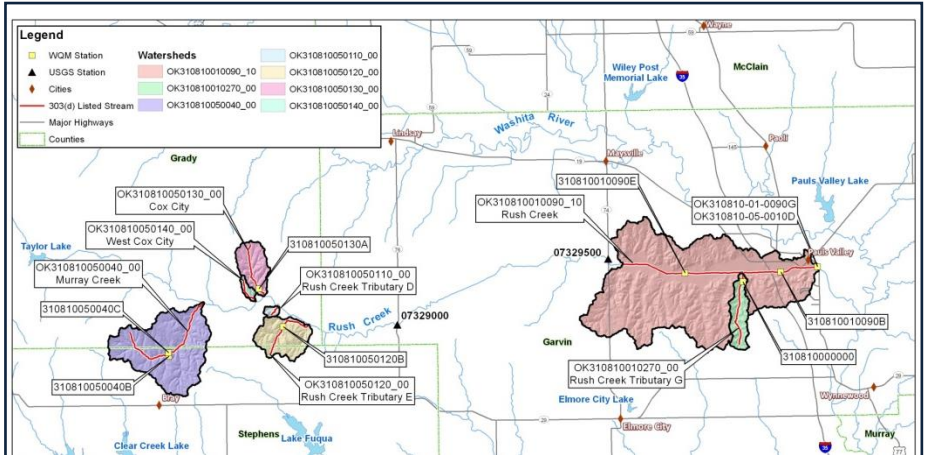


208 FACTSHEET FOR MINERAL TMDLs in the RUSH CREEK WATERSHED

Background: The impairments addressed in this study are minerals. Appendix F of Oklahoma’s [Water Quality Standards](#) (WQS) uses the word “minerals” to primarily refer to [chlorides](#), [sulfates](#), and [total dissolved solids](#) (TDS).

Watershed: This TMDL Study Area was located in the south central part of Oklahoma in the [Middle Washita](#) watershed (USGS HUC 11130303) in the [Anadarko Basin](#). The creeks impaired with minerals in this TMDL study included the **Murray Creek, West Cox City Creek, Cox City, Rush Creek, Rush Creek Tributary D, Rush Creek Tributary E, and Rush Creek Tributary G**. These waterbodies flow through portions of Garvin, Grady and Stephens Counties.



Beneficial Uses in This Watershed: The beneficial uses for all of the creeks in the Rush Creek Study Area, according to the WQS, were Aesthetics, Agriculture, Fish & Wildlife Propagation-Warm Water Aquatic Community Subcategory, Fish Consumption, and Primary Body Contact Recreation. In both the 2008 and 2010 assessment of all Oklahoma waterbodies for their beneficial uses (found in [Appendix B of the Integrated Report](#)), only the Agriculture designated use was impaired (on the 303(d) list) and that was for minerals. None of the other designated uses has been assessed with the exception of the Fish & Wildlife Propagation-Warm Water Aquatic Community Subcategory for Rush Creek which had a “Good” status.

According to Oklahoma’s [303\(d\) list](#), the creeks impaired with minerals in this TMDL study were the following (the “x” indicates the type of mineral for which it is impaired):

Waterbody ID	Name	Chloride	Sulfates	TDS
OK310810050040_00	Murray Creek		X	X
OK310810050130_00	Cox City Creek	X		
OK310810050140_00	West Cox City Creek	X		
OK310810050110_00	Rush Creek Tributary D	X		
OK310810050120_00	Rush Creek Tributary E	X		
OK310810010270_00	Rush Creek Tributary G	X		
OK310810010090_10	Rush Creek	X		

Water quality monitoring results from 1997 – 2010 were examined to verify if these waterbodies are still impaired. There were not enough samples to demonstrate that Murray Creek is impaired for TDS and not any data to show it is impaired for sulfates. As a result, these impairments for Murray Creek are being removed from

the [draft 2012 303\(d\) list](#). There also wasn’t any data to show that Rush Creek Tributary D is impaired for chloride since the data that was gathered came from another watershed. The chloride impairment for Rush Creek Tributary D is also being removed from the draft 2012 303(d) list. All the other creeks, in bold in the table above, were found to be impaired for chloride.

Possible Sources of Impairments:

Point sources: There were no point sources in the Rush Creek watershed.

