



AFN ENVIRONMENTAL STEWARDSHIP

RESPECTING AND PROTECTING MOTHER EARTH

NUCLEAR FUEL CYCLE

Canada relies on nuclear-generated electricity to satisfy some of its energy needs. First Nations have concerns about the impacts of Canada's nuclear industry and the entire fuel cycle from uranium mining to the ultimate management of used nuclear fuel. In order to allow for informed decision-making, First Nations have recommended an inclusive review of all aspects of nuclear power production from beginning to end. The purpose of this fact sheet is to explain the nuclear fuel cycle in order to encourage informed participation in dialogues surrounding this issue.

The nuclear fuel cycle consists of six basic steps. Each step consists of some phase of processing before material is transferred to another location for further processing or use.

Step 1 - Uranium Mining and Milling

Ore is crushed and processed in mills to separate uranium by using chemical processes that remove impurities. A fine uranium powder, called "yellowcake", is the resulting product.



Step 2 - Refining

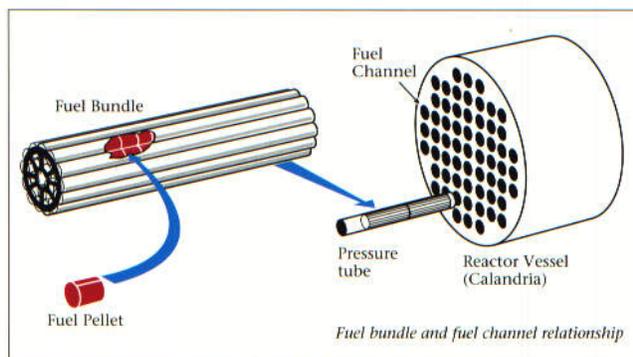
Yellowcake, ranging in colour from yellow to black, produced at the mills is about 70% uranium. At the Blind River refinery, in Ontario, it is further processed to remove impurities. It is then chemically converted to a form suitable for further processing.

Step 3 - Conversion

Additional processing at the Port Hope, Ontario "conversion" facility chemically transforms the product to uranium dioxide, suitable for nuclear reactor fuel.

Step 4 – Fabrication

In Canada, natural uranium dioxide powder, packaged in drums at a conversion plant, is shipped to one of the two fuel fabricators at either Port Hope or Peterborough, Ontario. The uranium dioxide powder is first pressed into cylindrical shapes and then "fired" to produce fuel pellets. The pellets, about 2 cm long and 1 cm in diameter, are then trucked to a plant where they are placed in 50 cm-long zirconium alloy tubes, and fastened together into 10 cm-diameter fuel bundles for nuclear reactors.



Step 5 - Electricity Production

The fuel bundles are placed into a nuclear reactor where a nuclear reaction produces heat, which then transforms water into steam. The steam spins large turbines, which, in turn, drive generators that produce electricity.

Step 6 - Used Nuclear Fuel

Each fuel bundle is used for approximately 18 months. Once a fuel bundle is removed from a nuclear reactor, the fuel bundles become what is known as used nuclear fuel. The bundle must then be contained and isolated from people and the environment for an unknown period into the future.

