State of Idaho Oversight Monitor

State Oversight
February 2003

Economic initiatives funded

Idaho State University and the Regional Development Alliance recently received funding for projects that will diversify eastern Idaho's economy and create new jobs. Funding for the two projects comes from the INEEL Settlement Fund, part of the 1995 Settlement Agreement that sets milestones and deadlines for treatment and removal of certain wastes from the INEEL.

$400,000 awarded to Accelerator Center

The Idaho Accelerator Center on the Idaho State University campus in Pocatello received $400,000 from the INEEL Settlement Fund. It will be used to construct two additional accelerator laboratories at the center, a unique research facility that provides opportunities for nuclear physics research and development.

"This partnership will help make the Idaho Accelerator Center Business Development Facility a real benefit to not only the university, but to southeastern Idaho and the entire state," Governor Kempthorne said. "By teaming up, the university, the state, the city and the private sector are helping to establish an educational, scientific and economic development asset that any community in the United States would be proud to have.

ISU Accelerator Center

"I believe this is an integral step in moving us toward the technology that Pocatello's future will be built on," said Pocatello Mayor Roger Chase. Idaho State University President Richard Bowen said "This arrangement will provide tremendous faculty and student research opportunities and increased economic development. New jobs and new business spin-offs created from this partnership will benefit the community and state."

After construction is completed, the Idaho Accelerator Center is expected to create 20 to 30 new jobs, perhaps more as spin-off businesses develop. These jobs will be primarily professional and technical positions and will exhibit above average earning potential.

The Idaho Accelerator Center occupies about 21,000 square feet of laboratory space in three laboratories on the Idaho State University campus. Chartered as a research center by the State Board of Education in 1994, it has more operating accelerators than any other university in North America.

What is an accelerator?

An accelerator is a device that is used to produce radiation. Radiation is produced in the form of particles as the accelerator "shoots" particles at targets. When the particles interact with the targets, radiation is produced.

Accelerators can be used to study how materials will interact and to study very small (subatomic) particles. Accelerator research can benefit cancer treatments and application of drugs to fight other diseases. Accelerators also help advance the new field of nanotechnology—using the behavior of very small particles to improve computer hardware and make new products that are cleaner, stronger, lighter, and more precise.

$1 million awarded to Regional Development Alliance

The state recently awarded an additional one million dollars from the INEEL Settlement Agreement Fund to the Regional Development Alliance.

The RDA was founded in 1997 to promote economic diversification and expansion activities in the seven counties surrounding the INEEL.

"Through regional cooperation and teamwork, the Regional Development Alliance has achieved significant results," Governor Kempthorne said.

"Its investments have boosted our rural economies and strengthened eastern Idaho's manufacturing, agricultural, service and technology sectors," said Kempthorne, "With this award, we're laying the groundwork for even greater economic growth."

The Regional Development Alliance's investments have created nearly 3,000 jobs. Including this award, it has received $20.5 million from the INEEL Settlement Fund. Elected officials and business representatives from the seven-county area make up the Alliance's 15-member bipartisan board.

RDA-funded projects: helping support Idaho's traditional industries . . .

Potato Products of Idaho**, based in Rigby, received $600,000 to equip a new facility. The company developed a process for delivering a fully cooked, oven-baked potato—Minute Baker (above)— that can be refrigerated or frozen, then heated in the microwave, on the stove, or in the oven. Idaho Russet Burbank Potatoes are used in the process, thus giving a major boost to Idaho potatoes.* ***www.minutebaker.com

***Miskin Scraper Works** received $522,000 to expand operations in Ucon and Pocatello. Miskin manufactures dirt moving equipment for agriculture and construction.*

Lost River Ballistic Technologies**, in Arco, received $403,000. The company makes high quality firearm products that are unsurpassed for accuracy and performance.* ***www.lostriverballistic.com

