

12.3 **A risk-based approach to identifying contaminants of greatest concern from *in-situ* oil shale retorts**

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Oil shale retorting will leave chemical residues in the subsurface that could potentially contaminate groundwater. From hydrous retort experiments and literature surveys, inorganic and organic contaminants were identified that are most likely to be generated during *in-situ* retorting. From this initial list of contaminants, those that are likely to pose the greatest risk we identified based on their mobility, concentration, and toxicity (from published LD50 values). Mobility, addressed from the sorption characteristics of the compounds, is estimated under the expected subsurface geochemical conditions (pH, Eh, total organic carbon) using published experimental data and linear free energy relationships. Where possible, we have evaluated the effects of temperature dependence of partition coefficients on transport. Geochemical modeling studies are used to estimate equilibrium concentrations of inorganic contaminants as the water returns to ambient temperature. The role of degradation of organic contaminants is discussed. The results provide relative risk for the transport of various contaminants from the near field to the far field. Site-specific time scales can then be estimated and used to calculate minimum degradation rates necessary to keep the contaminants below the maximum allowable concentration limit (MCL) at monitoring wells. Potential contaminants of concern that require additional study are identified.