UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
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DALLAS, TEXAS 75202 – 2733

AUG - 9 2018

Mr. Caleb Osborne
Associate Director
Office of Water Quality
Arkansas Department of Environmental Quality
5301 Northshore Drive
Little Rock, AR 72118-5317

Re: Amendments to *Regulation No. 2: Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas* by third-party rulemaking initiated by the City of Fayetteville, AR

Dear Mr. Osborne:

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 the City of Fayetteville, AR. The amendments to Regulation No. 2 were adopted by the Arkansas Pollution Control and Ecology Commission (APCEC) on August 25, 2017 and became effective as state law on September 29, 2017. These amendments were submitted to the EPA for approval on October 12, 2017 by the Arkansas Department of Environmental Quality (ADEQ).

At this time EPA is approving the new and revised provisions to Regulation 2.511 and Appendix A of Regulation No. 2, including the site-specific criteria changes for chloride, sulfate and total dissolved solids (TDS) in a 5.65-mile segment of the White River upstream of Beaver Lake. The criteria that apply from the Noland WWTP outfall to a point 0.4 miles downstream (WR-02) are 44 mg/L chloride, 79 mg/L sulfate and 362 mg/L total dissolved solids (TDS). The criteria that apply from WR-02 to the confluence with Richland Creek are 30 mg/L chloride, 44 mg/L sulfate and 237 mg/L TDS. These amendments are approved pursuant to the Clean Water Act § 303(c) and its implementing regulations at 40 CFR Part 131. The amended criteria are effective for Clean Water Act purposes. A discussion of this action is detailed in the enclosed Technical Support Document.

The review of this and prior third-party rules has been challenging due to the difficulty of discerning the effect of subtle changes in minerals concentrations using instream biological or toxicity testing data based on species that are not necessarily sensitive to the parameters of interest. Our approval of this and prior third-party rules have been based on a weight-of-evidence approach, using water quality, biological, and toxicity testing data, as well as data in published literature, the supporting use attainability analyses and other sources. We anticipate working with you in the development and implementation of a methodology that moves away from the current approach for site-specific criteria development as described in in Bill Honker's September 29, 2017 letter to you.

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 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 has concluded consultation with USFWS's concurrence that EPA's approval of the revised criteria is not likely to adversely affect threatened and endangered species or critical habitat by letter dated May 8, 2018.

I appreciate the APCEC'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) 665-7101, or contact Russell Nelson at (214) 665-6646 or nelson.russell@epalgov.

Sincerely,

Charles W. Maguire
Director
Water Division

Enclosure

cc: Sarah Clem, Branch Manager
Water Division

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* FOR THE WHITE RIVER, ARKANSAS

Revision Adopted by the Arkansas Pollution Control and Ecology Commission
Modifying Water Quality Standards for Chloride, Sulfates and Total Dissolved Solids for a portion of the White River

U.S. EPA REGION 6
WATER DIVISION
August 3, 2018

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I. Introduction

Background

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: beneficial 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.

Under 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 the basis for EPA's action on site-specific amendments to Regulation No. 2: *Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas* adopted by the Arkansas Pollution Control and Ecology Commission (APCEC). These amendments are site-specific chloride, sulfate and total dissolved solids (TDS) water quality criteria for the White River. These revisions are further described in the subsection below titled "Summary of Revised Provisions."

Chronology of Events

October 11, 2013	The City of Fayetteville Paul R. Noland Wastewater Treatment Plant (Fayetteville) filed a Petition to Initiate Third Party Rulemaking to Amend Regulation No. 2.
October 25, 2013	APCEC granted Fayetteville's Petition by Minute Order No. 13-22.
August 5, 2015	The City of Fayetteville, AR, filed a petition with the APCEC to amend Regulation No. 2.
January 13, 2017	Fayetteville filed an Amended Petition to Initiate Rulemaking and Request a Second Public Comment and Hearing
March 27, 2017	The APCEC held a public hearing at Fayetteville to receive comments on proposed amendments to Regulation No. 2.
August 25, 2017	APCEC adopted amendments to Regulation No. 2 via Minute Order 17-20.

September 29, 2017	The amended Regulation No. 2 became effective as state law.
October 12, 2017	EPA received revisions to Regulation No. 2. ADEQ submitted revisions to Regulation No. 2 to EPA Region 6 by letter dated October 4, 2017.

