LINE

Leadership in Nuclear Energy Commission

FULL REPORT | JANUARY 2013

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INTRODUCTION

Aerial view of EBR-I facility

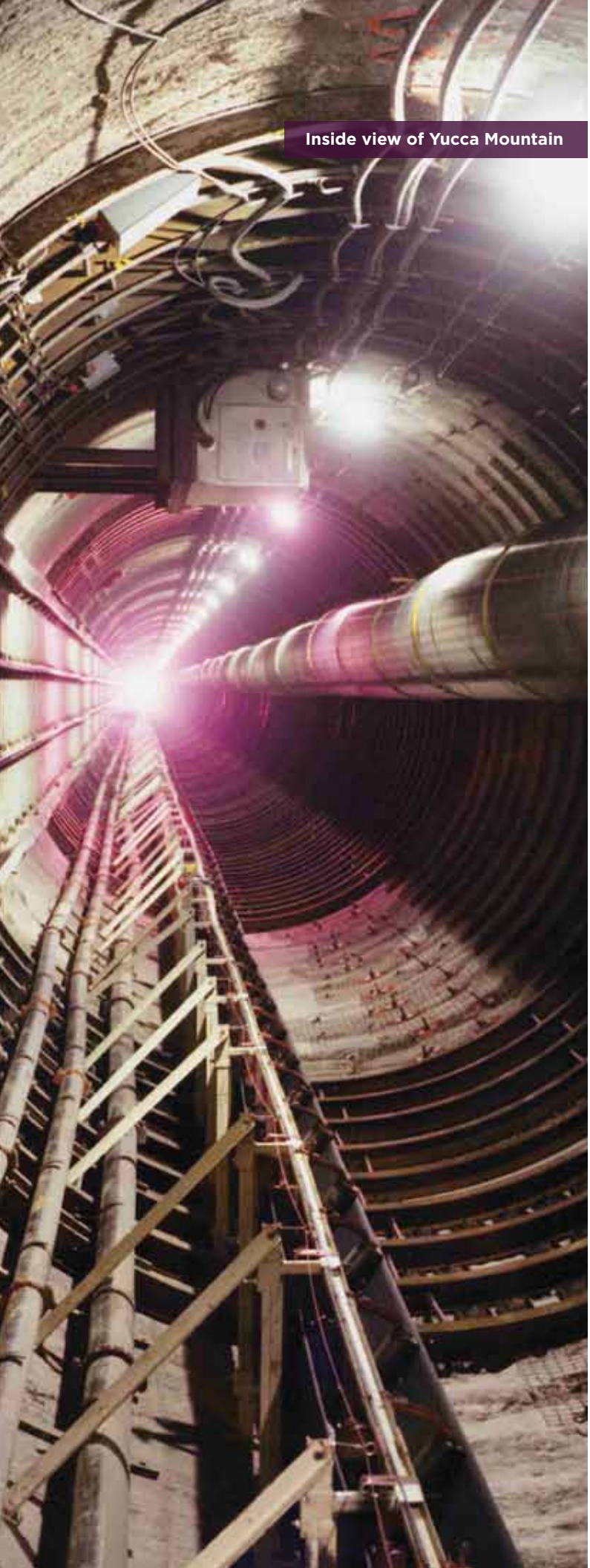
America's nuclear enterprise has deep roots in the State of Idaho.

These roots stretch back to the late 1940s when, in the aftermath of World War II, the U.S. Atomic Energy Commission began searching for a site to host a National Reactor Testing Station (NRTS). The NRTS was to serve as a test-bed for the emerging concept of nuclear-generated electricity. In 1949 the AEC selected a former naval gunnery range and adjoining property west of Idaho Falls – about 890 square miles in all – to serve as the site for the NRTS. By late 1951, Experimental Breeder Reactor-1 at the NRTS became the first power plant to produce electricity using atomic energy and in 1955, nearby Arco, Idaho became the first community lit by nuclear power.

In 1955, the city of Arco, Idaho became the **first community lit** by **nuclear power.**

Over the years, more than 50 experimental nuclear reactors, a nuclear fuel reprocessing plant, scores of research facilities, and several nuclear waste management and disposal facilities were built on the site of what is now known as the Idaho National Laboratory (INL). Most of the reactors and the original reprocessing plant have long been shut down – and are being cleaned up – but INL is still host to some of the most capable nuclear energy research, development and demonstration infrastructure in the world, including three operating research reactors and several facilities for the handling, examination and processing of radioactive materials.

The Hot Fuel Examination Facility at MFC



Inside view of Yucca Mountain

Today, INL also remains important as a major driver of local and statewide economic activity. According to a study conducted by Boise State University in 2010, INL is responsible for 24,000 direct and indirect jobs in Idaho — or 3.5 percent of the state's overall employment.[1] The same study estimated that INL's total contribution to the Idaho economy exceeds $3.5 billion on an annual basis. INL's presence has prompted several leading private companies involved in nuclear technology and services to locate operations in the state; in addition, Idaho's major universities have well-respected programs in nuclear engineering and related fields.

Despite this long history, and the considerable institutional, educational, and infrastructure assets that exist to support the nuclear energy industry in Idaho, the future of INL and of the broader nuclear enterprise — in Idaho and elsewhere — is uncertain. A number of factors account for this uncertainty:

- Increasing pressure on federal budgets.
- Reduced interest in building new nuclear plants in the United States as a result of low natural gas prices and post-Fukushima safety concerns.
- Efforts by other states to establish competencies that will compete with INL.
- The decision to withdraw the U.S. Department of Energy's license application for a geologic repository at Yucca Mountain in Nevada, which leaves spent nuclear fuel and high-level waste at the INL site with no place to go for permanent disposal.

THE LINE COMMISSION: A GOVERNOR'S FORESIGHT

Recognizing that Idaho has a major strategic and economic interest in maintaining INL's leadership role and in helping the nuclear energy industry successfully meet these broader challenges, Idaho governor C.L. "Butch" Otter established the Leadership in Nuclear Energy or "LINE" Commission in February 2012.

The Governor recognized that recent national developments in the nuclear energy sector will cause the State of Idaho to face important choices in the future and that he needed to understand the best options available.

[1] http://cobe.boisestate.edu/files/2010/12/Impacts_Brochure-Web1.pdf

Consistent with the direction outlined in Governor Otter's executive order [see Appendix I], the Commission focused on three issues of immediate importance to the future of the nuclear energy industries sector in Idaho:

- Ensuring that the unique research capabilities of INL continue to play an important role in supporting Idaho's economic growth and the nation's energy security going forward.
- Protecting the environment of Idaho and the health of its citizens by completing a comprehensive cleanup of the INL site and working for the safe management and permanent disposition of all nuclear legacy materials and wastes currently in Idaho.
- Building the technological, infrastructure, and workforce assets needed to position Idaho as a major player in future domestic and global markets for reliable, carbon-free nuclear energy.

To thoroughly explore these issues and develop recommendations for the full group to consider, the Commission established subcommittees on: (1) safety and the environment, (2) current and future technology, (3) education and workforce needs, (4) infrastructure, and (5) the national and global landscape for nuclear energy more broadly. The subcommittees added additional subject matter experts to the committees and were asked to answer and research strategic questions. The specific questions posed to each subcommittee are discussed in detail in Appendix II of this report.

The LINE Commission sought to gather as much information as possible in the most balanced, transparent, and focused manner possible. The Commission was of the view that this approach was most likely to do justice to the complex, yet significant, relevance of the nuclear industry to the State of Idaho.

Specific steps in the Commission's deliberative process are outlined below:

- National and local experts were sought, when possible, on every topic addressed by the Commission. The Commission was very fortunate to receive support and expert testimony from some of the most knowledgeable officials and industry experts in the nation.
- Meetings were held around the state (in Boise, Idaho Falls, Twin Falls, and Moscow) to ensure that the Commission heard from citizens across all regions.
- Public input was critical to the process. Time was extended in each meeting for public comment, and a LINE Commission website was established to encourage additional comment and to serve as a repository for all of the key documents associated with the LINE Commission's work.
- Meetings were held in a public setting and, where possible, were broadcast live via web streaming or made available using video-conferencing technology to ensure the process was open and transparent.
- A Progress Report on the work of the Commission and its subcommittees was issued for public review and comment in early December 2012. The Commission received hundreds of comments by the January 4th comment date and considered those in the preparation of its final report.

This report sets forth the final recommendations from the Commission to the Governor. Readers should note that this report to the Governor is strictly advisory in nature. The Commission is not authorized to set policy for the state of Idaho.

As noted in the Introduction, the nuclear industries sector – and INL in particular – have a long-standing and extremely important presence in Idaho's economy. Much of the LINE Commission's work has therefore focused on strategies for preserving and building on this legacy at a time of rapid change and difficult challenges for federally-funded research, the federal nuclear

IDAHO AND NUCLEAR ENERGY

waste management program and for commercial nuclear development alike. This section reviews the three main types of nuclear-related activities and assets that currently exist in the state: INL, private companies, and university and college programs.

IDAHO NATIONAL LABORATORY: THE NATION'S LEAD NUCLEAR ENERGY LABORATORY

Idaho National Laboratory is the nation's flagship research facility for nuclear energy. In operation since 1949, the facility was declared a national laboratory in the 1970s. Over time it came to host the world's largest concentration of nuclear research reactors, as well as the research teams that developed the world's first nuclear-powered submarine reactor and training programs for thousands of sailors serving on nuclear-powered vessels in the U.S. Navy.

INL cyber security teams are considered among the **best in the nation.**

Since its reorganization in 2005, Idaho National Laboratory has been the nation's leading facility for nuclear energy research, development, and demonstration. Today, INL is one of ten multi-program national laboratories owned by the U.S. Department of Energy (DOE). The INL site is also host to a multi-billion dollar, decades-long effort to address environmental contamination and other legacy issues at the site.

Aerial view of Advanced Test Reactor Complex

INL RESEARCH MISSION

Day-to-day management and operation of INL is the responsibility of Battelle Energy Alliance (BEA), which consists of Battelle, Babcock & Wilcox, URS Corporation, the Electric Power Research Institute, and a university consortium which includes the three Idaho research universities.

As noted in the introduction, three research reactors are currently still operating at INL. Foremost is the Advanced Test Reactor (ATR), which has been named a DOE National Scientific User Facility and is globally recognized for its unique capabilities and ability to perform advanced fuel studies.

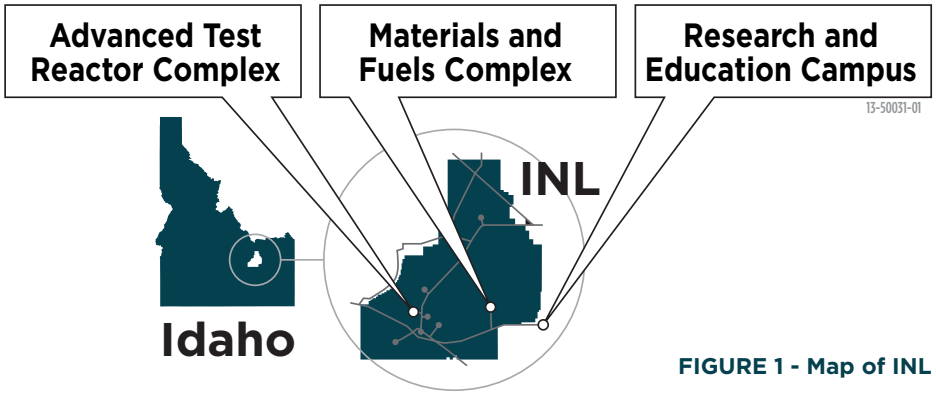


FIGURE 1 - Map of INL

A fourth reactor — the Transient Reactor Test Facility or "TREAT" — is under consideration for restart. Consistent with its mission to develop advanced nuclear technologies that can provide clean, abundant, affordable and reliable energy to the United States and the world, INL's ongoing nuclear- related activities include the following:

- Extensive work on nuclear safety;
- Close collaboration with industry and the U.S. Nuclear Regulatory Commission;
- Advanced analysis of radiation effects on materials for commercial and government users in the U.S. and abroad;
- Efforts to advance nuclear operations, including all aspects of the management and recycling of spent nuclear fuel;
- The development and validation of advanced fuels and materials performance, computer models and simulations; and
- The development of new fuels, materials and reactor technologies.

