STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PETITION TO AMEND SURFACE WATER QUALITY STANDARDS 20.6.4 NMAC

WQCC 14-05 (R)

New Mexico Environment Department,

Petitioner.

DIRECT TESTIMONY OF BRYAN DAIL

I. INTRODUCTION

My name is Bryan Dail. I am currently employed as an Environmental Scientist with the New Mexico Environment Department Surface Water Quality Bureau. I have a Bachelor's degree in Biology with Chemistry as a minor and a PhD in Microbiology. I have worked in the Surface Water Quality Bureau for 1.5 years. Previously, I worked for 12 years as an Assistant Research Professor in Microbiology, investigating nutrient cycling in forests and watersheds.

The testimony I am presenting today concerns three proposals to amend water quality standards. The first two proposals are editorial changes for use of the correct hydrologic terms in the descriptions for segments in 20.6.4.502 and 503 NMAC of the Gila River Basin, and changes to correctly identify and describe a river segment within Segment 503. The correction to Segment 503 also results in a change to the segment-specific standard for specific conductance ("SC"). The third proposal is for recommendations based on a Use Attainability Analysis ("UAA") conducted for the Mimbres River Basin to identify the attainable aquatic life use and criteria. I will present the bases for changes for these proposals in the order mentioned above. My professional resume is provided in SWQB Exhibit 58.

II. PROPOSALS- – Sections 20.6.4.502 and 503 NMAC

A. PROPOSED AMENDMENTS TO 20.6.4.502 and 503 NMAC

The following are the proposed changes to 20.6.4.502 and 503 NMAC:

20.6.4.502 GILA RIVER BASIN - The main stem of the Gila river from Redrock canyon upstream to the confluence of the West Fork Gila river and East Fork Gila river and perennial reaches of tributaries to the Gila river ~~below~~ downstream of Mogollon creek.

A. Designated Uses: industrial water supply, irrigation, livestock watering, wildlife habitat, marginal coldwater aquatic life, primary contact and warmwater aquatic life.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criterion applies: 28°C (82.4°F) or less.

[20.6.4.502 NMAC - Rp 20 NMAC 6.1.2502, 10-12-00; A, 05-23-05; A, 12-01-10]

20.6.4.503 GILA RIVER BASIN - All perennial tributaries to the Gila river ~~above~~ upstream of and including Mogollon creek.

A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance of 400 µS/cm or less for all perennial tributaries except West Fork Gila and

tributaries thereto, specific conductance of 300 µS/cm or less; ~~main stem of the Gila river above Gila hot springs and 400 µS/cm or less for other reaches;~~ 32.2°C (90°F) or less in the east fork of the Gila river and Sapillo creek ~~below~~ downstream of Lake Roberts; the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

[20.6.4.503 NMAC - Rp 20 NMAC 6.1.2503, 10-12-00; A, 05-23-05; A, 12-01-10; A, XX-XX-XX]

B. BASIS FOR PROPOSALS – Sections 20.6.4.502 and 503 NMAC

The first proposed changes to the segment descriptions in 20.6.4.502 and 503 NMAC are to replace the words 'above' and 'below' with the hydrological terms 'upstream of' and 'downstream of', respectively. This includes replacing the word 'below' in Subsection B of 20.6.4.503 NMAC.

The second change is to Subsection B of 20.6.4.503 NMAC and associated specific conductance ("SC") criteria. A perennial reach of the West Fork Gila River is misidentified in Subsection B. Correcting this error changes the assignment of the current SC criteria in this segment. Therefore, the SC assigned to tributaries of water bodies in this segment was also evaluated.

The segment in 20.6.4.503 NMAC ("Segment 503") in the Gila River Basin is currently assigned the high quality coldwater aquatic life use with segment-specific SC criteria of 300µS/cm applied to "the main stem of the Gila river above Gila hot springs." The SC criteria of 400 µS/cm is applied to all other reaches. The United Stated Geological Service ("USGS") map,

which is the default resource for physiographic feature identifications and often used to delineate segments, shows that the water body upstream of Gila Hot Springs is identified as "West Fork Gila River" (SWQB Exhibit 59). In addition, the river downstream of Gila Hot Springs to the confluence with the East Fork Gila River is actually the West Fork Gila River. The confluence of the West Fork and the East Fork Gila create the Gila River (SWQB Exhibit 59). Additionally, road maps of the area identify the road paralleling the river above the East and West Fork confluence, extending to Gila Hot Springs as the "West Fork Road" (SWQB Exhibit 60). Therefore, according to the USGS map, the water body designated as "the main stem Gila river above Gila hot springs" which is above the confluence of the West Fork and East Fork Gila is the West Fork Gila River.

