

**APPENDIX A**

**Numeric Standards Proposed for the Tongue, Powder, and Little Powder River Basins, and  
Adopted for the Cheyenne and Belle Fourche River Basins**

## **Appendix A**

### **Specific Electrical Conductivity (EC as uS/cm) and Sodium Adsorption Ratio (SAR) Values Proposed for the Tongue, Powder, and Little Powder River Basins and Adopted for the Cheyenne and Belle Fourche River Basins**

Wyoming currently implements its narrative water quality standard through its NPDES permitting program. Implementation is on a watershed basis, with DEQ setting permit limits that are determined to be protective of downstream irrigated agriculture. Wyoming, therefore, does not have specific numerical standards for SAR and EC at this time. Nevertheless, numerical standards of downstream jurisdictions apply and may have an affect on discharges in Wyoming. The SAR and EC values in this table are: 1) those adopted by the Northern Cheyenne Tribe and the specific values proposed by the parties to the Montana water quality standards process now underway; and 2) those adopted, as statewide standards, by South Dakota. None of the numerical values applicable to the Tongue, Powder, and Little Powder in Montana has final Clean Water Act (CWA) status, and it is not certain, at this point, what the final CWA values applicable to these Rivers will be. Nevertheless, these SAR and EC values were developed with assistance from advisors with expertise in the area of salinity and sodicity effects on irrigated agriculture. Therefore, it would not be unreasonable to view these values as providing a fair estimate of the range of SAR and EC values which may eventually be judged as providing an appropriate level of protection for irrigated agriculture in these basins. The numerical standards applicable to the Cheyenne and Belle Fouche Rivers in South Dakota are final standards with CWA status. The values are presented here simply to provide the reader with easy link to the standards development process now underway in Montana and the South Dakota water quality standards.

Specific EC and SAR Values Under Consideration in the Montana Water Quality Standards Process

*Montana DEQ Option 1*

Watershed	Irrigation Season (4/1 - 10/31)	Non-Irrigation Season (11/1- 3/31)	Criteria Applicable All Year to All Waters		Notes
			EC (max)	EC (max)	
Tongue River	1000	2000	EC x 0.0071 - 2.475	5.0	<p>SAR(max) is the SAR calculated using the ambient EC, for a specific sampling event, in the equation. The calculated SAR is a maximum. SAR(abs. max) is a maximum, not to be exceeded, value that applies to all waters at all times and is based on protecting against the rain-on-sodic-soil event. SAR(abs. max) is 0.5 where EC is less than 350.</p> <p>Although specific numeric standards for EC and SAR (as prescribed in this table) have been proposed, Montana's Option 1 proposal includes a range of potential values that could be considered for adoption by the Board. For SAR, the range is 1 - 10. For EC, the range is 350 - 2500.</p>
Tributaries to the Tongue River	500				
Powder River	1900				
Tributaries to the Powder River	500				
Little Powder River	1900				
Tributaries to the Little Powder River	500				

Montana DEQ Option 2

This option is the same as option 1, except for the Tongue River. For the Tongue River, the standards progressively become more stringent from downstream to upstream. This is to protect assimilative capacity in the Montana portion of the River, ensuring the desired level of water quality is attained at the mouth of the River while allowing for development in the upper section of the basin.

Watershed	Irrigation Season (4/1 - 10/31)	Non-Irrigation Season (11/1- 3/31)	Criteria Applicable All Year to All Waters		Notes
			EC (max)	EC (max)	
Tongue River (Yellowstone R. - N. Cheyenne, northern	1000	2000	EC x 0.0071 - 2.475	5.0	<p>SAR(max) is the SAR calculated using the ambient EC, for a specific sampling event, in the equation. The calculated SAR is a maximum. SAR(abs. max) is a maximum, not to be exceeded, value that applies to all waters at all times and is based on protecting against the rain-on-sodic-soil event. SAR(abs. max) is 0.5 where EC is less than 350.</p> <p>Although specific numeric standards for EC and SAR (as presented in this table) have been proposed, Montana's Option 2 proposal includes a range of potential values that could be considered for adoption by the Board. For SAR, the range is 1 - 10. For EC, the range is 350 - 2500.</p>
Tongue River (N. Cheyenne, northern boundary - southern boundary)	900				
Tongue River (N. Cheyenne, southern boundary - reservoir inlet)	700				
Tongue River (reservoir inlet Wy border)	600				
Tributaries to the Tongue River	500				
Powder River	1900				
Tributaries to Powder River	500				
Little Powder River	1900				
Tributaries to the Little Powder River	500				