> INL teams helped develop the nuclear power system powering the Curiosity rover on Mars.

Although nuclear energy remains its primary research focus, INL also conducts work on renewable energy systems and develops innovative technologies in the areas of national and homeland security. Examples include work on "hybrid" energy systems that integrate

Researchers explore using nuclear-generated heat to produce hydrogen

MAJOR NUCLEAR FACILITIES AND PROJECTS AT INL

Advanced Test Reactor, TREAT, and Supporting Facilities

One of INL's foremost research facilities is the Advanced Test Reactor (ATR), which is globally recognized for its unique capabilities and ability to perform advanced fuel studies. As a DOE National Scientific User Facility, the ATR attracts researchers from leading universities, industrial firms and research institutions all around the world who use ATR and supporting facilities – particularly the Hot Fuel Examination Facility and other post-irradiation examination facilities. In addition, DOE is considering whether to restart the TREAT reactor, which is designed to test the safety and performance of advanced nuclear fuels. The TREAT reactor has been maintained in standby mode since the 1990s; researchers believe it could be used to accelerate progress toward safer and more efficient fuels for nuclear power generation.

Idaho Cleanup Project

This project is focused on removing and safely containing the early nuclear waste generated by DOE activities and World War II-era conventional weapons testing. The 10-year, $4 billion cleanup project, funded through the DOE's Office of Environmental Management, focuses on reducing risks to the public and the environment. One of its key priorities is to protect the Snake River Plain Aquifer, which is the sole source of drinking water for more than 300,000 residents of eastern and southern Idaho.

When the Idaho Cleanup Project contract was signed in 2005, the scope of work was extremely broad, and included tasks such as the demolition of old research facilities, the movement of spent fuel from pools into dry storage, and the exhumation of certain buried wastes. Today, some challenges remain (discussed later in report), but the vast majority of these tasks have been successfully completed — in most cases on schedule and under budget. Hence the Cleanup Project is generally viewed as a resounding success.

The Advanced Mixed Waste Treatment Project (AMWTP)

This project is focused on the retrieval, characterization, treatment, and repackaging of transuranic waste currently stored at the INL site. (Note that transuranic waste in this context consists of the gloves, tools, clothing and other, primarily plutonium contaminated items, generated in U.S. nuclear facilities during the Cold War.) The vast majority of the waste processed at AMWTP was shipped to Idaho for storage in the 1970s and early 1980s and resulted from the manufacture of nuclear components at Colorado's Rocky Flats Plant. Cleanup efforts have been very successful and are expected to be complete in 2015. The AMWTP facility is a unique national asset and could potentially be deployed as a strategic resource — for example, to sort, characterize, and repackage similar mixed waste at other DOE sites.

The Naval Reactors Facility

The Naval Reactors Facility examines and stores naval spent nuclear fuel and irradiated test specimens. Data derived from these examinations are used to develop new technology and improve the cost-effectiveness of existing designs, making it possible to dramatically increase the lifetime of naval reactor fuel cores. The Naval Reactors Facility supports the joint DOE/Department of Defense Naval Nuclear Propulsion Program.

nuclear energy with bio- and fossil-energy systems, as well as electric-vehicle batteries, advanced biomass, and technologies for hydrogen production. INL efforts in the area of national and homeland security have included the manufacture of heavy armor for military combat vehicles, the development and testing of devices for detecting nuclear materials, wireless communications, grid reliability and security, and the development of software and hardware to protect critical national infrastructure from cyber attack (in fact, INL's cyber-security teams are internationally recognized and considered among the best in the nation). In addition, INL trains first responders in the handling of radiological incidents.

With more than 3,900 scientists, engineers and support personnel and an annual budget in excess of $800 million per year, INL is one of the largest employers in Idaho and a major

driver of local and statewide economic activity. Since 2005, the laboratory has awarded subcontracts throughout Idaho worth $886 million, including $535 million in eastern Idaho, $162 million in the Treasure Valley and $52 million in northern Idaho.[2] During the same period, other DOE contractors working at the INL site have issued subcontracts worth hundreds of millions of dollars more. [3] Figure 1 shows the location and main facilities of INL; some of its most important, current nuclear-related activities are summarized in the text box.

Early-day defense waste disposal

INL CLEANUP

The last 20 years have seen significant improvements in the safety and performance of nuclear energy systems, including improvements in the technologies and methods available for safely managing and disposing of nuclear materials and wastes. From the 1950s through the early 1980s, however, the environmental impacts of nuclear operations and waste disposal practices at INL and at other DOE sites did not receive much attention, aside from the occasional headline-grabbing story like the tragic SL-1 reactor accident in 1961 which claimed the lives of three reactor operators. This began to change in the 1990s, when concerns arose over the Snake River Plain Aquifer, which lies directly below INL and is an important water source for eastern and south central Idaho. Past practices such as the use of a former water supply well as an injection well to dispose of solvents and other wastes, as well as pipes and valves that leaked radioactive liquid and contaminated material from Rocky Flats, Colorado that had been buried at the INL site, were all seen as potential sources of contamination that could affect the aquifer.

Concerned about threats to the Snake River Plain Aquifer and other environmental impacts, Idaho Governor Cecil Andrus began aggressively advocating for cleanup of the INL site, first with the Atomic Energy Commission and later with the U.S. Department of Energy. His leadership, and that of his successor, Governor Phil Batt, led to a landmark agreement — reached in October 1995 — between the State of Idaho, the U.S. Navy, and the U.S. Department of Energy to settle a lawsuit that had been filed by the state to prevent further shipments of spent nuclear fuel to INL for storage.[4] The lawsuit stemmed from decades of frustration over the federal government's failure to make and keep commitments to the people of Idaho for the cleanup of what is now the INL site.

Key provisions of the agreement, which is often called the Batt Agreement or the Settlement Agreement, include the following:

- The State of Idaho will allow a total of 1,135 shipments of spent fuel to come to INL for interim storage over a 40-year period. Of those shipments, 575 will come from the U.S. Navy. The rest will come from other DOE sites, foreign research reactors, university reactors and a specified amount from private companies directly supporting DOE R&D activities.
- DOE will remove all spent nuclear fuel from Idaho no later than 2035.
- DOE will treat all high-level waste at the INL (including calcine waste), in preparation for final disposal elsewhere, by a target date of 2035.
- DOE will treat transuranic and alpha-contaminated mixed waste now located at INL. All transuranic waste will be removed from Idaho no later than December 31, 2018.

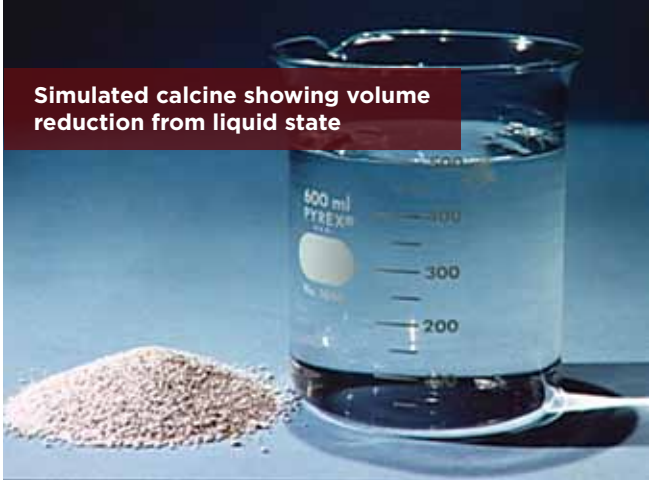
Leadership from Governor Andrus and Governor Batt created the **Settlement Agreement.** Signed in 1995.

- All spent fuel in wet storage will be placed in dry storage by December 31, 2023 and dry storage facilities will be placed, to the extent technically feasible, at a point not above the Snake River Plain Aquifer.
- INL will become the lead laboratory for DOE's spent fuel management program and DOE's Idaho Office will be

[2]BEA Procurement – Asset Suite reporting system

[3]According to the 2010 Boise State University study noted in the introduction, INL generates wages and salaries totaling $419 million and accounts for more than 6 percent of all Idaho tax revenues. For source, see footnote

[4]Idaho Department of Environmental Quality, http://www.deq.idaho.gov/inl-oversight/oversight-agreements/1995-settlement-agreement.aspx



Simulated calcine showing volume reduction from liquid state

responsible for directing the research, development, and testing of treatment, shipment and disposal technologies for all DOE spent fuel.

- If DOE fails to remove all spent fuel by 2035, DOE shall pay $60,000 per day for each day this requirement is not met. If DOE fails to meet any of the agreement milestones at any point, DOE shall suspend any further spent fuel shipments to INL unless the courts determine that the obligation has been satisfied.
- The federal government is further required to convert all highly radioactive liquid wastes currently stored in underground tanks at INL to a more stable dry form.

With the defeat of a 1996 ballot initiative that attempted to undo the Settlement Agreement [see text box below], Idaho became the only state in the nation with a court order mandating that federal nuclear waste leave state boundaries by a specific date. Even today, no other state in the nation has such a legally binding commitment. The Settlement Agreement and the way that it has transformed the state-federal relationship between Idaho and DOE – from one based on mistrust to one based on partnership – represent a true paradigm shift.

For example, DOE's success in meeting most Settlement Agreement milestones has made it possible for DOE to continue shipping spent nuclear fuel to Idaho for storage,[5] and has created an environment in which the State of Idaho

1996 REFERENDUM ON THE SETTLEMENT AGREEMENT

In 1996, a citizens' group called "Stop the Shipments" put an initiative on the state-wide ballot to nullify Governor Batt's 1995 Settlement Agreement. Proponents of the initiative argued that, "Any agreement to accept and store nuclear waste in Idaho must be approved by the legislature and by a vote of the people." However, the initiative was soundly defeated, with 62.5 percent of Idaho voters rejecting this effort to undo the Settlement Agreement.

Following is the text of the ballot initiative from the 1996 Referendum on the Settlement Agreement

General Election • November 5, 1996

PROPOSITION THREE

INITIATIVE REQUIRING LEGISLATIVE AND VOTER APPROVAL OF AGREEMENTS FOR THE RECEIPT OF ADDITIONAL RADIOACTIVE WASTE AND NULLIFYING PRIOR AGREEMENT.

Initiative proposing new sections of Idaho law limiting the authority of state officials to enter into agreements for the receipt and storage of additional radioactive waste in Idaho. The initiative would require that any such agreement must be approved by the state legislature, and by the voters at the next biennial election before becoming effective. The initiative would nullify the prior agreement entered into by the State of Idaho and the federal government regarding receipt of radioactive waste, and would require that the Attorney General of the State of Idaho file a motion under the Federal Rules of Civil Procedure to set aside or vacate the federal court order which implemented the agreement. The initiative also defines certain terms used in the initiative. The initiative further provides that nothing in the initiative would limit the authority of the governor or the attorney general under the Federal Resource Conservation and Recovery Act ("RCRA") or the Federal Comprehensive Environmental Response Compensation and Liability Act ("CERCLA"). The initiative contains a severability clause.

FIGURE 2 - Text of 1996 Referendum on the Settlement Agreement

[5]So far, the Navy has shipped 216 canisters of spent fuel and INL has received more than 75 shipments of spent fuel under the Settlement Agreement. The agreement also allows small quantities of commercial reactor fuel to be shipped into Idaho for research purposes.

