UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270

June 4, 2020

Bob Blanz, Associate Director
Office of Water Quality
Division of Environmental Quality
Arkansas Department of Energy and Environment
5301 Northshore Drive
Little Rock, AR 72118-5317

Re: Amendments to Rule No. 2: Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas by third-party rulemaking initiated by Vulcan Construction Materials, LLC, Lawrence County, Arkansas

Dear Dr. Blanz:

The Environmental Protection Agency (EPA) has completed its review of the amendments to Regulation No. 2: Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas that were made in relation to the Third-Party Rulemaking process initiated by Vulcan Construction Materials, LLC, AR. The amendments to Regulation No. 2 were adopted by the Arkansas Pollution Control and Ecology Commission (Commission) on June 28, 2019, Minute Order 19-08. These amendments were submitted to the EPA for approval by letter dated February 18, 2020, by the Arkansas Department of Environmental Quality (ADEQ).

At this time EPA is approving the revised site-specific criteria and removal of the designated domestic water supply (DWS) use to Rule No. 2, § 2.511(A) and Appendix A respectively. These revised site-specific criteria for sulfate and total dissolved solids are applicable from Vulcan Outfall 001 in the Unnamed Tributary to its confluence with Brushy Creek, the downstream portions of Brushy Creek to its confluence with Stennit Creek and the downstream portions of Stennit Creek to the Spring River. The removal of the DWS use applies from the Vulcan Outfall 001 in the Unnamed Tributary to its confluence with Brushy Creek and to the downstream portions of Brushy Creek to its confluence with Stennit Creek. Based on the weight of evidence, the revised site-specific criteria are approved pursuant to Sec. 303(c) of the Clean Water Act. New and/or revised criteria approved by the EPA are in effect for all CWA purposes. The EPA has also concluded that the state has adequately considered the use and value of Brushy Creek and its Unnamed Tributary as a public water supply consistent with 40 CFR 131.10 and approves removal of the DWS use from these waters. The EPA anticipates that the ADEQ will complete a Tier 2 antidegradation review as required by 40 CFR 131.12(a)(2)(i) to evaluate the use of assimilative capacity as part of the National Pollution Discharge Elimination System permitting process for Vulcan Construction Materials. The requirements of a Tier 2 review can be found at 40 CFR 131.12(a)(2).

The approval of new and revised water quality standards is subject to the results of consultation under section 7(a)(2) of the Endangered Species Act (ESA). Section 7(a)(2) of the ESA requires that federal agencies consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS), as appropriate, to ensure that actions they take, fund, or authorize are not likely to jeopardize the continued existence of listed species or result in the adverse modification or destruction of habitat. No species under NMFS jurisdiction are present in the action area. The EPA concluded consultation with USFWS regarding its approval of the revised criteria as not likely to adversely affect or have no effect on threatened and endangered species or critical habitat within the defined action area by letter dated June 2, 2020.

I appreciate the Commission's and the ADEQ's effort in the review of these revised provisions of the state's standards. If you have any questions or concerns, please contact me at (214) 665-8138, or contact Russell Nelson at (214) 665-6646 or nelson.russell@epa.gov.

Sincerely,

Charles Maguire

Charles W. Maguire
Director
Water Division

Enclosure

cc: Joe Martin, Branch Manager, Water Quality Planning, ADEQ
Mary Barnett, Ecologist Coordinator, Water Division, ADEQ

TECHNICAL SUPPORT DOCUMENT

EPA REVIEW OF SITE-SPECIFIC CRITERION REVISION TO REGULATION 2: REGULATION ESTABLISHING WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF ARKANSAS

Revision Adopted by the
Arkansas Pollution Control and Ecology Commission
Modifying Water Quality Standards for Sulfates and Total Dissolved Solids for Unnamed Tributary of Brushy Creek and Brushy Creek; and Sulfates for Stennitt Creek; Lawrence County, Arkansas

U.S. EPA REGION 6
WATER DIVISION

June 3, 2020

I. Introduction

Regulatory Requirements and Purpose

As described in § 303(c) of the Clean Water Act (CWA) and in the standards regulation within the Code of Federal Regulations (CFR) at 40 CFR § 131.20, states and authorized tribes have primary responsibility for developing and adopting water quality standards to protect their waters. State and tribal water quality standards consist of three primary components: designated uses, criteria to support those uses, and an antidegradation policy. In addition, CWA § 303(c)(1) and 40 CFR § 131.20 require states to hold public hearings at least once every three years to review and, as appropriate, modify and adopt standards. As required by 40 CFR § 131.21, the Environmental Protection Agency (EPA) reviews new and revised surface water quality standards that have been adopted by states and authorized tribes. Authority to approve or disapprove new and/or revised standards submitted to EPA for review has been delegated to the Water Division Director in Region 6. Tribal or state water quality standards are not effective under the CWA until approved by EPA.

The purpose of this Technical Support Document (TSD) is to describe EPA's analysis of the site-specific revisions to *Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas* adopted by the Arkansas Pollution Control and Ecology Commission (Commission)and documents supporting these revisions.

