What is the Uranium Fuel Cycle?

United States Environmental Protection Agency
Office of Radiation and Indoor Air (6608J)
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Milling of Uranium Ore

Uranium is extracted from ore with strong acids or bases. The uranium is concentrated in a solid substance called "yellowcake."

Chemical Conversion

Plants convert the uranium in yellowcake to uranium hexafluoride (UF_6), a compound that can be made into nuclear fuel.

Enrichment

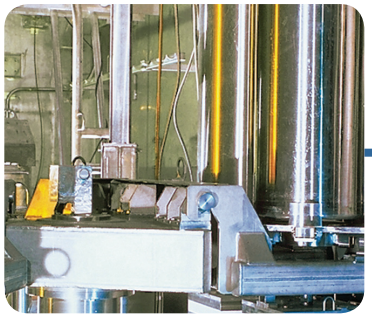
Processing facilities concentrate uranium^{235}-- the form (isotope) that is capable of undergoing a nuclear reaction.

Reprocessing

Reprocessing is the initial separation of spent nuclear fuel into its constituent parts.

Reprocessing is currently not taking place in the U.S.

Repository



Fabrication of Fuel

The enriched uranium is converted into fuel pellets and placed into rods for use in nuclear power plants.

Spent Nuclear Fuel

Used or "spent" nuclear fuel is stored in pools, or in specially designed dry storage casks.

Generation of Electricity at Nuclear Power Plants

Electricity is generated by nuclear power plants with reactors that use water for moderating nuclear reactions and cooling.

• • • Dotted lines show processes that are not currently taking place in the U.S.

EPA's "Environmental Radiation Protection Standards for Nuclear Power Operations" limit the radiation releases and doses to the public from the normal operation of uranium fuel facilities, including nuclear power plants.

What is the Uranium Fuel Cycle?

The Uranium Fuel Cycle: Environmental Considerations

Air—Tiny amounts of radioactive elements, such as argon, krypton, xenon, iodine and tritium (a radioactive form of hydrogen) get into the air during the normal operations of nuclear power plants.

Water—Wastewater discharges can contain tiny amounts of radioactive hydrogen (tritium) and other radioactive constituents. Facility wastewater permits set strict limits on how much radioactivity can be discharged to water.

Radioactive Wastes—Wastes managed for their radioactive content.

Spent Nuclear Fuels—Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

EPA and Nuclear Power Operations

EPA's mission is to protect human health and the environment. EPA sets limits on the amount of radiation that can be released into the environment. EPA does not regulate the daily operations of nuclear power plants or nuclear fuel facilities.

The Nuclear Regulatory Commission (NRC) has regulatory responsibility for licensing and oversight of commercial nuclear power facilities, and implements EPA's environmental standards at applicable facilities.

Environmental Radiation Protection Standards for Nuclear Power Operations Federal Register Reference—42 FR 2860, Vol. 42, No. 9, January 13, 1977

For more information, visit our website at:
www.epa.gov/radiation/laws/190

EPA United States Environmental Protection Agency