DRAFT RATIONALE FOR PROPOSED REVISIONS TO SELECT WATER QUALITY REGULATIONS AND WATER QUALITY CRITERIA

NAC 445A.1527
North Antelope Creek

Prepared by:

Nevada Division of Environmental Protection
Bureau of Water Quality Planning
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Nevada Water Pollution Control Regulations
NAC 445A.1527
North Antelope Creek

Executive Summary

Introduction
This document discusses the proposed addition of North Antelope Creek to the Nevada Administrative Code (NAC) to include beneficial uses and water quality standards for the creek. The proposed addition involves adding the waterbody to the water quality regulations and setting select water quality criteria. Detailed discussion of the proposed changes including supporting information and documentation are summarized below.

Reaches
It is proposed to add the entire length of North Antelope Creek (also known as Little Antelope Creek) to the NAC.

Beneficial Uses
The proposed beneficial uses for North Antelope Creek are:

- Watering Of Livestock;
- Aquatic Life;
- Recreation Involving Contact With The Water;
- Recreation Not Involving Contact With The Water;
- Industrial Supply; and
- Propagation Of Aquatic Life.

The beneficial uses that are not being proposed for North Antelope Creek are:

- Irrigation;
- Municipal and Domestic Supply;
- Waters of Extraordinary Ecological or Aesthetic Value; and
- Enhancement of Water Quality.

Proposed Water Quality Standards for North Antelope Creek

The Proposed Water Quality Standards for North Antelope Creek are shown in the Table 1.

1.0 Introduction

Under Section 303 of the Clean Water Act, States and authorized tribes have the responsibility for routinely reviewing and, as appropriate, modifying surface water quality standards that protect the designated uses of a water body and provide a basis for controlling discharges or releases of pollutants. The Nevada Division of Environmental Protection, Bureau of Water Quality Planning (BWQP) is proposing to add beneficial uses and surface water quality standards for North Antelope Creek, Elko County, Nevada.

2.0 Background

North Antelope Creek is located in western Elko County, Nevada, about 35 miles northeast of Battle Mountain, and is within the Humboldt River Hydrographic Basin (see Figure 1). The creek originates near Big Butte approximately 4 miles south of Willow Creek Reservoir, flows to the south and terminates at its confluence with Antelope Creek. Antelope Creek is a tributary to Rock Creek which flows into the Humboldt River east of Battle Mountain (Figure 1 and 2). Photographs of North Antelope Creek are shown in **Appendix 1**.

North Antelope Creek is approximately 10 miles long and is either ephemeral or intermittent through its entire length. The upper 1/3 and the lower 1/3 of the creek flow only due to precipitation events, while the middle 1/3 of the creek is intermittent.

Site use assessment visits were performed in May, June, and October of 2011. During each of the site visits there was no hydrologic connection between North Antelope Creek and Antelope Creek. In the photograph taken May 2011, shown in Appendix 1, it appears that there is a hydrologic connection. This is actually backflow from Antelope Creek, 100 feet upstream, North Antelope Creek is dry.

North Antelope Creek does not have assigned beneficial uses and specific water quality standards. Water Quality standards for North Antelope are currently provided under the Tributary rule, NAC 445A.145 shown below:

> ***NAC 445A.1239 Control points: Prescription and applicability of numerical standards for water quality; designation of beneficial uses. (****NRS 445A.425****, 445A.520****)***
>
> *1. Control points are locations where water quality criteria are specified. Criteria so specified apply to all surface waters of Nevada in the watershed upstream from the control point or to the next upstream control point or to the next water named in NAC 445A.123 to 445A.2234, inclusive.*
>
> *2. If there are no control points downstream from a particular control point, the criteria for that control point also apply to all surface waters of Nevada in the watershed downstream of the control point or to the next water named in NAC 445A.123 to 445A.2234, inclusive.*
>
> *3. Each standard is set to protect the beneficial use which is most sensitive with respect to that particular standard…*