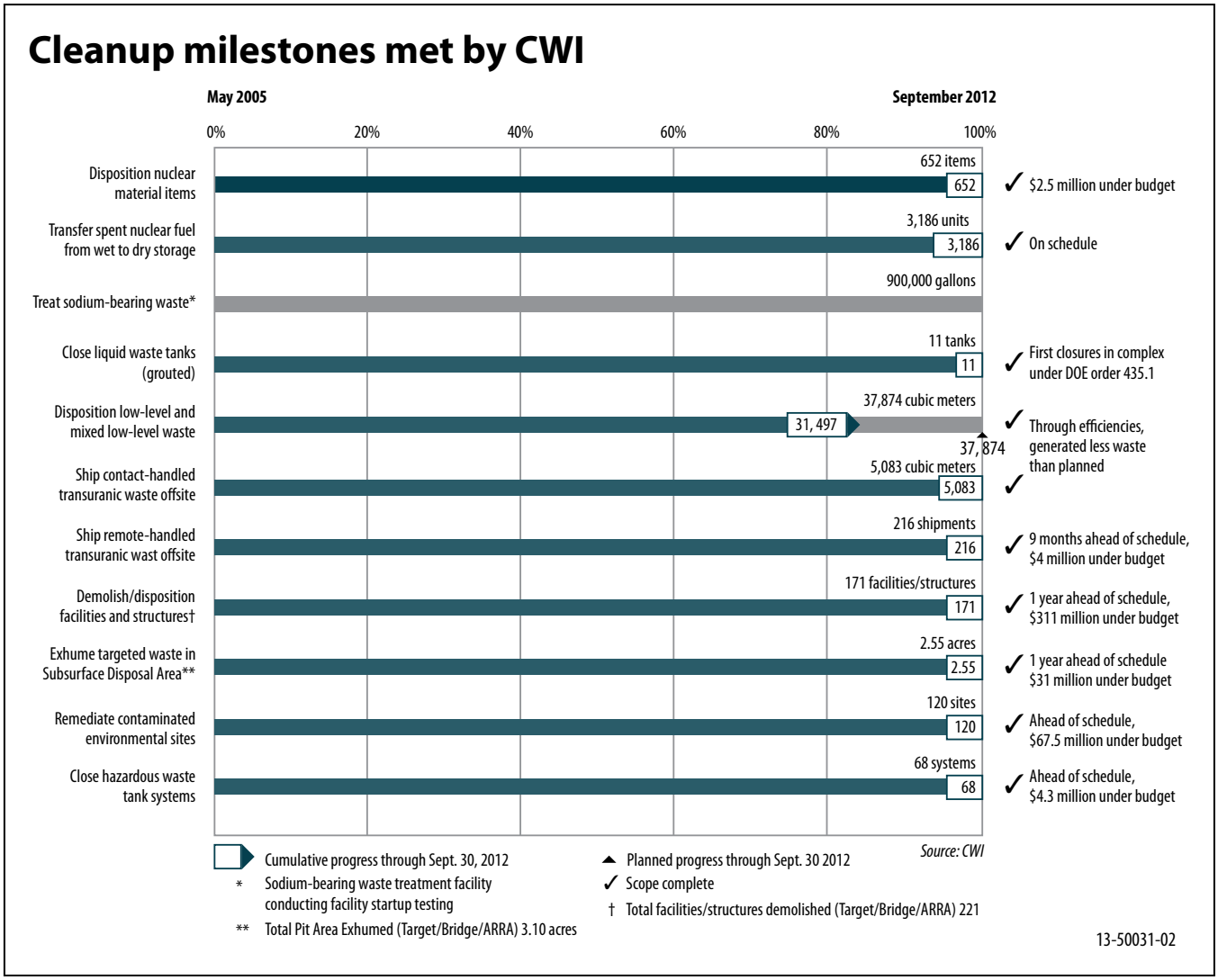


FIGURE 3 – Clean milestone met by CWI; *Source:* CWI

has concluded that it is in the state's best interest to exercise some of the flexibility built into the agreement as it pertains to commercial nuclear fuel shipments. In addition, two modifications to the Settlement Agreement have allowed Navy operations to continue beyond 2035 and have clarified what is meant by the removal of "all" transuranic waste. In sum, the Settlement Agreement continues to provide the framework for commitments by the federal government that must be met to protect the state. At the same time the agreement has provided the federal government with enough certainty to enable DOE and the U.S. Navy to continue investing substantial resources in Idaho.

Cleanup at INL: A Success Story

By any reasonable measure, the effort to clean up legacy nuclear waste at INL has been, and continues to be, a significant success story. For example, the Idaho site leads the nation in shipments of transuranic waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico. As of August 1, 2012, INL and its two primary cleanup contractors have shipped more than 53,000 cubic meters of waste to WIPP for permanent disposal and they are on target to beat the Settlement Agreement's 2018 deadline to remove all transuranic waste from the site by a significant margin.

In all, 959 of the 964 enforceable milestones established under the 1995 Settlement Agreement and other legal agreements between the State of Idaho and DOE have been completed to date. Four of the milestones missed thus far were either renegotiated or rescheduled while the fifth, involving IWTU, is discussed elsewhere in this report.

INL's cleanup contractor has also made tremendous progress in the demolition of unused and contaminated facilities and significantly reduced INL's footprint on the Idaho desert.

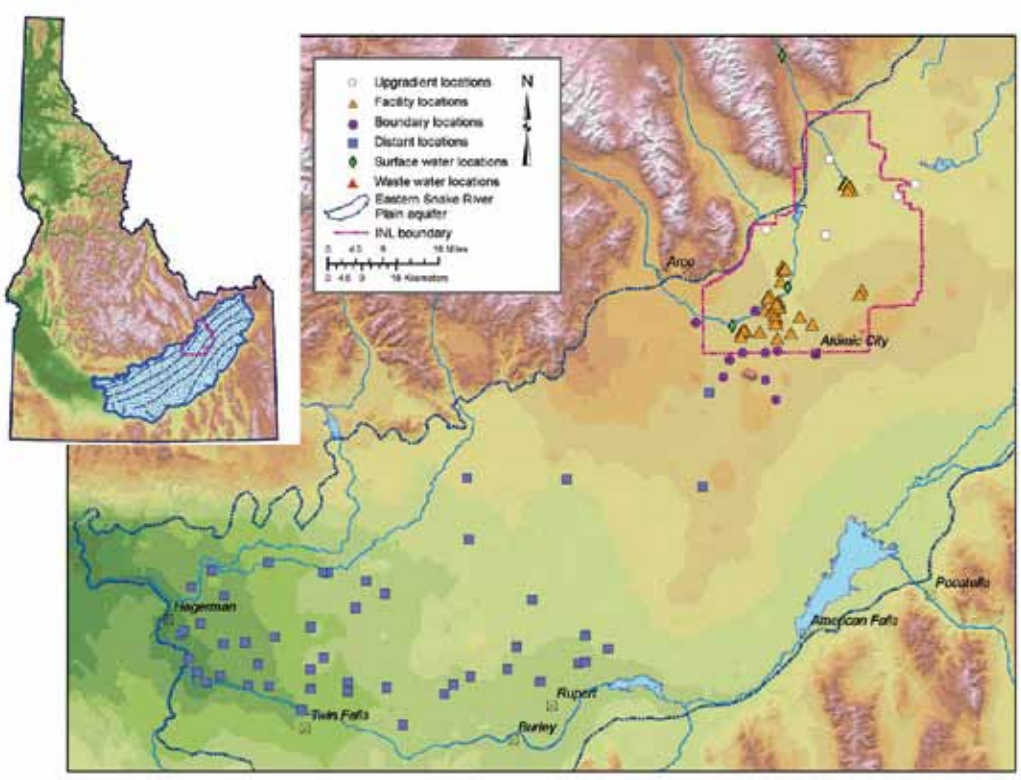


FIGURE 4 – Groundwater Sampling Locations by INL Oversight Program; *Source*: Idaho DEQ

Since 2005, more than 200 buildings and structures of various sizes, encompassing more than two million square feet, have been demolished. Because some of these structures were highly contaminated, the processes required to remove them were extremely complex.

In addition, the cleanup contractor has successfully closed seven of the eleven 300,000 gallon tanks that held high-level liquid wastes at INL. Closure of the remaining four tanks will be completed once the Integrated Waste Treatment Unit begins operations.

Most importantly, a presentation to the LINE Commission by the Idaho Department of Environmental Quality (DEQ) confirmed that contamination in the groundwater underneath the INL site is declining. This encouraging trend points to the success of the Cleanup Project.

Researchers from the U.S. Geological Survey, the State of Idaho, the Environmental Science and Research Foundation, and other institutions will continue to monitor for contaminants and their transport through the aquifer to assure the safety of this critical water resource. This long-term monitoring will be important to ensure that remaining cleanup activities succeed in fully containing and disposing of the legacy waste from the past.

To sustain the current pace of progress it will be important for the State of Idaho and the Idaho Congressional Delegation to work closely with DOE and the President's Office of Management and Budget (OMB) to maintain a consistent level of funding sufficient to expeditiously complete remaining cleanup priorities at the INL site.

Waste disposal practice from the 1960s

STATE AND TRIBAL OVERSIGHT OF INL CLEANUP EFFORTS

The State of Idaho, DOE, the U.S. Environmental Protection Agency, and the U.S. Nuclear Regulatory Commission have adopted regulations and requirements designed to protect public health and the environment during nuclear energy related operations. In 1989, concerns over the environmental impacts of INL operations led the Idaho Legislature to establish a comprehensive, site-specific state oversight program to independently assess INL's environmental impacts. In 1990, Idaho became the first state in the nation to negotiate an agreement with DOE to provide funding for the independent monitoring and oversight of a DOE facility. This work is now being carried out by the state DEQ's INL Oversight Program. As part of that program, "staff regularly visit the INL site, review and comment on DOE planning and decision-making documents, and keep up-to-date on how facilities are managed."

According to DEQ, "the INL Oversight Program also tracks inventories of various types of nuclear waste at the INL and how they are handled. Information gathered through oversight activities helps determine where monitoring should be focused and may also be used to guide emergency planning efforts."

In addition, state authorities also play several important roles in overseeing the transport of nuclear materials and waste and in assuring preparedness for emergency response. The transport of nuclear materials and waste is expected to continue as part of normal INL operations, and may even expand as private nuclear-energy companies conduct work at INL or elsewhere. The Shoshone-Bannock Tribes also participate in oversight of radioactive waste shipments through the Fort Hall Reservation along I-15 southeast of the INL, as part of a tribal/DOE program to conduct oversight and monitoring of DOE activities at the INL site.

Shoshone-Bannock/DOE cooperation also includes a Cultural Resources/Heritage Tribal Office, formed when the Tribes entered into a cooperative agreement with the DOE Idaho Operations Office in 1992. The INL site is located on Shoshone-Bannock aboriginal lands, and the goal of the Cultural Resources program is to protect and monitor tribal cultural resources on INL lands as well as aboriginal use areas. This is accomplished with regular site visits, monitoring, participation in archeological surveys and when necessary, data recovery. The program also oversees cultural resources projects on the Fort Hall Indian Reservation and works with other federal, state and private agencies to ensure compliance with cultural resources laws and protection of the Tribes' cultural properties.

REMAINING CHALLENGES FOR INL CLEANUP

Despite the tremendous progress of INL cleanup efforts to date, the LINE Commission is fully aware that some challenges remain. Two key issues, in particular, are being addressed by the state and DOE: the disposal of remaining liquid waste and the ultimate disposition of calcine waste. Each issue is important to understand.

With regard to the disposal of liquid waste, the Settlement Agreement required DOE to have treated all remaining liquid waste in underground tanks by the end of 2012. Over the past several years a facility known as the Integrated Waste Treatment Unit (IWTU) was constructed to accomplish this, but during startup testing critical IWTU equipment experienced technical difficulties. This has delayed the scheduled treatment of liquid wastes, prompting DOE to notify the State of Idaho that it will miss a Settlement Agreement milestone. Efforts are being made to remedy the situation and DOE plans to complete the waste treatment as soon as possible while adequately protecting workers and the public. Meanwhile, the Governor and state DEQ are carefully monitoring the situation to ensure that Idaho's rights and interests are protected.

