State INEEL Oversight & Radiation Control

March 2003

INEEL facility asks state if it can accept additional spent nuclear fuel

ANL-West would test fuel, then test new treatment method

Argonne National Laboratory-West recently asked state officials to consider a narrow exception to the 1995 Settlement Agreement. The exemption would allow ANL-West to accept 6 spent nuclear fuel rods from a commercial nuclear power plant in Illinois. This would entail a one-time waiver to the Settlement Agreement: a shipment of commercial spent nuclear fuel, which is banned by the Agreement, would be allowed. But one thing would not change: the total number of shipments the INEEL is allowed to accept under the Settlement Agreement. It will remain the same.

Your comments on the proposal can help the state make an informed decision. Comments can be shared via a postage-paid form included in this newsletter, via e-mail (AskOversight@deq.state.id.us,) or by calling Oversight's toll-free telephone line at 1-800-232-4635.

Argonne wants to compete for an opportunity to do research on 6 nuclear fuel rods. The Framatone Corporation, which makes the rods, wants a facility to examine them. Information gleaned from the examination would be used to improve fuel performance and determine why some of the fuel rods didn't work as expected.

About the spent nuclear fuel

Three rods failed during testing at one of the two La Salle nuclear power reactors in northern Illinois. The remaining three undamaged rods would provide a baseline for comparison. The examination would involve destruction of the fuel rods, which would prevent Framatone or the utility from taking them back for storage.

Argonne is interested in performing the examination to help its efforts to develop the next generation of nuclear reactors and to improve current reactors' operating abilities. It also wants to demonstrate whether its electrometallurgical treatment process can convert commercial spent fuel to a form that's safer to store, transport, and dispose. The process also renders uranium more resistant to use in making nuclear weapons.

These 6 fuel rods would contain approximately 18 kilograms of uranium oxide. A single truck shipment can carry the rods. Argonne's treatment process would extract the usable uranium and about 21 kilograms of solid ceramic and metal waste.

Other facilities that could perform the examination project include the Chalk River plant in Ontario, Canada, Studsvik in Sweden, and General Electric's Vallecitos Nuclear Center in California.

Settlement Agreement

Idaho's 1995 court settlement with DOE prohibits shipment of spent nuclear fuel from commercial reactors to INEEL with very limited exceptions. These exemptions include fuel from Colorado's Fort St. Vrain facility (and only after a spent fuel disposal or storage facility is open and accepting fuel from INEEL,) and small amounts of commercial spent fuel already owned by DOE in 1995. This includes the damaged Three Mile Island reactor brought to the INEEL for examination in the 1980s and spent fuel sent to DOE's West Valley Project in New York in the 1960s and 1970s.

Short time frame

Framatone plans to make a decision by April 1 on who does the work, so the time for deciding whether to allow Argonne to conduct this project is short. The state plans to let ANL-West know what its decision is by the end of March. Your input is welcome, and can be sent via the postage-paid form inside this newsletter, via e-mail or via Oversight's toll-free telephone number.

Should ANL-West be allowed to accept this spent nuclear fuel?

Arguments for

Idaho wants the INEEL to continue to conduct important research and development activities. If the treatment process that ANL-West hopes to test with this spent nuclear fuel is effective, it could have worldwide benefits. Treatment of spent nuclear fuel is a pressing concern, not just here in the United States, but all around the world. One area of particular concern is the former Soviet Union, where some technologies developed at ANL-West are already in use.

The INEEL is an important part of Idaho's economy, and the state has pledged to support new missions for the site. This contract with Framatone could help the INEEL expand into new markets. For Idaho communities, these opportunities translate into secure jobs and opportunities for economic growth and development.

Arguments against

The provision of the Settlement Agreement which guarantees that Idaho will not have to accept any spent nuclear fuel from commercial nuclear power generating plants was a significant victory for the state. Idaho should stand firm.

A final repository for spent nuclear fuel and high-level waste has not yet opened. The repository still faces significant technical, political, and management challenges. Until there is somewhere for spent nuclear fuel to go, Idaho should not accept spent nuclear fuel above and beyond that specifically allowed in the Settlement Agreement, even though it would remain within its total shipment limits.

Striking a balance: your input is needed

Responsible public policy is about balance, and your input is needed to help define what balance is best for Idaho. Which of the two viewpoints best represents your feelings about the issue?

Because the state must render a decision before the end of March, please fill out the feebback form in this newsletter and mail it back before March 18th. You can also fax your response to 208-373-0429, e-mail AskOversight@deq.state.id.us, or fill out the form online at www.Oversight.state.id.us.

Argonne National Laboratory West

If you drive from Idaho Falls to Arco, heading west on highway 20, the first INEEL facility you pass is Argonne National Laboratory West, frequently referred to as "Argonne West" or "ANL-W." Since highway 20 is the kind of drive where you have plenty of time to think, you may have wondered what ANL-W is and what it's doing in the middle of the INEEL. Here's a short version of ANL's story. It begins in Chicago, Illinois, during World War II.

Roots in the forest

In 1942, Italian-born Enrico Fermi, winner of the 1938 Nobel Prize in physics for his pioneering work in neutron irradiation and nuclear reactions—and a recent émigré to the United States—headed a team of scientists working at the University of Chicago's Metallurgical Laboratory. As a part of the Manhattan Project, Fermi's team constructed what was known as Chicago Pile No. 1: an innocuous stack of graphite blocks and uranium oxide pellets located under the stands of nearby Stagg Field. On December 2, 1942, CP-1 achieved the first ever controlled, self-sustaining nuclear chain reaction.

