

Ecotoxicology of Oil Sands Aquatic Environments

Andrea Farwell and D. George Dixon
Department of Biology, University of Waterloo

The oil sands industry in northern Alberta produces crude oil by extracting bitumen from oil sands. Large volumes of process-affected material (tailings/waste water) are produced, containing polycyclic aromatic compounds (PACs), naphthenic acids (NAs) and salinity derived from the oil sands ore and its processing. Oil sands aquatic reclamation is a challenge as oil sands process-affected material may have strong impacts on aquatic organisms. In this overview, we will address issues of water and sediment quality relevant to the development of oil sands aquatic reclamation strategies that produce healthy and sustainable aquatic ecosystems. Toxicological studies of whole process-affected water and tailings, extracts of oil sands derived NAs and PACs and modifying factors influencing toxicity to fish and other aquatic organisms will be highlighted. Algal and microbial production, and aquatic food web dynamics are processes that have received attention to date (e.g., in C and N stable isotope studies), in the belief that sustainable reclamation strategies will require an understanding of how these ecosystem processes are influenced by mining-related materials. This research will contribute to devising aquatic reclamation strategies, as well as providing baseline data for environmental monitoring and the much needed cumulative impact assessments for the Athabasca River drainage basin.