The Integrated Waste Treatment Unit

With regard to calcine waste, the Settlement Agreement also requires that this type of waste be treated so that it is ready to be shipped from Idaho by a target date of December 31, 2035. Calcine waste is created by the conversion of radioactive liquid waste; it is a dry granular material, much like laundry detergent. The conversion to dry material stabilizes the waste and reduces the contamination risk for future storage. Today, calcine waste is stored at INL in large stainless steel and concrete silos. The waste in its current form and storage configuration is stable and creates

Aerial view of Yucca Mountain

very little contamination risk. However, the Settlement Agreement directs DOE to treat the calcine so that it is ready for shipment outside of Idaho. A RCRA Part B permit application for calcine treatment was submitted by to the State of Idaho in December 2012. Considerable costs will be incurred to prepare the calcine waste for disposal.

Funding is another ongoing challenge for efforts to complete INL cleanup. The Settlement Agreement gives the state important leverage in this area, but while DOE is required to request adequate funding to meet its waste cleanup obligations, there is no guarantee that Congress will appropriate the requested funds. Idaho's Congressional Delegation has played – and must continue to play – a very critical role in aggressively securing the necessary funding for INL cleanup and other operations. With the significant budget challenges that now exist at the federal level, there are looming concerns that future funding could be in jeopardy. In addition, Idaho is likely to be competing with other states that likewise need to secure federal funds for their own cleanup programs.

Finally, one of the most significant challenges that has emerged in terms of completing INL cleanup and meeting the requirements of the Batt Agreement stems from the Obama Administration's decision to terminate work on a planned geologic repository for high-level radioactive waste and spent nuclear fuel at Yucca Mountain in Nevada. Rather than proceed with developing a repository at Yucca Mountain, DOE recently released a plan to implement a nuclear waste management program over the next 10 years that:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048. The Administration's goal is to have a repository sited by 2026; the site characterized,

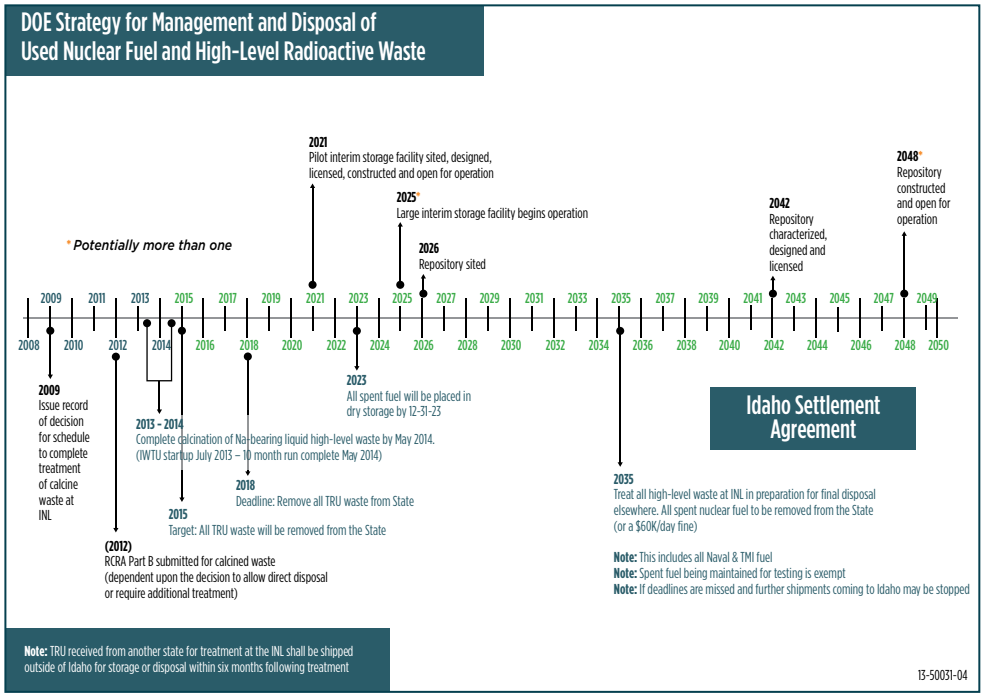


FIGURE 5 - Spent fuel and HLW milestones

and the repository designed and licensed by 2042; and the repository constructed and its operations started by 2048.[6]

Of course, the DOE plan has not been accepted by Congress and will require major legislative changes to implement. At present, with no facility under development that could dispose of Idaho's spent fuel and high-level waste and no storage facilities being developed outside of Idaho that have a mission to accept spent fuel and high-level waste stored on the INL site, it is hard to see how the Batt Agreement's 2035 deadline for moving these types of materials out of Idaho can be met. Figure 5 shows how the dates in the DOE plan compare with key milestone dates in the Settlement Agreement. The chart illustrates that it would be advisable for the state to plan ahead for the near certainty that the federal government will not be able to meet its longer-term commitments under the Agreement.

Differences in waste types are **important** to **understand.**

Of course, the current lack of progress toward a permanent disposal solution for spent nuclear fuel and high-level waste has implications, not just for Idaho but for the future of the nuclear energy industry in the United States more broadly. We return to these larger waste management challenges and their implications in the next section.

The LINE Commission believes it is important to understand that not all sources of nuclear waste pose a similar threat to the environment. At INL, the removal and disposal of buried transuranic waste and liquid tank wastes has been the highest priority for federal funding because these types of waste pose significantly more risk to the environment. As discussed below, calcine and spent nuclear fuel, by contrast, are far more stable and better contained in their current storage configurations and pose little to no risk to the environment.

There is a **dramatic difference** between nuclear waste *disposal* and used nuclear fuel *storage.*

STORAGE AND DISPOSAL TECHNOLOGIES HAVE MARKEDLY IMPROVED

It has become a common practice to refer to several very different radioactive materials as "waste." That terminology lumps together radioactive material that has no future value or use with used nuclear fuel that has no current use but could potentially be utilized in the future. Even the very valuable used nuclear fuel with which INL conducts research and development work is often referred to as "waste" in the public dialogue.

First, there is a dramatic difference between nuclear waste being *disposed* of versus *stored.*

Nuclear Waste Disposal: Represents a permanent placement of nuclear waste with no intention of ever retrieving the material. The most well known modern disposal site is the Waste Isolation Pilot Plant (WIPP) in New Mexico. There, in natural salt beds, transuranic nuclear waste is permanently disposed of with no expectation of future retrieval. Additionally, private and DOE facilities exist across the U.S. for the disposal of low-level radioactive wastes.

Permanent Nuclear Repository: Represents a permanent *disposal* site for DOE spent fuel and high-level waste and for spent nuclear fuel from commercial reactors. Yucca Mountain was selected by Congress in 1987 to host a permanent repository; unless the Yucca Mountain project is resurrected the nation has no identified repository site.

Spent Fuel Storage: Represents the temporary, and likely long-term, storage of spent nuclear fuel. These facilities – both spent fuel pools and dry storage casks – are located across the nation and are designed with robust technology that enables safe storage that can be utilized for decades and longer. Current fuel storage capabilities allow for future retrieval of the spent fuel.

Idaho's Legacy Waste: An Early Dumping Ground

For decades, the nation's environmental standards for disposing of radioactive materials and chemical wastes were based on principles of isolation, dilution and minimizing exposure. In short, it was viewed as considered acceptable to dispose of certain nuclear waste in drums and boxes, buried in the ground, in remote areas.

As a result of those policies, Idaho and INL became the destination for significant quantities of waste from Rocky Flats, a Colorado facility for nuclear weapons component production

[6]Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste, U.S. Department of Energy, January 2013

Above: A load of debris-laden drums is emptied into an unlined pit in 1969.

Left: Workers unload barrels of waste from Colorado's Rocky Flats Plant in 1961.

during the Cold War. That low-level waste was disposed of in Idaho with varying degrees of discipline. In the early days, the practice was to dig pits and trenches, dump the waste and then cover it with dirt. Later, an asphalt pad was constructed and barrels and boxes of waste were stacked in anticipation of being moved at some point in the future to a permanent disposal facility outside of Idaho.

Another accepted disposal practice of the day was to inject no longer useful organic solvents into the ground. That disposal practice has long since become obsolete and has resulted in on-going groundwater monitoring at each of these injection well sites to verify that mitigation of these chemical contaminant sources is effective.

The photographs above illustrate prevailing disposal practices of their time. Considerable advances in hazard understanding and risk mitigation technologies have occurred since the 1970s and today, INL activities are being managed to new and much higher environmental standards. *To be clear, these old disposal techniques would now be against the law!*

Idaho Cleanup Project

As a result of 1960s and 1970s era practices, Idaho currently carries the burden of "legacy waste." As part of the Idaho Cleanup Project, organic materials and other waste that posed the greatest risk to the aquifer are being removed and safely disposed of. The remaining areas will be safely secured and capped, and then closely monitored so that any residual materials that are impractical to retrieve and technically acceptable to remain in an engineered disposal site will not threaten the aquifer. As previously noted, the cleanup project is viewed as largely successful to date.

Current INL Waste: Dramatically Different

Today, the technology surrounding nuclear energy has dramatically advanced to where risks to the environment are significantly lower. Advances have occurred in both waste disposal and storage.

The following is a brief summary of the main types of nuclear materials currently present at INL, how they are stored and how they are being, or will be, disposed of.

Low Level Waste (LLW): Low level waste consists of radioactively contaminated items such as paper, rags, plastic bags, or water-treatment residues resulting from INL activities. Levels of radioactivity are often just above normal levels found in nature. If this waste remains enclosed and contained, it can be safely handled, shipped and disposed. Today, we have no low-level waste coming from outside the state for disposal at INL. Some radioactive material resulting from research at INL is disposed of on site in engineered facilities that are designed to isolate the materials and protect the Snake River aquifer while other low-level wastes are shipped out of state for disposal.

Liquid Waste: This category includes liquid waste resulting from past fuel reprocessing and decontamination work at INL. Currently 900,000 gallons of liquid waste are being safely stored in tanks awaiting final processing. This liquid waste is highly radioactive and more challenging to manage for the long term than solidified waste. Once solidified, this waste will be stored in robust concrete and steel containers at INL until disposed of in a repository or facility like the Waste Isolation Pilot Plant in New Mexico.

Calcine: Calcine is a granular material, similar in texture to dry laundry detergent, that results from the drying of high-level liquid wastes from INL reprocessing activities. Though calcine is highly radioactive, it is stable and currently stored in concrete-encased stainless steel bins designed to be effective for 500 years. It will be disposed of in a repository or in a facility like the Waste Isolation Pilot Plant in New Mexico.

Spent Nuclear Fuel (SNF): Spent or used nuclear fuel is composed of the metallic plates, rods and rod bundles that have previously been used as fuel in a nuclear reactor. The properties of SNF make it stable and straightforward to store. The storage of SNF in Idaho presents a small environmental risk. Spent fuel that has been shipped to Idaho was never intended for disposal at INL. It is stored by various means. Typically, spent fuel is stored in water for cooling and shielding purposes for a period of time and then put into dry storage containers. As technologies have improved, the storage methods for spent fuel at INL have improved. This fuel will be disposed of in a repository.

Spent Nuclear Fuel Storage: Distinctly Different than Disposal

Today, the nuclear industry continues to advance technology and storage techniques. Idaho, INL and the industry all benefit from these modern techniques. The pictures on the following page illustrate current technology surrounding the management of spent nuclear fuel. Any risks to the environment and surrounding areas created by modern forms of storage are dramatically lower than the risks created by now prohibited disposal techniques used in Idaho prior to 1995.

As outlined in the preceding pages, there is a significant difference between nuclear waste *disposal* and spent fuel *storage*. If Idaho were to allow nuclear waste disposal, our state would risk becoming the nation's nuclear dumping ground. As the Governor has stated, this would not be acceptable.