Summary of Revised Provisions

By letter dated October 4, 2017, ADEQ submitted water quality standards revisions adopted by APCEC via Minute Order No. 17-20 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 revisions are in Regulation 2.511 and Appendix A. These site-specific revisions for minerals (chloride, sulfate and total dissolved solids (TDS)) are applicable to the White River from the outfall of the City's Noland Wastewater Treatment Plant (WWTP) at River Mile 17.25 to immediately downstream of the confluence with Richland Creek at River Mile 11.61.

II. Revised Provisions

Background

A description of the White River watershed is useful in understanding the context for the site-specific criteria revisions adopted by APCEC. The White River watershed overlaps a portion of the Boston Mountains and Ozark Highlands Ecoregions. The Ozark Highlands Ecoregion is characterized as relatively forested, mountainous, and having steep gradients and fast-flowing streams. This ecoregion has a relatively large percentage of streams designated as extraordinary resource waters, and karst features, such as cave springs. Spring-fed streams are prevalent. The ecoregion has some of the highest animal production rates in Arkansas. Impacts from population growth and development, as well as instream gravel removal, have led to aquatic habitat destruction, surface erosion, and heavy siltation in streams (ADEQ, 2010). The Boston Mountains Ecoregion is sparsely populated and highly forested, with dominant land uses being recreation (Ozark National Forest), logging, agriculture (livestock farming and hay production), and silviculture. This ecoregion includes many streams that are designated as extraordinary resource waters. While water quality within the ecoregion is high, recent clearing of timberland, road construction/maintenance, and instream gravel removal have caused streambank erosion and increased stream turbidity (ADEQ, 2010).

The City of Fayetteville, Arkansas, is authorized to discharge treated municipal wastewater from the Paul R. Noland Wastewater Treatment Plant (Noland WWTP) to the White River upstream of Beaver Lake under the National Pollutant Discharge Elimination System (NPDES). The Noland WWTP NPDES permit (No. AR0020010), issued in 2006, authorizes the discharge of 11.21 million gallons per day of treated municipal wastewater from the cities of Fayetteville, Farmington, Elkins, Greenland, and Johnson, as well as industrial and commercial

enterprises, although wastewater from Farmington and Johnson is normally treated in the City's West Side WWTP. The Noland WWTP discharge is from a single outfall (001), which is in Arkansas' Reach 23 of Planning Segment 4K. This 6.2-mile (mi) reach of the White River runs from Lake Sequoyah to Beaver Lake (Figure 1).

Designated uses for the reach are primary and secondary contact recreation; domestic, industrial, and agricultural water supply; and the perennial Ozark Highlands fisheries use. Beaver Lake and Lake Sequoyah are designated as primary and secondary contact recreation; domestic, industrial, and agricultural water supply; and lake fisheries. The White River watershed within the Boston Mountains Ecoregion is designated as primary and secondary contact recreation; domestic, industrial, and agricultural water supply; and perennial/seasonal Boston Mountain fisheries (APCEC, 2011). In addition, the White River within the Boston Mountains ecoregion is designated as an extraordinary resource water although that designation is not influenced by the revised criteria.

