

74-7 - THE POTENTIAL FOR REUSE OF PRODUCED WATER IN THE CRITICAL MINERALS SUPPLY CHAIN IN THE POWDER RIVER BASIN OF WYOMING AND MONTANA



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324 (3, David L Lawrence Convention Center)

Abstract

The Powder River Basin (PRB) Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM) project is part of the Department of Energy sponsored CORE-CM initiative focused on domestic production of critical minerals and promoting economic development in traditionally fossil fuel producing basins. An important part of this project is regional assessment of waste streams and development of basinal strategies for waste stream reuse within the critical minerals (CM) supply chain. The availability of water for all parts of the CM supply chain is of particular concern in the arid mountain west.

In the Wyoming PRB, average annual production of produced water (PW) by the oil and gas industry is more than 16 billion gallons (2015-2022). Through published data and engagement with industry partners, we conducted a preliminary investigation of PW in the PRB to understand volumes, quality, and the potential for use in the CM supply chain. PW was assessed for potential as a direct feedstock and for use in CM processing of a variety of conventional and unconventional feedstocks, including ore from the Bear Lodge Alkaline Complex, coal, and coal byproducts.

Preliminary findings suggest that PRB PW contains significantly lower concentrations of rare earth elements (REE) and lithium than would be considered economic at this time. For example, concentrations of REE+Sc measured in PRB PW are <1 ppb (DE-EE0007603), and only seven PRB PW samples reported in the USGS PW database had lithium concentrations ≥ 50 ppm. However, enrichment of CM in residual brine and sludge from PW evaporation and solidification treatment ponds may yield concentrations of interest over a pond lifetime and should be considered in future studies.

Coal bed methane (CBM) PW accounted for 42% of all PW in the Wyoming PRB in 2022. Compared to non-CBM PW, PRB CBM water quality generally meets standards allowing surface discharge and reuse in local industries such as livestock. CBM PW may help to fill water needs within the CM supply chain. Understanding the distribution of CBM PW that is discharged versus reused will help develop basinal reuse strategies.