The LINE Commission, however, believes nuclear fuel storage technology enables the state to have confidence in current methods of spent fuel storage at INL while also gaining the experience to consider future opportunities involving spent fuel storage. Specifically, INL may need the ability to receive and store additional amounts of spent fuel to support research in long-term fuel storage technologies. The LINE Commission believes these would be reasonable and appropriate opportunities to consider and would not risk making Idaho a nuclear dumping ground.

OTHER PUBLIC SAFETY AND SECURITY CONSIDERATIONS FOR THE INL SITE

A concern expressed in public comments received by the LINE Commission relates to the safety of nuclear waste at the INL site in the event of an earthquake. Seismic activity has occurred in the vicinity of INL, as illustrated by the 6.9 magnitude earthquake that occurred near Borah Peak in 1983. INL facilities, while adjacent to the Borah Peak area, experienced little damage as a result of the 1983 earthquake, because their location right atop the Snake River Plain creates subsurface and geologic conditions that have a dampening effect on ground motion.

The Nuclear Regulatory Commission (NRC) continues to monitor the impact of earthquakes and the potential risk it creates for the safety of nuclear energy facilities. As a general

[7]To adequately manage seismic risks, NRC regulations require that structures, systems, and components be designed to take into account (1) the most severe natural phenomena historically reported for the site and surrounding area (the NRC then adds a margin for error to account for limits on the availability of accurate historical data (such as the early 1800s earthquakes in the central U.S. that are estimated to have had magnitudes as high as 8.2); (2) appropriate combinations of the effects of normal and accident conditions with the effects of natural phenomena; and (3) the importance of the safety functions to be performed.

matter, the NRC has evaluated seismic risks and found that all operating nuclear power plants in the U.S. "remain safe and require no need for immediate action."[7] At INL, seismic activity is continuously monitored around the site. Lab personnel acquire earthquake data in real time and use it to evaluate seismic hazards and set facility-specific design criteria to ensure the safety of workers and the public in the event of an earthquake. Given the considerable analysis and monitoring that has occurred and continues to occur, the LINE Commission does not view earthquake activity as a material threat to the safety of nuclear waste stored at the INL site.

In addition to seismic activity, the NRC requires nuclear facilities — including reactors, fuel-cycle facilities, and spent fuel storage and disposal facilities — to have considerable safeguards in place to protect against other forms of attack or threats. Required safeguards include regular threat assessments, extensive physical protection of facilities and

A preferred practice today is to place sufficiently cooled used nuclear fuel in physically robust steel and concrete casks that can be stored either vertically or inserted horizontally into reinforced concrete bunkers.

immediate areas, intrusion detection, and appropriate levels of response — including armed response if necessary. Based on its tours of INL facilities and information presented by INL staff, the LINE Commission concludes that INL is careful in evaluating potential security risks and has demonstrated a consistent record of providing appropriate safeguards for its facilities and surrounding areas.

PRIVATE NUCLEAR-ENERGY COMPANIES

While Idaho is not home to a commercial nuclear power plant, many Idaho companies still play significant roles in the nuclear industry. These companies are nationally recognized and provide services ranging from engineering expertise to advanced manufacturing capabilities to research in medical isotopes. The presence of INL has spurred and supported the growth of these and other nuclear-related businesses in Idaho.

During its public hearings the Commission heard testimony or otherwise received input from several companies that are based or have significant operations in Idaho:

- **Areva,** an international leader in the industry, provides services to INL contractors and has used the research capabilities at INL for advanced nuclear fuel development. Areva has also announced plans to construct a major uranium enrichment facility outside of Idaho Falls, although the construction schedule for the facility has been delayed.
- **Diversified Metal Products** is an Idaho Falls company that employs about 100 people and provides mechanical contracting and fabrication services with a focus on nuclear applications. Its capabilities include metal alloy component engineering, fabrication, and integration and installation of control systems for the nuclear industry.
- **International Isotopes** and its 25 Idaho-based employees develop and deploy technologies used in cancer therapy, medical diagnostics, and the transport of nuclear materials. The company has also developed an advanced technology for the beneficial re-use of waste materials from the uranium enrichment process. International Isotopes recently announced plans to construct a new facility in New Mexico to commercialize this technology.
- **The Northwind Group** was founded in Idaho Falls in the late 1990s and now employs more than 300 people across the United States. North Wind is a leading company for environmental, engineering and construction services.
- **Portage** was formed by several former INL employees in 1992 and now employs more than 400 skilled technical and professional personnel in the U.S. and abroad. Portage offers a wide range of technical and professional services including project management, environmental remediation, engineering, and information technology and database design; construction oversight and assessment; environmental planning.
- **Premier Technology** is a privately owned company based in Blackfoot, Idaho. Premier was founded in 1996 with a focus on manufacturing for the nuclear and food processing industries. It has since grown to become a full service engineering, manufacturing and construction management company employing nearly 370 engineers, machinists, and other skilled professionals. Premier is also the small business partner in the management of the Idaho Cleanup Project contract.

The above list provides just a sampling of the nuclear industry firms with roots in Idaho, and underscores how the presence of INL has helped Idaho grow competitive businesses in areas such as environmental remediation, technical services, and advanced manufacturing.

UNIVERSITY PROGRAMS

Idaho's educational institutions have long helped to meet the need for engineers, technicians and other skilled workers to support INL, Idaho's nuclear industry firms, and organizations nationwide. The three major Idaho universities, in particular, support INL's objective to be the premier U.S. national laboratory in nuclear science and engineering research and all of them have active programs focused on nuclear energy. These programs have been invigorated in recent years and it is clear to faculty members and university administrators that their future is directly tied to INL's success. Conversely, it is also clear that INL's success depends to some degree on its association with the Idaho universities.

In recent years, Idaho schools have further broadened and strengthened educational offerings related to the nuclear enterprise. In nuclear science and engineering, collectively, the three Idaho research universities have over 20 faculty members and 400 students in degree programs ranging

from the Associate in Science (A.S.) to Doctor of Philosophy (Ph.D.) degree. Research areas include health physics, fuel cycle applications, nuclear physics, reactor physics, material science, nuclear forensics, and safety, security, and safeguards. Collectively, Idaho's universities offer a range of experience and capabilities in these areas.

For example, Idaho State University (ISU) offers a full-range nuclear engineering and science program, with degree programs in nuclear engineering and health physics ranging from the baccalaureate to the Ph.D. ISU's Institute of Nuclear Science and Engineering includes the following programs and facilities outlined below:

ISU's Idaho Accelerator Center

IDAHO STATE UNIVERSITY

- The **Idaho Accelerator Center** (IAC) was created in 1994 to deliver undergraduate and graduate education, conduct applied physics research, create new applications of accelerator physics, and support the economic development of Idaho. The IAC has seven operating accelerators in five research facilities — more operating accelerators than any other university in North America. Its facilities support a broad range of student-driven research in nuclear science and engineering, ranging from the production of medical isotopes to the detection and quantification of fissile materials. The Center also allows ISU students and faculty to collaborate with researchers at leading universities and national laboratories in important areas such as nuclear material safeguards and proliferation detection.

> ISU has over seven operating accelerators — **more than any university** in North America.

- The **Research Innovation in Science and Engineering Complex (RISE)** is a multidisciplinary research center that offers numerous research and learning opportunities in nuclear science and engineering across all education levels, from technician and associates-level degrees to doctoral programs. The RISE Complex houses state-of-the-art technology, including accelerators, reactor technologies, and simulators, as well as a full suite of nuclear materials science tools not found at any other academic institution in the world. This infrastructure allows students to acquire real-world, hands-on experience that is highly sought after in industrial, governmental and academic settings.
- The **Energy Systems Technology and Engineering Center (ESTEC)** has both an instructional and an industrial focus. ESTEC trains graduates (technicians and technologists) to maintain existing energy infrastructure and to install and test components in new renewable, nuclear, and fossil-fueled energy facilities. Complementing ESTEC's instructional focus, the Center also conducts applied industrial research on behalf of INL, electric utilities, and energy-systems product vendors. ESTEC was recently designated the Northwest Regional Center of Excellence for Nuclear Education and Training by the Nuclear Energy Institute, an industry trade group. This designation means that ESTEC will be coordinating nuclear energy education and training for technicians in a nine-state region that includes Idaho, Montana, Washington, Oregon, South Dakota, North Dakota, Utah, Wyoming and Nebraska. To operate ESTEC, ISU partners with INL and Partners for Prosperity, a community-based organization focused on workforce development for low-income people.

BOISE STATE UNIVERSITY

Boise State University (BSU) does not have a nuclear engineering program but its Materials Science and Engineering Department has strong research collaborations with INL, as well as with nuclear engineering and science programs at ISU and the University of Idaho. BSU also engages in extensive educational collaborations, such as course offerings and joint programs.

BSU's Materials Science and Engineering department has grown rapidly during the past five years and is now one of the largest departments of its kind in the Pacific Northwest, offering B.S., M.S. and M.Engr. degrees with a focus on energy materials research and education. A Ph.D. program was added in 2012 and has already attracted 12 highly qualified students as well as six new faculty members, four of whom have expertise in energy materials and modeling and one of whom has a Ph.D. in nuclear engineering. These new faculty will build on BSU's existing relationships with INL and the Center for Advanced Energy Studies (discussed later in the report) to help expand future educational partnerships.

Students can also move into nuclear engineering at the graduate level through BSU's mechanical engineering department, which offers B.S., M.S. and M.Engr. degrees. The department is currently hiring a faculty member with a focus in an energy field that includes modeling, control and design. Another emerging focus at Boise State is computational science and engineering. A recent Major Research Instrumentation grant from the National Science Foundation will fund a new GPU/CPU cluster that will allow large-scale modeling and visualization. The plan is to use this facility as a state-wide resource with potential applications in nuclear engineering.

Overall Boise State's involvement in fields relevant for a career in nuclear energy spans the engineering college. BSU undergraduates have been awarded Nuclear Energy University Program scholarships and graduate students have received fellowships from the U.S. Nuclear Regulatory Commission. Several students each year participate in internships at INL and Pacific Northwest National Laboratory (PNNL). In all, BSU has won more than forty awards, totaling more than $12 million from research grants, contracts and joint projects related to nuclear engineering over the last five years. In addition, faculty and staff in BSU's Department of Materials Science and Engineering manage the Microscopy and Characterization Suite and the Advanced Material Laboratory at the Center for Advanced Energy Studies. These facilities are designed to accommodate collaborators across the state as well as nationally. Because they are equipped to handle radioactive materials, these facilities have also enhanced the capability and national importance of INL's Advanced Test Reactor and DOE's National Scientific User Facility (NSUF).

UNIVERSITY OF IDAHO

The University of Idaho's Graduate Nuclear Engineering Program grants Master of Science and Ph.D. degrees. In recent years, U of I has had approximately 12–15 full-time and 15–20 part-time MS and PhD students. Many of the full-time students are based at the Center for Advanced Energy Studies in Idaho Falls.

U of I is also working with other Idaho research universities to integrate their advanced graduate programs with the nuclear engineering curriculum at Idaho State University and to develop closer curricular collaboration with BSU's Materials Science and Engineering Department. The eventual goal is to win national ranking and international recognition for an Idaho Institute of Nuclear Science and Engineering in Idaho Falls that supports the missions of INL.

