

EXECUTIVE SUMMARY

2007 Tongue River Hydrology Report

Tongue River Information Program

The Tongue River valley of Wyoming and Montana has over 60,000 acres of irrigated land which have supported cattle ranching and farming operations for more than 100 years. The Tongue River also runs through the coal-rich Powder River geologic basin which has experienced growth in coal bed natural gas development since 1999, along with surface coal mining since the early 1970's. The Tongue River Information Project (TRIP) has been funded by the Montana Board of Oil and Gas Conservation in 2006-2007 in response to concerns by irrigators, environmental regulators and policy makers that the discharge of produced water from coal bed natural gas (CBNG) production in the upper Tongue River basin could be affecting the water quality of the river and, in turn, soil properties and crop production. TRIP includes an agronomic and soils monitoring program called the Agronomic Monitoring and Protection Program (AMPP), and a hydrologic component, which is summarized in this Tongue River Hydrology Report. All TRIP reports may be accessed on-line at: <http://www.bogc.dnrc.state.mt.us/CoalBedMeth.asp>

The findings of the hydrology evaluation begin with the understanding that water supply available to the Tongue River is directly related to the amount of precipitation falling in the upper basin. Further, it is well-documented that water quality indicators, in particular Specific Conductance (SC- a measure of total dissolved solids) and sodium adsorption ratio (SAR), are inversely related to flow; that is, the river has higher SC and SAR at lower flows, and vice versa (USGS, 2007). The average annual flows at the US Geological Survey State Line gauging station for Water Years 2000 through 2006 have all been less than the median flow based on 46 years of measurements (448 cfs). Four of the past six Water Years have been the lowest average flows of record.

Comparisons of SC and SAR data at comparable stream flows for periods before and after the onset of CBNG development do not indicate increasing trends at any USGS monitoring station on the Tongue River. An increase of salinity and sodium in the downstream direction is a common occurrence for the Tongue River and other western streams, due to a combination of natural and human-caused factors. The largest increases on the Tongue River occur between the USGS stations at Monarch, Wyoming and the State Line, and between Brandenburg and Miles City, based on data from Water Years 2004 and 2005. The most significant influences on water quality in these stream reaches are changes in surface geology and the degree of irrigation. CBNG discharges contribute salts and sodium in the upper reach, but have no role in the lower reach since the lowermost CBNG discharge is about 1 mile below the Tongue River Dam.

The Tongue River basin is home to approximately 25,000 people, 88% of whom live in and around Sheridan, Wyoming. There are at least 60,000 irrigated acres in the basin, 73% of which are in Wyoming. Water rights filing information demonstrates that claims for water from the basin are far in excess of its historic delivery capability. Just over 6,000 private water wells are drilled in the basin, 64% of which are in Montana, and most of which are for agricultural purposes. Through 2006, approximately 3,000 CBNG wells were installed in the basin, 73% of which are in Wyoming. The quantity of CBNG-produced water within the Tongue River basin

averaged about 3.1 gpm per well during 2006 in both states, for an equivalent total of 19.4 cubic feet per second (cfs). Approximately three-fourths of this total was discharged to off-channel facilities, beneficially used, or treated prior to discharge, with the remainder discharged to the river untreated via MPDES or WYPDES permits.

There are seven permits for discharge of CBNG-produced water to the Tongue River, three of which are in Montana and four in Wyoming, with a total of 36 outfalls. These permits are authorized for discharge of from 1,640 to 2,630 gpm (3.6 – 5.9 cfs) of untreated CBNG water, and 4,438 gpm (9.9 cfs) of treated CBNG water. Actual CBNG discharges have been significantly less than the permitted discharges. The discharge rates and/or water quality authorized by permits are seasonally adjustable in order to meet irrigation water standards set by the State of Montana.

Agricultural non-point sources of contaminant discharge to the Tongue River have not been quantified. In 2002, the NRCS identified 20 visible irrigation return flows exclusive of those in Rosebud County. The portion of the Tongue River immediately downstream from the TY diversion dam to the mouth is listed as impaired on the MDEQ's current (2004) 303(d) list, and on the Draft 2006 list. The impairment is primarily due to a combination of the diversion of relatively good quality water from the Tongue River at the T&Y diversion dam, and the inflow of poorer- quality water from irrigation return flows, groundwater and tributaries.

This review demonstrates that although the Tongue River basin drains a mostly rural setting, it is a hard-working watershed, that has to date successfully supported both a long-standing agricultural economy and a rapidly-developing energy industry. Based on the combination of lengthy drought conditions, energy development and concerns over irrigation water supplies, continued monitoring of the river's flow and quality, and an improved accounting of basin-wide point and non-point sources of contaminants is warranted.