Summary of Revised Provisions

By letter dated February 18, 2020, the Arkansas Department of Environmental Quality (ADEQ) submitted water quality standards revisions adopted by the Commission via Minute Order No. 20-05 to EPA for review and approval. These amendments were developed subject to Regulation No. 2.306, which allows for the modifications of water quality criteria. These amendments are based on a 3rd party rulemaking proposed by Vulcan Construction Materials, LLC, to establish site-specific sulfate and total dissolved solids (TDS) water quality criteria as described in **Table 1** below and remove the designated drinking water supply use from the Unnamed Tributary of Brushy Creek from Vulcan Construction Materials Outfall 001 to Brushy Creek; to Brushy Creek from its Unnamed Tributary to Stennitt Creek.

Table 1. Final Revised Criteria[1]

Unnamed Tributary of Brushy Creek from Vulcan Construction Materials Outfall 001 to Brushy Creek			**Brushy Creek from Unnamed Tributary to Stennitt Creek**			**Stennitt Creek from Brushy Creek to Spring River**		
Revised Site-specific criteria			Revised Site-specific criteria			Revised Site-specific criteria		
Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Chloride (mg/L	Sulfate (mg/L)	TDS (mg/L)
N/A	260	725	N/A	126	549	N/A	43.3	N/A

[1] Arkansas Pollution Control and Ecology Commission, Minute Order No. 20-05, Exhibit C Final Revised Regulation; January 24, 2020

EPA Action on the Revised Provisions

Based on the available information described in the following analysis, EPA has concluded that the revised site-specific criteria for Unnamed Tributary of Brushy Creek, portions of Brushy Creek and, portions of Stennitt Creek are unlikely to adversely impact the aquatic community in these waters. Based on the weight of evidence, the revised site-specific criteria detailed in **Table 1** are approved pursuant to Section 303(c) of the CWA. Once approved by the EPA these criteria are effective for all CWA purposes.

The EPA has also concluded that the state has adequately considered the use and value of the Unnamed Tributary of Brushy Creek and Brushy Creek as a public water supplies consistent with 40 CFR 131.10 and approves removal of the Drinking Water Use (DWS) from these waters. The DWS use was removed from Stennitt Creek for the reach of Stennitt Creek downstream of the mouth of Brushy Creek in 1999 as part of a previously approved Use Attainability Analysis and Third-Party Rulemaking.[2,3]

II. Background

Vulcan Construction Materials, LLC, Outfall 001 discharges groundwater and stormwater pumped from the quarry pit of its facility in Black Rock, Arkansas, under National Pollutant Discharge Elimination System (NPDES) Permit No. AR0046922. Sulfate and TDS concentrations from Outfall 001 add to the sulfate and TDS concentrations which exceed regulatory levels set forth in Arkansas Pollution Control and Ecology (APCEC) Rule No. 2 in the Unnamed Tributary of Brushy Creek, Brushy Creek, and Stennitt Creek. The ionic composition of the water discharged through Outfall 001 is the result of the natural geology of the region and quarry activities that expose pyritic rock. The source of the TDS and sulfate is water that is exposed to pyritic rock on the walls of the quarry pit.

Use Attainability Analysis – 2010

On September 12, 2011, Vulcan Construction Materials submitted a Use Attainability Analysis (UAA)[4] study on Brushy Creek that was conducted in calendar year 2010 to Arkansas Department of Environmental Quality (ADEQ). The report concluded that the existing water quality (in particular TDS and sulfates) downstream of the Vulcan Construction Materials Outfall 001 support the aquatic life designated use set forth in Rule No. 2. This conclusion was the basis for proposed site-specific criteria for TDS and sulfate and reflect existing conditions supporting the designated aquatic life use. In its review, ADEQ noted that the potential effects of water quality on the benthic macroinvertebrate community were "confounded" with habitat

[2] Regulation No. 2, Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas. Arkansas Pollution Control & Ecology Commission.
[3] Stennitt Creek UAA 4g Report. Meridian Aggregates, Black Rock Quarry. GBM[2] and Associates. May 13, 1999
[4] FTN and Associates. Use Attainability Analysis Report for Brushy Creek Vulcan Construction Materials, LLC, Black Rock Quarry, Lawrence County, Arkansas. September 12, 2011.

differences between upstream and downstream locations and requested additional supporting data.[5]

Use Attainability Analysis: First Supplement – 2015

During the summer and fall of 2015, Vulcan Construction Materials conducted a supplemental study to address the ADEQ's concerns regarding confounded results from the original study. This First Supplemental Study was designed with the following parameters: (1) subdivision of upstream and downstream fish sampling reaches to include similar habitat types; (2) performance of a detailed analysis of habitat, particularly substrate; and (3) deployment of artificial substrates for benthic macroinvertebrate colonization in riffle habitats. The supplemental study also included instream sampling of the benthic macroinvertebrate community following ADEQ sampling protocols.