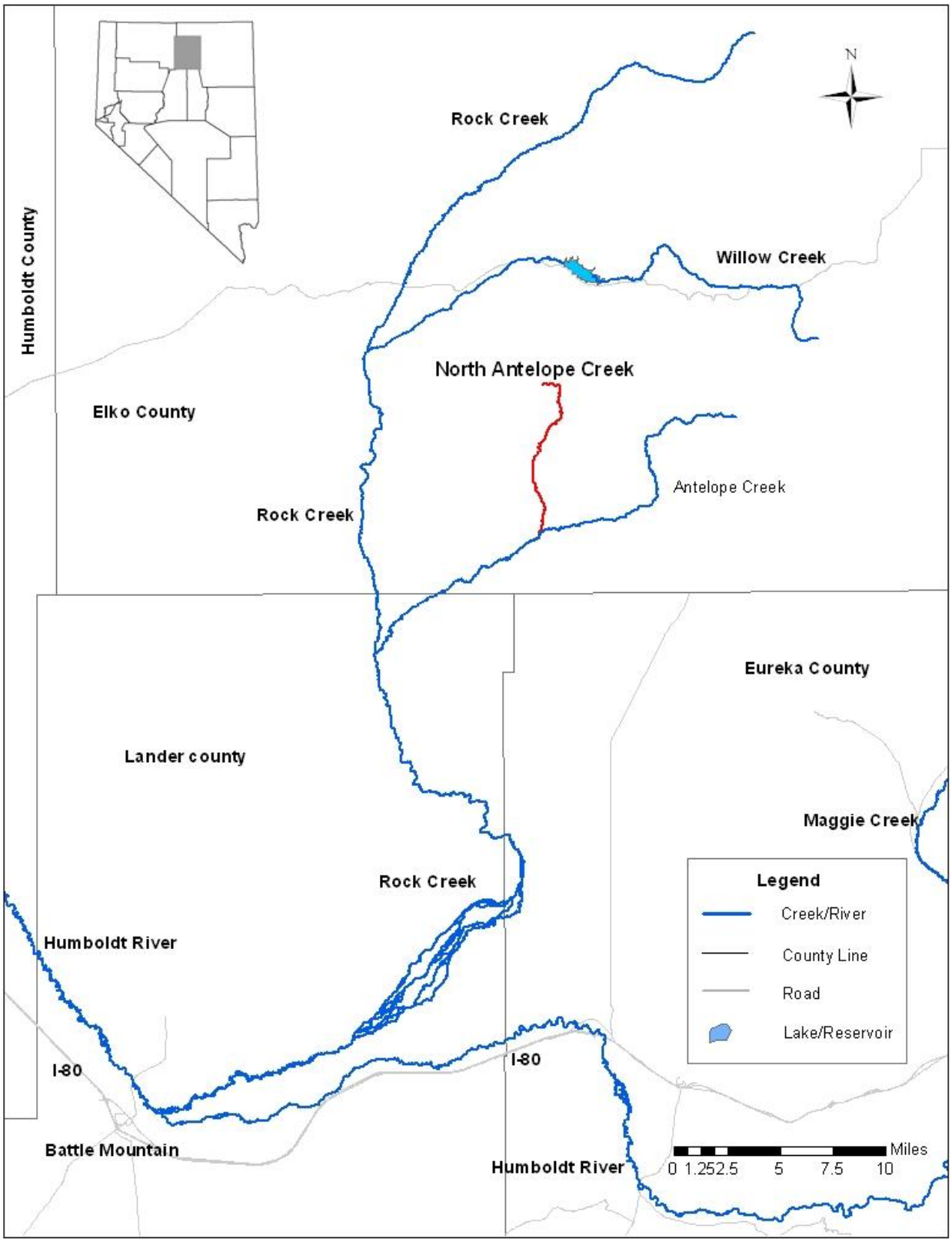

Figure 1 Location Map, North Antelope Creek (shown in red)

