



## **APPENDIX K**

# **California Toxics Rule - Hardness Based Water Quality Objectives**

California Toxics Rule - Table of Calculated Hardness Based Criteria Maximum (Acute) Concentrations  
 (Find the sample hardness value in left column and the respective water quality objective at right for each listed metal)

Hardness mgCaCO3/L	Total Cadmium	Dissolved Cadmium	Total Chromium	Dissolved Chromium	Total Copper	Dissolved Copper	Total Lead	Dissolved Lead	Total Nickel	Dissolved Nickel	Total Silver	Dissolved Silver	Total Zinc	Dissolved Zinc
5	0.154	0.165	149.33	47.19	0.83	0.80	1.80	2.21	37.21	37.14	0.02	0.02	9.47	9.26
10	0.336	0.350	263.44	83.25	1.60	1.53	4.35	4.91	66.89	66.75	0.08	0.07	17.03	16.66
15	0.532	0.544	367.20	116.03	2.34	2.25	7.30	7.79	94.26	94.07	0.16	0.13	24.01	23.48
20	0.735	0.744	464.75	146.86	3.07	2.95	10.52	10.79	120.23	119.99	0.25	0.22	30.64	29.97
25	0.946	0.948	557.94	176.31	3.79	3.64	13.98	13.88	145.21	144.92	0.37	0.32	37.02	36.20
30	1.162	1.155	647.80	204.70	4.50	4.32	17.63	17.04	169.43	169.09	0.51	0.43	43.20	42.25
35	1.382	1.366	734.97	232.25	5.20	4.99	21.46	20.25	193.03	192.64	0.67	0.57	49.23	48.14
40	1.607	1.579	819.91	259.09	5.90	5.66	25.43	23.51	216.11	215.68	0.84	0.71	55.12	53.91
45	1.835	1.794	902.94	285.33	6.59	6.33	29.54	26.81	238.75	238.28	1.03	0.87	60.91	59.57
50	2.067	2.011	984.32	311.04	7.28	6.99	33.78	30.14	261.01	260.49	1.23	1.05	66.60	65.13
55	2.302	2.231	1064.23	336.30	7.96	7.65	38.14	33.50	282.93	282.37	1.45	1.23	72.20	70.61
60	2.539	2.451	1142.84	361.14	8.64	8.30	42.61	36.88	304.54	303.93	1.69	1.43	77.72	76.01
65	2.779	2.674	1220.26	385.60	9.32	8.95	47.18	40.28	325.88	325.23	1.93	1.64	83.18	81.35
70	3.021	2.898	1296.62	409.73	9.99	9.60	51.85	43.71	346.97	346.27	2.20	1.87	88.57	86.62
75	3.266	3.123	1372.00	433.55	10.67	10.24	56.61	47.15	367.82	367.08	2.47	2.10	93.90	91.83
80	3.512	3.349	1446.47	457.08	11.33	10.88	61.46	50.61	388.46	387.68	2.77	2.35	99.18	96.99
85	3.761	3.576	1520.10	480.35	12.00	11.52	66.39	54.09	408.91	408.09	3.07	2.61	104.40	102.11
90	4.011	3.805	1592.95	503.37	12.66	12.16	71.40	57.58	429.16	428.31	3.39	2.88	109.58	107.17
