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OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

PUBLIC NOTICE

July 19, 2013

Availability of Draft Mineral TMDLs for the Rush Creek Watershed

Proposed Modification to Incorporate Rush Creek Watershed Mineral TMDLs into Oklahoma's Water Quality Management Plan

Request for Public Comments

Public Comment Period Ends on Tuesday, September 3, 2013

The Oklahoma Department of Environmental Quality (DEQ) is seeking comments on a draft Total Maximum Daily Load (TMDL) report entitled "**Mineral TMDL Report for the Rush Creek Watershed**". 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 chloride, sulfates, and total dissolved solids (TDS). TDS is a measure of the amount of material dissolved in water and was found to be the cause of impairments for 1,541 miles of streams in Oklahoma. In addition, chloride impairs 1678 miles of streams, and sulfates impair 1,955 miles of streams (DEQ 2012). High salinity (salts such as chloride and sulfates) may interfere with the growth of aquatic vegetation which can affect the aquatic ecosystem. It can also make water taste bad, harm plumbing, and increase the risk of hypertension in people. Sulfates in surface water is a concern because, in excess, it can react with dissolved metals in the water to form other more toxic chemicals and make the water more acidic.

USGS Student Jessica Magers examining outcrop as part of a groundwater study of the Rush Springs Aquifer. Photo courtesy of the U.S. Geological Survey; Department of the Interior/photo by Shana Mashburn

The Rush Creek Mineral TMDL report describes the reductions needed in the amounts of chloride, sulfates, and total dissolved solids to improve water quality in the Rush Creek watershed. DEQ is also proposing to incorporate these TMDLs into Oklahoma's Water Quality Management Plan (208 Plan). The "**208 Factsheet Regarding Mineral TMDLs in the Rush Creek Watershed**" is attached. The full Rush Creek Watershed TMDL report can be found on-line at: http://www.deq.state.ok.us/WQDnew/tmdl/index.html.

Background: The Federal Clean Water Act requires states to develop Water Quality Standards (WQS) which provide goals and pollution control targets for improving water quality where the standards are not met. The waterbodies where standards are not met are considered to be "impaired." Impaired waterbodies are listed on what is known as the 303(d) list, which refers to Section 303(d) of the Clean Water Act. The plan to improve water quality for impaired waterbodies is accomplished by establishing limits known as Total Maximum Daily Loads (TMDLs) for each pollutant exceeding the standards. TMDLs set levels for pollutants that allow waterbodies to achieve their WQS for beneficial uses. Beneficial uses include water for drinking, recreation, aesthetics, agriculture, fishing, and swimming. All waterbodies and their designated uses can be found in Oklahoma's Integrated Report.

Watershed: This TMDL Study Area is in the southern portion of Oklahoma in the Middle Washita watershed (USGS HUC 11130303) in the Anadarko Basin in portions of Garvin, Grady, and Stephens Counties.

Beneficial Uses[1] and Impairments: The Agriculture beneficial use[2] was impaired for minerals in all of the creeks in the Study Area according to Oklahoma's 2010 Integrated Report. The Agriculture beneficial use refers to the suitability of a waterbody for activities such as irrigation or livestock watering. The assessment of all Oklahoma waterbodies for their beneficial uses can be found in Appendix B of the Integrated Report.

In addition to Agriculture, the other beneficial uses for the creeks in the Rush Creek Study Area were Aesthetics, Fish & Wildlife Propagation-Warm Water Aquatic Community Subcategory, Fish Consumption, and Primary Body Contact Recreation (PBCR). Only the Agriculture designated use was addressed in this TMDL study since it was the only impaired use from the 303(d) list for these creeks. 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 (OK310810010090_10) 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 is conducted by several different agencies including the Oklahoma Conservation Commission (OCC), the Oklahoma Water Resources Board (OWRB), and the U.S. Geological Survey (USGS). The sampling data for minerals from all of these monitoring activities was examined for the creeks in the Sampling Area which consisted of 47 samples between 1997 – 2010. For Murray Creek, sampling data from 2002 showed it is not impaired for sulfates. There were also not enough samples to demonstrate that Murray Creek is impaired for TDS. As a result, Murray Creek is being removed from the draft 2012 303(d) list since there isn't any data to show that it is impaired for sulfates or TDS.