Use Attainability Analysis: Second Supplement – 2016

A second supplemental study was conducted in the fall of 2016 to update biological habitat and water quality data in a reference location (Clear Creek) and Stennitt Creek. Results from the fish and instream benthic macroinvertebrate sampling of Brushy Creek from the First Supplemental Study (2015) referred to above was directly compared to the results from the fish and instream benthic macroinvertebrate sampling of the reference stream (Clear Creek) from the Second Supplemental Study (conducted in the fall of 2016). Fish and macroinvertebrate communities at the reference location were sampled in the same manner as for Brushy Creek in the First Supplemental Study, i.e., through subdividing upstream and downstream fish sampling reaches to include similar habitat types, completing a detailed analysis of habitat (particularly substrate), and instream sampling of the benthic macroinvertebrate community using state sampling protocol. No artificial substrates were deployed at the reference location during the Second Supplemental Study.

Sampling in Stennitt Creek was undertaken to address potential changes in aquatic life communities from TDS and sulfate entering from Brushy Creek. The original UAA study included biological sample collection in Stennitt Creek upstream of the mouth of Brushy Creek. Due to dense emergent vegetation, using seines and/or backpack shocking gear wasn't amenable to collection of fish and the only portions of the reaches that could be sampled efficiently were small, shallow, silt-bottomed pools, which would be expected to hold limited numbers and diversity of fish. Consequently, sampling the benthic macroinvertebrate community using a targeted habitat approach and artificial substrates provided adequate information for assessing the aquatic life designated use. A sampling approach was developed, which, in lieu of fish sampling, involved macroinvertebrate sampling of selected major habitats (emergent vegetation, silt/sand-bottom pools) and deployment of artificial substrates (Hester-Dendy) in reaches of Stennitt Creek upstream and downstream of the mouth of Brushy Creek.

[5] FTN and Associates. Letter to Ms. Sarah Clem, Arkansas Department of Environmental Quality. February 9, 2012

Watersheds and Receiving Streams Description

The receiving waters are listed in the NPDES permit No. AR0046922 as "an unnamed tributary of Brushy Creek, thence to Brushy Creek, thence to Stennitt Creek, thence to the Spring River, thence to the Black River, thence to the White River in Segment 4H of the White River Basin." Both Brushy Creek and Stennitt Creek are within the Ozark Highlands ecoregion.[6] Applicable Arkansas Designated Uses and dissolved minerals ecoregion values are provided in the following **Table 2**. Brushy Creek originates immediately west of the Black Rock Quarry (Lawrence County, Arkansas) and flows east and northeast for approximately 1.8 miles to its confluence with Stennitt Creek. The total watershed for Brushy Creek is 3.79 square miles. Stennitt Creek originates west of the Black Rock Quarry and has a watershed area of 10.1 square miles at its confluence with Brushy Creek and 15.8 square miles at the Spring River.

Table 2. Ecoregion Reference and Drinking Water Criteria

	Ecoregion Reference Values and Applicable Criteria for Dissolved Minerals			
	Chloride (mg/L)	**Sulfide (mg/L)**	**TDS (mg/L)**	**Designated Uses[7]**
Unnamed Tributary of Brushy Creek	13[8]	17[8]	240[8]	Primary/Secondary Contact Recreation; Domestic, Industrial, and Agricultural Water Supply; Seasonal Ozark Highlands Fishery
	250[9]	250[9]	500[9]	
Brushy Creek	13[8]	17[8]	240[8]	Primary/Secondary Contact Recreation; Domestic, Industrial, and Agricultural Water Supply; Seasonal Ozark Highlands Fishery
	250[9]	250[9]	500[9]	
Stennitt Creek above Brushy Creek	13[8]	17[8]	240[8]	Primary/Secondary Contact Recreation; Domestic, Industrial, and Agricultural Water Supply; Seasonal Ozark Highlands Fishery
	250[9]	250[9]	500[9]	
Stennitt Creek below Brushy Creek	13[8]	17[8]	456[10]	Primary/Secondary Contact Recreation; Industrial, and Agricultural Water Supply; Seasonal Ozark Highlands Fishery
Spring River Below Stennitt Creek	20[11]	30[11]	290[11]	Primary/Secondary Contact Recreation; [12]Domestic, Industrial, and Agricultural Water Supply; Seasonal Ozark Highlands Fishery
Clear Creek (Reference Site)	13[8]	17[8]	240[8]	Primary/Secondary Contact Recreation; Domestic, Industrial, and Agricultural Water Supply; Seasonal Ozark Highlands Fishery
	250[9]	250[9]	500[9]	

[6] Plate OH-4. Regulation No. 2, Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas. Little Rock, AR: Arkansas Pollution Control & Ecology Commission. 2020

[7] Appendix A. Plate OH-4. Regulation No. 2, Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas. Little Rock, AR: Arkansas Pollution Control & Ecology Commission. 2020.

[8] APCEC Regulation No. 2. Site Specific Criteria. §2.511(A). 2020

[9] Secondary drinking water standard based on domestic water supply designated use.