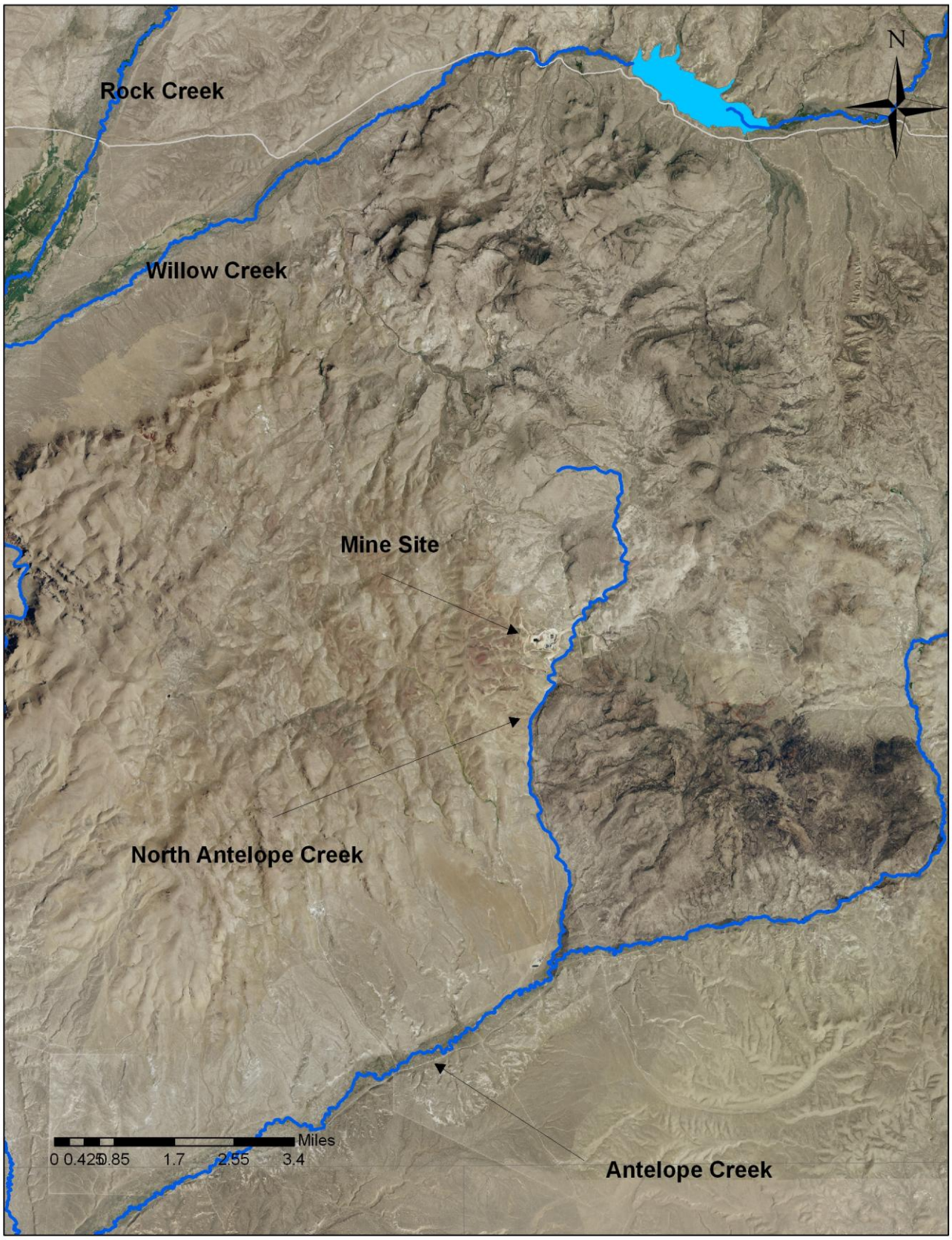

Figure 2 North Antelope Creek

NDEP's goal is to assign appropriate beneficial uses and water quality standards to waterbodies. Currently, as North Antelope Creek is a tributary to Rock Creek (through Antelope Creek), the standards for the lower section of Rock Creek apply to North Antelope Creek. This rationale is NDEP's assessment of what appropriate beneficial uses and water quality standards should apply to North Antelope Creek. As with all waters, the beneficial uses are established and water quality standards are then assigned to protect those uses.

Below is a more detailed discussion of the land uses along North Antelope Creek, but in general the area has been used for grazing and mining.

Ivanhoe Gold Company, a subsidiary of Galactic Resources Ltd. began development work in 1988 and conducted mining operations from 1990 to 1992 at the Hollister Mine. Newmont Mining Corporation (Newmont) obtained the property in 1992 from Ivanhoe Gold Company but did not conduct mining operations. The portions of the Hollister Mine owned by Newmont have been in a state of post-closure since 2001. The site includes two partially backfilled open pits (West Pit and East Pit), a reclaimed, spent heap leach pad, and four overburden stockpiles (North, West, South, and East).

