Peer Review Plan

Date: 6/5/2023

Source Center: U.S. Geological Survey (USGS)
Wyoming-Montana Water Science Center
3162 Bozeman Avenue
Helena, MT 59601

Title: Growth of coal mining operations in the Elk River Valley (B.C. Canada) linked to increasing solute transport of Se, NO3-, and SO42- into the transboundary Koocanusa Reservoir (USA-Canada).

Subject and Purpose: The purpose of this product is to quantify changes in loadings and concentration trend in mine wastes over an approximate 40-year period. The Elk River Valley, British Columbia has been mined for coal resources since 1897. Currently there are four active metallurgical (open-pit/Mountain Top Removal) coal mines operated by Teck Resources with the possibly of five new mines or mine expansions in the future. Mine wastes are placed overtop streams of the Elk River and sulfate, nitrate, and selenium are exported downriver into the transboundary Koocanusa Reservoir. Koocanusa is created by Libby Dam, which releases water to the Kootenai River in Montana. The Kootenai River Basin supports White Sturgeon (Acipenser transmontanus), the threatened Bull Trout (Salvelinus confluentus), as well as two species of concern—Burbot (Lota lota) and Westslope Cutthroat Trout (Oncorhynchus clarkia lewisi). Selenium is of particular concern to the fisheries and aquatic life in general because it is bio-accumulative and can be toxic. In 2012, Montana listed Koocanusa Reservoir as impaired due to elevated concentrations of selenium. Over a 6-year period from 2015-2020, the USGS, State of Montana, British Columbia Ministry of the Environment, and other collaborators developed a framework and model to develop a site-specific aquatic life criterion of 0.8 µg/L for the reservoir and 3.1 µg/L for the river in Montana that were promulgated in 2020 by the U.S. Environmental Protection Agency. Total dissolve selenium at the USGS International Boundary sample locations has exceeded 0.8 ug/L since July 2020. Data from the British Columbia Ministry of the Environment suggest that selenium is persistently elevated for over 400-river miles from the Elk River Valley to the British Columbia/Washington State Border. This study aimed to document how historical, active, and future mining and water treatment affects loads and concentrations to United States water resources. Major findings include unprecedented 40-year trends with increases as much as 784 percent in dissolved solute exports from the Elk River to Koocanusa Reservoir. Approximately 95 percent of the selenium exported from Canada into Koocanusa Reservoir is derived from the Elk River. Mine engineering has altered catchment hydro-geochemistry to the degree that baseflows and selenium concentrations at baseflows are increasing with time and the study findings suggest prescriptive treatment of surface waters may be insufficient to reverse increases in solute concentrations and loads. The product is intended for publication in the scientific journal American Chemical Society Journal Environmental Science and Technology.

Impact of Dissemination: This information product is considered by the USGS to be Influential Scientific Information.

Manner of Review, Selection of Reviewers, and Nomination Process: Review will be by individual e-mail/letters/memoranda/documents. The USGS will select its reviewers in accordance with requirements found in Survey Manual (SM) chapter SM 502.3—Fundamental Science Practices: Peer Review. Reviewers will also be selected by the journal and Environmental and Climate Change Canada based on their respective organization’s requirement.

Expected Number of Reviewers: Anticipates a minimum of five reviewers.

Requisite Expertise: Surface water-quality (using Weighted regressions on time, discharge, and season (or WRTDS) and Exploration and Graphics for RivEr Trends (or EGRET) methods), loads, trends, selenium, mountain top removal, coal mining.

Opportunity for Public Comment: No opportunity for public comment is formally incorporated by the USGS for this product.

Agency Contact: peer_review_agenda@usgs.gov.