[10] Site-Specific criteria and removal of DWS Use based on Stennitt Creek UAA 4g Report. Meridian Aggregates, Black Rock Quarry. GBM[2] and Associates. May 13, 1999.

[11] APCEC Regulation No. 2. Site Specific Criteria. § 2.511(A). 2020

[12] The "FTN and Associates. Development of and Technical Support for Site-Specific Criteria for Total Dissolved Solids and Sulfate in Brushy Creek and Sulfate in Stennitt Creek Lawrence County, Arkansas Vulcan Construction Materials, LLC Black Rock Quarry Black Rock, Arkansas. October 4, 2018".

Ionic Composition of the Discharge and Receiving Streams

Calcium, magnesium and bicarbonate are the dominant ions in Vulcan Construction Materials Outfall 001 and Brushy Creek upstream of the influence of Outfall 001 with additional sulfate in Outfall 001 as enumerated in the following **Table 3**. This table also includes monitoring data from October 14, 2015, through December 7, 2016, indicating that TDS, chloride, sulfate, and hardness concentrations are similar to the levels observed during previous monitoring. Therefore, the ionic makeup of the outfall and receiving stream has changed little since the 2011 UAA original study.

These monitoring data from Outfall 001 encompass three complete years and includes periods of unusually wet (spring of 2009) and dry (summer and fall of 2010) weather and representative of the range of TDS and sulfate concentrations likely to occur at Outfall 001 and Brushy Creek.

Table 3. Dominant Ions and Hardness for Vulcan Outfall 001

		Outfall 001				Brushy Creek Upstream			
Sampling Period	**Parameter**	**Min**	**Mean**	**Max**	**N**	**Min**	**Mean**	**Max**	**N**
February 29, 2009 – March 21, 2011	Total Alkalinity	150	199	240	10	220	260	290	4
	Bicarbonate	180	239	288	10	264	312	348	4
	Calcium	62	73.3	85	20	55	61	66	4
	Magnesium	40	47.3	54	10	30	35	38	4
	Potassium	1.7	2.75	4.6	10	1.4	1.5	1.7	4
	Sodium	2.8	3.87	5.9	10	1.8	2.4	2.8	4
	Total Dissolved Solids	327	482	618	23	240	305	340	4
	Chloride	5.4	8.58	13	10	3.8	5.8	9.9	4
	Sulfate	72.4	135	200	22	7.9	13.0	17	4
	Hardness	320	378	432	10	261	297	321	4
October 14, 2015 – December 7, 2016	Total Dissolved Solids	361	470	594	7	288	319	374	7
	Chloride	0.1	9.2	20	7	0.1	3.6	10	7
	Sulfate	98.1	117	131	7	5.0	5.4	6.9	7
	Hardness	260	304	384	7	288	319	374	7

Summary of Water Chemistry, Biological and Habitat Results

The following information is a summary of the conclusions in the FTN (2018) For further details and analysis, please see this report.

Brushy Creek and its Unnamed Tributary, Stennitt Creek, and Clear Creek (Reference) Water Quality

1. Sulfate concentrations at locations not influenced by the Vulcan Construction Materials Outfall 001 were generally near or below detection limits but were distinctly higher in locations influenced by Outfall 001;
2. TDS concentrations were generally higher immediately downstream on Brushy Creek than upstream due to input from the Unnamed Tributary of Brushy Creek;
3. TDS concentrations at locations not influenced by the Vulcan Construction Materials Outfall 001 (i.e., Brushy Creek upstream of the Unnamed Tributary of Brushy Creek, Stennitt Creek upstream of the confluence of Stennitt Creek and Brushy Creek and Clear Creek Reference) exceeded the ecoregion value of 240 mg/L the “significant

modification"[13] value of 255 mg/L at all locations with the exception of one sample collected at Clear Creek Reference on December 7, 2016 where the TDS concentration was 240 mg/L.;

4. Sulfate concentrations on Brushy Creek, downstream of the confluence of Brushy Creek and the Unnamed Tributary of Brushy Creek typically exceeded the "significant modification" value of 22.7 mg/L;
5. The sulfate concentration downstream of the confluence of Brushy Creek and Stennitt Creek did not exceed the "significant modification" value of 22.7 mg/L;
6. TDS concentration downstream of the confluence of Brushy Creek and Stennitt Creek did not exceed the site-specific criterion of 456 mg/L and the TDS concentration at this location represented little or no increase over upstream concentrations;
7. Flows at the Unnamed Tributary of Brushy Creek location are mainly due to inflows from the Vulcan Construction Materials Outfall 001;
8. Flow from the Unnamed Tributary of Brushy Creek dominated flow in Brushy Creek downstream of the mouth of the Unnamed Tributary of Brushy Creek; and
9. Brushy Creek acquires additional flow, which dilutes sulfate and TDS between the mouth of the Unnamed Tributary of Brushy Creek and the Brushy Creek confluence with Stennitt Creek.

