



# AFN ENVIRONMENTAL STEWARDSHIP

RESPECTING AND PROTECTING MOTHER EARTH

## FACT SHEET: *USED NUCLEAR FUEL*

There are different kinds of nuclear waste in our society, from what is characterized as low and intermediate-level wastes to high-level waste. Used nuclear fuel is considered high-level waste, and can be very hazardous to living creatures and the environment if not properly managed. It is, however, highly regulated and has been shown to be well-managed in Canada. The Nuclear Waste Management Organization (NWMO) is responsible for the long-term, safe storage of this waste, and their plan is called Adaptive Phased Management (APM).

### THE NUCLEAR FUEL CYCLE:

**STEP ONE – MINING & MILLING:** Uranium ore is mined from northern Saskatchewan in the Athabasca Basin. The ore is crushed and processed in mills using chemicals in order to separate the uranium from the ore. The result is a fine, yellow or black powder called “yellowcake”

**STEP TWO – REFINING:** The yellowcake, which is about 80% natural uranium, is sent to a refinery in Blind River, Ontario, where it is further processed to remove impurities and prepared for conversion.

**STEP THREE – CONVERSION:** The conversion facility is located in Port Hope, Ontario, and this is where the uranium is chemically transformed into uranium dioxide, a form of uranium suitable for use as fuel in Canada’s nuclear reactors.



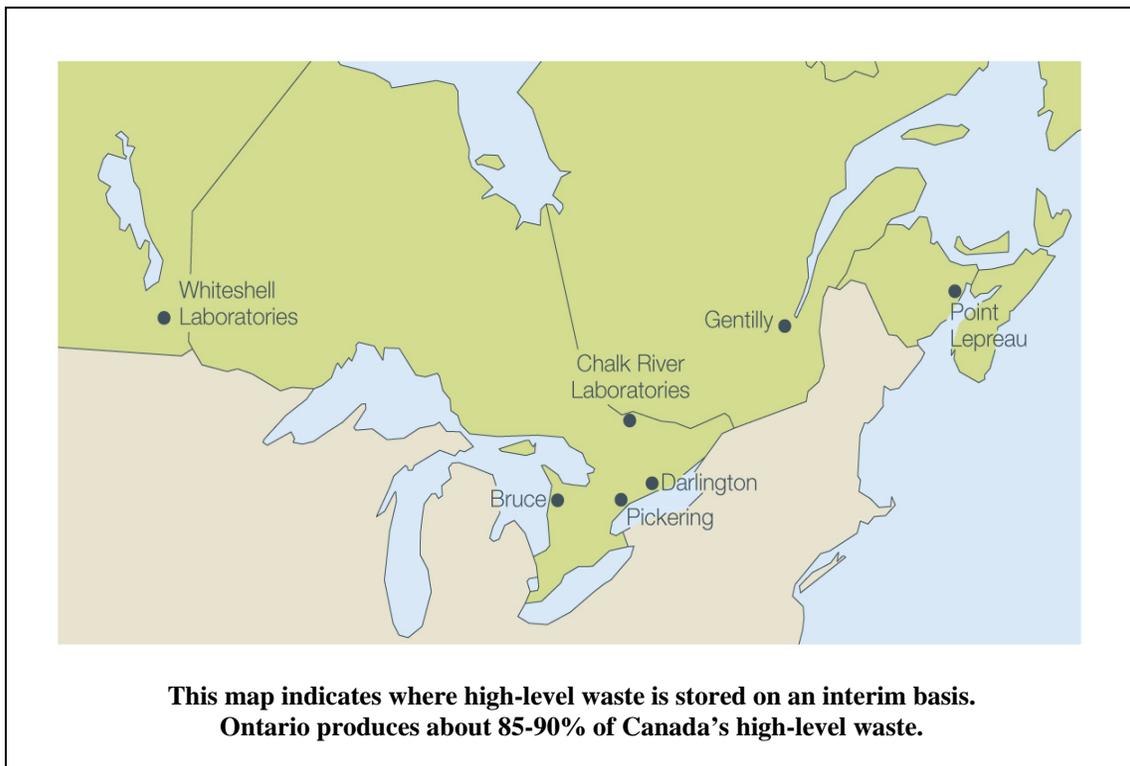
**STEP FOUR – FABRICATION:** The uranium dioxide is sent to one of two fabrication facilities, either in Port Hope or Peterborough, Ontario, where it is pressed and heated to extreme temperatures to form ceramic pellets. The pellets are placed into long tubes which are bundled together into an assembly called a fuel bundle. The fuel bundle is about the size and shape of a

fireplace log, and weighs approximately 53lbs.



**STEP FIVE – ELECTRICITY PRODUCTION:** The fuel bundles are placed in a nuclear reactor, which produces intense heat, which is used to turn water into steam which drives giant turbines, creating electricity. After about 18 months, the fuel bundles are removed from the reactor and placed in water-filled pools for 7-10 years, to reduce its heat and radioactivity. The bundles are then placed in large containers with heavy shielding and stored at the facility where they were used. These are licensed interim storage facilities, and are not the permanent storage sites for used nuclear fuel.

The bundles remain radioactive for about 1 million years at which point they reach the radioactivity of natural uranium. This is why the NWMO is currently developing a plan for the safe, permanent storage of all of Canada's used nuclear fuel deep underground in a facility called a deep geological repository (DGR).



**FOR MORE INFORMATION ABOUT THE CONTAINMENT OF USED NUCLEAR FUEL, PLEASE SEE THE FACT SHEET ON *MULTI-BARRIER CONTAINMENT*.**