95	4.263	4.035	1665.07	526.16	13.33	12.79	76.48	61.08	449.25	448.35	3.72	3.16	114.72	112.20
100	4.517	4.265	1736.51	548.74	13.99	13.43	81.65	64.59	469.17	468.24	4.06	3.45	119.82	117.18
105	4.773	4.497	1807.31	571.11	14.64	14.06	86.88	68.11	488.95	487.97	4.41	3.75	124.87	122.13
110	5.030	4.729	1877.49	593.29	15.30	14.69	92.18	71.64	508.57	507.55	4.78	4.06	129.89	127.04
115	5.289	4.963	1947.11	615.29	15.95	15.32	97.54	75.18	528.06	527.01	5.16	4.39	134.88	131.91
120	5.549	5.197	2016.17	637.11	16.61	15.94	102.97	78.72	547.42	546.33	5.55	4.72	139.83	136.76
125	5.810	5.432	2084.72	658.77	17.26	16.57	108.47	82.28	566.66	565.52	5.96	5.06	144.75	141.57
130	6.073	5.668	2152.77	680.28	17.91	17.19	114.02	85.84	585.77	584.60	6.37	5.42	149.64	146.35
135	6.337	5.904	2220.35	701.63	18.56	17.81	119.63	89.40	604.78	603.57	6.80	5.78	154.51	151.11
140	6.603	6.141	2287.48	722.84	19.20	18.43	125.30	92.98	623.68	622.43	7.24	6.15	159.34	155.84
145	6.869	6.379	2354.17	743.92	19.85	19.05	131.02	96.55	642.47	641.18	7.69	6.54	164.15	160.54
150	7.137	6.618	2420.45	764.86	20.49	19.67	136.80	100.14	661.16	659.84	8.15	6.93	168.93	165.22
155	7.406	6.857	2486.34	785.68	21.13	20.29	142.63	103.72	679.76	678.40	8.63	7.33	173.69	169.87
160	7.676	7.097	2551.83	806.38	21.78	20.91	148.52	107.31	698.26	696.87	9.11	7.74	178.43	174.50
165	7.947	7.337	2616.96	826.96	22.42	21.52	154.45	110.91	716.68	715.25	9.60	8.16	183.14	179.11
170	8.219	7.578	2681.73	847.43	23.06	22.13	160.43	114.51	735.01	733.54	10.11	8.59	187.83	183.70
175	8.492	7.820	2746.16	867.79	23.69	22.75	166.46	118.11	753.26	751.75	10.63	9.03	192.51	188.27
180	8.767	8.062	2810.26	888.04	24.33	23.36	172.54	121.71	771.43	769.88	11.15	9.48	197.16	192.82
185	9.042	8.305	2874.03	908.19	24.97	23.97	178.67	125.32	789.52	787.94	11.69	9.94	201.79	197.35
190	9.318	8.548	2937.50	928.25	25.60	24.58	184.83	128.93	807.53	805.92	12.24	10.41	206.40	201.86
195	9.595	8.792	3000.66	948.21	26.24	25.19	191.05	132.54	825.47	823.82	12.80	10.88	210.99	206.35
200	9.873	9.036	3063.53	968.07	26.87	25.80	197.31	136.15	843.35	841.66	13.37	11.37	215.57	210.82
205	10.152	9.281	3126.11	987.85	27.50	26.40	203.61	139.77	861.15	859.43	13.95	11.86	220.12	215.28