Brushy Creek and its Unnamed Tributary and Clear Creek (Reference Site) Habitat

1. The physical habitat characterization indicated mainly cobble-gravel substrates with little or no "run" habitat at Brushy Creek upstream of Vulcan Construction Materials Outfall 001, Brushy Creek downstream of Vulcan Construction Materials Outfall 001, and Clear Creek Reference;
2. The riparian zone of the Clear Creek reference was mainly forested while that of the Brushy Creek locations was mainly pasture;
3. The total habitat score, as anticipated, was greatest at the Clear Creek reference and was primarily due to higher scores for the vegetative protection, riparian vegetative zone width, and epifaunal substrate/available cover categories; and
4. Although there was no statistically significant association between the distribution of Rapid Bioassessment Protocols (RBP) habitat categories and sampling reach, the differences in vegetative protection, riparian vegetative zone width, and epifaunal substrate/available cover categories probably represent ecologically significant differences with respect to habitat quality for aquatic life support, especially for fish communities.
5. The distribution of substrate size categories was strongly associated with sampling location and reflects less silt/clay and more cobble in both pools and riffles at the Clear Creek reference. These results indicate higher quality habitat at the reference site compared to Brushy Creek locations. Based on habitat differences, a higher level of aquatic life use attainment would be expected in Clear Creek reference compared to either Brushy Creek reach.

[13] "Significant modification" is defined as any discharge which results in instream concentrations more than 1/3 higher than these values for chlorides (Cl^-) and sulfates ($SO4^{=2}$) or more than 15 mg/L, whichever is greater, is considered to be a significant modification of the maximum naturally occurring values. See APCEC 2020. Regulation No. 2. §2.511(B).

6. RBP habitat scores and the Brushy Creek locations upstream (and downstream of the Unnamed Tributary of Brushy Creek inflow were similar among all categories, which is reflected in nearly identical total habitat scores. The significantly different distribution of substrate categories at upstream of Unnamed Tributary of Brushy Creek reflects more bedrock and less silt/clay and gravel in the downstream location of Brushy Creek riffles. Furthermore, the downstream site pools had less gravel and cobble, more silt/clay, however, cobble and gravel dominated both habitat types at both locations. Although these differences result in statistically significant differences between upstream and downstream reaches, the biological significance and expected overall effect on the level of aquatic life use attainment is not clear. Based on professional judgment, these differences appear to be somewhat modest in terms of biological significance. Given the minimal differences in RBP scores and the similar dominance by gravel and cobble substrate, overall habitat at upstream and downstream locations on Brushy Creek appears to be similar and should support similar levels of aquatic life use attainment.
7. Conclusion: the general ranking of habitat quality for purposes of interpreting aquatic life for both fish and benthic macroinvertebrates in Brushy Creek and Clear Creek reference is: Clear Creek (Reference) > Brushy Creek Upstream Location = Brushy Creek Downstream Location.

Stennitt Creek Habitat

1. The Stennitt Creek upstream of the confluence of Brushy Creek and Stennitt Creek downstream of the confluence with Brushy Creek sampling reaches were similar and generally comparable in terms of RBP habitat categories, substrate, immediate watershed characteristics and size (depth, width); and
2. Conclusion: General ranking of habitat quality for purposes of interpreting aquatic life for benthic macroinvertebrates in Stennitt Creek is: Stennitt Creek downstream > Stennitt Creek upstream.

Aquatic Life Attainment at Brushy Creek Downstream of the Confluence of the Unnamed Tributary of Brushy Creek Based on Fish Community

As noted in Section 1.5.3.2, of the FTN (2018) report in consultation with ADEQ that representative fish samples could not be obtained in the relevant reaches of Stennitt Creek due to dense emergent vegetation. Therefore, fish sampling was not conducted in Stennitt Creek.

Aquatic Life Attainment was based on APCEC 2020. Rule No. 2. Section 2.302, which uses the presence of "key" and "indicator" fish species as one factor to assess attainment of ecoregion designated uses. Ozark Highlands ecoregion key and indicator species are listed in APCEC 2020. Rule No. 2. Section 2.302(F)(3)(a).

1. Two ecoregion key species (subspecies of the) Orangethroat Darter and Bleeding shiner (*E. uniporum* and *L. zonatus*) were collected at Brushy Creek upstream and downstream and Clear Creek reference locations;

