

**Adopted October 12, 2006
Resolution R6T-2006-0047**

**AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE
LAHONTAN REGION:**

Revised Sodium-Related Standards for the Carson and Walker River Watersheds

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INTRODUCTION

On October 12, 2006, under Resolution R6T-2006-0047, the California Regional Water Quality Control Board, Lahontan Region adopted amendments to Chapter 3 of its *Water Quality Control Plan for the Lahontan Region* (Basin Plan) to replace water quality objectives for Percent Sodium in the Carson and Walker River watersheds with new objectives for Sodium Adsorption Ratio (SAR), and make other editorial changes. After final approval, the amendments will be physically incorporated into the Basin Plan, and editorial updates of the Record of Amendments page, Table of Contents, List of Tables, and page numbers will be made.

The following is a summary of the adopted revisions. Page number references are to pages in the 1995 paper edition of the Basin Plan. Deletions from and additions to the Basin Plan text are shown in strikeout-underline format on the following pages.

- On page 3-10, a new narrative objective for “Sodium Adsorption Ratio (SAR)” has been added under the “West Fork Carson River Hydrologic Unit” heading, in alphabetical order between existing objectives for “pH” and “Species Composition.”
- On page 3-10 under the “East Fork Carson River Hydrologic Unit heading”, subheadings were revised, and a new narrative objective for “Sodium Adsorption Ratio (SAR)” has been added above the existing objectives for the Indian Creek watershed.
- On page 3-11, the “Walker River Hydrologic Units” heading was replaced with separate headings for the West and East Walker River Hydrologic Units. New SAR objectives were inserted under each heading.
- On page 3-33, at the end of Table 3-11, the entire footnote related to Percent Sodium was deleted. (The footnote is a typographical error; Table 11 does not include water quality objectives for Percent Sodium.)
- On pages 3-40 and 3-42, the columns for “% Na” in Basin Plan Tables 3-14 and 3-15 were deleted. The footnotes for “% Na Sodium, Percent,” including the equations and explanations of terms, were also deleted from these two tables.

The following Basin Plan pages are taken from an in-progress revised electronic edition of the plan. The plan is being reformatted to include all amendments fully approved since 1995. Font types and sizes, text spacing, and page numbers may change in the final revised edition.

Changes to pages 3-10
and 3-11:

**West Fork Carson River
Hydrologic Unit**

(Figure 3-7, Table 3-14)

The following additional water quality objectives apply to all surface waters of the West Fork Carson River Hydrologic Unit:

Algal Growth Potential: The mean of monthly mean of algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Biostimulatory Substances: The concentrations of biostimulatory substances shall not be altered in an amount that could produce an increase in aquatic biomass to the extent that such increases in aquatic biomass are discernible at the 10 percent significance level.

Color: The color shall not exceed the 13 Platinum Cobalt Unit mean of monthly means (approximately equal to the State of Nevada standard of 13 Platinum Cobalt Unit sample mean).

Dissolved Oxygen: The dissolved oxygen concentration shall not be depressed by more than 10 percent, below 80 percent saturation or below 7.0 mg/L at any time, whichever is more restrictive.

pH: Changes in normal ambient pH levels shall not exceed 0.5 unit.

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use. SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}$$

Concentrations of all chemical constituents in the equation above are expressed in milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objective for SAR, as an annual average, applies to surface waters of the West Fork Carson River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

<u>Water Body</u>	<u>SAR (Annual Average)</u>
West Fork Carson River	1

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certain surface waters of the West Fork Carson River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

Species Composition: Species composition of the aquatic biota shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Taste and Odor: The taste and odor shall not be altered.

Turbidity: The turbidity shall not be raised above a mean of monthly means value of 2 NTU. (This objective is approximately equal to the State of Nevada standard of 2 NTU annual mean.)

**East Fork Carson River
Hydrologic Unit**

(Figure 3-7, Table 3-14)

The following additional water quality objective applies to all surface waters of the East Fork Carson River Hydrologic Unit

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use.

SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}$$

Concentrations of all chemical constituents in the equation above are expressed in milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objective for SAR, as an annual average, applies to surface waters of the East Fork Carson River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

<u>Water Body</u>	<u>SAR (Annual Average)</u>
<u>East Fork Carson River</u>	<u>2</u>
<u>Bryant Creek</u>	<u>1</u>

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certain surface waters of the East Fork Carson River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

The following additional water quality objectives apply to all surface waters of the **Indian Creek watershed:**

Algal Growth Potential: The mean of monthly mean of algal growth potential shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Biostimulatory Substances: The concentrations of biostimulatory substances shall not be altered in an amount that could produce an increase in aquatic biomass to the extent that such increases in aquatic

biomass are discernible at the 10 percent significance level.

Color: The color shall not exceed the 13 Platinum Cobalt Unit mean of monthly means (approximately equal to the State of Nevada standard of 13 Platinum Cobalt Unit sample mean).

Dissolved Oxygen: The dissolved oxygen concentration shall not be depressed by more than 10 percent, below 80 percent saturation, or below 7.0 mg/L at any time, whichever is more restrictive.

pH: Changes in normal ambient pH levels shall not exceed 0.5 unit.

Species Composition: Species composition shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

Taste and Odor: The taste and odor shall not be altered.

West Walker River Hydrologic Units

(See Figure 3-8 and Table 3-15 for water quality objectives for the West Walker River HUs.)

The following additional water quality objective applies to all surface waters of the West Walker River Hydrologic Unit

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use. SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}$$

Concentrations of all chemical constituents in the equation above are expressed in

milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objectives for SAR, as an annual average, apply to surface waters of the West Walker River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

<u>Water Body</u>	<u>SAR (Annual Average)</u>
<u>West Walker River</u>	<u>2</u>
<u>Topaz Lake</u>	<u>2</u>

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certain surface waters of the West Walker River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

East Walker River Hydrologic Unit

(See Figure 3-8 and Table 3-15 for water quality objectives for the East Walker River HU.)

The following additional water quality objective applies to all surface waters of the East Walker River Hydrologic Unit

Sodium Adsorption Ratio (SAR): Water quality objectives for SAR are set to protect the irrigated agriculture component of the Agricultural Supply (AGR) beneficial use. SAR is calculated using the following equation, where Na = sodium ion concentration, Ca= calcium ion concentration, and Mg = magnesium ion concentration.

$$\text{SAR} = \frac{\text{Na}}{\sqrt{\frac{\text{Ca} + \text{Mg}}{2}}}$$

Concentrations of all chemical constituents in the equation above are expressed in

milliequivalents per liter. As a ratio, SAR has no units.

The following water quality objective for SAR, as an annual average, applies to surface waters of the West Walker River HU. Except as noted below, SAR objectives apply to the entire water body and its tributary surface waters in California.

<u>Water Body</u>	<u>SAR (Annual Average)</u>
<u>East Walker River</u>	<u>2</u>

The Lahontan Regional Board recognizes that SAR may be higher than the value above in certain surface waters of the East Walker River watershed due to natural sources of sodium, including geothermal sources. Where higher SAR values occur only as a result of natural sources, the affected water bodies or water body segments will not be considered to be in violation of the applicable SAR objective.

Mono Hydrologic Unit

(See Figure 3-9 and Table 3-16 for water quality objectives for the Mono HU.)

Changes to Tables 3-11, 3-14, and 3-15:

Table 3-11 (continued)
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT

See Fig. 3-5	Surface Waters	Objective (mg/L except as noted) ^{1,2}								
		TDS	Cl	SO ₄	P	B	NO ₃ -N	N	TKN	Fe
12	Truckee River above Bear Creek	65	2.0	2.0	0.02	-	0.04	0.19	0.15	0.10
13	Truckee River at Lake Tahoe Outlet	65	2.0	2.0	0.01	-	0.02	0.12	0.10	0.03

¹ Values shown are mean of monthly mean for the period of record.

² Objectives are as mg/L and are defined as follows:

- B Boron
- Cl Chloride
- N Nitrogen, Total
- NO₃-N Nitrogen as Nitrate
- TKN Nitrogen, Total Kjeldahl
- P Phosphorus, Total
- % Na Sodium, Percent:

~~$$\frac{(Na \times 100)}{Na + Ca + Mg + K} = \% Na$$~~

Na, Ca, Mg, and K expressed as milliequivalents per liter (meq/L) concentrations.