400 mg CaCO3/l use 400 mg/ CaCO3/l.

California Toxics Rule - Table of Calculated Hardness Based Criteria Maximum (Acute) Concentrations  
(Find the sample hardness value in left column and the respective water quality objective at right for each listed metal)

Hardness mgCaCO3/L	Total Cadmium	Dissolved Cadmium	Total Chromium	Dissolved Chromium	Total Copper	Dissolved Copper	Total Lead	Dissolved Lead	Total Nickel	Dissolved Nickel	Total Silver	Dissolved Silver	Total Zinc	Dissolved Zinc
210	10.432	9.526	3188.42	1007.54	28.13	27.01	209.95	143.39	878.88	877.13	14.54	12.36	224.66	219.72
215	10.712	9.772	3250.46	1027.15	28.76	27.61	216.33	147.00	896.56	894.76	15.14	12.87	229.19	224.15
220	10.994	10.018	3312.24	1046.67	29.39	28.22	222.76	150.62	914.16	912.33	15.75	13.39	233.70	228.55
225	11.276	10.264	3373.77	1066.11	30.02	28.82	229.22	154.25	931.71	929.85	16.37	13.92	238.19	232.95
230	11.559	10.512	3435.05	1085.48	30.65	29.43	235.73	157.87	949.20	947.30	17.00	14.45	242.67	237.33
235	11.843	10.759	3496.09	1104.76	31.28	30.03	242.27	161.49	966.62	964.69	17.65	15.00	247.13	241.69
240	12.127	11.007	3556.90	1123.98	31.90	30.63	248.85	165.11	983.99	982.03	18.30	15.55	251.58	246.04
245	12.413	11.255	3617.47	1143.12	32.53	31.23	255.47	168.74	1001.31	999.31	18.96	16.11	256.01	250.38
250	12.699	11.504	3677.82	1162.19	33.16	31.83	262.12	172.36	1018.57	1016.53	19.63	16.68	260.43	254.70
255	12.986	11.753	3737.96	1181.19	33.78	32.43	268.82	175.99	1035.78	1033.71	20.31	17.26	264.84	259.01
260	13.273	12.002	3797.88	1200.13	34.40	33.03	275.54	179.61	1052.93	1050.83	21.00	17.85	269.23	263.31
265	13.562	12.252	3857.59	1219.00	35.03	33.63	282.31	183.24	1070.04	1067.90	21.70	18.44	273.61	267.59
270	13.850	12.503	3917.10	1237.80	35.65	34.22	289.11	186.86	1087.10	1084.92	22.41	19.04	277.98	271.86
275	14.140	12.753	3976.41	1256.55	36.27	34.82	295.94	190.49	1104.10	1101.89	23.12	19.65	282.33	276.12
280	14.430	13.004	4035.53	1275.23	36.89	35.42	302.80	194.11	1121.06	1118.82	23.85	20.27	286.68	280.37
285	14.721	13.256	4094.45	1293.85	37.51	36.01	309.70	197.73	1137.98	1135.70	24.59	20.90	291.01	284.61
290	15.013	13.507	4153.19	1312.41	38.13	36.61	316.64	201.36	1154.84	1152.53	25.34	21.53	295.33	288.83