Microscopy and Characterization Suite at CAES

CENTER FOR ADVANCED ENERGY STUDIES

The Center for Advanced Energy Studies (CAES) is a research and education partnership, formed in 2005, between Boise State University, Idaho State University, the University of Idaho and INL. The goal of this collaborative effort by the three universities and INL is to lead energy research programs important to the nation, educate the future workforce by attracting bright undergraduate and graduate students and faculty to the Idaho state universities, reach out across Idaho and the nation to promote an informed energy policy dialogue, and act as a catalyst for technology-based economic development in Idaho and the

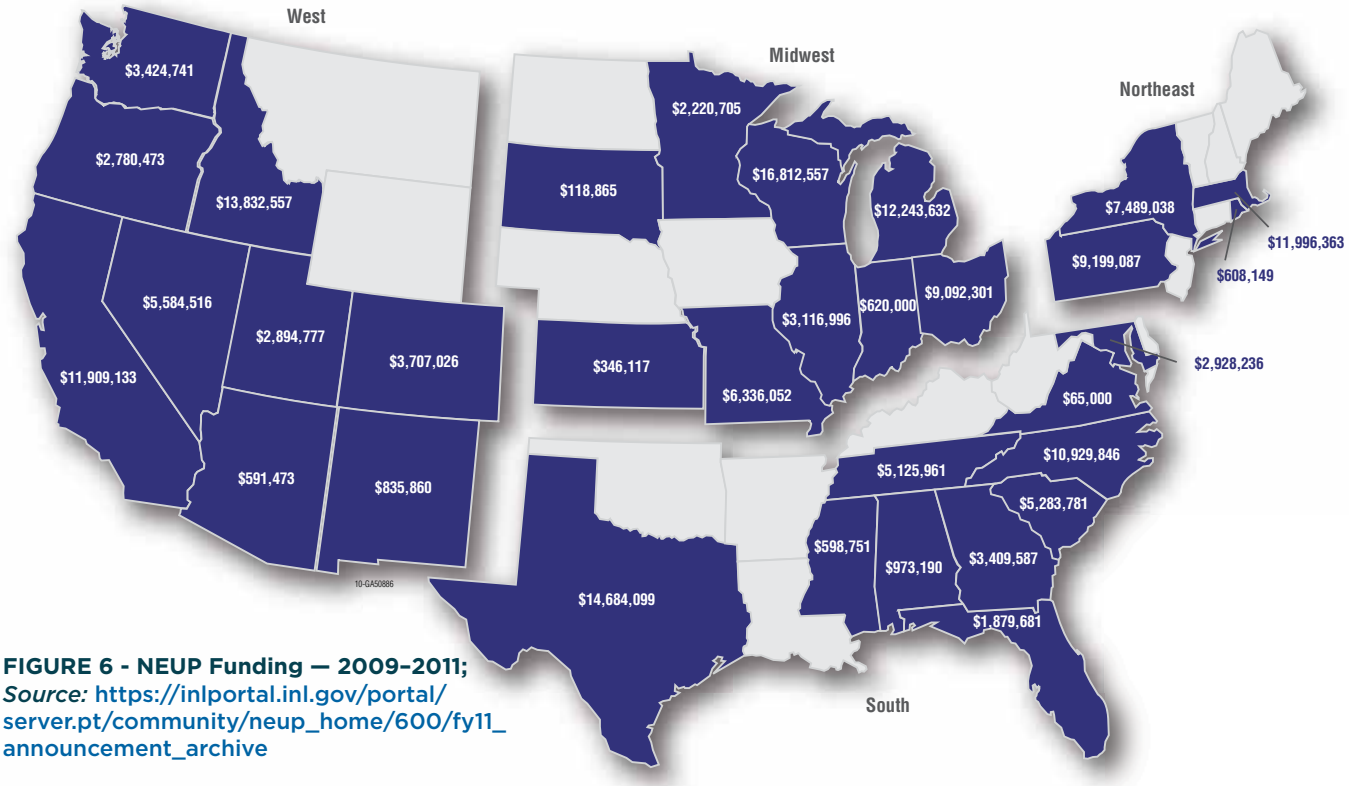


FIGURE 6 - NEUP Funding — 2009–2011;
Source: https://inlportal.inl.gov/portal/server.pt/community/neup_home/600/fy11_announcement_archive

region. This collaborative approach is critical to CAES' success by allowing the best and brightest to work together regardless of their physical location or institutional affiliation in an environment that promotes excellence, increases the impact and reduces the timescale of innovative research, and expands and invigorates the scientific and engineering talent pool. In addition to promoting and facilitating state wide collaboration between the four partner institutions, CAES operates a 55,000 square-foot state of the art research facility, located in Idaho Falls and built on Idaho State University property, which promotes side-by-side collaboration between university faculty and students and INL researchers on energy projects of national importance.

CAES is committed to conducting research that addresses the energy challenges confronting Idaho and the nation as a whole. Though its research agenda emphasizes nuclear energy, it also spans materials science, bioenergy, carbon management, geothermal energy, energy policy, modeling and simulation, and energy efficiency.

Idaho universities compete very successfully for federal nuclear energy research funding. For example, of the states awarded funding through DOE's Nuclear Energy University Program since 2009, Idaho universities have received the third largest amount, $13.8 million. Only Wisconsin and Texas received more funding ($16.8 and $14.7 million, respectively).

Success at winning federal funding has prompted interest both in expanding CAES' physical facility in Idaho Falls and in extending the geographic reach of its programs. Such an expansion would help cement the role of the Center for Advanced Energy Studies as a regional energy asset.

CAES building in Idaho Falls – Constructed using Federal, DOE Contractor, and Settlement Agreement funds.

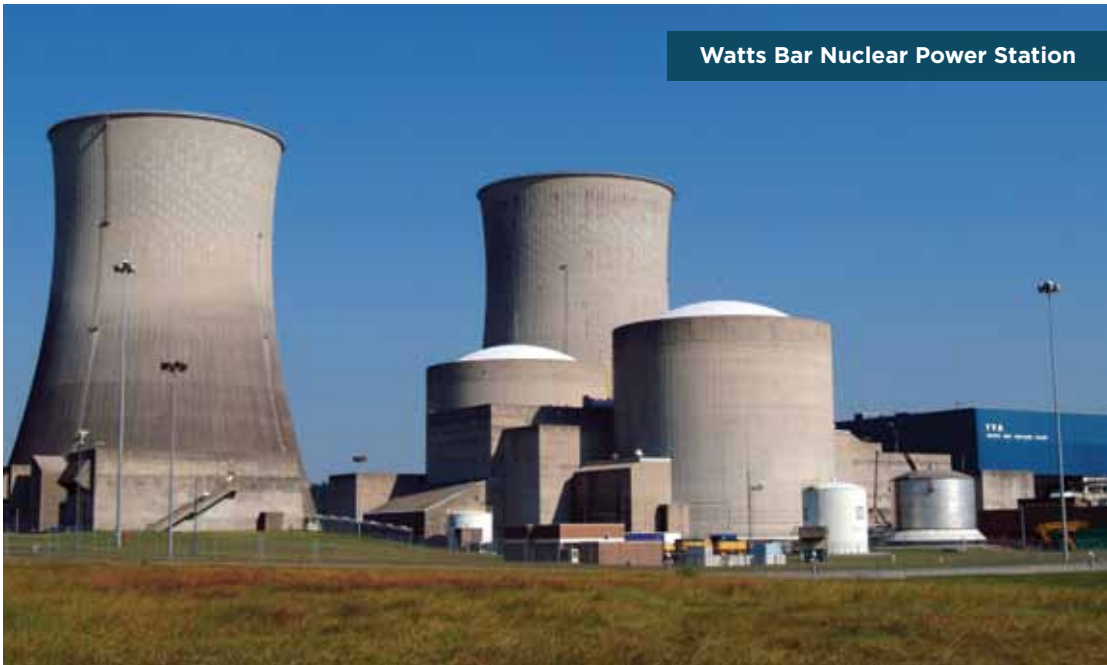
A LOOK AHEAD | OPPORTUNITIES FOR IDAHO

Nuclear energy currently accounts for nearly 20 percent of electricity production in the United States[8] and slightly more than 12 percent of electricity production worldwide.[9] Due to low maintenance and fuel costs, and modest future capital requirements, most of the nation's 104 operating nuclear power plants have thus far been able to compete favorably with gas-generated electricity, despite today's low natural gas prices. In recent surveys, a strong majority of the U.S. believes the nation should maintain a presence in nuclear safety and nonproliferation. Additionally, public favorability of nuclear energy has increased steadily. So while nearly all existing U.S. reactors are in the latter-half of their initial 40-year operating licenses, most have applied – or are expected to apply – for 20-year license extensions.

Nuclear energy currently generates nearly 20% of the nation's electricity.

Outside the U.S., the nuclear industry is still growing in some parts of the world, with several countries planning to build new reactors. Most of these counties are motivated by some mixture of national strategic considerations and environmental and energy security concerns. There are currently more than 430 nuclear reactors operating worldwide with roughly 60 reactors under construction and another 150 new reactors planned. South Korea, China, India and Russia are moving forward aggressively with investments in new nuclear capacity and efforts to develop their own base of nuclear manufacturing, construction and operational expertise.

Outside Europe and Japan, the accident experienced at the Fukushima Daichii nuclear power plant after the devastating tsunami of March 11, 2011 does not appear to be



Watts Bar Nuclear Power Station

[8]See http://www.eia.gov/energyexplained/index.cfm?page=nuclear_use

[9]See http://www.nei.org/resourcesandstats/nuclear_statistics/worldstatistics

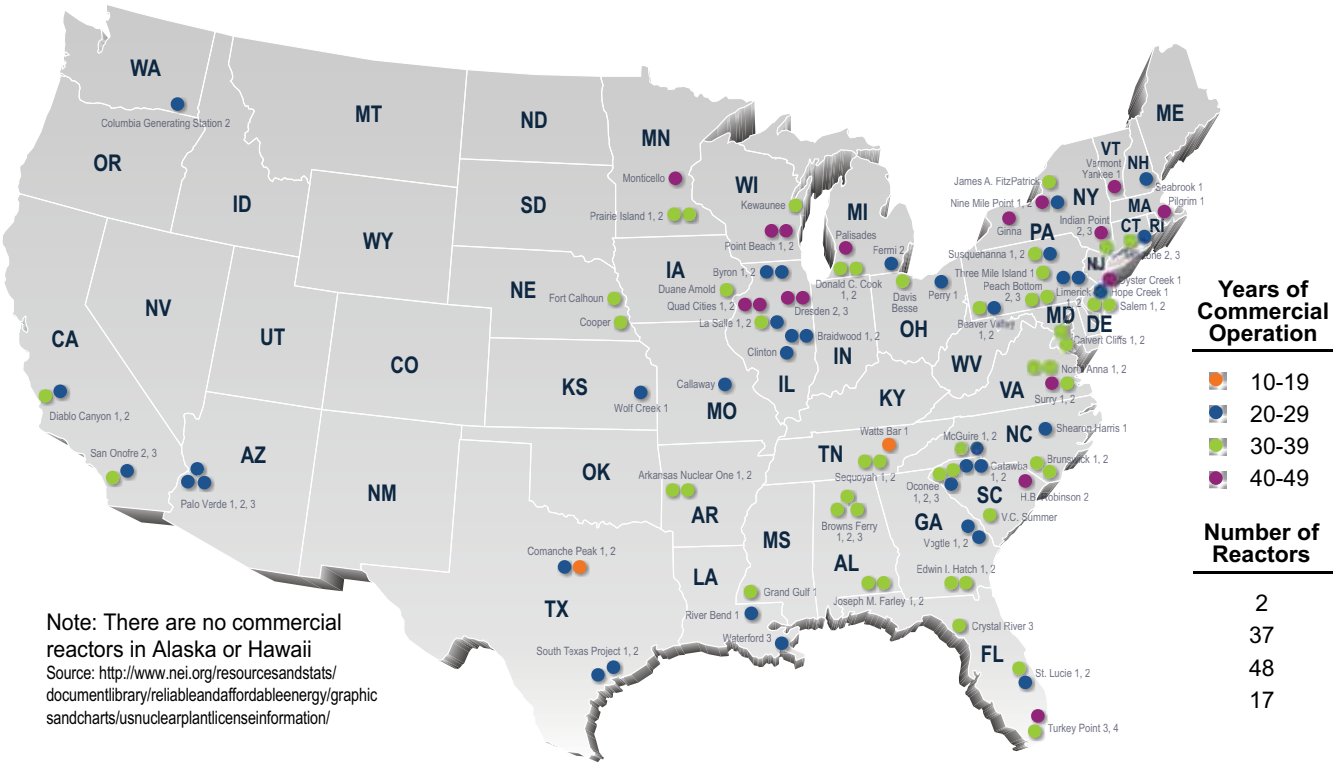


FIGURE 7 - Commercial nuclear power plants in the United States. *Source:* www.world-nuclear.org/info/inf41.html

diminishing interest in and demand for nuclear energy. Meanwhile regulators in the United States and in other leading nuclear nations have sought to improve the safety and resilience of nuclear facilities in the case of extreme events and to address heightened public concerns following the accident. In the United States, some of the precautions recommended after Fukushima — such as accelerating the transfer of spent nuclear fuel from cooling pools to dry cask storage — were already being implemented to some extent as a result of the events of 9/11.

