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# TECHNICAL MEMORANDUM

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**SUBJECT:** Snake/Salt River Basin Plan  
Water Quality

**PREPARED BY:** Sunrise Engineering, Inc.

**DATE:** December 24, 2002

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## **Introduction:**

Water quality issues can affect the development and use of water in a river basin. Various properties are used to determine water quality such as physical, chemical, biological, bacteriological, and radiological characteristics. Quality of water can be affected by human activities as well as natural events. This technical memorandum will identify water quality issues within the Snake/Salt River basin.

The Environmental Quality Act was passed by the Wyoming Legislature in 1973. The purpose of the law was to address the concern that pollution “will imperil public health and welfare, create public and private nuisances, be harmful to wildlife, fish and aquatic life, and impair domestic, agricultural, industrial, recreational and other beneficial uses”. The Act authorized the state “to prevent, reduce and eliminate pollution; to preserve, and enhance the water and reclaim the land of Wyoming; to plan development, use, reclamation, preservation and enhancement of the air, land, and water resources of the state; to preserve and exercise the primary responsibilities and rights of the state of Wyoming; to secure cooperation between agencies of the state, agencies of other states, interstate agencies, and the federal government in carrying out these objectives” (Environmental Quality Act, 1973).

The State of Wyoming has designated the Water Quality Division (WQD) of the Wyoming Department of Environmental Quality (WDEQ) to oversee water quality and enforce the Environmental Quality Act. This is being done through various programs that have been set up to control various forms of potential pollution. Pollution can come from point and non-point sources, and can effect surface water and groundwater.

There have been numerous federal legislative efforts that authorize the remediation and protection of water quality and the environment. These include the Clean Water Act, Pollution Prevention Act, Safe Drinking Water Act, Clean Air Act, National Environmental Protection Act, Solid Waste Disposal Act, Toxic Substance Control Act, and the Federal Insecticide, Fungicide and Rodenticide Act. Most of the federal programs involved with water quality allow individual states to obtain primacy to administer the federal programs. The Environmental Protection

Agency (EPA) can step in if a state is not conducting the program to their satisfaction, even if the state has primacy.

## **Water Quality Standards:**

### *Surface Water Quality*

New water quality standards were established by the WQD, with final adoption of the standards in July 2001. Surface water standards can be found in Chapter 1 of the Water Quality Rules and Regulations produced by WDEQ, and the following description of the surface water classification system is taken from that chapter.

The following water classes are a hierarchical categorization of waters according to existing and designated uses. Except for Class 1 waters, each classification is protected for its specified uses plus all the uses contained in each lower classification. Class 1 designations are based on value determinations rather than use support and are protected for all uses in existence at the time or after designation. There are four major classes of surface water in Wyoming with various subcategories within each class (see "Wyoming Surface Water Classification List" for current listing).

- (a) Class 1, Outstanding Waters. Class 1 waters are those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. Non-point sources of pollution shall be controlled through implementation of appropriate best management practices. Pursuant to Section 7 of the WDEQ Water Quality Rules and Regulations, the water quality and physical and biological integrity which existed on the water at the time of designation will be maintained and protected. In designating Class 1 waters, the Environmental Quality Council shall consider water quality, aesthetic, scenic, recreational, ecological, agricultural, botanical, zoological, municipal, industrial, historical, geological, cultural, archaeological, fish and wildlife, the presence of significant quantities of developable water and other values of present and future benefit to the people.
- (b) Class 2, Fisheries and Drinking Water. Class 2 waters are waters, other than those designated as Class 1, that are known to support fish or drinking water supplies or where those uses are attainable. Class 2 waters may be perennial, intermittent or ephemeral and are protected for the uses indicated in each sub category listed below. There are four subcategories of Class 2 waters.
  - (i) Class 2AB. Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable. Class 2AB waters include all permanent and seasonal game fisheries and can be either "cold water" or "warm water" depending upon the predominance of cold water or warm water species present. All Class 2AB waters are designated as cold water game fisheries unless identified as a warm water game

fishery by a "ww" notation in the “Wyoming Surface Water Classification List”. Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use. Class 2AB waters are also protected for nongame fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value uses.