The mineral interest in the area was acquired from Newmont by Great Basin Gold and exploration of the East Pit area of the Hollister Mine was conducted from 1997 to 2002. Underground exploration was conducted from 2002 to 2007. Since 2007, Rodeo Creek Gold, Inc., a subsidiary of Great Basin Gold, has continued the ongoing underground exploration with the Hollister Development Block.

3.0 Beneficial Use Assessments

During 2011 NDEP completed beneficial use surveys on North Antelope creek. These surveys consisted of observing potential beneficial uses as defined in the NAC 445A.122. The uses in NAC445A.122 that can be assigned to a waterbody include: Watering of livestock, Irrigation, Aquatic life, Recreation involving contact with the water, Recreation not involving contact with the water, Municipal or domestic supply, Industrial supply, Propagation of wildlife, Waters of extraordinary ecological or aesthetic value, and Enhancement of water quality. Each of these uses was assessed as to whether it was appropriate to establish the use on North Antelope Creek.

Below are the proposed beneficial uses for North Antelope Creek with observations substantiating these uses:

- Watering Of Livestock
    - Open Range;
    - Cattle were present in Antelope Creek, and a few in the lower portions of North Antelope Creek;
    - Cattle feces were observed near the channel above and below the Mine area;
    - Numerous salt licks (buckets) were observed along Antelope Creek;

    NDEP is proposing Watering of Livestock as a use.
- Aquatic Life
    - Macroinvertebrates observed by NDEP within North Antelope Creek;
    - Tetra Tech collected macroinvertebrates within North Antelope Creek;
    - Small fish were observed by NDEP in a small spring area near southern boundary of the Mine property, but NDOW listed no game fish species in North Antelope Creek their fishable waters maps or in Walstrom, Robert E. 1973, Forecasts for the Future-Fish and Wildlife, Appendix D, Inventory: Statistical Data for the Streams and Lakes of Nevada;
    - Periphyton were observed throughout the wetted area;

    NDEP is proposing Aquatic Life as a use.
- Recreation Involving Contact With The Water
    - None observed;
    - No evidence of swimming;

- Recreation in the water of North Antelope Creek is possible;

NDEP is proposing Contact recreation as a use at the infrequently used protection level.

- Recreation Not Involving Contact With The Water
  - Hunting - Shell casings observed;
  - Tracks of off road vehicular traffic were found;

  NDEP is proposing Recreation Not Involving Contact with Water as a use.
- Industrial Supply
  - Mining is present;

  NDEP is proposing Industrial Supply as a use.
- Propagation Of Wildlife
  - Deer tracks, chukars, hawks, owls, coyote tracks, and small mammals (squirrels, rabbits) were observed;

  NDEP is proposing Propagation of Wildlife as a use.

<u>The beneficial uses that are not being proposed for North Antelope Creek are:</u>

- Irrigation
  - No connection was observed between North Antelope Creek and Antelope Creek;
  - No surface or ground irrigation water rights are on file at the State Engineers Office; and
  - No evidence, of fields, row crops, alfalfa, irrigation canals, irrigation pivots, etc.
- Municipal and Domestic Supply
  - No connection was observed between North Antelope Creek and Antelope Creek;
  - No surface or ground municipal or domestic water rights on file at the State Engineers Office; and
  - No observed municipal or domestic uses on North Antelope Creek.
- Waters of Extraordinary Ecological or Aesthetic Value
  - Not appropriate as this use is to protect very high quality waters (e.g., Lake Tahoe).
- Enhancement of Water Quality.
  - Not appropriate as this use is to protect waters that flow into very high quality waters (e.g., tributaries to Lake Tahoe).

Please note, if a beneficial use is not established for North Antelope Creek (e.g., Irrigation), this does not prevent NDEP from establishing that use at a later date if conditions change.

4.0 Water Quality Standards for North Antelope Creek

The beneficial use water quality standards proposed for North Antelope Creek are based primarily on the United States Environmental Protection Agency (USEPA) national recommended criteria. The proposed water quality standards are shown in Table 1. The proposed standards for water quality parameters are the recommended criteria values to protect the most sensitive beneficial use.

