Peer Review Plan

Date: 3/3/2026

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

Title: Physical Hydrologic Controls on Selenium Transport in an International Reservoir affected by Mining.

Subject and Purpose: The purpose of this product is to better understand and quantify selenium dynamics in Lake Koocanusa. The Elk River Valley, British Columbia has been mined for coal resources since 1897. To date, there are four-active metallurgical (open-pit/Mountain Top Removal) coal mines operated by Elk Valley Resources with the possibility of five new mines or mine expansions. Mine wastes are known sources of sulfate, nitrate, and selenium which are exported downriver into the transboundary Koocanusa Reservoir. Lake Koocanusa is created by Libby Dam, which releases water to the Kootenai River in Montana. The Kootenai River Basin supports endangered White Sturgeon (*Acipenser transmontanus*), threatened Bull Trout (*Salvelinus confluenctus*), and two species of concern Burbot (*Lota lota*) and Westslope Cutthroat Trout *(Oncorhynchus clarkia lewisi*). Of particular concern to the fisheries and aquatic life in general is selenium because it is bio-accumulative and can be toxic at low concentrations (parts per billion). In 2012, Montana listed Koocanusa Reservoir as impaired due to elevated concentrations of selenium. Over a 6-year period from 2015-2020, the State of Montana, British Columbia Ministry of the Environment, USGS, 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 by U.S. Environmental Protection Agency in 2020. Total dissolved selenium concentrations at the USGS International Boundary sample locations have exceeded 0.8 µg/L since July 2020. Selenium loading from the mines and the downstream extent of elevated selenium concentrations in water have been studied in recent years, however processes governing the spatial and temporal distribution of selenium in Koocanusa reservoir are not well understood. This study completed a mass balance of selenium inputs and outputs for the reservoir and used a simplified solute transport model, One-Dimensional Transport with Inflow and Storage (OTIS) to model selenium concentrations and seasonal dynamics at multiple locations along the length (145 km) of the narrow reservoir. Major findings show 98% of the selenium input to the reservoir from the two largest tributaries (Kootenay and Elk Rivers) was output from the reservoir during water years 2014 to 2024. The OTIS results illustrate that hydrologic processes dominant in rivers (advection and diffusion) are the primary controls on the distribution of selenium concentrations in the reservoir. Exceedances of Montana's water quality standard for Lake Koocanusa (0.8 µg L^{-1} dissolved selenium) were common across sites and seasons, as shown in both model predictions and discrete observations. 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.

Timing of Review (Including Deferrals): February 2026 – August 2026. Deferrals are not anticipated at this time.

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. The journal and Canadian partner will select reviewers according to their respective requirements.

Expected Number of Reviewers: A minimum of five reviewers are anticipated.

Requisite Expertise: Surface water-quality, One-Dimensional Transport with Inflow and Storage (OTIS), loads, trends, selenium, 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.