*Petitioners<sup>1</sup> Proposal*

This proposal is similar to DEQ’s option 2 in that there are multiple standards for each river and the standards become progressively more stringent from downstream to upstream. This proposal also includes multiple irrigation periods at certain locations.

<b>River Segments and Compliance Locations</b>	<b>EC (max)</b>	<b>SAR (max)</b>	<b>Notes</b>
Tongue River - Wyoming state line	600	0.5	Applicable dates: all year
Tongue River - Reservoir	800	1.0	Applicable dates: all year
Tongue River - at conf. w. Yellowstone R.	1000	1.6	Applicable dates: 4/1 - 10/31
Tongue River - at conf. w. Yellowstone R.	1200	2.5	Applicable dates: 11/1 - 3/31
Powder River - Moorhead	1400	4.0	Applicable dates: 4/15 - 7/15
Powder River - Moorhead	2200	5.0	Applicable dates: 7/16 - 9/1
Powder River - Moorhead	3000	6.0	Applicable dates: 9/2 - 4/14
Powder River - at conf. w. Yellowstone R.	1600	4.0	Applicable dates: 4/15 - 7/15
Powder River - at conf. w. Yellowstone R.	2400	5.0	Applicable dates: 7/16 - 9/1
Powder River - at conf. w. Yellowstone R.	3200	6.0	Applicable dates: 9/2 - 4/14
Little Powder - Biddle	2000	5.0	Applicable dates: 4/15 - 7/15
Little Powder - Biddle	2400	6.0	Applicable dates: 7/16 - 9/1
Little Powder - Biddle	3000	8.0	Applicable dates: 9/2 - 4/14

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<sup>1</sup> “Petitioners” include -Tongue River Water Users, T&Y Irrigation District, Buffalo Rapids Irrigation Project, and Northern Plains Resource Council.

WQS for Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR) Adopted by the Northern Cheyenne Tribe

The Northern Cheyenne Tribe’s EC and SAR numerical standards were adopted by the Tribal Council on May 28, 2002. The numerical standards apply to the Tongue River and tributaries within the boundaries of the Reservation.

Tongue River (within the Reservation Boundaries)	Irrigation Season (4/1 - 11/15)	Criteria Applicable All Year		Notes
		EC (30-day ave.)	EC (inst. max.)	
Southern Boundary	1000	2000	2.0	The Tribe has also adopted indicator values for total dissolved solids (TDS) that will be used to monitor conditions and trends of these waters.
Northern Boundary	1500	2000	3.0	
Tributaries	1500	2000	3.0	

WQS for Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR) Adopted by South Dakota

Watershed	Criteria Applicable All Year			Notes
	EC (30-day ave.)	EC (daily max)	SAR (daily max)	
Belle Fourche and Cheyenne Rivers and tributaries	≤ 2500	≤ 4375	≤ 10	

Wyoming Narrative WQS Concerning Agricultural Water Supply

Section 20 of Wyoming’s Chapter 1 Rules and Regulations incorporates a narrative water quality standard, which specifies that all surface waters with potential for use as an agricultural water supply shall be maintained at a quality which supports the use, and any degradation shall not cause a measurable decrease in crop or livestock production. Unless otherwise demonstrated, all Wyoming surface waters are assumed to have the natural water quality potential for use as an agricultural water supply.