- (ii) Class 2A. Class 2A waters are those that are not known nor have the potential to support game fish but are used for public or domestic drinking water supplies, including their perennial tributaries and adjacent wetlands. Uses designated on Class 2A waters include drinking water, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value.
  - (iii) Class 2B. Class 2B waters are those known to support or have the potential to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where it has been shown that drinking water uses are not attainable pursuant to the provisions of Section 33 of the WDEQ Water Quality Rules and Regulations. Class 2B waters include permanent and seasonal game fisheries and can be either "cold water" or "warm water" depending upon the predominance of cold water or warm water species present. All Class 2B waters are designated as cold water game fisheries unless identified as a warm water game fishery by a "ww" notation in the “Wyoming Surface Water Classification List”. Uses designated on Class 2B waters include game and nongame fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value.
  - (iv) Class 2C. Class 2C waters are those known to support or have the potential to support only nongame fish populations or spawning and nursery areas at least seasonally including their perennial tributaries and adjacent wetlands. Class 2C waters include all permanent and seasonal nongame fisheries and are considered "warm water". Uses designated on Class 2C waters include nongame fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture, and scenic value.
- (c) Class 3, Aquatic Life Other than Fish. Class 3 waters are waters, other than those designated as Class 1, that are intermittent, ephemeral or isolated waters and because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning, or certain perennial waters which lack the natural water quality to support fish (e.g., geothermal areas). Class 3 waters provide support for invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. Uses designated on Class 3 waters include aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value. Generally, waters suitable for this classification have wetland characteristics, and such characteristics will be a primary indicator used in identifying Class 3 waters. There are three subcategories of Class 3 waters.

- (i) Class 3A. Class 3A waters are isolated waters including wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable.
  - (ii) Class 3B. Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. In general, 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 3B waters.
  - (iii) Class 3C. Class 3C waters are perennial streams without the natural water quality potential to support fish or drinking water supplies but do support wetland characteristics. These may include geothermal waters and waters with naturally high concentrations of dissolved salts or metals or pH extremes.
- (d) Class 4, Agriculture, Industry, Recreation and Wildlife. Class 4 waters are waters, other than those designated as Class 1, where it has been determined that aquatic life uses are not attainable pursuant to the provisions of Section 33 of the WDEQ Water Quality Rules and Regulations. Uses designated on Class 4 waters include primary contact recreation, wildlife, industry, agriculture and scenic value.
- (i) Class 4A. Class 4A waters are artificial canals and ditches that are not known to support fish populations.
  - (ii) Class 4B. Class 4B waters are intermittent and ephemeral stream channels that have been determined to lack the hydrologic potential to normally support and sustain aquatic life pursuant to the provisions of Section 33(b) of the WDEQ Water Quality Rules and Regulations. In general, 4B streams are characterized by only infrequent wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 4B waters.
  - (iii) Class 4C. Class 4C waters are all waters that have been determined to lack the potential to normally support and sustain aquatic life pursuant to the provisions of Section 33(b)(i), (iii), (iv), (v), and (vi) of the WDEQ Water Quality Rules and Regulations. Class 4C includes, but is not limited to effluent-dominated streams where it has been determined under Section 33(b)(iii) that removing a source of pollution to achieve full attainment of aquatic life uses would cause more environmental damage than leaving the source in place.
- (e) Specific stream segment classifications are contained in a separate document entitled “Wyoming Surface Water Classification List”. Class 1 waters are those waters that have

been specifically designated by the Environmental Quality Council. Class 2 designations are based upon the fisheries information contained in the Wyoming Game and Fish Department's "Stream and Lakes" inventory database as submitted to the Department of Environmental Quality in June, 2000. This database represents the best available information and is considered conclusive. Class 4 designations are based upon knowledge that a water body is an artificial, man made conveyance, or has been determined not to support aquatic life uses through an approved Use Attainability Analysis. All other waters are designated as Class 3A or 3B. New information made available to the department may be cause to amend the classifications.

### *Groundwater Quality*

Chapter 8 of the Wyoming Water Quality Rules and Regulations addresses groundwater quality standards and protection. These rules are enforced by the Wyoming Department of Environmental Quality Water Quality Division. Chapter 8 describes various classifications that have been created for groundwater and outlines the rules for discharges to these waters. Additional information regarding groundwater quality is presented in the technical memorandum prepared by Hinckley Consulting for the Snake/Salt River Basin Plan entitled "Groundwater Resources".

### **Basin Surface Water Quality:**

WDEQ has classified surface water features according to the previously described classification system. According to the Wyoming Surface Water Classification List (WDEQ, 2001) there are many surface waters within the Snake/Salt River basin designated as Class 1 waters, including the following:

- All surface waters located within the boundaries of national parks and congressionally designated wilderness areas as of January 1, 1999.
- The main stem of the Snake River through its entire length above the U.S. Highway 22 Bridge (Wilson Bridge).
- All waters within the Fish Creek (near Wilson) drainage.
- The main stem of Granite Creek (tributary of the Hoback River) through its entire length.
- Wetlands associated with the above listed Class 1 waters.