***Antigo Cheese**, based in Wisconsin, received $500,000 from the Regional Development Alliance to buy and restart the cheese plant in Blackfoot. Antigo makes hard Italian Cheese like Italian and Romano. The plant can process a million pounds of milk each day and employ up to 50 people in full production.*

. . . helping expand new industries

***Governet,** a Nevada-based corporation, received $261,650 from the Regional Development Alliance to help defray start-up costs for an Idaho Governet center. A subscriber-based company offering Internet access to public information, Governet also creates web sites.*

*Idaho Falls software company **Frontline Solutions** received $65,500 to expand its operations. Frontline Solutions is a software engineering and development corporation that is currently developing methods to streamline processes used to collect information and purchase supplies and services. Frontline Solutions also provides systems analysis and software engineering. RDA funds will be used to market the software and purchase new equipment.*

***Melaleuca, Inc.**, of Idaho Falls, was granted a $2.5 million interest-free loan to expand its Idaho operations. It offers a complete line of wellness products, like nutritional supplements, environmentally friendly home care cleaners, and personal care products.*

The announcement of the loan in October 2002 ignited a brief but intense political controversy. Although the announcement of the award was made shortly before the November election, the loan itself had been approved three years earlier. The announcement had been delayed while details of a new building were worked out. Republican and Democratic local elected officials and members of the RDA board defended the loan and the Alliance's decision-making process.

A list of RDA's loans, grants, and other investments is available on its web site at www.regalliance.org.

DOE reaffirms INEEL's nuclear mission

During a visit to Idaho Falls in July, Secretary of Energy Spencer Abraham reaffirmed INEEL's key role in nuclear energy research. Secretary Abraham told INEEL employees:

> *In light of all these [advantages of nuclear power], it makes tremendous sense for the United States to maintain a strong role for nuclear energy. We want to see existing nuclear plants remain online for their full life expectancy, and we want to see new plants built.*
>
> *For that to happen, the Department of Energy needs to have a major facility that has the resources, the technology, the equipment, the brainpower—and the support from Washington—to accomplish this.*
>
> *So I am proud to be here today to tell the people of INEEL that that is going to be you.*

What changes are in store for INEEL?

INEEL will take on several new roles:

- It will be at the center of the federal government's research into "Generation IV" nuclear systems. DOE wants to have the next-generation of reactor and fuel cycle technologies ready to deploy by 2030.
- It will play a central role in DOE's Advanced Fuel Cycle Technology Initiative, a project to develop and demonstrate new separation technologies for dealing with spent nuclear fuel and high-level waste.
- Argonne National Laboratory-West, part of INEEL run by the University of Chicago, will assemble nuclear-powered batteries.

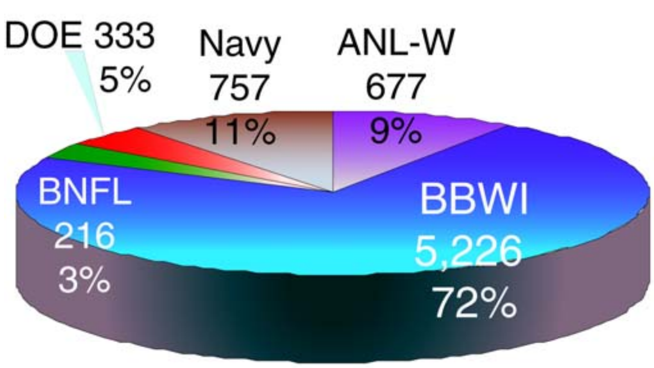
How will this affect jobs?

Employment at the INEEL has fluctuated from less than 3,000 when the site was first established in the early 50s to almost 13,000 in 1991. From 1963 to 1974, the site's employment remained stable at 4,000 to 6,000.

"Most DOE sites employ between three to five thousand people," explains Idaho Department of Commerce Director Gary Mahn. "Employment at the INEEL will stabilize as the site's clean-up mission concludes and a new mission takes its place."

