THE HORIZON OIL SANDS

Alberta’s Athabasca oil sands deposit contains over 300 billion barrels of oil reserves. Canadian Natural’s Horizon Oil Sands is located 70 kilometres north of Fort McMurray, where Canadian Natural owns and operates leases covering 236,000 acres, which contain over 6 billion mineable barrels of bitumen. Extensive economic benefits will be generated for Alberta and Canada over the Horizon Oil Sands’ 40-year life span. At full operating capacity, the Project will employ approximately 2,400 people.

Bitumen is a thick, sticky form of crude oil. At room temperature bitumen is like cold molasses. The bitumen is mined from the Alberta oil sands using an open pit mining strategy. At the Horizon Oil Sands site, Canadian Natural will further upgrade the mined bitumen to a sweet synthetic crude oil (SCO) using proven delayed coking and hydro-treating technologies. The following is a brief summary of the SCO production processes at Horizon.

Mining
Once trees and brush have been cleared from the mining site, the topsoil muskeg and several layers of sand, clay and gravel must be removed to allow access to the oil sands. These layers of “overburden” are stockpiled so that they can be replaced when the mined site is ultimately reclaimed and the landscape is reconstructed.

Mining shovels dig up the oil rich sand and load it into huge trucks, which then transport the oil sand to crushers to begin the extraction process.

Extraction
During extraction, the oil sand ore is crushed into small pieces, filtered through screens and then mixed with hot water. The “slurry” is transported via pipeline (hydro-transport) to the Bitumen Extraction Plant.
In a separation vessel, the slurry goes through a “frothing” process. The sand and water separate and settle at the bottom of the vessel, while tiny air bubbles trapped in the bitumen cause it to form into froth and rise to the surface, where it is skimmed off. A cross section of the tank would show the sand on the bottom, water, and the bitumen froth on top.

The bitumen froth is mixed with a solvent (diluent). The sand and water tailings that separate from the bitumen are deposited in a tailing pond. From there, the sand is returned to the mine site to rebuild the mined-out areas, the water is recycled back to the extraction plant to be used again in the separation process and the diluted bitumen is sent to the upgrading facilities.

**Primary Upgrading**
The bitumen/diluent blend must go through additional upgrading before it can be refined for commercial use. It is sent by pipeline to Upgrading for a process that will convert the bitumen into a synthetic crude oil (SCO).

The first upgrading process is called Primary Upgrading (PUG). The process begins with the separation of diluent from bitumen in the Diluent Recovery Unit (DRU) in a distillation process. The diluent is reclaimed and send back to Bitumen Production where it is used again.

The bitumen is then transported to the Delayed Coker Unit where it is heated to extremely high temperatures. The heat breaks up or “cracks” the large complex bitumen hydrocarbon molecules into smaller hydrocarbon chains. This coking process produces different hydrocarbon cuts: refinery fuel gas, naphtha, diesel, gas oil and coke. Coke is a byproduct of the primary upgrading and it is transported by trucks to a storage area for future utilization. The fuel gas is used in the upgrader’s furnaces, and the remaining hydrocarbons require further processing in Secondary Upgrading.

**Secondary Upgrading**
In the Secondary Upgrading process (SUG), hydrogen is added to stabilize the hydrocarbon molecules. Impurities like sulphur and nitrogen are removed. The remaining different hydrocarbons: naphtha, diesel and gas oil, are then blended to make a mixture called Synthetic Crude Oil (SCO). The SCO is the product that is transported via pipelines to refineries across North America.