NUCLEAR ENERGY OUTLOOK IN THE U.S.

While the U.S. has the largest number of operating nuclear power plants in the world, the low price of natural gas (and the relatively low capital burden associated with building natural gas-fired electric generation capacity) is having a negative impact on investment in any other technology for electricity production in the U.S., including nuclear energy. Despite a brief resurgence of interest in nuclear energy in the mid to late 2000s, when various companies considered building as many as 26 new commercial nuclear power reactors in the United States,[10] it now appears that only the two new reactors currently under construction in Georgia and two that are have been proposed in South Carolina are likely to proceed this decade.

Whether natural gas will continue to be relatively plentiful and cheap in the United States, and for how long, is currently uncertain. Factors such as environmental regulation, public acceptance of hydraulic fracturing or "fracking" operations, and the opening of natural gas export terminals could fundamentally alter the economics of the domestic natural gas market. In light of this uncertainty, many experts argue that maintaining a balanced and diverse supply of energy sources is important to our nation's long-term economic strength and energy security.

If natural gas does remain inexpensive over the rest of the decade, it could force nuclear power plant operators to make difficult decisions about the future of their operating reactors. For example, the owner of the Kewaunee nuclear power station recently announced plans to close the reactor permanently in early 2013. According to news reports, the decision to shutter the plant "was driven by economics and projected low wholesale electricity prices in the region." The plant owner reportedly

[10]These other issues include high construction costs, long construction timeframes, and the inability of the federal government to implement a workable loan guarantee program for nuclear power as established under the Energy Policy Act of 2005

tried but failed to find a buyer for the plant.[11] Whether this is a unique case or is one that will be repeated at other nuclear power plants remains to be seen.

Nuclear technology providers in the U.S. and abroad are engaged in an effort to develop new products that address the economic, waste and other challenges facing the future use of nuclear energy and other nuclear technologies [see figure 8]. And the U.S. government – principally through DOE – engages in research, development and demonstration programs focused on ensuring that nuclear energy remains a viable technology to address current and future energy demands while addressing concerns about greenhouse gas emissions.

The remainder of this section reviews the opportunities that exist in nuclear energy and nuclear technology for Idaho's nuclear-related research, infrastructure, business, and workforce assets.

PROS AND CONS OF NUCLEAR ENERGY

	Pros	Cons
Economics	» Cheap electricity production by existing already amortized nuclear plants » Low operational costs and stable market prices (low volatility in the price of nuclear generated electricity) » High tech, high paying domestic jobs (at the plants and the service sector) » Production cost immune to potential carbon taxes » Growing international market for new nuclear plants that can create a strong industry in the U.S.	» Very high capital cost of new plants » Economic uncertainty associated with the regulatory process » Relatively inexpensive domestic alternative energy sources (e.g. natural gas) » Competitive international market for reactor vendors (France, Russia and South Korea) » Uncertainty in long-term storage and disposal of used nuclear fuel (UNF)
Energy Security	» Reliance on primarily domestic resources (uranium) » A very good safety, reliability and operational availability record by domestic industry	» Increasing domestic fossil fuel resources » Negative public perception of safety post-Fukushima » Public concern about increasing volume of used fuel (stored at operating reactor sites)
National Security	» Maintaining U.S. leadership in technologies and applications during an increasing international demand on nuclear energy » U.S. leadership in non-proliferation and nuclear safety » Reduced reliance on non-domestic energy sources	» Concerns about the vulnerability of nuclear plants and fuel facilities to terrorism » Risks of the misuse of civilian technologies for proliferation of nuclear weapons
Environmental Impact	» High density clean energy with nearly zero greenhouse gas emissions » Small plant footprints per unit energy	» Environmental impact of uranium mining » Water usage equivalent to any large thermal plant » Uncertainty in long-term disposal of used nuclear fuel

Figure 8 - Pros and cons of nuclear energy

[11] "Questions arise about shuttering of Kewaunee nuclear power reactor," Wisconsin State Journal, November 3, 2012 – see http://host.madison.com/news/local/environment/questions-arise-about-shuttering-of-kewaunee-nuclear-power-reactor/article_8ab13fd6-25ea-11e2-b3f4-001a4bcf887a.html

OPPORTUNITIES FOR IDAHO

INL

Concerns over air quality and climate change are a major driver for clean energy alternatives, including nuclear energy. Nuclear technology currently accounts for nearly two-thirds of all low-carbon electricity production in the United States. It will remain an essential element of any effort to improve air quality and reduce the carbon footprint of electricity generation.

For these and other reasons – including the importance of baseload electricity supply and the impact U.S. leadership in nuclear energy can have in achieving economic and national security objectives – the U.S. government maintains a research, development and demonstration program focused on nuclear energy. This program is conducted primarily through the U.S. Department of Energy. While the specifics of the program can vary from year to year, the focus in recent years has been on research and development of nuclear energy technologies focused on electricity generation, safety, waste storage and management, and security technologies, to help meet energy security, proliferation resistance, and climate goals.[12]

Specifically, the DOE nuclear research program emphasizes:

- Development of Small Modular Reactor and advanced nuclear reactor technologies
- Spent fuel disposition (both storage and disposal technologies and advanced techniques for recycling spent nuclear fuel)
- Modeling and simulation of advanced reactors and fuel cycles
- Nonproliferation
- Crosscutting science and other enabling technologies

INL, as the nation's lead nuclear energy laboratory, is well-positioned to capture a significant share of DOE and other federal research funding directed at nuclear energy and nuclear technologies. Unfortunately, given the rising federal debt and increasing pressures to hold down federal spending, it is likely that the amount of federal funding directed at nuclear energy RD&D will decrease in the coming years.

INL Business Volume

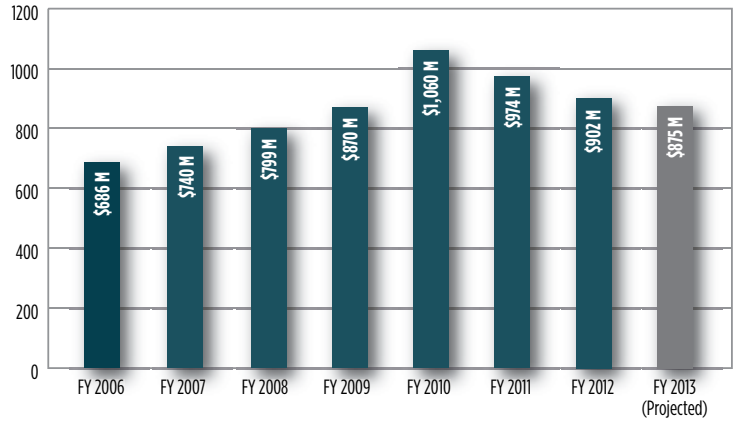


Figure 9 - INL Business Volume

IDAHO UNIVERSITIES

Idaho universities and colleges are an important part of the state's nuclear technology enterprise and a major asset for Idaho in terms of capturing new nuclear-related economic opportunities in the future. Growing demand for higher education credentials in nuclear-related fields and the continued ability to compete successfully for nuclear research funding represent two promising areas of opportunity for Idaho universities and colleges going forward.

In both areas, Idaho faces competition from other states. Nationally, there are 39 higher education institutions in 28 states that offer bachelors, masters or doctoral programs in nuclear science and engineering. Idaho is one of nine states with more than one institution offering such degrees: Idaho State University (BS, MS and PhD) and the University of Idaho (MS and PhD). In addition, 38 technical schools in 24 states offer National Nuclear Uniform Curriculum-recognized associate in applied science degrees (AAS) in the areas of nuclear operations, nuclear maintenance, radiation protection and chemistry. Idaho State University's Energy Systems Technology and Education Center offers two industry-recognized and approved degrees in Nuclear Operations and Nuclear Instrumentation and Control.

Demand for skills and credentials in nuclear engineering and other nuclear-related disciplines has been rising, notwithstanding the domestic industry's uncertain growth prospects at present. Figure 10 shows the number of nuclear engineering degrees awarded in the U.S. in recent years.[13] In 2011 a total of 471 BS, 289 MS, and 114 PhD degrees were awarded in the United States. The numbers represent a 30 percent increase in nuclear engineering BS and MS degrees awarded in 2011 compared to 2006 and a 43 percent increase in

[12]U.S. Department of Energy FY 2013 Budget Request to Congress, Volume 3

[13]Integrated Postsecondary Education Data System (IPEDS) http://nces.ed.gov/ipeds/datacenter/

PhD degrees for the same time period. Even without a wave of new reactor construction in the U.S., nuclear engineering and related fields are likely to continue to offer attractive job prospects, thanks to the ongoing staffing needs of companies that serve the overseas market and because of the need to replace retiring nuclear plant workers in the U.S. Based on data that show a heavy reliance on employees in the 50-and-older age range throughout the industry; the Nuclear Energy Institute has estimated that as many as 5,000 positions will need to be filled, on average, for at least the next five years in the commercial nuclear energy industry.

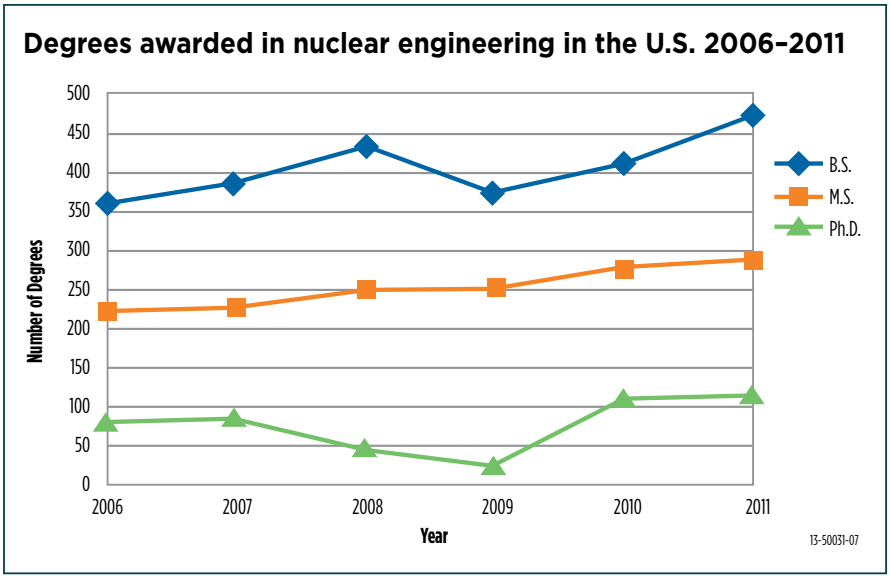


Figure 10 - Degrees Awarded in Nuclear Engineering in the U.S. 2006-2011

Although interest is on the rise, Idaho universities currently account for only a small fraction (approximately 2 percent) of the degrees in nuclear engineering awarded by all U.S. universities each year. Looking at the broader range of disciplines relevant to nuclear science and engineering,[14] Idaho universities graduated, on average, 299 bachelors, 64 masters, and 12 doctoral students in each of the years between 2006 and 2011.[15] (Of the total degrees awarded by Idaho universities in these disciplines, 51 percent were in mechanical engineering and 3 percent were in nuclear engineering.) These numbers, when considered in the context of projected nuclear industry workforce needs, suggest that Idaho universities could enroll a substantially larger number of students in nuclear engineering and related fields. In fact, an analysis of workforce age and qualifications at INL indicates that — at the current rate of degree production — Idaho universities and technical colleges will not keep up with even the workforce needs of INL alone, especially at the doctoral and masters levels.[16] In addition, the need for nuclear or nuclear-related education at the technician level (two-year associates in applied science and one-year certificate programs) will closely track the need for other degrees. Currently, there are only three nuclear/radiological technical programs in the region that address INL's specific nuclear or radiological technician workforce needs. These include the Nuclear Operations Engineering Technology and Nuclear Instrumentation and Control Engineering Technology Associate in Applied Science degrees from ISU's Energy Systems Technology and Education Center (ESTEC) and the Eastern Idaho Technical College (EITC) one-year certificate in Radiation Safety.