Mahn insists there's reason for optimism. "Eastern Idaho's economy is becoming more robust and diverse," said Mahn. "The job creation efforts of Bechtel BWXT, the INEEL, the Regional Development Alliance and EIEDC are paying off."

Who do INEEL employees work for?



Employment at National Labs: 2002

Argonne National Laboratory: 4,000

Brookhaven National Lab: 3,000 full-time, 4,000 guests

Hanford: 11,000

Los Alamos: 7,500 University of California employees, 3,200 contractors

Lawrence Berkeley: 4,000 full-time, 2,000 guests

Oak Ridge National Lab: 3,800 full-time, 3,000 guests

Sandia: 7,700

INEEL: 7,209

The average number of full-time employees at major DOE sites, excluding guest researchers, is 6,314.

The average number of employees at major DOE facilities, including guest researchers, is 7,600.

INEEL contractors

Since the INEEL started as the National Reactor Testing Station in 1949, six contractors have served as the primary contractors at the laboratory. The first five were:

- Phillips Petroleum Company 1950-1966
- Phillips Petroleum Company and the Idaho Nuclear Corporation (Allied Chemical Corporation, and Aerojet General Corporation) 1966-1972
- Aerojet Nuclear Corporation 1972-1976
- EG&G Idaho 1976-1994
- Lockheed Martin Idaho Technologies Company 1994-1999

Because of the special work and research done at the Chem Plant (now known as INTEC, the Idaho Nuclear Technology Engineering Center,) it often had different contractors than the rest of the site:

- American Cynamid 1951-1953
- Phillips Petroleum 1953-1966
- Idaho Nuclear 1966-1979
- Exxon Nuclear Idaho Company 1979-1984
- WINCO, a subsidary of Westinghouse, 1984-1991

Since 1994, management of the Chem Plant/INTEC was included in the site Maintenance & Operations contract.

The Naval Reactors Facility is operated by Bechtel Bettis, Inc., under contract with and direct supervision of the Naval Nuclear Propulsion Program. Argonne National Laboratory is run by the University of Chicago.

Bechtel BWXT Idaho LLC, known as BBWI, is the sixth and current prime contractor for the INEEL. Bechtel BWXT Idaho LLC's contract began on Oct. 1, 1999 and continues until Sept. 30, 2004. It's comprised of three organizations: Bechtel, BWX Technologies, and the Inland Northwest Research Alliance.

Bechtel, a century of building things: Bechtel, which was founded in 1898, started by grading railroad beds. Since then, the company has worked on "20,000 projects in 140 nations on all seven continents." One of the most famous projects Bechtel has worked on was the Bay Area Rapid Transit system in the San Francisco area.

BWX Technologies: The part of BWX Technologies that has expertise in the nuclear industry started out in the late 1800s as Babcock & Wilcox, a manufacturer of water tube steam boilers. Targeting the growth in steam-powered industries during the years after the Civil War, Babcock & Wilcox built the boilers that powered the first subways in New York City and was known for manufacturing steam generators and heat exchangers for nuclear power plants. In 1978, Babcock & Wilcox was acquired by McDermott International. In 1997, the part of Babcock & Wilcox that does government contracting was renamed BWX Technologies.

Inland Northwest Research Alliance, the university consortium: Eight universities make up the Inland Northwest Research Alliance, BBWI's third partner: Boise State University, Idaho State University, Montana State University, University of Alaska Fairbanks, University of Montana, Utah State University, and Washington State University. The Alliance's mission is to "develop the basic and applied research capabilities and educational programs at the INEEL."

Each contractor can bring different expertise, approaches, and management styles to the site. *At any given time there may also be dozens of subcontractors working on and around the site.*

In this photo, the Reynolds Electric and Engineering Company drills the "Raft River Geothermal Exploratory Hole," designed to develop techniques for locating geothermal reservoirs and exploring the use of geothermal resources for generating electricity.