2. The Clear Creek reference contained two ecoregion indicator species, Southern Redbelly Dace and Ozark Madtom (*C. erythrogaster, and N. albater)*, while no indicator species were collected in the Brushy Creek reaches;
3. Although the relative abundance of the (subspecies of the) Orangethroat Darter (*E. uniporum* - key species at Brushy Creek upstream of the Unnamed Tributary of Brushy Creek was more than three times higher than the Brushy Creek downstream location (21% vs. 5.6%) where TDS and sulfate concentrations are the highest, the relative abundance of *E. uniporum* at the Brushy Creek downstream location and the Clear Creek reference, where TDS and sulfate are lowest, was similar (8.4% versus 5.6% at Clear Creek reference and Brushy Creek downstream, respectively);
4. The absence of indicator species in Brushy Creek cannot be definitively explained, although it is conceivable that it is due to the higher background TDS and/or lower quality habitat present in Brushy Creek;
5. These result indicates that the relative abundance of *E. uniporum* is not associated with TDS and sulfate concentrations and that the elevated concentrations of TDS and sulfate at Brushy Creek downstream support a population of *E. uniporum* similar to the Clear Creek reference and the highest abundance of *L. zonatus*, another key species, was at the Brushy Creek downstream location where sulfate and TDS are the highest.
6. Conclusions: The elevated TDS and sulfate concentrations at the downstream location on Brushy Creek support the Ozark Highlands designated use (key species) per APCEC 2020. Regulation No. 2. Section 2.302. They also demonstrate that TDS concentrations higher than the ecoregion value of 240 mg/L will support, in this instance, the Ozark Highlands ecoregion aquatic life designated use per APCEC 2020. Regulation No. 2.

Aquatic Life Attainment at Brushy Creek Downstream of the Confluence of the Unnamed Tributary of Brushy Creek Based on Benthic Macroinvertebrate Community

1. Brushy Creek: Instream Samples: Using ADEQ. 2018. "Assessment Methodology for the Preparation of the 2018 Integrated Water Quality Monitoring and Assessment Report," percent comparability for Brushy Creek downstream of Unnamed Tributary of Brushy Creek versus Brushy Creek upstream, and two Clear Creek reference locations were 95%, 95% and 86%, respectively. These values indicated a "biological condition category" of "comparable to reference" and indicates "support" of the aquatic life use. They also demonstrated that TDS concentrations higher than the ecoregion value of 240 mg/L will support the aquatic life use for this ecoregion.
2. Stennitt Creek: Instream Samples: Using ADEQ. 2018. "Assessment Methodology for the Preparation of the 2018 Integrated Water Quality Monitoring and Assessment Report," percent comparability for Stennitt Creek downstream of the confluence with Brushy Creek versus Stennitt Creek upstream was 95%, which corresponds to a "biological condition category" of "comparable to reference" and indicates "support" of the aquatic life use. Percent comparability as low as 54% indicates "supporting." Because the percent comparability (95%) between the two locations was at the high end of the range indicating support, the level of confounding between habitat and water quality in this comparison would probably not be sufficient to result in a determination of impairment at Stennitt Creek downstream location if the habitat factor could somehow be removed. Therefore, based on ADEQ methodology for assessing attainment, these results

indicate that the water quality in Stennitt Creek downstream of the confluence with Brushy Creek supports the aquatic life use with respect to benthic macroinvertebrates.

III. Criteria Development

Mass balance computations based on harmonic mean flows were carried out to develop site-specific dissolved minerals criteria for the Unnamed Tributary of Brushy Creek from Vulcan's Outfall 001 to its confluence with Brushy Creek, a segment of Brushy Creek from its confluence with the Unnamed Tributary of Brushy Creek to its confluence with Stennitt Creek, and a segment of Stennitt Creek from its confluence with Brushy Creek to its confluence with Spring River.

Because the Drinking Water designated use applies to the Unnamed Tributary of Brushy Creek and Brushy Creek, initial mass balance water computations using 7Q10 flows were carried out to calculate proposed dissolved minerals criteria for the protection of aquatic life using TDS and sulfate concentrations of Outfall 001 (95th percentile) and upstream concentrations from recent monitoring. However, these calculations indicated possible exceedance of the secondary drinking water standard for TDS (500 mg/L) in Brushy Creek and its Unnamed Tributary. The DWS designated use, but not existing use, was proposed to be removed from the Unnamed Tributary and from Brushy Creek downstream of the Unnamed Tributary based on the mass balance results for 7Q10 conditions. In the absence of the Drinking Water use in Brushy Creek, site-specific dissolved minerals criteria would be developed from mass balance computations based on harmonic mean flows rather than 7Q10 flows. Additionally, mass balance computations based on harmonic mean flows is required for Stennitt Creek below Brushy Creek since the Drinking Water use was removed in 1999 as part of a previously approved Third-Party Rulemaking.

IV. Supporting Data and Analysis for Removal of the Domestic Water Supply Use

The revised water quality standards include the removal of the Domestic Water Supply (DWS) use that is currently applicable to Brushy Creek and its Unnamed Tributary to which the Vulcan Construction Materials Outfall 001 discharges. The federal regulation at 40 CFR 131.10(k)(3) requires that in those instances where a state wishes to remove or revise a designated use that is a non-101(a)(2) use, that it submit documentation justifying how its consideration of the use and value of water for those uses appropriately supports the State's action.

