

# CHANGES TO GROUND-WATER QUALITY AS A RESULT OF STRIP MINING IN CLOSTRIP, MONTANA<sup>1</sup>

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**Abstract.** Historic open pit coal mining in the Colstrip area dates from as early as 1924. Large-scale mining in the area began in the late 1960's at the Big Sky Mine and the mid-1970's at the Rosebud Mine. These two, adjacent mines have a combined permit area of almost 140 square kilometers. Ground-water quality monitoring within and adjacent to the permit areas began in the early 1970's and continues to the present. Generally, monitoring indicates little to no change in ground water quality upgradient of the mines. Backfilled pit areas and downgradient aquifers are showing variable water quality impacts. Mine monitoring wells have also detected water quality impacts associated with activities at the Colstrip power generating plant.

Changes in water quality due to mining include increases in total dissolved solids (TDS) largely due to increases in sulfate, but also bicarbonate, sodium, calcium and magnesium. In backfilled pit areas, TDS in saturating spoil is typically double that of coal aquifer background concentrations of 1000 mg/L to 3000 mg/L. However, concentrations in spoil vary temporally and spatially and may be three or more times higher than background. Downgradient alluvial, coal, and underburden aquifers show increases in TDS concentrations that range from hundreds to more than a thousand mg/L.

Ground-water quality is expected to improve as dissolved salts are flushed through backfill. The time required for this will vary with the hydrologic setting in each mined area. Although TDS concentrations are still increasing in most spoil wells, improvements in spoil water quality have been observed in others. Some spoil wells in Big Sky Mine Area A and Rosebud Mine Area B show a trend of decreasing TDS concentrations.

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