In correcting this error the SWQB evaluated whether to apply one SC criteria to the West Fork Gila, or two different SC criteria, one upstream and one downstream of the influence of the Gila Hot Springs, as is currently in Segment 503. In the surface water quality standards ("WQS"), SC limits are assigned to the high quality cold water aquatic life use ("HQCW") and these limits are segment-specific, ranging between 300 µS/cm and 1,500 µS/cm depending on the natural background in the particular surface water (the intent of this criterion is to prevent excessive increases in dissolved solids which would result in changes to community structure). Hot springs or geothermal waters, because they are in intimate contact with reactive parent geology, are known to have higher specific conductance than other surface waters and are thus considered as natural background influences when establishing the proper segment specific SC limit to a HQCW segment. Therefore, the influence of the Gila Hot Springs complex was evaluated as the basis for the current (and higher) segment-specific SC criteria for Segment 503.

Based on data from a geochemical study of several New Mexico hot springs conducted in 1972, the geothermal hot springs in the town of Gila Hot Springs join the West Fork Gila above the confluence of the West Fork and East Fork Gila rivers, and exhibit naturally high SC consistently exceeding 500 µS/cm. The data summary from Gila Hot Springs and other area hot springs are shown in SWQB Exhibit 61. However, to determine the influence of the hot springs on the West Fork Gila, SC data from grab samples and long-term measurements taken by the SWQB from several tributaries of the Gila River were evaluated. SWQB also analyzed similar data for other streams and rivers in the Gila basin (SWQB Exhibit 62). The data compiled for the West Fork of the Gila River, downstream of Gila hot springs indicated some influence of the hot springs, but consistently were able to meet a 300 µS/cm criterion. Because other Gila tributaries and branches are captured by the segment-specific SC criteria, the other Gila tributaries within the Segment 503 were analyzed to determine if the 400 µS/cm SC criteria is also appropriate for these water bodies (SWQB Exhibit 63). Because background ranges of greater than 300 µS/cm are apparent on other Gila tributaries within the segment (other than the West and Middle fork Gila rivers), and are due to natural inputs of geothermal waters, the 400 µS/cm criterion is appropriate for those water bodies. A summary memo supporting the reasoning for these proposals is also provided in SWQB Exhibit 64.

C. CONCLUSION – Sections 20.6.4.502 and 503 NMAC

To be consistent with USGS maps and local geographic knowledge; the segment description should be revised as presented in the proposal for 20.6.4.502 and .503 NMAC. According to analyses of SC results and flow data, the West Fork Gila River and its tributaries

currently maintain the SC criteria of 300 µS/cm. The segment-specific SC criterion of 400 µS/cm for all other perennial tributaries (i.e., excluding the West Fork Gila River and its tributaries) and upstream of and including Mogollon Creek remains appropriate.

III. PROPOSALS – Sections 20.6.4.803, 804 and 807 NMAC

A. INTRODUCTION

The Use Attainability Analysis ("UAA") is a scientific tool to identify and assign the proper designated uses to a water body segment. From the United States Environmental Protection Agency (EPA) UAA guidance website[1]: "*A key concept in assigning designated uses is "attainability," or the ability to achieve water quality goals under a given set of natural, human-caused, and economic conditions. The overall success of pollution control efforts depends on a reliable set of underlying designated uses in water quality standards*".

Designated uses are those uses specified in state or tribal regulations or water quality standards *whether or not they are being attained*. They may include uses such as recreational (*e.g.*, boating and swimming), the propagation of fish and other aquatic life, human health related to the consumption of fish and shellfish, and uses by wildlife and livestock. Designated uses are further explained in §101(a)(2) of the Clean Water Act ("CWA"). A UAA can be structured to answer such questions as: (1) what are the current uses of a segment or water body; (2) What are the causes of impairment of such uses; and, (3) what are the attainable uses based on the physical, chemical and biological character of the water body? The CWA §101(a) uses are presumed and may only be removed by states or tribes if they are not currently attained as

[1] http://water.epa.gov/scitech/swguidance/standards/uses/uaa/info.cfm

specified in 40 CFR §131.10(g). Alternatively, sub-categories of a use may be established if the tribe or state can demonstrate that attaining the designated use is not feasible under 40 CFR §131.10(g).