295	15.305	13.759	4211.75	1330.91	38.75	37.20	323.60	204.98	1171.67	1169.32	26.09	22.18	299.64	293.05
300	15.598	14.012	4270.12	1349.36	39.37	37.79	330.60	208.61	1188.44	1186.07	26.86	22.83	303.94	297.25
305	15.892	14.264	4328.32	1367.75	39.99	38.39	337.63	212.23	1205.18	1202.77	27.63	23.49	308.22	301.44
310	16.186	14.518	4386.35	1386.09	40.60	38.98	344.69	215.85	1221.87	1219.43	28.41	24.15	312.50	305.62
315	16.481	14.771	4444.21	1404.37	41.22	39.57	351.79	219.47	1238.53	1236.05	29.21	24.83	316.76	309.79
320	16.776	15.025	4501.90	1422.60	41.84	40.16	358.91	223.09	1255.14	1252.63	30.01	25.51	321.02	313.96
325	17.072	15.279	4559.43	1440.78	42.45	40.75	366.06	226.71	1271.71	1269.16	30.82	26.20	325.26	318.11
330	17.369	15.533	4616.80	1458.91	43.07	41.34	373.25	230.33	1288.24	1285.66	31.64	26.89	329.50	322.25
335	17.666	15.788	4674.01	1476.99	43.68	41.93	380.46	233.95	1304.73	1302.12	32.47	27.60	333.72	326.38
340	17.964	16.042	4731.07	1495.02	44.29	42.52	387.71	237.57	1321.19	1318.55	33.31	28.31	337.94	330.50
345	18.262	16.298	4787.98	1513.00	44.91	43.11	394.98	241.18	1337.61	1334.93	34.15	29.03	342.15	334.62
350	18.561	16.553	4844.73	1530.94	45.52	43.70	402.28	244.80	1353.99	1351.28	35.01	29.76	346.34	338.72
355	18.860	16.809	4901.34	1548.82	46.13	44.29	409.61	248.41	1370.34	1367.60	35.88	30.49	350.53	342.82
360	19.160	17.065	4957.81	1566.67	46.75	44.88	416.97	252.03	1386.65	1383.87	36.75	31.24	354.71	346.90
365	19.460	17.321	5014.13	1584.47	47.36	45.46	424.35	255.64	1402.92	1400.12	37.63	31.99	358.88	350.98
370	19.761	17.578	5070.32	1602.22	47.97	46.05	431.77	259.25	1419.16	1416.33	38.52	32.74	363.04	355.05
375	20.063	17.835	5126.37	1619.93	48.58	46.63	439.21	262.86	1435.37	1432.50	39.42	33.51	367.19	359.11
380	20.365	18.092	5182.28	1637.60	49.19	47.22	446.68	266.46	1451.55	1448.64	40.33	34.28	371.34	363.17
385	20.667	18.350	5238.06	1655.23	49.80	47.81	454.17	270.07	1467.69	1464.75	41.25	35.06	375.47	367.21
390	20.970	18.607	5293.71	1672.81	50.41	48.39	461.70	273.68	1483.80	1480.83	42.17	35.85	379.60	371.25
395	21.274	18.865	5349.23	1690.36	51.01	48.97	469.24	277.28	1499.88	1496.88	43.11	36.64	383.72	375.28
400	21.578	19.124	5404.62	1707.86	51.62	49.56	476.82	280.88	1515.92	1512.89	44.05	37.44	387.83	379.30