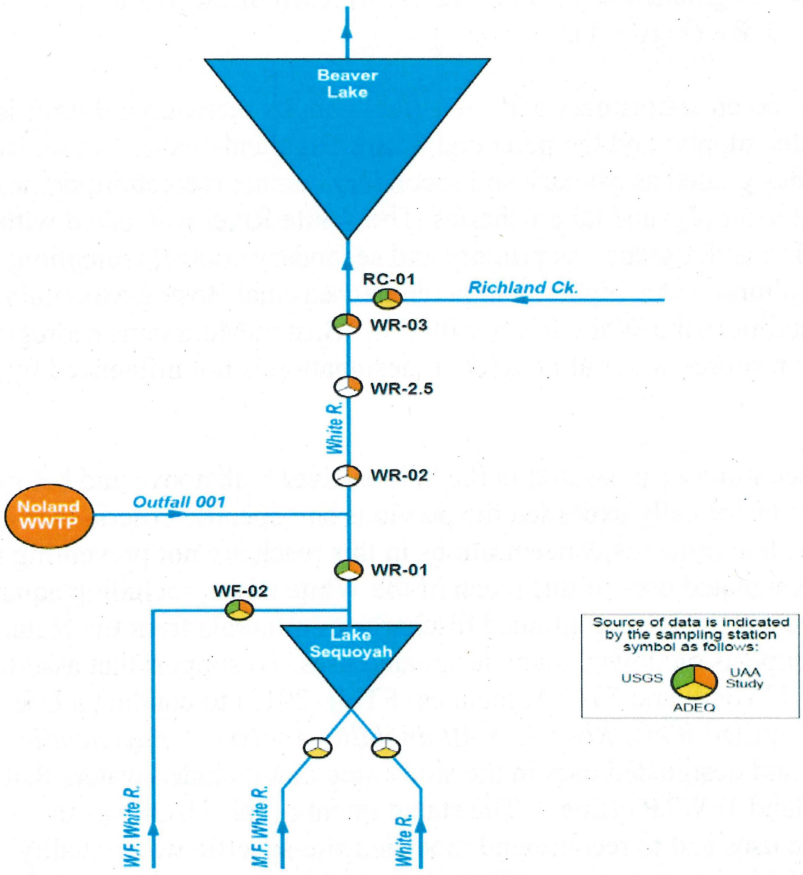
Although minerals concentrations measured in the White River both above and below the Noland WWTP discharge have historically exceeded the previous site-specific criteria (see Table 1 below), Fayetteville contends that minerals concentrations in this reach are not preventing the attainment of the existing or designated uses of this reach of the White River, including aquatic life, which is the most sensitive use, and that continued discharge of minerals from the Noland WWTP will have no adverse impacts on downstream designated uses. To support that assertion, Fayetteville contracted with CH2MHill and FTN Associates (FTN) (2013) to conduct a Use Attainability Analysis (UAA) entitled *White River Use Attainability Analysis – Fayetteville Arkansas*, to evaluate existing and designated uses in the study area that included waters that could be influenced by the Noland WWTP effluent. The stated intent of this UAA was to evaluate existing and attainable uses and to recommend modified site-specific water quality criteria for dissolved minerals (chloride, sulfate and TDS) that would protect existing and attainable designated uses in the White River and downstream affected waters.

Based on the results of the *White River UAA*, Fayetteville filed a Third-Party Rulemaking Petition to amend the Arkansas water quality criteria for chloride, sulfate, and TDS in the 5.64-mile segment of the White River upstream of Beaver Lake. This segment of the river starts at the outfall of the Noland WWTP, River Mile 17.25, and ends immediately downstream of the confluence with Richland Creek, River Mile 11.61[1].

During the public comment period for this rulemaking, the Arkansas Department of Environmental Quality (ADEQ) submitted comments recommending that the original criteria proposed by Fayetteville be re-evaluated to reflect instream concentrations based on either the submitted data or the minerals concentrations measured over the past 23 years. The ADEQ also recommended that the segment be divided into two reaches, with different criteria applying to the upstream and downstream reaches of the originally proposed segment. Fayetteville agreed with ADEQ's recommendation and divided the affected segment into two reaches, one running from the Noland WWTP outfall to a point 0.4 miles downstream (WR-02), and another from WR-02 to the confluence with Richland Creek.

[1]River Miles were computed by CH2M using GIS data with River Mile 0.0 located at the Interstate Route 412 Bridge over the White River.

Figure 1. Study Area Schematic for the White River (CH2M Hill and FTN, 2013).



To incorporate ADEQ's recommendations and other public comments, CH2MHill and FTN developed an *Addendum - White River UAA*. The *Addendum* reflected the recommendation to split the river into two reaches and to base the proposed criteria on instream concentrations derived from submitted data or long-term monitoring data. Fayetteville amended its proposal and, in response, APCEC adopted amended criteria for chloride, sulfate and TDS as listed in **Table 1** below.

Table 1. Site-specific water quality criteria for the White River.

Stream Reach	Previous Criteria			Revised Criteria		
	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
Noland WWTP to WR-02	20	20	160	44	79	362
WR-02 to Richland Creek	20	20	160	30	40	237

The state's supporting documentation for this rulemaking can be found at:
https://www.adeq.state.ar.us/regs/drafts/3rdParty/reg02/13-010-R/

Supporting Data and Analysis for Aquatic Life Use Protection

The *White River UAA* explains that the proposed site-specific mineral criteria were based on the results of a mass balance model that would account for the 7Q-10 flows in the White River, coupled with either permitted or design capacity effluent discharge from the Noland WWTP discharge. The revised criteria are based on the ninety-fifth (95th) percentile of either the instream data set downstream of the discharge or a data set determined off a correlation of an instream data set measured downstream of the discharge. The resulting 95th percentile mineral concentrations were initially proposed as site-specific criteria for the White River from the Noland WWTP outfall to immediately downstream of Richland Creek. These proposed criteria were subsequently re-evaluated using the 95th percentile of a dataset based on long-term monitoring as recommended by ADEQ to derive the final criteria that were adopted by APCEC.