The Department has conducted a UAA for the Mimbres River. The UAA concludes that the designated aquatic life use ("ALU") is not attainable for the entire reach, and recommends a segment. From Cooney Canyon to the headwaters of the Mimbres River, including all perennial tributaries from the 23d ecoregion (Subalpine Forests), should remain designated as High Quality Coldwater ALU. A new segment extending from Allie Canyon to Cooney canyon (the "Middle Mimbres") should be re-designated as Coldwater ALU, and a segment from Allie Canyon to the mouth of the Mimbres should be re-designated as Coolwater ALU with a segment-specific temperature criterion of 30°C (SWQB Exhibit 65, Figure 5). While survey year 2009 exhibited a lower flow as compared to the 30 year mean (USGS 08477110 MIMBRES RIVER AT MIMBRES, NM), interannual variation in flows, and both the 2003 and 2009 temperature dataset suggest that the 29°C criteria associated with coolwater ALU will not be attainable and a segment-specific criteria of 30°C is more appropriate. Therefore, the Department is proposing the following changes to the water quality standards.

B. PROPOSALS - Sections 20.6.4.803, 804 and 807 NMAC

The following are the proposed changes to 20.6.4.502 and 503 NMAC:

20.6.4.803 CLOSED BASINS - Perennial reaches of the Mimbres River downstream of the confluence with ~~Willow Springs~~ Allie canyon and all perennial reaches of tributaries thereto.

A. Designated Uses: ~~coldwater~~ coolwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less and temperature of 30°C (86°F) or less.

[20.6.4.803 NMAC - Rp 20 NMAC 6.1.2803, 10-12-00; A, 05-23-05; A, 12-01-10; A, XX-XX-XX]

20.6.4.804 CLOSED BASINS - Perennial reaches of the Mimbres River upstream of the confluence with ~~Willow Springs~~ Allie canyon to Cooney canyon, and all perennial reaches of East Fork Mimbres (McKnight Canyon) below the fish barrier, and all perennial reaches thereto.

A. Designated Uses: irrigation, domestic water supply, coldwater aquatic life, livestock watering, wildlife habitat and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: ~~specific conductance 300 µS/cm or less;~~ the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

[20.6.4.804 NMAC - Rp 20 NMAC 6.1.2804, 10-12-00; A, 05-23-05; A, 12-01-10; A, XX-XX-XX]

[NOTE: The segment covered by this section was divided effective XX-XX-XX. The standards for the additional segment are covered under 20.6.4.807 NMAC.]

20.6.4.807 CLOSED BASINS - Perennial reaches of the Mimbres river upstream of Cooney Canyon and all perennial reaches thereto, including perennial reaches of East Fork Mimbres river (McKnight Canyon) above the fish barrier.

A. Designated Uses: irrigation, domestic water supply, high quality coldwater aquatic life, livestock watering, wildlife habitat and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance 300 µS/cm or less; the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

[20.6.4.807 NMAC – A, XX-XX-XX]

C. BASIS FOR PROPOSALS

The Mimbres River in southwestern New Mexico is an endorheic or "closed basin" river system that is currently classified in water quality standards section 20.6.4 of the New Mexico Administrative Code (NMAC) as segments 20.6.4.803 NMAC, with a Coldwater Aquatic Life Use (CWALU) and 20.6.4.804, with a High Quality Coldwater Aquatic Life Use (HQCWALU). Segment 20.6.4.803 NMAC ("Segment 803"), contains the lower Mimbres River, beginning where the Mimbres ceases perennial surface flow near Deming, NM, and continuing upstream to a geographic feature listed as Willow Springs Canyon, which is below the town of Mimbres

(SWQB Exhibit 65, Figure 5). Segment 20.6.4.804 ("Segment 804") contains the upper Mimbres River (and tributaries thereto) from Willow Springs Canyon to the headwaters in the Black Range of the Aldo Leopold Wilderness.

The current segment map of the Mimbres River is shown in Figure 1, SWQB Exhibit 65. The Mimbres River watershed is contained within the larger Guzman basin in southwestern New Mexico and northern Mexico. The river headwaters are in the Aldo Leopold wilderness of the Black Range in Sierra and Grant counties. It then flows south into Luna county and, depending on flow, ceases to have perennial surface water near the city of Deming, NM. The uplands and headwaters are in U.S. Forest Service lands while the Mimbres valley is mostly privately held lands abutting the river and its tributaries.