400 mg CaCO3/l use 400 mg/ CaCO3/l.

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 (Find the sample hardness value in left column and the respective water quality objective at right for each listed metal)

Hardness mgCaCO3/L	Total Cadmium	Dissolved Cadmium	Total Chromium	Dissolved Chromium	Total Copper	Dissolved Copper	Total Lead	Dissolved Lead	Total Nickel	Dissolved Nickel	Total Zinc	Dissolved Zinc
5	0.23	0.24	17.80	5.62	0.72	0.69	0.07	0.09	4.14	4.13	9.47	9.33
10	0.40	0.41	31.40	9.92	1.30	1.25	0.17	0.19	7.44	7.42	17.03	16.79
15	0.56	0.55	43.77	13.83	1.84	1.77	0.28	0.30	10.48	10.46	24.01	23.68
20	0.70	0.68	55.40	17.51	2.36	2.26	0.41	0.42	13.37	13.34	30.64	30.21
25	0.83	0.80	66.50	21.02	2.85	2.74	0.54	0.54	16.14	16.11	37.02	36.50
30	0.96	0.92	77.21	24.40	3.33	3.20	0.69	0.66	18.84	18.80	43.20	42.59
35	1.08	1.03	87.60	27.68	3.80	3.65	0.84	0.79	21.46	21.42	49.23	48.54
40	1.20	1.14	97.73	30.88	4.26	4.09	0.99	0.92	24.03	23.98	55.12	54.35
45	1.32	1.24	107.63	34.01	4.72	4.53	1.15	1.04	26.54	26.49	60.91	60.06
50	1.43	1.34	117.32	37.07	5.16	4.95	1.32	1.17	29.02	28.96	66.60	65.66
55	1.54	1.44	126.85	40.08	5.60	5.37	1.49	1.31	31.46	31.39	72.20	71.19
60	1.65	1.53	136.22	43.05	6.03	5.79	1.66	1.44	33.86	33.79	77.72	76.63
65	1.76	1.63	145.45	45.96	6.46	6.20	1.84	1.57	36.23	36.16	83.18	82.01
70	1.86	1.72	154.55	48.84	6.88	6.60	2.02	1.70	38.58	38.50	88.57	87.33
75	1.96	1.81	163.53	51.68	7.30	7.00	2.21	1.84	40.89	40.81	93.90	92.58
80	2.07	1.90	172.41	54.48	7.71	7.40	2.39	1.97	43.19	43.10	99.18	97.79
85	2.17	1.98	181.19	57.26	8.12	7.79	2.59	2.11	45.46	45.37	104.40	102.94
90	2.27	2.07	189.87	60.00	8.53	8.18	2.78	2.24	47.71	47.62	109.58	108.05
95	2.36	2.16	198.47	62.72	8.93	8.57	2.98	2.38	49.95	49.85	114.72	113.11
100	2.46	2.24	206.98	65.41	9.33	8.96	3.18	2.52	52.16	52.06	119.82	118.14
105	2.56	2.32	215.42	68.07	9.73	9.34	3.39	2.65	54.36	54.25	124.87	123.13
110	2.65	2.40	223.79	70.72	10.12	9.72	3.59	2.79	56.54	56.43	129.89	128.08
115	2.75	2.48	232.08	73.34	10.51	10.09	3.80	2.93	58.71	58.59	134.88	132.99
120	2.84	2.56	240.32	75.94	10.90	10.47	4.01	3.07	60.86	60.74	139.83	137.87
125	2.93	2.64	248.49	78.52	11.29	10.84	4.23	3.21	63.00	62.88	144.75	142.73
130	3.03	2.72	256.60	81.08	11.67	11.21	4.44	3.34	65.13	65.00	149.64	147.55
135	3.12	2.79	264.65	83.63	12.06	11.57	4.66	3.48	67.24	67.11	154.51	152.34
140	3.21	2.87	272.65	86.16	12.44	11.94	4.88	3.62	69.34	69.20	159.34	157.11
145	3.30	2.95	280.60	88.67	12.82	12.30	5.11	3.76	71.43	71.29	164.15	161.85
150	3.38	3.02	288.50	91.17	13.19	12.66	5.33	3.90	73.51	73.36	168.93	166.57
155	3.47	3.09	296.36	93.65	13.57	13.02	5.56	4.04	75.58	75.42	173.69	171.26
160	3.56	3.17	304.16	96.12	13.94	13.38	5.79	4.18	77.63	77.48	178.43	175.93
165	3.65	3.24	311.93	98.57	14.31	13.74	6.02	4.32	79.68	79.52	183.14	180.58
170	3.73	3.31	319.65	101.01	14.68	14.09	6.25	4.46	81.72	81.56	187.83	185.20
175	3.82	3.38	327.33	103.44	15.05	14.45	6.49	4.60	83.75	83.58	192.51	189.81
180	3.91	3.46	334.97	105.85	15.42	14.80	6.72	4.74	85.77	85.60	197.16	194.40
185	3.99	3.53	342.57	108.25	15.78	15.15	6.96	4.88	87.78	87.60	201.79	198.96
190	4.08	3.60	350.13	110.64	16.14	15.50	7.20	5.02	89.78	89.60	206.40	203.51
195	4.16	3.67	357.66	113.02	16.51	15.85	7.44	5.16	91.78	91.59	210.99	208.04
200	4.24	3.73	365.16	115.39	16.87	16.19	7.69	5.31	93.76	93.58	215.57	212.55
205	4.33	3.80	372.61	117.75	17.23	16.54	7.93	5.45	95.74	95.55	220.12	217.04