Shortly afterward, CP-1 was moved to a new facility in the *Argonne Forest* section of the Cook County Forest Preserve. Referred to informally as the "Argonne Laboratory," the name became official in July 1946 when Argonne National Laboratory was created under a letter contract with the University of Chicago. The University

has held the contract from that day until the present.

On January 1, 1947, the newly created Atomic Energy Commission assumed government administration of the contract, replacing the wartime Manhattan Project in this role.

Argonne comes to Idaho

The Idaho extension of Argonne National Laboratory had its origins in the wartime presumption that natural supplies of uranium were limited.

One way of creating more uranium, which was needed to build nuclear weapons, had been proposed by Dr. Walter Zinn, ANL's first director. Zinn, who had worked with Enrico Fermi on the CP-1, proposed a reactor that would create plutonium, a material that can sustain a chain reaction, from natural uranium, a material that cannot. Zinn's proposal became reality in 1951, when Experimental Breeder Reactor I (EBR-1) achieved a self-sustaining chain reaction.

One of the most famous moments for the facility occurred on December 20, 1951, when the reactor was used to generate electricity. It was the first time electricity had been created as a result of nuclear fission.

Experimental Breeder Reactor-II

EBR-I was decommissioned in 1963. It was followed by a succession of experimental reactors managed by ANL. The longest-used Argonne facility has been Experimental Breeder Reactor II, which housed the first complete breeder reactor and was later used to demonstrate some of the passive safety features that will be key elements in Generation IV reactors. DOE shut down EBR-II in 1994 because of shifts in energy research policy.

ANL-West's nuclear projects: a sampler

Electrometallurgical processing is the name given to Argonne's technique for disposing of spent nuclear fuel rods. Using this technology, fission products are separated from uranium, reducing the amount of waste that has to be stored and recovering usable uranium. In contrast, the current method for disposing of spent nuclear fuel does not include any kind of processing to reduce the volume of waste. To learn more about electrometallurgical processing, see http://www.era.anl.gov/spentfuel/emt.html.

ANL-West has specialilized facilities for handling nuclear materials and waste. Photo courtesy of ANL-West.

Space batteries, also known as *radioisotope thermoelectric generators*, convert the heat from decaying plutonium-238 into electrical energy. Used in spacecraft since 1961, these long-lived batteries have been manufactured at the Mound facility in Ohio. In the summer of 2002, DOE moved the assembly of these batteries to ANL-West.

Generation IV reactors, which may replace the current Generation II nuclear reactors used to generate twenty percent of the nation's electrical power, are envisioned to incorporate design features that enhance safety and increase efficiency. Six concepts have been chosen for research. To learn more, see http://www.inel.gov/initiatives/generation.shtml.

ANL-West's **transuranic waste coring** can ensure that waste shipped from DOE sites around the country meets WIPP's disposal standards. Some wastes, like sludge hardened by mixing with concrete, are difficult to examine, but there's not enough of it to justify developing the capacity at DOE sites around the country. Instead, it is brought to ANL-West, as it has developed methods for sampling of solids by extracting a 2-inch diameter core (yes, it's like pulling out an apple core) from top to bottom of waste barrels and then taking samples along the core for analysis in a laboratory.

SPENT NUCLEAR FUEL

What is spent nuclear fuel?

Spent nuclear fuel, or SNF, is used-up fuel rods from nuclear reactors. These rods no longer have enough of the right material needed to efficiently "burn" in a reactor.

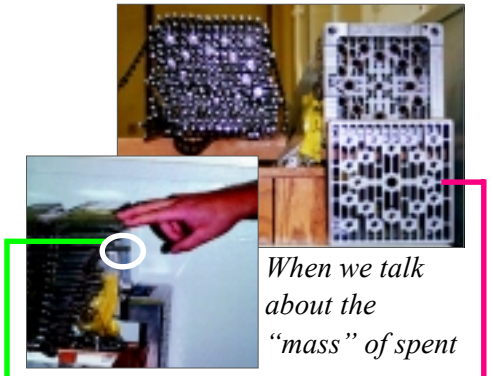
What is commercial SNF?

The 1995 Settlement Agreement, made an important distinction between spent nuclear fuel from commercial nuclear reactors—those owned by a business or utility—and that produced by government reactors like those run by the Department of Energy or the Navy. The INEEL would not be asked to accept any of spent nuclear fuel stored at commercial reactors around the United States until a permanent repository is opened. If the state decides to allow ANL-West to accept this SNF it will add another, the first waiver of an Agreement provision.

How much is at the INEEL? How much more is this?

There are about 270 metric tons of spent nuclear fuel now stored at the INEEL. That's about 595,242 pounds, the approximate mass of 111 sport utility vehicles.

Casks used to ship spent nuclear fuel.



When we talk about the "mass" of spent nuclear fuel, we're describing only the actual fuel material (such as uranium) that makes up the fuel. The measurement does not include the metal tubes that encase the fuel or the materials that link fuel rods together, like this box.

The proposed shipment would consist of six rods that are about a half inch across and nearly 14 feet tall.

The mass of the fuel shipped to ANL-West, if allowed, would be about .018 of a metric ton, about 40 pounds, the same weight as this dog, a small golden retreiver. But since uramium is denser than dog, it would take up about as much space as a quart of water.

What is a metric ton? A metric ton is 2,204 pounds. A sport utility vehicle, like this Ford Expedition, weighs about 2½ metric tons. The mass of the spent nuclear fuel now stored at the INEEL is about the same as the mass of 111 sport utility vehicles. (An Expedition weighs about 5,345 pounds; that's 2.67 short tons, or 2.42 metric tons.)

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