For Rush Creek Tributary D, there also wasn't any data to show it is impaired with chloride because the samples used for the assessment were collected from another watershed. Since there isn't any data to show that Rush Creek Tributary D is impaired for chloride, it is also being removed from the draft 2012 303(d) list.

Cox City Creek, West Cox City Creek, Rush Creek, Rush Creek Tributary E, and **Rush Creek Tributary G** (the ones in bold above) were all found to be impaired for chloride. Draft chloride TMDLs were developed for all of these creeks. The water quality data examined to make these determinations can be found in Appendix A of the "**Mineral TMDL Report for the Rush Creek Watershed**" at: http://www.deq.state.ok.us/wqdnew/index.htm.

TMDLs: A TMDL is a plan of action to reduce pollutant loads so that impaired waterbodies will be able to meet their beneficial uses. TMDLs calculate the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will be able to meet water quality standards for that particular pollutant. The TMDL report uses scientific data collection, analysis, and water quality modeling to determine the sources and amounts of

1 The beneficial uses for all waterbodies are found in Appendix A of the Oklahoma Water Quality Standards.

2 The specifics of the Agriculture beneficial use are outlined in 785:45-5-13 of the Oklahoma Water Quality Standards.

the pollutants entering the lakes and allocates pollutant loads to those sources at levels that would ultimately restore water quality to meet clean water standards. The TMDL allocates loads to point sources (these are known as waste load allocation or WLA) and nonpoint sources (load allocation or LA).

The National Pollutant Discharge Elimination System (NPDES) program regulates point source discharges. A point source is described as a "discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters." These are usually, but not always, discharges from a pipe. Nonpoint sources (NPS) are ones, like agricultural runoff, that cannot be identified as entering a waterbody at a single location.

In a TMDL, all contributing sources of the pollutants (point and nonpoint sources) are identified, and they are allocated a portion of the allowable load that usually requires a reduction in their pollution discharge in order to help the waterbody no longer be impaired. Natural background sources, seasonal variations, and a margin of safety (usually at least 10%) are all taken into account in the allocations. The TMDL equation is as follows:

TMDL = WLA (waste load allocations from point sources) **+ LA** (from nonpoint sources) **+ MOS** (Margin of safety)

Point Source Discharges in the Rush Creek Watershed: Point source discharges are single, identifiable, and localized, like discharges from a pipe. TMDLs must provide WLAs for all NPDES regulated point sources.

- **NPDES regulated municipal and industrial wastewater treatment facilities:** There aren't any municipal or industrial wastewater facilities discharging into the Rush Creek watershed.
- **NPDES regulated Concentrated Animal Feeding Operations (CAFOs):** A CAFO is an animal feeding operation that confines and feeds 1,000 or more animal units for 45 days or more in a 12-month period. There aren't any CAFOs in the Rush Creek watershed.
- **NPDES regulated stormwater discharges:** DEQ regulates stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s), industrial sites, and construction sites. But DEQ's stormwater program does not include discharges from Indian Country lands, discharges related to oil & gas extraction, or discharges associated with agricultural purposes. There are no NPDES-regulated stormwater MS4 discharges in the Rush Creek watershed. For details about DEQ's Stormwater Program, go to http://www.deq.state.ok.us/WQDnew/stormwater/.

Nonpoint Sources: Nonpoint sources include those sources that cannot be identified as entering the waterbody at a specific location. Non-point sources of pollutants are typically separated into urban and rural categories. Surface storm runoff[3] is an important source of loading in urban or residential settings with roads and other paved, impervious areas. Almost all the minerals found in the waterbodies in the Rush Creek watershed come from nonpoint sources. Nonpoint sources of minerals can include:

- **Agricultural irrigation:** Because a maximum of 14% of the land in the sub-watersheds of the impaired creeks is used for crops, irrigation is not considered to be a major source of minerals.
- **Road salts** used for deicing streets during the winter: Studies have shown that, in urbanized areas, about 95% of the chloride that goes into a watershed comes from deicing streets and parking lots in the winter. Surface runoff, vehicle spraying, and wind can blow the salts and affect local waterbodies. Given the few roads in this rural Study Area, road salts are not considered to be a significant source of chloride.