Nonpoint sources: The nonpoint sources examined in this Study Area were:

- Local [geological conditions](#) and [groundwater](#)
- Agricultural irrigation
- [Road salts](#)
- Oil and gas well sites
 - [Commercial soil farming sites](#)
 - [Produced water](#)
 - [Abandoned](#) or improperly capped oil and gas wells
 - [Evaporation](#) pits or [drilling mud](#) pits
 - [Underground injection wells](#)
 - [Production spills](#)

TMDLs: The TMDLs were calculated using load duration curves. Because of the very small number of samples available and lack of monitoring data, the percent reduction goal (PRG) could only be calculated for one waterbody in the Study Area – **Rush Creek (OK310810010090_10) with a PRG of 30%**.

The full Rush Creek Watershed TMDL report can be found on the following DEQ webpage:
<http://www.deq.state.ok.us/WQDnew/tmdl/index.html>.

The following tables give the TMDL for each creek depending on the flow in the creek:

Chloride TMDL Calculations for Cox City Creek (OK310810050130_00)				
Percentile	Flow (cfs)	TMDL (lb/day)	LA (lb/day)	MOS (lb/day)
0	197	1.80E+05	1.62E+0	1.80E+04
5	2.4	2.16E+03	1.95E+0	2.16E+02
10	1.2	1.06E+03	9.52E+0	1.06E+02
15	0.8	7.16E+02	6.44E+0	7.16E+01
20	0.6	5.60E+02	5.04E+0	5.60E+01
25	0.5	4.82E+02	4.34E+0	4.82E+01
30	0.4	4.05E+02	3.64E+0	4.05E+01
35	0.37	3.42E+02	3.08E+0	3.42E+01
40	0.32	2.96E+02	2.66E+0	2.96E+01
45	0.27	2.49E+02	2.24E+0	2.49E+01
50	0.22	2.02E+02	1.82E+0	2.02E+01
55	0.19	1.71E+02	1.54E+0	1.71E+01
60	0.15	1.37E+02	1.23E+0	1.37E+01
65	0.13	1.17E+02	1.05E+0	1.17E+01
70	0.10	9.34E+01	8.40E+0	9.34E+00
75	0.07	6.53E+01	5.88E+0	6.53E+00
80	0.04	4.05E+01	3.64E+0	4.05E+00
85	0.02	1.87E+01	1.68E+0	1.87E+00
90	0.001	1.24E+00	1.12E+0	1.24E-01
95	0.001	9.17E-01	8.25E-01	9.17E-02
100	0.001	9.17E-01	8.25E-01	9.17E-02

Chloride TMDL Calculations for West Cox City Creek (OK310810050140_00)				
Percentile	Flow (cfs)	TMDL (lb/day)	LA (lb/day)	MOS (lb/day)
0	31	2.82E+04	2.54E+04	2.82E+03
5	0.4	3.38E+02	3.04E+02	3.38E+01
10	0.2	1.65E+02	1.49E+02	1.65E+01
15	0.12	1.12E+02	1.01E+02	1.12E+01
20	0.10	8.75E+01	7.88E+01	8.75E+00
25	0.08	7.54E+01	6.78E+01	7.54E+00
30	0.07	6.32E+01	5.69E+01	6.32E+00
35	0.06	5.35E+01	4.81E+01	5.35E+00
40	0.05	4.62E+01	4.16E+01	4.62E+00
45	0.04	3.89E+01	3.50E+01	3.89E+00
50	0.034	3.16E+01	2.84E+01	3.16E+00
55	0.029	2.67E+01	2.41E+01	2.67E+00
60	0.023	2.14E+01	1.93E+01	2.14E+00
65	0.020	1.82E+01	1.64E+01	1.82E+00
70	0.016	1.46E+01	1.31E+01	1.46E+00
75	0.011	1.02E+01	9.19E+00	1.02E+00
80	0.007	6.32E+00	5.69E+00	6.32E-01
85	0.003	2.92E+00	2.63E+00	2.92E-01
90	0.001	9.17E-01	8.25E-01	9.17E-02
95	0.001	9.17E-01	8.25E-01	9.17E-02
100	0.001	9.17E-01	8.25E-01	9.17E-02