The NDEP has developed a proposed ***Nutrient Criteria Plan/Strategy*** that will provide a more robust approach for addressing nutrient pollution and impacts to aquatic life and aesthetic/recreational uses in Nevada waters. This assessment approach measures both causal and response variables and utilizes a weight of evidence framework to manage and evaluate nutrient levels on a site specific basis. In addition to total phosphorous numerical water quality standards for North Antelope Creek, the following narrative standard would be used also: *"The water must not contain nutrient concentrations from a source other than a natural source which cause the growth of algae or aquatic plants in amounts that interfere with any beneficial uses of the water."*

This narrative standard will allow a multiple line of evidence approach; incorporating factors such as water chemistry, dissolved oxygen levels, algae growth conditions, biological data, and physical habitat conditions, such as stream flow, shading, and substrate types, to more effectively evaluate and to

determine whether nutrient pollution is a problem in these waters as well as other Nevada surface waters.

Table 1 Water Quality Standards for Antelope Creek

NAC 445A.1527 Humboldt Region: North Antelope Creek at Antelope Creek (NRS 445A.425, 445A.520) The limits of this table apply to the body of water known as North Antelope Creek from its origin to Antelope Creek. North Antelope Creek is located in Elko County.

PARAMETER	REQUIREMENTS TO MAINTAIN EXISTING HIGHER QUALITY	WATER QUALITY STANDARDS FOR BENEFICIAL USES	Beneficial Use[a]										
			Livestock	Irrigation	Aquatic	Contact	Noncontact	Municipal	Industrial	Wildlife	Aesthetic	Enhance	Marsh
Beneficial Uses			X		X	X	X		X	X			
Aquatic Life Species of Concern													
Temperature - °C		S.V. ≤ 34.0			*	X							
pH – SU		S.V. 6.5 – 9.0	X		*	*			X	*			
Dissolved Oxygen - mg/l		S.V. ≥ 5.0	X		*	X	X			X			
Total Phosphorous (as P) - mg/l		S.V. ≤ 0.1[b]			*	*	X						
Nitrogen Species (as N) - mg/l		Nitrate [b]	X		*					X			
		Nitrite [b]	X		*					X			
		Total Nitrogen [b]			*	X	X			X			
Total Ammonia (as N) - mg/l		[c]			*								
Total Dissolved Solids - mg/l		S.V. ≤ 3000	*										
Chloride - mg/l		1-hr. Avg. ≤ 230[d] 96-hr. Avg. ≤ 860	X		*					X			
Suspended Solids - mg/l		S.V. ≤ 80			*								
Turbidity – NTU		S.V. ≤ 50			*								
E coli - No./100 ml		A.G.M. ≤ 126 S.V. ≤ 576				*	X						
Fecal Coliform - No./100 ml		S.V. ≤ 1000	*				X			*			

* = The most restrictive beneficial use.
X = Beneficial use.

a. Refer to NAC 445A.122 and 445A.2142 of this regulation for beneficial use terminology.
b. The water must not contain nutrient concentrations from a source other than a natural source which cause the growth of algae or aquatic plants in amounts that interfere with any beneficial uses of the water.
c. The ambient water quality criteria for ammonia are specified in NAC 445A.118.
d. One-hour and 96-hour average concentration limits may be exceeded only once every 3 years.

5.0 Water Quality Criteria

The beneficial use standards (BUS) are set at values necessary to protect the most sensitive designated beneficial uses, taking into account downstream beneficial uses. In general, the BUS are derived from EPA guidance, other agency guidance, or site specific studies.

Following is a discussion of the proposed beneficial use standards and proposed water quality standards.

Routine Pollutants

Temperature

The proposed water quality temperature standard of single-value (S.V.) ≤ 34.0 is based, in part, on Nevada Department of Wildlife (NDOW) recommendations of temperature requirements needed to support different stages of various warm water aquatic life species found in the Nevada. Temperature Standards are going to be reviewed for the entire state and at that point the Temperature Standard will be addressed.

pH

It is proposed to set the pH Criteria to a single value of 6.5 to 9.0 SU. The most recent USEPA Criteria recommends a pH of 6.5 – 9.0 SU for protection of aquatic life. This range appears to provide adequate protection for freshwater fish and bottom dwelling invertebrates (USEPA, 1986). This Criteria also protects for watering of livestock, water contact recreation, and propagation of wildlife uses.

Discussion of pH data

There are 25 pH samples on North Antelope Creek ranging from 7.27 to 8.44. All the samples are within the range of the proposed Criteria.