Both Mimbres River segments were listed as impaired for the reason of water temperatures exceeding the current aquatic life use designations in the 2014-2016 CWA §303(d)/§305(b) Integrated List & Report. The temperature impairments for the two Mimbres River segments are suspected to be a result of the river's ecoregional setting, as opposed to being anthropogenic. Thus, the SWQB conducted a UAA to determine the appropriate aquatic life use using physical, ecological and biological settings as parameters for investigation, as well as Air-Water temperature modeling to determine attainable temperature. Air temperature is the single greatest environmental forcing factor in driving stream temperatures (NMED/SWQB, 2011).The Mimbres UAA demonstrated that the Coolwater ALU is the most protective and attainable use for the lower Mimbres (Segment 803), but that this segment should extend upstream to the geographic feature of Allie canyon, approximately four (4) miles above the town of Mimbres, and that a segment-specific temperature of 30°C be assigned because of natural water temperatures resulting from its ecoregional setting and high air temperatures. From Allie canyon,

it is proposed that segment 804 extend upstream to the ecoregional boundary of the 23c "montane conifer forests" and 23b, "Madrean lower mountain forests" at Cooney Canyon on the mainstem Mimbres and to the fish barrier at McKnight Canyon. The UAA demonstrated that for Segment 804, a CWALU is most protective and attainable. If approved the segment-specific criterion for specific conductance (SC) would no longer apply and thus this is removed in the proposed language in 20.6.4.804 NMAC. A new segment, 20.6.4.807 NMAC ("Segment 807"), is proposed for perennial reaches of the Mimbres River and East Fork Mimbres River (McKnight canyon) that encompasses the headwaters and assigns these waters the High Quality Coldwater (HQCW) ALU. With the adoption of the HQCW ALU, a SC criterion would apply that is segment-specific and between the ranges of 300 and 1,500 µS/cm, dependent on natural conditions. SWQB performed a survey of SC on Mimbres headwater reaches in 2005 and results showed an average SC of 145 and a maximum of 173, thus we propose the lowest SC criterion of 300 µS/cm. The SC proposal in Subsection B of 20.6.4.807 NMAC was not in the petition proposal submitted to the WQCC on June 25, 2014; however, based on SWQB's evaluation of the natural conditions and the assignment of the HQCW ALU to Segment 807, it is necessary to add the SC criterion which is assigned to the HQCW ALU under Subparagraph 20.6.4.900.H (1) at this time. Therefore, the proposal in this testimony is the appropriate use and criteria assignment for Segment 807.

The ecoregions containing the Mimbres watershed are shown in Figure 1 of SWQB Exhibit 65. Ecoregions are geographic areas of similar characteristics including elevation, geology, climate, soils, and vegetation, and these factors also help to identify segments, assessment units, and probable influences on stream chemistry and habitat. Some ecoregions

characteristics for the Mimbres River are summarized in Table 1 of SWQB Exhibit 65, and results of temperature monitoring shown in Tables 3b and 3c of SWQB Exhibit 65.

It can be seen that elevations range from approximately 4,400 to 9,700 feet, and that both segments fail to meet both acute and chronic temperature criteria (SWQB Exhibit 65, Table 3b). Maximum water temperature predictions using an elevation-based air temperature model suggest that for expected air temperatures in warm months, neither segment would be able to meet the current aquatic life use criteria (SWQB Exhibit 65, Table 3c). That some within-segment stations did meet some of the temperature criteria (SWQB Exhibit 65, Tables 3a and b) when thermographs are deployed therein is likely a function of micro-climate influences such as groundwater influxes or model errors. However, a preponderance of both actual and modeled water temperatures suggest that both segments 803 and 804 are misidentified in regard to supportable aquatic life uses.

A second indicator of proper aquatic life use assignment is the fish community of a particular water body or segment. Fish species have thermal requirements (*i.e.*, a temperature range within which they thrive) for various life stages, and while the fish community alone is not a *de facto* indication of proper ALU, as alterations of the thermal regimes in a stream due to disturbance may select for a particular fish community, they can lend important and supporting information to identifying proper use. Thermal preference categories in New Mexico include coldwater, coolwater, and warmwater communities and SWQB has a database to identify fish species' thermal preferences based on a scientific consensus of NM fisheries biologists, and review of the available literature. The aquatic life thermal preferences categories and their associated temperature criteria are presented in Table 2 of SWQB Exhibit 65.