Photo published on Jan. 7, 1975, part of "*The INEL Marks 1974 A Year Of Accomplishment, Stability And Safety*," in an employee newsletter published by the Aerojet Nuclear Company.

Generation IV: back to the future for INEEL

If you are wondering what a "Generation IV" reactor is, you're in good company. Unless you happen to work in the nuclear power industry, there's little reason for knowing this sort of terminology. Here's a short primer on the various generations of nuclear reactors.

Generation I: the prototypes

Beginning with the 1957 startup of the Shippingport Atomic Power Station in Shippingport, Pennsylvania, there have been three generations of commercial nuclear reactors built to generate electrical power.

Generation I started with Shippingport, which was a *pressurized water reactor* (PWR). The prototype reactor station was built for the Atomic Energy Commission and Duquesne Light Company to gain knowledge and experience used in the design of the Generation II reactors that followed. Shippingport operated until 1982. Other Generation I reactors included the Dresden-I reactor near Morris, Illinois, the first commercial *boiling water reactor* (BWR); the Fermi-I reactor near Detroit, Michigan, which was the first commercial liquid-metal cooled, fast-breeder reactor; and Fort St. Vrain near Platteville, Colorado, which was the first (and only) gas-cooled commercial reactor built in the United States.

Generation II: large-scale power stations

The 104 commercial reactors currently operating in the United States are Generation II reactors. This second generation of nuclear design includes both United States' PWR and BWR designs, Canadian CANDU reactors, French PWRs, and the poorly designed Russian RMBK reactors like the one at Chernobyl.

There are 438 Generation II nuclear power plants generating about 17% of the world's electricity. In the U.S., nuclear power supplies about 20% of our electricity. Percentages in other countries range from 1% for China to 78% for Lithuania.

Generation III: not seen here

Since the 1979 accident at Three Mile Island, no U.S. utility has proposed a new nuclear power plant. True, there had always been concerns about nuclear power, but TMI was the capper. Around the world, however, new nuclear power plants continue to be built. As of 2001, there are eight reactors under construction in China, four in South Korea, four in the Ukraine, three in Japan—and others.

Some of these new nuclear power plants, such as the Shika 2 plant being constructed in Japan, define a third generation of commercial power reactors. In the 80s, the Electric Power Research Institute, working with General Electric and Westinghouse, promoted Advanced Light Water Reactor design concepts that represent an evolution in nuclear power plants.

Generation III reactors have been designed so that safety features rely less on human interaction and complex systems of equipment and more on inherently safe design. The Integral Fast Reactor concept tested at Argonne's INEEL facilities included passive safety features.

Generation IV: back to the future

Generation IV nuclear power plants will take what has been learned from the first three generations and factor in design goals like minimizing waste and making spent nuclear fuel more secure.

But for nuclear power to have a future in the United States, Generation IV reactors will also have to address other factors. Design, safety, and engineering advances alone won't allay the fears of those who reject nuclear power—credibility must be established and trust earned.

PWR? BWR? What's the difference?

The majority (69 out of 104) of the commercial reactors in the United States are Pressurized Water Reactors (PWRs). In a PWR reactor, the pressure in the reactor vessel is kept high enough so that the water never boils. As the water is pumped through the vessel, it picks up energy—in the form of heat—from the fuel rods and transfers this energy to a separate system of piping via a heat-exchanger.

To picture this process, think of a car radiator and how it dumps heat from the engine coolant to the surrounding air. A heat exchanger in a reactor works the same way, only instead of transferring heat to air, it transfers heat from a loop of pipes to a second loop of pipes. The water in the second piping system is allowed to boil into steam, which is used to turn a turbine—a fancy set of fan blades connected to a generator.

The remaining 35 commercial reactors in the U.S. are *Boiling Water Reactors* (BWRs), in which the water in the reactor vessel is allowed to boil and create steam without the use of a second system of piping.