The data used in calculations have a direct bearing on the accuracy and validity of mass balance models. To that point, the *White River UAA* explains that data collected downstream of the Noland WWTP from WR-02 to Richland creek segment when Beaver Lake was at flood stage were not used in the calculations. As a result, sampling was moved approximately 2.8 mi upstream to a location (designated Station WR-2.5) approximately midway between the Noland WWTP outfall and Station WR-03. This location was considered more representative of riverine rather than impounded conditions. Fish sampling was conducted at WR-2.5 in September 2011. Monthly water quality sampling was initiated at this location in September 2011. Benthic macroinvertebrates were sampled from WR-2.5 in October 2011 and March 2012. This approach was based on Reg. 2.405 Biological Integrity, which refers to aquatic biota assessment comparing communities that are similar in habitat and hydrologic condition, based on an upstream and downstream comparison, or a comparison using a composite of reference waters. The approach used excluded those portions of the White River that are frequently at flood stage. Although generally consistent with Reg. 2.405, excluding portions of the water body frequently at flood state is arguable more problematic in this instance since flood stage occurs for extended periods in at least a portion of the segment above Beaver Lake. The exclusion of these data likely resulted in higher mineral criteria than would have been derived if the original site (WR-03) had been maintained, yet the resulting criteria will apply to the entire segment.

The question is whether the higher mineral concentrations will have discernable impact on the fish community at WR-02 or further downstream. The *White River UAA* refers to ADEQ guidance (ADEQ, 2010) that suggests it is not necessary for all key or indicator species that are present at WR-02 to be representative of an Ozark Highlands fishery. Regulation 2 describes the Ozark Highland Ecoregion subcategory as streams supporting diverse communities of indigenous or adapted species of fish and other forms of aquatic biota. Fish communities are characterized by a preponderance of sensitive species and normally dominated by a diverse minnow community followed by sunfishes and darters. These communities are generally characterized by both key and indicator fish species described in the state's regulation. The discussion in the UAA does not give any indication as to whether this variability in key or indicator species as the result of a discharger is acceptable or if it was only intended to acknowledge variation resulting from natural habitat limitations.

Our review identified many of the same concerns ADEQ identified in its comments on the *White River UAA*, noting that although mineral concentrations were comparable between WR-02 and WR-2.5, conductivity was upwards of 100 µS/cm higher at WR-02. Habitat scores for WR-01, WR-02, and WR-2.5 were relatively similar for each season, with all ranking sub-optimal. Macroinvertebrate bioassessment scores for fall showed higher scores in WR-01, lower scores for WR-02, and then an increase for WR-2.5. This suggests that the trend in macroinvertebrate assessment scores generally followed an inverse trend for minerals which were lower at WR-01, higher at WR-02, then slightly lower at WR-2.5. EPA agrees with ADEQ's conclusion that the data presented did not conclusively exclude minerals as the causal factor for decreased macroinvertebrate scores. However, although EPA believes the data suggest the revised criteria may result in impacts to the aquatic community, triggering a Tier 2 antidegradation review (discussed below), EPA determined the aquatic life use will be maintained.

III. Additional Considerations

Supporting Information for Site-Specific Criteria vs. Designated Use Change

ADEQ submitted these criteria revisions as site-specific criteria without any accompanying designated use change. However, the *White River UAA* cites one of the six 40 CFR 131.10(g) regulatory factors to justify a use change. The WQS regulation at 40 CFR §131.10(g) provides that "[s]tates may remove a designated use… or establish sub-categories of a use if the [s]tate can demonstrate that attaining the designated use is not feasible…" because of at least one of the six specified factors. EPA's regulation at 40 CFR 131.11(b)(1)(ii) provides that states and authorized tribes may adopt water quality criteria that are "modified to reflect site-specific conditions." Site-specific criteria, as with all criteria, must be based on a sound scientific rationale and protect designated uses and are subject to EPA review and approval or disapproval under Section 303(c) of the CWA. A site-specific criterion is developed to protect aquatic life at a site, usually by considering a site's physical, chemical, and/or biological conditions (i.e., water quality characteristics or species composition). Because ADEQ did not propose to change the designated use of the water segments in question, and instead asserted that the current designated use is attainable, and the adopted SSC are protective of the current designated use, it is not necessary to cite a factor from 40 CFR § 131.10(g) to support the SSC. Citing one of these factors implies that the aquatic life use is being downgraded.