Many of the remaining rivers and streams in the basin are classified as 2AB in the primary classification from WDEQ, while a few are classified as 3B.

The Clean Water Act requires that a 305(b) report be created which covers statewide water quality, along with a 303(d) list, which is a list of impaired streams in the state. Impaired streams require the establishment of total maximum daily loads (TMDLs) for problem pollutants. A TMDL is the amount of a specific pollutant that a water body can receive and assimilate in a given time period and still meet water quality standards.

The classification of stream indicates what use is being or can be supported by that stream. In general, the quality of water in the Snake/Salt River basin is good based upon water bodies supporting their designated uses. This is evident in the lack of basin water features included in Wyoming's 2002 305(b) State Water Quality Assessment Report produced by WDEQ, which includes 303(d) listings. These listings are broken into four parts, the first being the 303(d) Waterbodies with Water Quality Impairments. There are no Snake/Salt River basin water features on this list. The second is the 303(d) Waterbodies with NPDES Discharge Permits Containing WLA's Expiring. Flat Creek near Thayne and Snake River near Alpine are on this list, as NPDES discharge permits for the wastewater treatment plants in these areas have imminent expiration dates. The third is the 303(d) Waterbodies with Water Quality Threats, which includes Spread Creek-North Fork due to habitat degradation, Flat Creek between Snake River and Cache Creek due to habitat degradation, and Salt River near the Etna Gaging Station due to fecal coliform bacteria. There are no waters in the Snake/Salt River basin that were delisted from the 2000 303(d) list.

In summary, there are no water features in the basin requiring TMDLs, and there are current threats only in a few areas. Other water quality problems described in the 2002 Water Quality Assessment Report (though not on the 2002 303(d) list) include physical degradation of the Pacific Creek stream channel and general erosion in the Greys-Hoback watershed. Stream channel rehabilitation on the North Fork of Spread Creek has been done, however the stream will remain on the above mentioned 303(d) list until the riparian vegetation is better established.

According to "Water Resources Data Wyoming Water Year 2001" produced by U.S. Geological Survey (USGS), only three water quality sampling stations are currently being operated by USGS in the Snake/Salt River basin. These stations are shown in **Table 1**.

**Table 1. Current USGS Water Quality Sampling Stations**

Station Name	Station Number	Period of Record
Snake River above Jackson Lake, at Flagg Ranch	13010065	1987 to Present
Snake River at Moose	13013650	1995 to Present
Salt River above Reservoir, near Etna	13027500	1994 to Present

Water quality data for the stations listed in **Table 1** can be found in **Appendix A**. The data is for the 2001 water year, which covers results from October 2000 to September 2001. Review of the data indicates that there are no water quality problems apparent in the sample testing results, other than the fecal coliform test results at the Salt River station described above.

Additional water quality monitoring across Wyoming is conducted by WDEQ as part of their watershed monitoring program. During the late 1990's, water quality collection sites were selected in order to provide reference quality data. These sites generally did not have water quality problems, as the data were used as a reference for later testing. Resulting data for sites within the Snake/Salt River basin can be found in **Appendix B**. Due to the fact that these sites were intended to provide reference data, there are no evident impairments of the rivers and streams from the test results. Since 2000, data have been collected from sites that were targeted

as being potentially impaired waters. This data will be available to the public later in 2003 following completion of WDEQ quality control procedures.

**Aquifer Sensitivity and Vulnerability:**

A program to assess the vulnerability of groundwater to contamination from surface pollutants was initiated in 1992 by WDEQ in cooperation with the University of Wyoming's Water Resources Center, the Wyoming State Geological Survey, and the US Environmental Protection Agency . Geographic Information System (GIS) software was used to combine various geologic, topographic, and soils characteristics into composite scores. These scores describe “aquifer sensitivity” + the intrinsic ability of the subsurface environment to transport surface contaminants into groundwater, and “groundwater vulnerability” + the integration of aquifer sensitivity with current land use practices likely to cause groundwater contamination. Final reports for this program were completed in 1998, and data was available digitally in 1999. Additional information regarding aquifer sensitivity and vulnerability can be found in the technical memorandum created for the Snake/Salt River Basin Plan by Hinckley Consulting entitled “Groundwater Resources”.

**References:**

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