Dissolved Oxygen

It is proposed to set the Dissolved Oxygen Criteria to a S.V. ≥ 5.0 mg/l. The most recent USEPA Criteria recommends a Dissolved Oxygen value ≥ 5.0 mg/l for protection of aquatic life for warm water fish early life stages (USEPA, 1986). This criterion also protects for water contact recreation, water non-contact recreation, and propagation of wildlife uses.

Total Phosphorous

It is proposed to add the parameter Total Phosphorous (as P) of S.V. ≤ 0.1 (USEPA, 1986). NDEP also proposes to add the narrative criteria:

> "The water must not contain nutrient concentrations from a source other than a natural source which cause the growth of algae or aquatic plants in amounts that interfere with any beneficial uses of the water."

This Criteria protects for aquatic life, water contact recreation, and water non-contact recreation.

Nitrogen Species – Nitrate, Nitrite and Total Nitrogen

It is proposed to set the standard for Nitrogen Species (as N) for Nitrate, Nitrite, and Total Nitrogen as a narrative criterion:

> "The water must not contain nutrient concentrations from a source other than a natural source which cause the growth of algae or aquatic plants in amounts that interfere with any beneficial uses of the water."

This Criterion protects for aquatic life, water contact recreation, water non-contact recreation. watering of livestock and propagation of wildlife uses.

Total Ammonia
It is proposed to add Total Ammonia criteria specified in NAC 445A.118. The most recent USEPA Criteria update recommends an acute water quality criteria for total ammonia for freshwater aquatic life, a chronic water quality criteria for total ammonia for waters where freshwater fish in early life stages may be present, and a chronic water quality criteria for total ammonia for water where freshwater fish in early life stages are absent for protection of aquatic life which are specified in NAC 445A.118 (USEPA, 1999).

Total Dissolved Solids
It is proposed to set the Total Dissolved Solids (TDS) criteria to a single value of 3000 mg/l. The most recent USEPA Criteria recommends a TDS value of ≤ 3000 mg/l for protection of livestock watering (USEPA, 1972). This criterion protects for watering of livestock.

Discussion of Total Dissolved Solids data
There are 25 TDS samples on North Antelope Creek ranging from 203 mg/l to 2500 mg/l. No samples exceeded the proposed criteria.

Chloride
It is proposed to set the Chloride Criteria to a S.V. ≤ 230/860 mg/l for the protection of Aquatic Life (USEPA, 1988). Chloride is a natural mineral salt that is ubiquitous throughout the different Nevada hydrobasins. Natural factors such as an arid climate; periodic drought conditions; and evaporation processes can inherently increase the chloride concentrations in surface waters. Except for select terminal waterbodies (e.g. Humboldt Sink and Walker Lake), the chloride concentrations routinely measured in Nevada surface waters are generally below the proposed water quality standard. This criterion also protects for watering of livestock and propagation of wildlife.

Total Suspended Solids
Total suspended solids (TSS) refers to the organic and inorganic particulate matter in water. TSS impacts upon aquatic life can be divided into two categories: 1) effects that occur in the water column; 2) effects resulting from sedimentation of the stream substrate caused by deposition of the suspended solids. The recommended TSS criteria S.V. ≤ 80 mg/l. These criteria were set for the protection of aquatic life and are based upon 1972 USEPA guidance (USEPA, 1972).

Turbidity
It is proposed to set the Turbidity Criteria to a S.V. ≤ 50 NTU. The 1968 Report of the Commission on Water Quality Criteria recommends a Turbidity value of 50 NTU for protection of warm water aquatic life. This value protects against sediment filling in the interstices between gravel and stones which eliminate the spawning grounds of fish and the habitat of many aquatic insects and other invertebrate animals such as mollusks, crayfish, fresh water shrimp, etc. (FWPCA, 1968).

E Coli
It is proposed to add the *E. Coli* Criteria of an annual geometric mean (AGM) ≤ 126 No./100 ml and a S.V. ≤ 410 No./100 ml. The most recent USEPA implementation guidance criteria for bacteria recommends E Coli values of AGM ≤ 126 No./100 ml and a SV ≤ 410 No./100 ml for protection of water contact recreation. These values appear to provide adequate protection for the risk level of 8% (8 illness per 1000 swimmers) and the 90th percentile (lightly used full body contact recreation)(USEPA, 2004). The S.V. ≤ 410 No./100 ml is consistent with other Nevada Standards tables within the NAC. This criterion also protects the non-contact water recreation use.