Use of 95th Percentile Approach

Although EPA has approved most third-party rulemakings, in doing so, EPA has never endorsed or approved a methodology using the 95th percentile of downstream minerals concentrations as a basis for developing site-specific criteria. In 2017 comments on the *White River UAA* and in more recent 3rd party rulemakings, EPA has expressed concerns with the 95th percentile approach. The agency believes a field-based methodology that assesses aquatic communities across a gradient of minerals concentrations is more appropriate than traditional toxicity testing for setting criteria. Criteria that are revised should not be adjusted to accommodate anthropogenic influences such as a discharge but should be based on least impacted reference conditions (USEPA, 1983 and 1989). However, despite EPA's concerns with

using the 95th percentile of downstream minerals concentrations as a basis for developing site-specific criteria, EPA has determined that the resulting site-specific criteria in this instance are protective of the designated use.

Other Impacts May Be Masking Impacts of Minerals on Aquatic Life

In its 2012 comments on the *White River UAA*, ADEQ identified concerns with the geomorphic differences between sites and that they were not accounted for during habitat surveys. There were inconsistencies that appeared to create some subjectivity in habitat scoring, including improper scoring from raw data, inconsistency in measured data, scores from season to season, and inconsistency between investigators within a season. In instances where the locations were as much as six times greater than other locations, velocity/depth regimes and channel flow should be affected. However, for measures of habitat quality, the only notable difference between WR-02 and other sites was the velocity/depth regimes. Despite the geomorphic differences, WR-02 were reported as generally having the highest quality of habitat among sites and seasons. ADEQ concluded that the combined raw data were insufficient to support such high quality epifaunal substrate scores. In its 2013 comments, EPA also commented that although the UAA refers to WR-02 as comparable to other sites, it had much more algae and woody debris which altered the amount of available habitat and may make it less comparable to other habitats than the habitat scores indicated. The epifaunal substrate metric of the habitat score varied substantially among the sites, accounting for the differences in quantity and quality of habitat types. In effect, the overall physical habitat scores may have been similar, but the raw data suggests that the physical habitat itself was not.

Considering the macroinvertebrate assemblage, ADEQ noted that metrics consistently indicated negative impacts through two seasons of study downstream of the Noland WWTP outfall at WR-02 despite higher flows during the second sampling season. ADEQ noted that elevated Hilsenhoff Biotic Index (HBI) scores for WR-02 are indicative of organic loading, which parallels the predominance of benthic algae. Citing recent regional literature, ADEQ noted that Justus et al. (2009) reviewed 30 Ozark Highland ecoregion streams and concluded that calculated algal indices had a stronger relation to low to moderate nutrient enrichment than fish or macroinvertebrates, but all three were negatively correlated to enrichment. Total phosphorus concentrations for these 30 streams ranged from 0.002-0.062 mg/L with a median value of 0.015 mg/L. ADEQ also cited Regulation 2.509, which prohibits materials stimulating algal growth in concentrations sufficient to cause objectionable algal densities, other nuisance aquatic vegetation or otherwise impair any designated uses. ADEQ concluded that data indicate that current total phosphorus limits from Noland WWTP are contributing to degraded aquatic communities downstream of the Noland WWTP discharge at WR-02.

In its review of the *White River UAA*, EPA also noted that the percent of dominant taxa and HBI metrics were somewhat higher at WR-02 than at the other sites, generally indicating a less diverse community at WR-02. Further, we noted that taxa richness, number of EPT taxa, percent dominant taxa, and HBI values seem to indicate the macroinvertebrate community at WR-2.5, downstream of the Noland WWTP outfall, was generally comparable to communities upstream of the Noland WWTP and to Richland Creek. This suggests that the lower diversity is likely limited to directly downstream of the Noland WWTP outfall. In our 2013 comments, we

noted that while the macroinvertebrate community at WR 2.5 shows recovery in some metrics, the site displayed signs of stress in others. The number of taxa and number of intolerant taxa are lower compared to the upstream site WR-01 and downstream at RC-02. The conclusion that can be drawn here is that the macroinvertebrate community is impacted below the discharge at WR-02, but that the impact may be due to nutrients based on the algal growth and elevated HBI scores.