The SWQB conducted a literature review of fish species documented for the Mimbres River and fish community data collected by the SWQB as well as through consultation with fisheries biologists at the SWQB, the U.S. Forest Service, and New Mexico Game and Fish. Native and introduced species of fish and their thermal preferences are presented in Tables 5a and b of SWQB Exhibit 65, respectively, and indicate that a variety of fish communities exist in the two segments, but that cool- to warmwater species are the likely communities native to the Mimbres River. Native warmwater species are listed as extirpated or are thought to be unlikely in the river; however, the introduced warmwater species, the Longfin dace, appears to be a significant member of the extant community (SWQB Exhibit 65, Table 5c). Along most of the Mimbres River, the SWQB's fisheries surveys and those of New Mexico Game and Fish suggest cold-to-cool-to-warmwater transitions as the river progresses from the headwaters, to the Mimbres valley, to the Chihuahuan desert. Although the introduced coldwater Rainbow trout has been occasionally recorded for the mid to lower Mimbres River, where temperatures typically exceed the coldwater standard, data do not indicate a reproducing population of these fish for Mimbres River Segment 803, as well as a significant portion of the upper Mimbres Segment 804 (SWQB Exhibit 65, Figure 4).

A third indicator of supportable aquatic life use is the geomorphological settings of the Mimbres basin. From headwaters to the valley and on into the desert, the Mimbres River transitions from a narrow, bedrock constrained and naturally shaded stream, to an open, meandering river, in which shade providing riparian flora occurs intermittently with reaches of scant vegetation (SWQB Exhibit 65, Figure 2). The Mimbres river valley is nestled between rolling hills with sparse vegetation and thus erosion has, over geologic time, delivered significant unconsolidated natural erosional till to the valley. The erosional till material is highly porous,

making water retention to support riparian flora difficult except for the most drought and flood tolerant species. Although channelization, water table drawdowns and irrigation uses also likely contribute to the Mimbres River temperature regimes, many of these anthropogenic influences have waned since their peak in the late 1970's, as reflected in water table records.

C. CONCLUSION

For reasons of historical and existing fish communities, measured and modeled water temperature, and the geomorphic setting of the Mimbres River, the SWQB proposes changes to 20.6.4.803 and 804 NMAC, and the addition of a new segment as 20.6.4.807 NMAC. Specifically, the UAA recommends coolwater ALU is attainable for perennial reaches of 20.6.4.803 NMAC extending from the mouth of the Mimbres near the City of Deming, New Mexico to Allie Canyon, with a segment-specific maximum temperature of 30°C. For 20.6.4.804 NMAC, the UAA recommends a coldwater ALU for the perennial reaches in 20.6.4.804 NMAC from Allie Canyon to Cooney Canyon near the 23d/23c ecoregional boundary on the mainstem of the Mimbres River and also at the similarly-situated fish barrier on the McKnight Canyon tributary (East Fork Mimbres). Finally, the creation of a new segment, 20.6.4.807 NMAC, is proposed with the high quality coldwater ALU and criteria applicable to all perennial reaches of the Mimbres River from the headwaters of the Mimbres River to Cooney Canyon (and within the 23d ecoregional zone).

III. PUBLIC PARTICIPATION

The SWQB released the public discussion draft for the Triennial Review that included proposed changes to the Gila River segments and the draft Mimbres River UAA on April 1, 2014, with a public comment period that was extended through May 30, 2014. The draft UAA and recommendations were also posted on the SWQB's website and an email notification was sent to interested parties. No public commentary was received on the UAA. The Mimbres River UAA was sent to the EPA for technical review on July 21, 2014.

IV. RECOMMENDATION

The SWQB is petitioning the WQCC to approve changes to the descriptions for Segments 20.6.4.502 and .503 NMAC, and changes to correctly identify and describe the appropriate SC criteria for Segment 20.6.4.503 NMAC. The SWQB is also petitioning the WQCC to approve recommendations based on the UAA conducted for the Mimbres River Basin segments 20.6.4.803, 804 and 807 in order to assign the attainable aquatic life uses and criteria.

Once approved by the WQCC and adopted as standards, the SWQB will submit the revised water quality standards (as will be published in the New Mexico Register) to USEPA for formal review and final approval action under CWA § 303(c). This concludes my testimony.