Fecal Coliform
It is proposed to set the Fecal Coliform Criteria to a SV of 1000 No./100 ml. The 1972 National Academy of Sciences and National Academy of Engineering, Water Quality Criteria recommends a Fecal Coliform value of 1000 No./100 ml for protection of Livestock. This value appears to provide adequate protection

so that no hazards to animals or man result from their use or from consumption of raw crops irrigated with such waters (NASNAE, 1973). This criterion also protects for water non-contact recreation, and propagation of wildlife uses.

Toxics

NAC 445A.1236 is the water quality regulation containing standards for toxic materials and other pollutants that are applicable on a statewide basis to surface waters contained in the Nevada water quality regulations and to other waters per the tributary rule as described in NAC 445A.1239. Toxic material is defined in NAC 445A.110 as "…any pollutant or combination of pollutants which will on the basis of information available to the administrator, cause an organism or its offspring to die or suffer any disease, behavioral abnormality, cancer, genetic mutation, physiological malfunction, including a malfunction in reproduction, or physical deformation, if that pollutant or combination of pollutants is discharged and exposed to or assimilated by the organism, whether directly from the environment or indirectly through food chains."

Chemical standards have been tabulated in NAC 445A.1236 for four (4) categorical uses of a water body. These four uses include municipal or domestic supply, protection of aquatic life, irrigation, and watering of livestock. Specific water quality standards for individual inorganic chemicals and organic chemical compounds are provided in the table (NAC 445A.1236) to protect the aforementioned designated uses.

Discussion of Metals Data

For the use aquatic life, manganese exceeds the standard more than 10 % of the time and iron, selenium and zinc exceed the standard more than once in a 3 year period. .

6.0 Summary

NDEP is proposing to add North Antelope Creek (the entire length) to the Nevada Administrative Code (NAC) to include beneficial uses and water quality standards for the creek. The proposal involves adding a waterbody to the water quality regulations and setting select water quality criteria for North Antelope Creek.

NDEP is proposing to add the beneficial uses

- Watering Of Livestock;
- Aquatic Life;
- Recreation Involving Contact With The Water;
- Recreation Not Involving Contact With The Water;
- Industrial Supply; and
- Propagation of Aquatic Life.

The beneficial uses that are **not** being added for North Antelope Creek are:

- Irrigation;
- Municipal and Domestic Supply;
- Waters of Extraordinary Ecological or Aesthetic Value; and
- Enhancement of Water Quality.

The proposed standards for water quality parameters are the recommended criteria values to protect these beneficial uses.

The proposed regulation revision petition that will be presented to the SEC regarding changes to specific water quality standards and addition of a new water to the Nevada regulations, as described in this document, will be finalized based on formal review comments and suggestions made by the public during

public workshop meetings. The formal comments received regarding the proposed actions and any corresponding changes that are made will be summarized in the regulation revision petition for North Antelope Creek.

References

Federal Water Pollution Control Administration 1968. Water Quality Criteria, Report of the National Technical Advisory Committee to Secretary of the Interior. Washington, D.C. EPA-800-R-68-900.

USEPA 1972. Water Quality Criteria (Blue Book). Prepared by the National Academy of Sciences – Committee on Water Quality Criteria. USEPA, Washington, DC.

USEPA 1986. Water Quality Criteria (Gold Book). EPA-440/9-76-023. USEPA, Washington DC.

USEPA 1988. Ambient Water Quality Criteria for Chloride – 1988. EPA-440/5-88-001. USEPA, Washington DC.

USEPA 1999. 1999 Update of Ambient Water Quality Criteria for Ammonia. Office of Water, Office of Science and Technology, Washington, D.C. and Office of Research and Development, Mid-Continent Ecology Division, Duluth, Minnesota. EPA-822-R-99-014

Walstrom, Robert E. 1973, Forecasts for the Future-Fish and Wildlife, Appendix D, Inventory: Statistical Data for the Streams and Lakes of Nevada, Carson City, Nevada,

Appendix 1 North Antelope Creek Photographs

June 2011 – Above Mine Site

October 2011 – Above Mine Site

May 2011 – Approximately 2.5 miles below Mine

October 2011 - Approximately 2.5 miles below Mine

May 2011 – Confluence with Antelope Creek

October 2011 - Confluence with Antelope Creek