In their Petition for Rulemaking, the third-party proponents of the site-specific criteria changes considered the potential for mineral concentrations in the Noland discharge to cause toxicity in biomonitoring tests. The *White River UAA* describes an approach to evaluate toxic thresholds by evaluating chronic toxicity (per USEPA, 2002) in a series of increasing TDS, sulfate, and chloride test concentrations using the water flea (*Ceriodaphnia dubia)*. The results estimated 25 percent inhibition concentration (IC25) values of 1,643 mg/L TDS, 371 mg/L sulfate and 327 mg/L chloride determined in whole-effluent toxicity (WET) tests, representing the best estimates of the sublethal toxic thresholds for these minerals at this site. The document refers to these values as much greater than instream minerals concentrations and greater than the highest TDS, sulfate and chloride concentrations measured in the Noland WWTP effluent to date (680 mg/L, 104 mg/L, and 76 mg/L, respectively). The contention is that this reinforces the results of the biological field data review which indicated that minerals concentrations are not having an adverse impact on biological communities. However, as ADEQ noted in its comments on the use of the IC25, the biological data presented does not conclusively exclude minerals as the causal factor for decreased macroinvertebrate assemblages but may indicate that other variables are more problematic. The WET testing was carried out using *C. dubia* which is more sensitive to elevated TDS than the fathead minnow (USEPA, 1999). However, our concern is that these tests did not use other freshwater invertebrate species that are sensitive to elevated chloride such as the fingernail clam (*Sphaerium simile*), planorbid snail (*Gyraulus parvus*), and tubificid worm (*Tubifex tubifex*), thus potentially underestimating the effect of chloride.

The *White River UAA* refers to the APCEC (2011) standards description of nine "key" and nine ecoregion-specific "indicator" fish species that are generally dominant in the Ozark Highland Ecoregion. The UAA reports that five of the key species were observed during the fish community assessment. However, only two of the indicator species were observed. The UAA provides the ADEQ metric ratings for the fish communities as well as other selected metrics. The sub-metrics that were used to calculate the Index of Biotic Integrity (IBI) score (percent sunfish, percent minnows, percent darters, percent herbivores and catch per unit effort) suggest a change in the fish community immediately downstream of the Noland WWTP outfall, with fewer sunfish, darters, and total taxa and more minnows and herbivores. The fish communities downstream of the Noland WWTP outfall at WR-02 and WR-2.5 are rated "generally similar," as defined by ADEQ for the Ozark Highland Ecoregion. The fish communities at WR-02 and WR-2.5 were rated higher than the community upstream of the outfall (at WR-01), based on the IBI score.

A comparison of assessments from 1963 and 1993 relying on the index of similarity (as defined in ADPCE, 1995) showed that the total number of species and individuals was lower during the 1993 event, at each sampling station on the White River, the index of similarity between events ranged from "somewhat dissimilar" to "relatively similar". The conclusion then (1995) indicated a shift from relatively clean habitat with a population dominated by darters to

one dominated by herbivores and omnivore trophic feeders (minnows), indicating that the watershed was likely being impacted by land use changes. The *White River UAA* suggests that the difference in the community, specifically a decrease in sensitive individuals and a higher proportion of catfish (Ictaluridae) and primary feeders at station WR-02 may not be related to mineral concentrations at WR-02. The argument being made is that since mineral concentrations are similar at Stations WR-02 and WR-2.5, the altered fish community structure observed at WR-02 is not due to mineral levels. A significant part of the supporting argument in the *White River UAA* for the appropriateness of the revised criteria is focused on the fish community structure in the West Fork of the White River at WR-01 upstream of the Noland WWTP and downstream at WR-02 and WR-2.5. The UAA reported that based on ADEQ's IBI scores, the fish community at the downstream sites scored higher than the upstream site at WR-01. The decrease in sensitive fish species at WR-02 was attributed to organic loading from the WWTP rather than to mineral concentrations based on the similarity in the community structure between WR-2.5 to WR-01. However, it is important to note that the West Fork of the White River, where site WR-01lies, receives a discharge from the West Fork WWTP and other potential sources of mineral. The West Fork is currently on the ADEQ's 2016 303(d) list as not meeting its fishery use as the result of exceedances of sulfate and TDS. This calls into question the contention that organic loading is the sole source of degradation.