3 For information on how to reduce runoff after rainstorms, request the free DVD, "Reduce Runoff: Slow it Down, Spread it Out, Soak it in!" (EPA Publication #84211001) from the National Service Center for Environmental Publications at their webpage (http://www.epa.gov/nscep/) or call them at 800-490-9198. The DVD includes the video, "After the Storm" which was co-produced by EPA and The Weather Channel. The "After the Storm" brochure (PDF) can be downloaded at http://water.epa.gov/action/weatherchannel/index.cfm.

- **Underlying local geological formations and groundwater:** Many of the springs in the Study Area originate from springs and seeps coming from the Rush Springs Aquifer. Many aquifers in western Oklahoma have high concentrations of naturally occurring chloride and sulfates from groundwater. As a result, groundwater quality can have a direct impact on surface water quality. But, chloride samples taken in the Rush Springs area were below the water quality criteria[4] (sample results ranged from <10 mg/L to 110 mg/L with an average of 56 mg/L).

- **Oil and gas**[5]

  - **Commercial soil farming sites** (aka Land Farming): This is the application of oil and gas drilling wastes to the land to allow the soil's naturally-occurring microbial population to metabolize, transform, and break down the waste. But salts (which contain chloride) cannot biodegrade and may accumulate in excessive amounts in soils. If that happens, chloride could be carried by storm runoff to nearby streams.

    In Oklahoma, soil farming is not overseen by DEQ. Because soil farming is associated with oil and gas development, it is regulated by the Corporation Commission who regulates all oil and gas activities, including environmental rules.[6] The regulations regarding soil farming, as well as all other forms of oil and gas disposal, can be found in their regulations.[7]

  

  USGS Photo: Sampling produced water from an oil well in northern Louisiana.

  - **Produced water:** This is a possible source of chloride since samples of produced water showed concentrations of chloride exceeding 40,000 mg/L and concentrations of TDS exceeding 68,000 mg/L. Recycling of produced water is not common.

  - **Abandoned or improperly capped oil and gas wells:** Many underground formations are permeated with brine that is up to five times saltier than sea water and that can have radioactivity, heavy metals and/or other toxins. Without extensive and costly plugging, brine can flow up the well shaft and seep into fresh water aquifers or reach the surface. In the mid-1960s oil-producing states enacted regulations to protect fresh water supplies by requiring that hundreds of feet of cement be poured in the wells at different levels in the process of closing them properly. Chloride, brine and TDS pollutant loadings from uncapped wells can also build up on the ground surface and be transported by rainfall runoff to receiving streams, as well as being carried down into groundwater which later seeps into streams. The Oklahoma Energy Resources Board (OERB) restores about 12,000 orphaned and abandoned well sites a year across Oklahoma at no cost to the landowner. If you know of an abandoned well site, you can register the land for restoration at: http://www.oerb.com/Default.aspx?tabid=137.

  - **Pits:** Evaporation pits containing produced water/brine (have been shown to decrease water quality of the pits are unlined) and drilling mud pits.

  - **Underground injection (Class II) wells:** The most common method used to dispose of produced water[8] in Oklahoma is underground injection wells. The Corporation Commission's regulations are designed to decrease contamination from the well site to surrounding areas.

  - **Production spills:** A total of 16,906 fluid releases in Oklahoma were reported to the Corporation Commission from 1993 – 2003. Saltwater made up about 76% of the total volume of all spills. The quantified releases of saltwater had a median volume of 40 barrels.

The best way to minimize runoff from these sites is by using Best Management Practices (BMPs) which include drilling practices that minimize generation of drilling wastes and bioremediation.

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4 For chloride, the single sample limit is 170 mg/L and the long-term average is 127 mg/L.

5 For any complaints concerning oil and gas drilling, production, and/or abandoned oil and gas wells, go to: http://www.occeweb.com/Complaints/OGcomplaints2.html.