INEEL's half-century of nuclear reactor research

Since the first Experimental Breeder Reactor powered up in 1951, the INEEL has been home to more than fifty different nuclear reactors. Here are some of the highlights in INEEL's half-century of reactor research.

EBR-I: first electricity from fission

Electricity generated by Experimental Breeder Reactor I on December 20, 1951 powered four light bulbs. It was the first use of electrical power generated by nuclear fission.

In the early years of nuclear reactor development, there was a focus on building "breeder" reactors. These reactors "breed" more reactor fuel while they operate to make electricity. The Experimental Breeder Reactor II started up in 1961, and for many years supported research into not only breeder technology, but also new methods of fuel reprocessing and passive safety systems. The reactor operated until 1994.

Materials testing reactors

The second nuclear reactor to power up at INEEL, the Materials Test Reactor (MTR) was used to conduct research on the materials used in commercial power reactors. Back when the nuclear industry was just getting started, not a lot was known about how high levels of radiation would affect the metals and components that would be used in reactors. The MTR was an essential test bed for conducting fundamental research in this area.

The Engineering Test Reactor, which started in 1957, provided an upgrade to the MTR facilities, with more space for experiments and more power. In 1972, the ETR housed the Sodium Loop Safety Facility, which was used to conduct breeder reactor research.

In 1967, the Advanced Test Reactor provided the ability to condense material testing into short periods of time. Designed to create much greater concentrations of neutrons (the neutral particle contained within the heart of atoms), the ATR has been used to conduct research into how materials stand up to the radiation inside of nuclear reactors. It has also advanced the Navy's program for use of nuclear power in submarines and aircraft carriers.

BORAX: more power than 20 mule teams

Five Boiling Water Reactor Experiments (BORAX I through V) were conducted from 1953 through 1964. These experiments provided knowledge about how reactors would behave if the cooling water were allowed to boil into steam inside of the reactor vessel. The Borax III reactor was the first to light a town—Arco—in 1955.

An ill-fated reactor

The Stationary Low Power Reactor (SL-1) was built by the U.S. Army to explore the possibility of using nuclear reactors for generating power in the field—especially in remote sites like the Arctic Circle and Antarctica. It was destroyed by a steam explosion on January 3, 1961, killing all three operators on hand. The accident happened when one of the three workers manually pulled a fuel rod out of the reactor during routine maintenance. It was the first time an accident in a nuclear reactor had resulted in fatalities, and the only time such an event has occurred at a DOE

SL-1 area in 1962, after the reactor had been dismantled and buried.

facility. Since the SL-1 accident, U.S. reactors have been designed so that movement of a single control rod is not sufficient to create a nuclear chain reaction.

Loss of Fluid Test Facility

In the 70s, the Loss of Fluid Test Facility was a hotbed of INEEL testing, bringing together the resources of several different nations to construct an experimental facility where engineers and scientists could explore what happens when a reactor suddenly loses cooling water.

Reactors at INEEL

The INEEL has been home to fifty-two reactors, more than any other site in the United States and possibly more than any other site in the world. This list of the reactors INEEL has hosted comes from the pages of *Proving the Principle*, Susan Stacy's definitive history of the site:

1 Advanced Reactivity Measurement Facility No. 1
2 Advanced Reactivity Measurement Facility No. 2
3 Advanced Test Reactor ★ Still operating
4 Advanced Test Reactor Critical Facility ★ Still operating
5 Argonne Fast Source Reactor
6 Boiling Water Reactor Experiment No. 1
7 Boiling Water Reactor Experiment No. 2
8 Boiling Water Reactor Experiment No. 3
9 Boiling Water Reactor Experiment No. 4
10 Boiling Water Reactor Experiment No. 5
11 Cavity Reactor Critical Experiment
12 Coupled Fast Reactivity Measurement Facility
13 Critical Experiment Tank
14 Engineering Test Reactor
15 Engineering Test Reactor Critical Facility
16 Experimental Beryllium Oxide Reactor
17 Experimental Breeder Reactor No. I
18 Experimental Breeder Reactor No. II
19 Experimental Organic Cooled Reactor
20 Fast Spectrum Refractory Metals Reactor
21 Gas Cooled Reactor Experiment
22 Heat Transfer Experiment No. 1
23 Heat Transfer Experiment No. 2
24 Heat Transfer Experiment No. 3
25 High Temperature Marine Propulsion Reactor
26 Hot Critical Experiment
27 Large Ship Reactor A
28 Large Ship Reactor B
29 Loss of Fluid Test Facility
30 Materials Test Reactor
31 Mobile Low-Power Reactor No. 1
32 Natural Circulation Reactor
33 Neutron Radiography Facility ★ Still operating
34 Nuclear Effects Reactor
35 Organic Moderated Reactor Experiment
36 Power Burst Facility
37 Reactivity Measurement Facility
38 Shield Test Pool Facility
39 Special Power Excursion Reactor Test No. I
40 Special Power Excursion Reactor Test No. II
41 Special Power Excursion Reactor Test No. III
42 Special Power Excursion Reactor Test No. IV
43 Spherical Cavity Reactor Critical Experiment
44 Stationary Low-Power Reactor
45 Submarine Thermal Reactor
46 Systems for Nuclear Auxiliary Power (SNAP) 10A Transient No. 1
47 Systems for Nuclear Auxiliary Power (SNAP) 10A Transient No. 3
48 Systems for Nuclear Auxiliary Power (SNAP) 10A Transient No. 2
49 Thermal Reactor Idaho Test Station
50 Transient Reactor Test Facility ★ Could operate (but isn't)
51 Zero Power Physics Reactor ★ Could operate (but isn't)
52 Zero Power Reactor No. 3

In this issue of the Oversight Monitor...

When the Idaho legislature established Oversight 1989, it clearly set out the program's goals. Among them: "to ensure that the INEEL continues to contribute positively to the nation and to Idaho's society and economy."

Oversight also plays a small but significant role in economic development through the 1995 Settlement Agreement. The Agreement is best known for setting out deadlines for treatment and disposal of certain types of nuclear waste, but it also required the DOE to pay $30 million to the state to reduce eastern Idaho's dependence on the INEEL.

The state turns some of the money over to the Regional Development Alliance. Companies interested in a grant or loan from Settlement Fund dollars submit proposals to the Alliance. The Alliance's 15-member non-partisan board evaluates the proposals, looking for projects that provide a good return on investment, contribute to long-term economic stability, and provide opportunities for employment. It sometimes partners with other cooperative efforts, like the state Department of Commerce, the contractor that runs the site for the DOE, Idaho colleges and universities, or local economic development organizations.

Although most decisions on allocation of Settlement Agreement economic development funds are made by the Regional Development Alliance, the state also has a role. The state has dedicated funds to certain projects, like helping the University of Idaho build a Science and Technology Center in Idaho Falls, and funding the Acclerator Center at Idaho State University. These proposals, too, are evaluated for return on investment, long-term economic stability, and employment opportunities.

The INEEL contractor also makes investments in the region's economy, as do local business and industry.

These efforts and partnerships, when paired with the Department of Energy's designation of the INEEL as the nation's lead nuclear laboratory, should help ensure that the nation and eastern Idaho continue to benefit from the INEEL.

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Strategic investments aid barley growers

The state and the Regional Development Alliance were among those that worked to convince Mexico-based Groupo Modelo, maker of Corona beer, to select Idaho Falls as the site for a new $64 million large-scale malting plant. They also worked to convince Budweiser to expand its eastern Idaho malting plant. These investments will strengthen Idaho's economy.

INEEL Oversight
Idaho's eyes on the INEEL

Idaho INEEL Oversight Program
1410 North Hilton St.
Boise, Idaho 83706