In its comments, ADEQ noted that while the fish assemblage structure at WR-02 was comparable to WR-2.5, RC-02, and ecoregion streams (categorized as generally similar), WR-02 scored the lowest in the percentage of sensitive individuals, Ictalurids, and primary feeders. The ADEQ also noted that a decrease in sensitive species, such as Ictalurids is a well-documented occurrence downstream of point source dischargers. Increased relative abundance of primary feeders is indicative of organic loading which also coincides with observed responses in macroinvertebrate assemblage in WR-02. While these metrics are indicative of organic loading they do not necessarily mean that aquatic biota are free from impacts from minerals originating from the Noland WWTP.

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 (CPP) document (2000) currently contain implementation methods for the state's antidegradation policy consistent with federal regulations. 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 the White River, 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 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 (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. The antidegradation review will assure that the applicable level of protection is being provided to that water body. Tier 1 protection is applicable to all waters of the U.S. and requires the protection of existing uses. Tier 2 protection applies to water bodies that are "high quality", which is a water body 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.

The *White River UAA* describes water quality data from the Noland WWTP effluent and physical, chemical, and biological data from representative stream locations in the White River watershed. This included both *in situ* and summary data, and summary statistics for chloride, sulfate, and TDS concentrations. These data and statistics establish the baseline ambient water quality conditions for the White River study area. The revised criteria were derived using the 95th percentile of downstream minerals concentrations representing ambient conditions. The resulting criteria represent an increase in chloride, sulfate, and TDS concentrations. The White River at reach 23 of planning segment 4K is listed on Arkansas's CWA Section 303(d) List of Impaired Waters (ADEQ 2016) as not supporting the (Ozark Highlands) fisheries designated use due to surface erosion. The White River is also listed for exceedances of sulfate and TDS criteria although these criteria are not identified as impairing the fishery use. The source of these minerals is unknown (ADEQ 2016).

Although listed as exceeding minerals criteria, the *White River UAA* notes that ADEQ does not believe that the magnitude of chloride, sulfate and TDS is impairing the aquatic life of in the White River. If minerals are not impairing the Ozark Highland Ecoregion fishery use, the White River is likely a high-quality water that has assimilative capacity for chloride, sulfate and TDS. 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 full requirements of a Tier 2 review can be found at 40 CFR 131.12(a)(2).

The *White River UAA* includes an "alternatives analysis," which is limited to an economic assessment of different treatment alternatives. This analysis does not meet the requirements of an antidegradation review as required by federal regulations for the finding required before a lowering is allowed. See 40 CFR 131.12(a)(2)(ii). The alternatives analysis provides a description of technical aspects of treatment but does not provide analysis or economic tests to show that additional controls are either not technically feasible or would result in substantial and widespread economic impact on the community. See 40 CFR 131.10(g)(6) and EPA *Economic Guidance for Water Quality Standards*. As a result, activities such as new or

increased discharges or expansion of existing facilities that would lower water quality remain subject to an antidegradation review

White River Assessment and 303(d) Listing

In addition to sulfate and TDS, the White River has historically been placed on the Arkansas Section 303(d) list for exceedances of chloride criteria. The absence of chloride on the 2016 303(d) list is the result of the state's use of its 2016 assessment methodology which increased the necessary criteria exceedance rate for listing from 10 percent to 25 percent. In 2007 revisions to Regulation 2, APCEC struck language that specified that minerals are not to exceed in more than "1 in 10 samples collected over a period of not less than 30 days or more than 360 days" and replaced that language with a 25 percent exceedance rate for site-specific minerals criteria. ADEQ subsequently modified its assessment methodology in 2016 to reflect the APCEC's 2007 amendments to Regulation 2. However, EPA disapproved the removal of the 1 in 10 (10%) exceedance rate for minerals from Regulation 2 in its January 24, 2008 action (EPA, 2008). Because of EPA's action, the 10% exceedance rate for minerals criteria assessment remains effective for CWA purposes in lieu of a 25% exceedance rate.

IV. Revised Provisions EPA is Approving

The EPA's obligation is to ensure that water quality criteria adopted by the state are based on a sound scientific rationale and are protective of the appropriate designated use. Drawing conclusions based on the supporting *White River UAA* and its *Addendum* as with previous third-party rulemakings continues to be challenging since the methodology that has been used to derive the revised criteria makes it difficult to discern the effect of subtle changes in minerals concentrations based on ambient conditions. Given that very small variations in ionic composition can result in subtle to significant differences in the structure and function of aquatic communities, it is often unclear what effect other analytes like magnesium, potassium, alkalinity, pH, etc. may be having in the White River and its tributaries. Recent studies have indicated that traditional toxicity testing cannot capture all the impacts of minerals on aquatic life and that a field-based methodology may be more appropriate. As a result, site-specific criteria that have been derived using the 95th percentile approach may eventually require re-evaluation.