The current supporting report by FTN (2018), focuses on the physical characteristics limiting their ability to support the DWS use in both Brushy Creek and its Unnamed Tributary. These streams are also described as not containing adequate volumes of water to be utilized as drinking water supplies now or in the future. Neither Brushy Creek nor its Unnamed Tributary are currently being utilized as a drinking water source. This was supported by the comments provided by Arkansas Department of Health opposing this rulemaking. Based on the information provided, EPA found that the state has adequately considered the use and value of Brushy Creek and its Unnamed Tributary as a public water supply consistent with 40 CFR 131.10 and approves removal of the DWS use from: Brushy Creek from its Unnamed Tributary to Stennitt Creek and

Unnamed Tributary of Brushy Creek from Vulcan Construction Materials Outfall 001 to Brushy Creek.

Although the physical characteristics of Brushy Creek and its Unnamed Tributary do limit their ability to support a DWS use, it is worth noting that in its discussion of the DWS use, the original supporting FTN (2018) report indicated that the concern was a combination of factors, the presumption of low flow combined with the application of the DWS criteria for TDS (500 mg/L). The 2018 report noted that the application of the DWS criteria would result in more restrictive permit limits than the aquatic life use criteria. Thus, the DWS use is being removed because it requires a criterion of 500 mg/L TDS, which precludes the revised TDS criteria for these waterbodies. This suggests that the possibility of more restrictive permit limits was a significant factor in removing the current DWS use.

V. Evaluation of Potential Impacts to Downstream Waters

The federal regulation at 40 CFR 131.10(k)(3) requires that in those instances where a state wishes to remove or revise a designated use that is a non-101(a)(2) use, that it submit documentation justifying how its consideration of the use and value of water for those uses appropriately supports the State's action. EPA reviewed and considered all of the public comments ADEQ received on this rulemaking expressing concerns about impacts to downstream water quality from the revised criteria and removal of the DWS use. With the exception of comments by ADEQ, public comments on the Vulcan Construction Materials rulemaking were opposed to the DWS use removal and the revised criteria.

In 2019, the Arkansas Department of Health (ADH) reiterated its objection to the removal of the domestic water supply designation for both Brushy Creek and its Unnamed Tributary, noting that both are tributaries of the Spring River, which is a drinking water source to approximately 4,000 people and the water intake for Northeast Arkansas Public Water Authority is approximately three miles downstream of the confluence of Stennitt Creek and the Spring River. The ADH has expressed concern that minerals entering the Spring River will likely have a direct effect upon water quality in this drinking water supply. ADH requested that supporting documents regarding Economic Impact/Environmental Benefit Analysis be revised to reflect the costs associated with treatment for any future degradation of the watersheds. The ADH also requested that all related documents mentioning ADH reflect its opposition to the proposed rulemaking and the removal of the domestic supply designation for Brushy Creek and its Unnamed Tributary.

The FTN (2018) report provides a mass balance results and predicted concentrations for 7Q10 flow conditions. See Section 10.1.3 of the 2018 report. The mass balance indicates that the discharge form the Vulcan Construction Materials Outfall 001 will have minimal impact on TDS and sulfate concentrations in the Spring River. Although the FTN report incorrectly notates that the Spring River doesn't include a DWS use, the discharge from Outfall 001 will not cause exceedances of the DWS criteria in the Spring River during 7Q10 conditions as summarized in the following **Table 4**.

Table 4. Predicted Concentrations

	7Q10 Conditions	Applicable Criteria[14]	7Q10 Conditions	Applicable Criteria[14]
Stream Reach	**Sulfate (mg/L)**		**TDS (mg/L)**	
Unnamed Tributary from Outfall 001 to Brushy Creek	142.8	250	556	500
Brushy Creek below the confluence of the Unnamed Tributary	140.3	250	553	500
Stennitt Creek downstream of the confluence of Brushy Creek	118.5	N/A	531	N/A
Spring River downstream of the confluence of Stennitt Creek	4.1	30	220	290

VI. Revised Provisions EPA is Approving

Based on the available information, EPA concludes that the revised site-specific criteria for Brushy Creek and its Unnamed Tributary and Stennitt Creek are unlikely to adversely impact the aquatic communities in these waters. Based on the weight of evidence, the revised site-specific criteria in **Table 1** are approved pursuant to Sec. 303(c) of the CWA. Upon approval by EPA, these criteria are in effect for all CWA purposes (see **Table 1**).

The EPA has also concluded that the state has adequately considered the use and value of Brushy Creek and its Unnamed Tributary as a public water supply consistent with 40 CFR 131.10 and approves removal of the DWS use from Unnamed Tributary of Brushy Creek from Vulcan Construction Materials Outfall 001 to Brushy Creek and Brushy Creek from Unnamed Tributary to Stennitt Creek.

VII. Additional Considerations

Antidegradation Requirements

Federal regulations require states to develop antidegradation implementation methods for the antidegradation policy that are, at a minimum, consistent with the state's policy and with 40 CFR 131.12(a). Neither Regulation 2 nor the state's Continuing Planning Process[15] (CPP) document currently contain implementation methods for the state's antidegradation policy. It is EPA's understanding that ADEQ is working to develop implementation methods and will likely incorporate methods in the next iteration of its CPP. It is important to note that the state is required to provide an opportunity for public involvement during the development of, and during any subsequent revisions of, the state's implementation methods and that the final version of the implementation methods must be available to the public. See 40 CFR 130.5(b)(6) and 40 CFR 131.12(b). While not required for EPA's approval of the state's revised site-specific criteria for Brushy Creek and its Tributary and Stennitt Creek (Tier 2 waters), the development of these implementation methods is critical for the proper implementation of the site-specific criteria that the state has adopted.