6 Oklahoma Statutes (O.S.): 27A O.S. § 1-3-101 section E

7 Oklahoma Administrative Code (OAC) Title 165 (Corporation Commission), Chapter 10 (Oil and Gas Conservation), Subchapter 9 (Commercial Disposal Facilities).

8 Argonne National Laboratory (2009). *Produced Water Volumes and Management Practices in the United States*, Page 41.

TMDL Calculations:

The purpose of a TMDL is to identify sources of pollutants in a watershed and calculate the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. Load duration curves were used to develop the TMDLs. For more information on how the TMDLs were developed, see Sections 4 & 5 and Appendix B of the *Mineral TMDL Report for the Rush Creek Watershed*.

Recommendations:

Because of the small numbers of sampling data available, the percent reduction goal (PRG) could only be calculated for one waterbody in the Study Area - Rush Creek (OK310810010090_10). For Rush Creek, the amount of chloride going into it needs to be reduced by 30% in order for it to meet its designated use for Agriculture.

The amount of chloride reduction needed for the other creeks depends on the flow of the creek. The tables listing the TMDL depending on the flow for each creek can be found in the 208 Factsheet for Mineral TMDLs in the Rush Creek Watershed or in Tables 5-1 to 5-5 of the Rush Creek Mineral TMDL Report.

Providing comments

- DEQ invites your comments. The comment period will be open for 45 days. The TMDL report is a draft document and is subject to change based on comments received during the public participation process.
- You may also request a public meeting in writing. If there is a significant degree of interest, DEQ will schedule a public meeting.
- All official comments for the record must be submitted either in writing or by e-mail before the end of the comment period. DEQ will prepare a responsiveness summary addressing all comments received. After evaluating comments received and making any necessary changes, the TMDL report will be submitted to EPA for final approval. The final results of the TMDL will be incorporated into Oklahoma's Water Quality Management Plan.

Please submit your comments in writing to:

Dr. Karen Miles
Water Quality Division
Oklahoma Department of Environmental Quality
P.O. Box 1677
Oklahoma City, OK 73101-1677
(405) 702-8192
E-mail: Water.Comments@deq.ok.gov

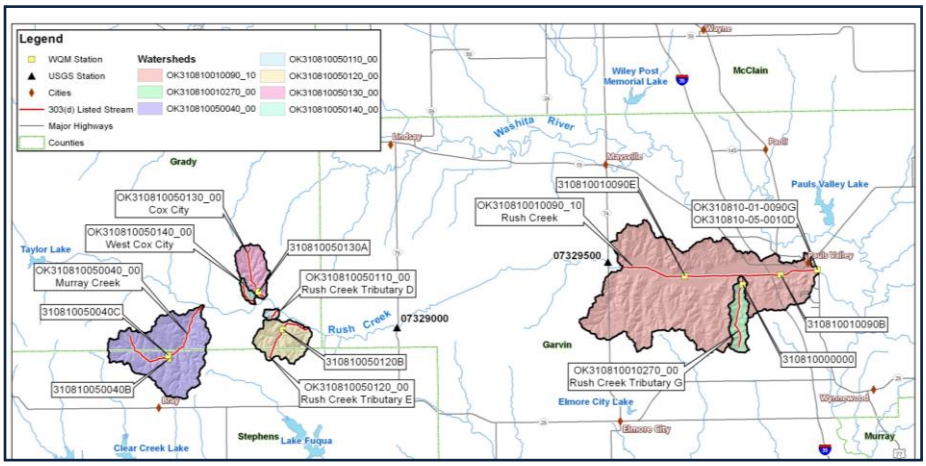
Comments must be received by 4:30 pm on Tuesday, September 3, 2013

Obtaining copies: You may view the full Rush Creek Watershed TMDL study by going to the DEQ website at: http://www.deq.state.ok.us/WQDnew/tmdl/index.html or pick up copies of the study at the DEQ main office, Water Quality Division, 707 North Robinson, Oklahoma City from 8:30 am – 5:00 pm. A document copying fee may apply.

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 chloride, 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 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. As a result, 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 background soils, geological formations, 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
  - Pits: Evaporation and 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: Pending

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