For hardness values over 400 mg CaCO3/l use 400 mg/ CaCO3/l.

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 (Find the sample hardness value in left column and the respective water quality objective at right for each listed metal)

Hardness mgCaCO3/L	Total Cadmium	Dissolved Cadmium	Total Chromium	Dissolved Chromium	Total Copper	Dissolved Copper	Total Lead	Dissolved Lead	Total Nickel	Dissolved Nickel	Total Zinc	Dissolved Zinc
210	4.41	3.87	380.04	120.09	17.59	16.88	8.18	5.59	97.71	97.52	224.66	221.52
215	4.49	3.94	387.44	122.43	17.94	17.23	8.43	5.73	99.68	99.48	229.19	225.98
220	4.57	4.01	394.80	124.76	18.30	17.57	8.68	5.87	101.64	101.43	233.70	230.42
225	4.65	4.07	402.13	127.07	18.65	17.91	8.93	6.01	103.59	103.38	238.19	234.85
230	4.73	4.14	409.44	129.38	19.01	18.25	9.19	6.15	105.53	105.32	242.67	239.27
235	4.82	4.21	416.71	131.68	19.36	18.59	9.44	6.29	107.47	107.25	247.13	243.67
240	4.90	4.27	423.96	133.97	19.71	18.92	9.70	6.43	109.40	109.18	251.58	248.05
245	4.98	4.34	431.18	136.25	20.06	19.26	9.96	6.58	111.33	111.10	256.01	252.43
250	5.06	4.40	438.38	138.53	20.41	19.59	10.21	6.72	113.25	113.02	260.43	256.78
255	5.13	4.47	445.54	140.79	20.76	19.93	10.48	6.86	115.16	114.93	264.84	261.13
260	5.21	4.53	452.69	143.05	21.11	20.26	10.74	7.00	117.07	116.83	269.23	265.46
265	5.29	4.60	459.80	145.30	21.45	20.60	11.00	7.14	118.97	118.73	273.61	269.78
270	5.37	4.66	466.90	147.54	21.80	20.93	11.27	7.28	120.86	120.62	277.98	274.09
275	5.45	4.72	473.97	149.77	22.14	21.26	11.53	7.42	122.75	122.51	282.33	278.38
280	5.53	4.79	481.01	152.00	22.49	21.59	11.80	7.56	124.64	124.39	286.68	282.66
285	5.60	4.85	488.04	154.22	22.83	21.92	12.07	7.71	126.52	126.27	291.01	286.93
290	5.68	4.91	495.04	156.43	23.17	22.24	12.34	7.85	128.40	128.14	295.33	291.19
295	5.76	4.97	502.02	158.64	23.51	22.57	12.61	7.99	130.27	130.01	299.64	295.44
300	5.83	5.04	508.97	160.84	23.85	22.90	12.88	8.13	132.13	131.87	303.94	299.68
305	5.91	5.10	515.91	163.03	24.19	23.22	13.16	8.27	133.99	133.72	308.22	303.91
310	5.99	5.16	522.83	165.21	24.53	23.55	13.43	8.41	135.85	135.58	312.50	308.12
315	6.06	5.22	529.72	167.39	24.87	23.87	13.71	8.55	137.70	137.42	316.76	312.33
320	6.14	5.28	536.60	169.57	25.20	24.20	13.99	8.69	139.55	139.27	321.02	316.52
325	6.21	5.34	543.46	171.73	25.54	24.52	14.27	8.83	141.39	141.11	325.26	320.71
330	6.29	5.40	550.30	173.89	25.88	24.84	14.54	8.98	143.23	142.94	329.50	324.89
335	6.36	5.46	557.12	176.05	26.21	25.16	14.83	9.12	145.06	144.77	333.72	329.05
340	6.44	5.52	563.92	178.20	26.54	25.48	15.11	9.26	146.89	146.60	337.94	333.21
345	6.51	5.58	570.70	180.34	26.88	25.80	15.39	9.40	148.72	148.42	342.15	337.36
350	6.58	5.64	577.46	182.48	27.21	26.12	15.68	9.54	150.54	150.24	346.34	341.49
355	6.66	5.70	584.21	184.61	27.54	26.44	15.96	9.68	152.35	152.05	350.53	345.62
360	6.73	5.76	590.94	186.74	27.87	26.76	16.25	9.82	154.17	153.86	354.71	349.74
365	6.80	5.82	597.66	188.86	28.20	27.08	16.54	9.96	155.98	155.67	358.88	353.85
370	6.88	5.88	604.35	190.98	28.53	27.39	16.83	10.10	157.78	157.47	363.04	357.96
375	6.95	5.94	611.03	193.09	28.86	27.71	17.12	10.24	159.59	159.27	367.19	362.05
380	7.02	5.99	617.70	195.19	29.19	28.02	17.41	10.38	161.38	161.06	371.34	366.14
385	7.10	6.05	624.35	197.29	29.52	28.34	17.70	10.52	163.18	162.85	375.47	370.22
390	7.17	6.11	630.98	199.39	29.85	28.65	17.99	10.66	164.97	164.64	379.60	374.28
395	7.24	6.17	637.60	201.48	30.17	28.97	18.29	10.81	166.76	166.42	383.72	378.35
400	7.31	6.22	644.20	203.57	30.50	29.28	18.58	10.95	168.54	168.20	387.83	382.40

For hardness values over 400 mg CaCO3/l use 400 mg/ CaCO3/l.