Antidegradation is an integral part of a state's or tribe's water quality standards, as it provides important protections that are critical to the fulfillment of the CWA objective to restore and

[14] APCEC Rule No. 2. Site Specific Criteria. § 2.511(A). 2020
[15] State of Arkansas Continuing Planning Process. Update and Revisions. 2000

maintain the chemical, physical, and biological integrity of the Nation's waters. The federal regulations outline requirements for three tiers of antidegradation protection: protection for existing uses (Tier 1), protection for high quality waters, where the quality of the water exceeds levels necessary to support the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water (Tier 2), and protection for outstanding national resource waters (Tier 3). Antidegradation is broadly applicable to all pollutant sources, all water bodies, and at all times, but it is most commonly triggered through activities that could lower water quality and are regulated. No permit may be issued without an antidegradation review to a discharger to high-quality waters with effluent limits greater than actual current loadings, if such loadings will cause a lowering of water quality.[16] The antidegradation review will assure that the applicable level of protection is being provided to that water body.

Water quality data along with physical, chemical, and biological data from representative reference stream locations within the Brushy Creek and its Unnamed Tributary and Stennitt Creek watersheds establish the baseline conditions for these waters and should be used for the purpose of an antidegradation review. Where water quality is better than the levels necessary to support the CWA Sec. 101(a)(2) uses, the state must conduct a Tier 2 antidegradation review, including an analysis of alternatives, to find that a lowering of high-water quality is "necessary to accommodate important economic or social development in the area in which the waters are located." The EPA anticipates that ADEQ will conduct a Tier 2 antidegradation review, as required by 40 CFR 131.12(a)(2)(i), to evaluate the use of assimilative capacity in allowing discharges of chloride, sulfate and TDS during the NPDES permitting process. The full requirements of a Tier 2 review can be found at 40 CFR 131.12(a)(2).

Endangered Species Act Consultation

The EPA's approval of revised aquatic life water quality standards (WQS) is subject to the consultation requirement of Section 7(a)(2) of the Endangered Species Act (ESA). Under Section 7(a)(2) of the ESA, 16 U.S.C. §1536, EPA has the obligation to ensure that its approval of these modifications to Arkansas's Regulation 2 will not jeopardize the continued existence of threatened and endangered species and their critical habitat in Arkansas. EPA initiated consultation with the USFWS-Conway Field Office regarding the effects of EPA approving a change to APCEC Regulation No. 2, § 2.511(A), for chloride, sulfate and TDS applicable to Brushy Creek and its Unnamed Tributary and Stennitt Creek on May 19, 2020.

EPA considered the available information in the literature and the technical comments from the Service, looking primarily at how increases in sulfate and TDS (**Table 1**) would affect the listed species within the defined action area that encompasses portions of Brushy Creek and its Unnamed Tributary and Stennitt Creek. There are no nationally recommended water quality acute/chronic criteria for aquatic life for sulfate and TDS. Based on this analysis, the EPA has determined that the approval of site-specific criteria adopted by the Commission for the defined action area may result in a minor shift in diversity in emergent macroinvertebrates, although

[16] USEPA. (1989). Application of Antidegradation Policy to the Niagara River. (Memorandum from Director, Office of Water Regulations and Standards to Director, Water Management Division, Region II; August 4.) Washington, DC.

overall numbers of less tolerant species will tend to increase resulting in a negligible effect on the prey base and is not likely to adversely affect the Gray Bat *(Myotis grisescens),* Indiana Bat *(Myotis soda/is),* Northern Long-eared Bat *(Myotis septentrionalis),* Ozark Big-eared Bat *(Corynorhinus townsendii ingens)* and Piping Plover *(Charadrius melodus),* Red Knot (*Calidris canutus rufa*) or the Eastern Black Rail (*Laterallis jamaicensis ssp. Jamaicensis*). The Service concurred with EPA's determinations these criteria may affect but are not likely to adversely affect these species on June 2, 2020.

EPA has also determined that given their absence from the action area, EPA's approval of the revised site-specific criteria will have no effect on the Curtis Pearlymussel (*Epioblasma Florentina curtisii*), Pink Mucket - pearlymussel (*Lampsilis abrupta*), Rabbitsfoot (*Quadrula cylindrica cylindrical*), Scaleshell Mussel (*Leptodea leptodon*), Snuffbox mussel (*Epioblasma triquetra*). EPA has also determined that given that they are wholly terrestrial plants, the approval of the revised site-specific water quality criteria will have no effect on the Pondberry (*Lindera melissifolia*) and Missouri Bladderpod *(Physaria filiformis)*.