

BACKGROUND

No oil sands end pit lake (EPL) currently exists, but about 29 are proposed within the mineable oilsands region. The document presents the scientific and engineering expertise to guide all reclamation activities associated with EPL design and construction. This is a technical *guidance* document, one that provides the information, direction, and the advice that the planners and engineers who will be responsible for turning about 29 pits into functioning, healthy aquatic ecosystems will require to carry out those activities.

The current objectives for EPLs in the Athabasca oil sands were established by stakeholders in the region who agreed to participate in the information-gathering process: government agencies, Aboriginal and non-governmental organizations, and industry. It does not represent the views of all potential stakeholders, as a comprehensive survey or formal consultative process was beyond the project's mandate.

EPLs may or may not contain tailings associated with mining. In general, two types of EPLs are anticipated for oil sands mine sites:

EPLs with tailings storage: In this scenario, soft tailings such as fluid fine tailings or thickened tailings are capped with a layer of freshwater. Inputs to the lake include surface runoff, precipitation, groundwater seepage, and consolidation waters from tailings deposits. Tailings become denser over time and release pore water to the water cap. Process-related materials that may be placed in the mined-out pits includes tailings deposits, tailings sand, lean oil sands, overburden, petroleum coke and process-affected waters that remain at the end of mine operations.

EPLs without tailings storage: The excavated mined-out pit is allowed to fill with surface runoff and groundwater once mining and dewatering activities cease. The list of design and management considerations of EPLs that do not contain tailings is significantly shorter than those that do store mine tailings.

Returning mineable oil sands developments in the Athabasca oil sands region to a state functionally equivalent to the natural conditions that characterize the boreal forest of northern Alberta will involve a sophisticated suite of tools, techniques, and expertise. The end pit lake is an integral element of this task.

Reclamation of the pit that remains at the end of a mines life, and its transformation into a sustainable lakes, is a developing technology. As a result, industry can draw on experiences from pit lakes created in other mining industries along with current research and literature reviews conducted within the region. Such experiences include Syncrude Canada's Base Mine Lake (BML) demonstration lake and test wetlands and CEMA's in-lake dynamics and water quality modeling and geotechnical stability analysis of EPL

shorelines. The oil sands can also draw on experience from pit lakes created by other industries, such as Teck Coal's Sphinx Lake in Sparwood, British Columbia.

The permanent placement of fine tailings in EPLs is approved for many oil sands mines, subject to demonstration, based on previous Energy and Utilities Board Decisions.

EPLs will not be constructed in the undisturbed landscapes.

Independent experts reviewed every chapter of this document. But the science of EPLs and the regulations that govern their construction and management will continue to evolve. This document is intended to provide a base of knowledge, and direction, for EPL design and construction.