- SO₄ Sulfate
- TDS Total Dissolved Solids (Total Filterable Residue)

Table 3-14
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
EAST & WEST FORK CARSON RIVER HYDROLOGIC UNITS

See Fig. 3-7	Surface Waters	Objective (mg/L except as noted) ⁴								
		TDS	Cl	SO ₄	Total P	B	% Na	Total N	TKN	NO ₃ -N
1	West Fork Carson River at Woodfords ¹	55	1.0	2.0	0.02	0.02	20	0.15	0.13	0.02
2	West Fork Carson River at Stateline ¹	70	2.5	2.0	0.03	0.02	20	0.25	0.22	0.03
3	Indian Creek Res. ¹	305	24	-	0.04	-	-	4.0	-	-
4	East Fork Carson River ²	<u>80</u>	<u>4.0</u>	<u>4.0</u>	<u>0.02</u>	<u>0.12</u>	<u>25</u>	<u>0.20</u>	-	-
		100	6.0	8.0	0.03	0.25	30	0.30		
5	Bryant Creek Basin ^{2,3}	<u>140</u>	<u>15</u>	<u>35</u>	<u>0.02</u>	<u>0.20</u>	<u>---</u>	<u>0.20</u>	-	-
		200	25	50	0.03	0.50	50	0.30		

¹ Values shown are mean of monthly mean for the period of record.

² Annual average value/90th percentile value.

³ In addition, the following numerical water quality objectives shall apply specifically to surface waters of the Bryant Creek Basin:

<u>Parameter</u>	<u>Maximum Value (mg/l except as noted)</u>
Turbidity (NTU)	15
Alkalinity, total as CaCO ₃	70 (minimum)
Acidity, total as CaCO ₃	10
Dissolved Iron	0.5
Manganese	0.5
Color, Pcu	15
Aluminum	0.1
Copper	0.02
Arsenic	0.05

⁴ Objectives are as mg/L and are defined as follows:

B	Boron	NO ₃ -N	Nitrogen as Nitrate
Cl	Chloride	TKN	Nitrate, Total Kjeldahl
N	Nitrogen, Total	P	Phosphorus, Total
% Na	Sodium, Percent		

$$\frac{(\text{Na} \times 100)}{\text{Na} + \text{Ca} + \text{Mg} + \text{K}} = \% \text{Na}$$

Na, Ca, Mg, and K expressed as milliequivalents per liter (meq/L) concentrations.

SO ₄	Sulfate
TDS	Total Dissolved Solids (Total Filterable Residue)

Table 3-15
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
WEST & EAST WALKER RIVER HYDROLOGIC UNITS

See Fig. 3-8	Surface Waters	Objective (mg/L except as noted) ^{1,2}						
		TDS	Cl	SO ₄	% Na	B	Total N	Total P
1	Topaz Lake	<u>90</u> 105	<u>4</u> 7	-	<u>25</u> 30	<u>0.10</u> 0.20	<u>0.10</u> 0.30	<u>0.05</u> 0.10
2	West Walker River at Coleville	<u>60</u> 75	<u>3.0</u> 5.0	-	<u>25</u> 30	<u>0.10</u> 0.20	<u>0.20</u> 0.40	<u>0.01</u> 0.02
3	East Walker River at Bridgeport	<u>145</u> 160	<u>4.0</u> 8.0	-	<u>30</u> 35	<u>0.12</u> 0.25	<u>0.50</u> 0.80	<u>0.06</u> 0.10
4&5	Robinson Creek & all other tributaries above Bridgeport Valley	<u>45</u> 70	<u>2.0</u> 4.0	-	-	-	<u>0.05</u> 0.10	<u>0.02</u> 0.03

¹ Annual Average value/90th Percentile Value

² Objectives are as mg/L and are defined as follows:

B Boron
 Cl Chloride
 N Nitrogen, Total
 P Phosphorus, Total
 % Na Sodium, Percent

$$\frac{(\text{Na} \times 100)}{\text{Na} + \text{Ca} + \text{Mg} + \text{K}} = \% \text{Na}$$

(Na, Ca, Mg, K expressed as milliequivalents per liter or meq/L concentrations)

SO₄ Sulfate
 TDS Total Dissolved Solids (Total Filterable Residue)