However, based on a weight of evidence review of the revised mineral criteria for the White River, including the supporting information presented in the *White River UAA* and its *Addendum,* the EPA has determined the revised criteria are protective of the water body's designated use. The EPA noted concerns with the use of the 95th percentile approach and the accuracy and validity of mass balance models and the exclusion of some portions of the river that likely resulted in higher proposed criteria than necessary. The EPA also noted concerns with the geomorphic differences between sites and some subjectivity in habitat scoring. The supporting information on the aquatic community is of particular importance. The UAA reported that fish IBI scores suggest a change in the fish community immediately downstream of the Noland WWTP outfall. With mineral concentrations similar downstream of the Noland WWTP, the third party has argued that the altered fish community structure may be due to land use changes and erosion to a greater degree than to mineral concentration. When considering benthic macroinvertebrates, the document similarly reported that metric scores for percent of dominant

taxa and HBI are generally higher at WR-02 downstream of the Noland WWTP than at the other sampling stations, indicating that there are is a less diverse and more organic tolerant community at WR-02. The UAA also notes that metric scores for taxa richness, number of EPT taxa, percent dominant taxa, and HBI indicate that the benthic macroinvertebrate community at WR-2.5, well downstream of the Noland WWTP outfall, are comparable to communities upstream of the Noland WWTP and to those in Richland Creek (RC-01). The conclusion drawn is that the lower diversity of the benthic macroinvertebrate communities is isolated directly downstream of the Noland WWTP outfall. The supporting data, while suggestive of a nutrient impact, do not clearly demonstrate that the impact to the macroinvertebrate community below the Noland WWTP is attributable to nutrients or mineral loading, individually or in combination. There continues to be some level of uncertainty in making this association.

The aquatic life use and specific designated uses like the Ozark Highland Ecoregion are broadly defined in Regulation 2. This broad definition for ecoregional uses means that there is a gradient between reference conditions and nonattainment in individual waters. The EPA believes the revised site-specific mineral criteria will use some assimilative capacity in the White River and may in fact have some although slight incremental impact on the aquatic community. Taking these definitions and the factors discussed previously into consideration, the EPA has determined that the revised criteria are protective of the Ozark Highland Ecoregion fishery use in the White River. Therefore, based on a weight of evidence approach, EPA is approving the revised site-specific criteria for chloride, sulfate and TDS in this 5.65-mile segment. The revised criteria apply to two reaches, one from the Noland WWTP outfall to a point 0.4 miles downstream (WR-02), and another from WR-02 to the confluence with Richland Creek. The new criteria proposed for the two reaches are as follows:

	Existing Criteria			**Proposed Criteria**		
Stream Reach	**Chloride (mg/L)**	**Sulfate (mg/L)**	**TDS (mg/L)**	**Chloride (mg/L)**	**Sulfate (mg/L)**	**TDS (mg/L)**
Noland WWTP to WR-02	20	20	160	44	79	362
WR-02 to Richland Creek	20	20	160	30	40	237

These criteria are approved pursuant to Sec. 303(c) of the CWA and are in effect for CWA purposes. While EPA agrees that Arkansas sufficiently demonstrated that the revised SSC for the White River are protective of the use, EPA recommends that ADEQ consider undertaking additional studies to identify the source of the observed impacts on macroinvertebrates immediately downstream of the Noland WWTP discharge.

Applicability of the Approved Criteria

Although EPA is approving these criteria, antidegradation review requirements are triggered by any action that would result in the lowering of water quality in a high-quality water. See 40 CFR 131.12(a)(2). Based on information supporting the revised criteria, the White River is likely to be a high-quality/Tier 2 water. Activities such as new or increased discharges or expansion of existing facilities that would lower water quality are subject to an antidegradation review. EPA guidance states that 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 (USEPA, 1989).

The EPA has successfully concluded informal consultation and the U.S. Fish and Wildlife Service has concurred by letter dated May 8, 2018, that EPA's approval of these revised criteria is not likely to adversely affect threatened and endangered species or critical habitat.

IV. References

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