Chloride TMDL Calculations for Rush Creek Tributary E (OK310810050120_00)				
Percentile	Flow (cfs)	TMDL (lb/day)	LA (lb/day)	MOS (lb/day)
0	286	2.63E+05	2.36E+05	2.63E+04
5	3.4	3.15E+03	2.83E+03	3.15E+02
10	1.7	1.54E+03	1.39E+03	1.54E+02
15	1.1	1.04E+03	9.37E+02	1.04E+02
20	0.9	8.15E+02	7.34E+02	8.15E+01
25	0.8	7.02E+02	6.32E+02	7.02E+01
30	0.6	5.89E+02	5.30E+02	5.89E+01
35	0.5	4.98E+02	4.48E+02	4.98E+01
40	0.5	4.30E+02	3.87E+02	4.30E+01
45	0.4	3.62E+02	3.26E+02	3.62E+01
50	0.32	2.94E+02	2.65E+02	2.94E+01
55	0.27	2.49E+02	2.24E+02	2.49E+01
60	0.22	1.99E+02	1.79E+02	1.99E+01
65	0.19	1.70E+02	1.53E+02	1.70E+01
70	0.15	1.36E+02	1.22E+02	1.36E+01
75	0.10	9.51E+01	8.56E+01	9.51E+00
80	0.06	5.89E+01	5.30E+01	5.89E+00
85	0.03	2.72E+01	2.45E+01	2.72E+00
90	0.002	1.81E+00	1.63E+00	1.81E-01
95	0.001	9.17E-01	8.25E-01	9.17E-02
100	0.001	9.17E-01	8.25E-01	9.17E-02

Chloride TMDL Calculations for Rush Creek Tributary G (OK310810010270_00)				
Percentile	Flow (cfs)	TMDL (lb/day)	LA (lb/day)	MOS (lb/day)
0	175	1.60E+05	1.44E+05	1.60E+04
5	2.1	1.92E+03	1.73E+03	1.92E+02
10	1.0	9.40E+02	8.46E+02	9.40E+01
15	0.7	6.36E+02	5.72E+02	6.36E+01
20	0.5	4.98E+02	4.48E+02	4.98E+01
25	0.47	4.29E+02	3.86E+02	4.29E+01
30	0.39	3.59E+02	3.23E+02	3.59E+01
35	0.33	3.04E+02	2.74E+02	3.04E+01
40	0.29	2.63E+02	2.36E+02	2.63E+01
45	0.24	2.21E+02	1.99E+02	2.21E+01
50	0.20	1.80E+02	1.62E+02	1.80E+01
55	0.17	1.52E+02	1.37E+02	1.52E+01
60	0.13	1.22E+02	1.09E+02	1.22E+01
65	0.11	1.04E+02	9.33E+01	1.04E+01
70	0.09	8.29E+01	7.47E+01	8.29E+00
75	0.06	5.81E+01	5.23E+01	5.81E+00
80	0.04	3.59E+01	3.23E+01	3.59E+00
85	0.02	1.66E+01	1.49E+01	1.66E+00
90	0.001	1.11E+00	9.95E-01	1.11E-01
95	0.001	9.17E-01	8.25E-01	9.17E-02
100	0.001	9.17E-01	8.25E-01	9.17E-02

Chloride TMDL Calculations for Rush Creek (OK310810010090_10)				
Percentile	Flow (cfs)	TMDL (lb/day)	LA (lb/day)	MOS (lb/day)
0	25,409	2.33E+07	2.10E+07	2.33E+06
5	304	2.79E+05	2.51E+05	2.79E+04
10	149	1.37E+05	1.23E+05	1.37E+04
15	101	9.24E+04	8.32E+04	9.24E+03
20	79	7.23E+04	6.51E+04	7.23E+03
25	68	6.23E+04	5.60E+04	6.23E+03
30	57	5.22E+04	4.70E+04	5.22E+03
35	48	4.42E+04	3.98E+04	4.42E+03
40	42	3.82E+04	3.43E+04	3.82E+03
45	35	3.21E+04	2.89E+04	3.21E+03
50	28	2.61E+04	2.35E+04	2.61E+03
55	24	2.21E+04	1.99E+04	2.21E+03
60	19	1.77E+04	1.59E+04	1.77E+03
65	16	1.51E+04	1.36E+04	1.51E+03
70	13	1.21E+04	1.08E+04	1.21E+03
75	9	8.44E+03	7.59E+03	8.44E+02
80	6	5.22E+03	4.70E+03	5.22E+02
85	3	2.41E+03	2.17E+03	2.41E+02
90	0.2	1.61E+02	1.45E+02	1.61E+01
95	0.001	9.17E-01	8.25E-01	9.17E-02
100	0.001	9.17E-01	8.25E-01	9.17E-02

EPA Approval Date: 9/19/2013
Record Last Updated: 6/17/2014