feb	Mar
Existing Condition	Wet	84	82	76	68	68
	Above Normal	98	88	89	74	67
No Action	Wet	79	79	80	73	79
	Above Normal	92	81	86	77	67
Alternative 1A	Wet	114	95	113	89	90
	Above Normal	153	147	139	97	83
Alternative 2A	Wet	109	95	94	87	90
	Above Normal	152	148	140	100	83
Alternative 3	Wet	88	89	113	81	90
	Above Normal	103	96	116	83	72
Alternative 4 H1	Wet	91	92	94	83	92
	Above Normal	116	128	137	88	78
Alternative 4 H2	Wet	93	93	79	84	91
	Above Normal	129	137	130	87	80
Alternative 4 H3	Wet	92	93	94	83	92
	Above Normal	115	128	137	88	78
Alternative 4 H4	Wet	95	93	79	85	91
	Above Normal	122	133	130	86	79
Alternative 5	Wet	85	85	89	78	87
	Above Normal	97	87	102	81	70
Alternative 6A	Wet	112	95	89	85	89
	Above Normal	163	147	139	99	83
Alternative 7	Wet	96	93	90	82	91
	Above Normal	135	126	132	89	79
Alternative 8	Wet	95	93	84	83	92
	Above Normal	134	126	128	86	78
Alternative 9	Wet	96	84	99	74	73
	Above Normal	138	117	112	82	72

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