A second important area of opportunity for Idaho universities centers on their ability to continue to compete successfully for nuclear-related R&D funds. As noted earlier in this report, Idaho was third highest among the states that were awarded Nuclear Energy University Programs (NEUP) grants between 2009 and 2011, trailing only Texas and Wisconsin. This suggests that the quality of Idaho's nuclear programs/institutions is comparable to other states, but that the state could work to capture an even larger share of the federal funding available to support peer reviewed nuclear energy research in the future. Recommendations put forward by the LINE Commission's Technology Subcommittee

[14]Disciplines considered include: Applied Mathematics, Chemistry, Chemical Engineering, Engineering Physics, Materials Science and Engineering, Mechanical Engineering, Nuclear Engineering, and Physics. Although important to the nuclear industry as well as a wide variety of other industry sectors, Computer Science, Computer Engineering, and Electrical Engineering are not included in the totals.

[15]Integrated Postsecondary Education Data System (IPEDS); see http://nces.ed.gov/ipeds/datacenter/.

[16]According to data compiled by the subcommittee, of approximately 4,000 employees at INL, 1,900 are over the age of 50 and more than 1,100 over the age of 55. The median age range is 50-54. Between 2006 and 2011, INL hired, on average, approximately 329 new people per year (attrition of 206 plus growth of 123) between 2006 and 2011. During this period of time the INL workforce also grew from an employee head count of 3,513 to 4,181. The distribution of the highest degree of educational attainment for these hires was 21 percent high school, 14 percent associate's or post-secondary certificates, 32 percent bachelor's, 17 percent master's and 17 percent doctor's degrees.

targeted further opportunities for strengthening collaboration between INL, nuclear commercial enterprises, and Idaho universities to invest in the state's research infrastructure and to secure R&D funding, including from new sources such as foreign governments and foreign commercial businesses.

COMMERCIAL NUCLEAR FIRMS

As noted in an earlier section, several nuclear-related commercial enterprises, offering a wide range of services, manufacturing capabilities, and expertise, are headquartered in, or have operations in, Idaho. They include large, multinational companies like Areva as well as smaller, U.S.-based companies that provide highly specialized products or capabilities.

Given the outlook for the nuclear energy industry, in the U.S. and abroad, growth opportunities for these companies are likely to be clustered in two areas: (1) serving the still growing international market for nuclear energy production and (2) providing cutting-edge waste management and fuel cycle services for the domestic and global market as all countries with existing nuclear fleets — including the U.S. — grapple with longer-term issues of facility decommissioning and waste storage and disposition. Other important opportunities may exist in "niche" markets like medical isotope production; Idaho hosts both companies with medical isotope expertise and supporting research capabilities in the state's universities and INL. As discussed at the outset of this section, the market for services and products related to new reactor design and construction are likely to be concentrated overseas for the next decade or longer, given currently dim prospects for substantial new nuclear investments in the U.S. Other countries, however, are moving forward with plans to substantially expand their nuclear energy footprint. The dozens of new plants that are planned or currently under construction around the world, represent an important business opportunity for the specialized engineering, manufacturing, operations and maintenance, and advanced safety and security capabilities Idaho-based companies can provide. The U.S. Department of Commerce, for example, has estimated that the international market for nuclear equipment and services will total between $500 and 740 billion over the next ten years.[17] Longer term, the global and domestic market for advanced nuclear energy technologies, such as small modular reactors and hybrid energy systems, could grow quickly, especially if economic and regulatory conditions change. Future carbon constraints, for example, or changes in the cost and availability of competing fuels like natural gas, could rapidly shift the economics of nuclear power relative to other electricity production options in the U.S. and elsewhere. Idaho-based commercial nuclear firms would be well positioned to respond to such new market opportunities.

One potentially promising option for capturing the advantages of nuclear energy while avoiding the high capital cost of new reactors involves developing and commercializing small modular reactors (SMRs). SMR designs may be able to deliver power with a shorter construction timetable and with less upfront financial risk but their overall economic viability is currently uncertain. If the current U.S. nuclear manufacturing infrastructure and regulatory framework can be adapted or augmented to allow SMR manufacturing, this could offer an economic development opportunity to states with a favorable business climate and established nuclear capabilities.

Cutaway of B&W's SMR concept

DOE has launched a program intended to lead to the demonstration and commercialization of SMR designs. In January of 2012, DOE announced it is seeking applications for two SMR development grants, estimated to total $452

[17]See http://trade.gov/press/press-releases/2011/commerce-report-small-modular-nuclear-reactors-can-help-meet-future-energy-demands-create-american-jobs-021611.asp

[18]See http://www.platts.com/RSSFeedDetailedNews/RSSFeed/ElectricPower/3903791

million over five years. The funds will pay up to half the cost of certifying two SMR designs.[18] The LINE Commission heard from several nuclear energy firms that are developing SMR technologies and whose plans include the eventual development of demonstration SMRs and SMR manufacturing capabilities to meet market demand in the U.S. and abroad.

In addition, new reactor designs based on gas-cooled and liquid metal-cooled reactor technologies are likely to be introduced in some parts of the world over the next decade. The introduction of reactors based on these designs can be expected to create demand for more advanced fuels.

President Obama established the **Blue Ribbon Commission** to study solutions for storage of the nation's spent nuclear fuel.

Fuel cycle and waste management services will continue to be in demand even in countries that are not adding to their existing reactor fleets or are winding down their current nuclear commitments. Areva's plan to build a uranium enrichment plant in Idaho, for example, responds to the ongoing demand for fuel from currently operating reactors given that much of the current U.S. fleet is expected to apply for, and receive, license extensions that would allow for continued operation well into the 2020s and 2030s.

One issue that could serve as an economic opportunity for willing businesses, communities and states – is the nation's failure thus far to find a long-term disposal solution for spent nuclear fuel. While some have advocated reprocessing to extract re-useable elements from spent nuclear fuel (as is currently being done in France, Russia and Japan), the U.S. has rejected this option for economic, environmental and national security reasons. Instead, U.S. policy calls for the direct disposal of spent fuel in an underground repository. Under legislation passed in 1987, a single site at Yucca Mountain in Nevada was to be considered for the construction of such a repository, but the Obama Administration halted work on this project in 2010.

Instead, the Administration tasked a Blue Ribbon Commission (BRC) with developing recommendations for re-formulating and re-invigorating the U.S. nuclear waste management program. The BRC issued a report in January 2012 [see text box on page 30] and while legislation to implement its recommendations has been put forward, no bill has advanced very far in Congress. The Administration, likewise has submitted a strategy for implementing the Commission's recommendations. At the state and local level, communities in several states – most notably Eddy and Lea Counties in southeastern New Mexico – have expressed interest in hosting nuclear waste management facilities and are gearing up to participate in a consent-based siting process.

Nonetheless, the decision to halt work on the Yucca Mountain repository — and the recommendations subsequently developed by the BRC — present potential opportunities as well as risks for the State of Idaho. For example, the Yucca Mountain decision means that spent fuel at locations across the country will remain in storage for much longer periods than initially anticipated; DOE's latest plan calls for a spent fuel repository

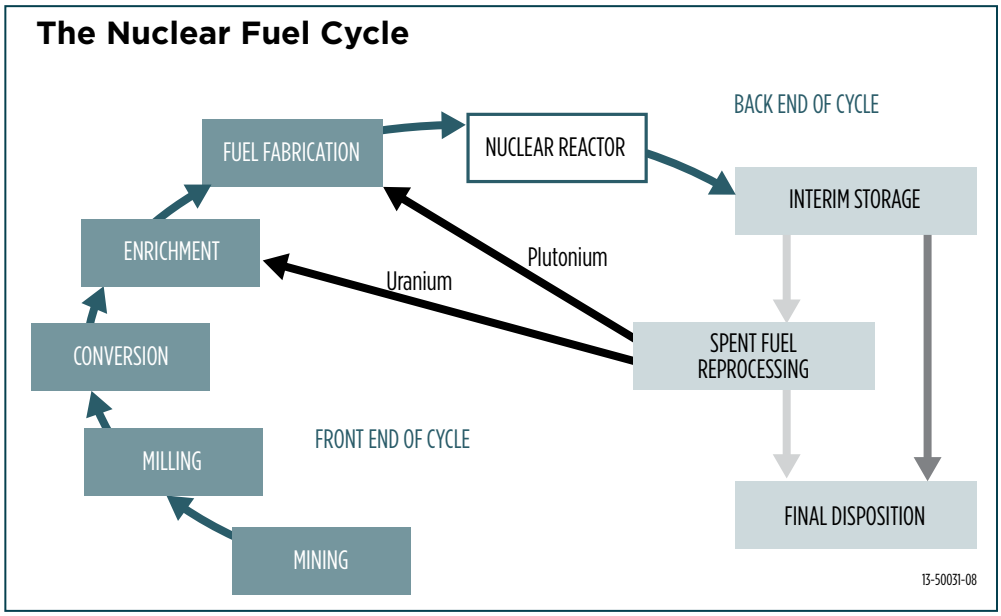


Figure 11 – The Nuclear Fuel Cycle

[19]Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste, U.S. Department of Energy, January 2013

to be available in 2048,[19] decades after the repository at Yucca Mountain was supposed to be open. Consequently, there is a need to perform research so we understand with certainty the performance of today's commercial reactor fuels in the conditions and configurations we have chosen for storage. Such research, if performed at INL might require allowing on the order of 30-60 tons of commercial spent fuel into the state. Doing so would not make Idaho the nation's interim storage site. INL is ideally suited to host the new research efforts that will be needed to study the behavior of spent nuclear fuel over long periods of time in dry storage.

At this so-called "back end" of the nuclear fuel cycle [see Figure 11; Source: BRC report, p. 10], there will be growing demand in the U.S. and elsewhere for the specialized expertise and equipment needed to package spent nuclear fuel and high-level waste into forms suitable for safe, multi-decade storage and eventual disposal in a geologic repository. States that are willing to engage in establishing or expanding storage facilities for spent fuel and high-level waste would appear to hold a competitive advantage in terms of receiving research funds directed at these "back-end-of-the-fuel-cycle" activities. For example, the BRC report highlighted a need for research to explore spent fuel degradation mechanisms in dry storage, "particularly since many current safety assessments are based on an examination of fuel with lower burnup than is now "standard" and do not account for storage times of the length now being contemplated."[20]

Related opportunities include engineering and supplying the instrumentation and control technologies needed to monitor the condition of nuclear facilities and materials and address potential safety risks with the higher degree of reliability and lesser reliance on human intervention likely to be demanded in the aftermath of Fukushima and developing non-destructive techniques for assessing the integrity of waste storage and disposal systems.

Finally, uncertainty in the federal disposal program may add impetus to calls for the federal government to develop one or more facilities for the consolidated storage of spent nuclear fuel. DOE's plan calls for construction of both a pilot-scale storage facility and a large-scale storage facility. Several Idaho cities have expressed interest in exploring the pros and cons of possibly hosting a storage facility, while other individuals, businesses and organizations are opposed to any such proposal even being considered.

The Commission was not tasked specifically with evaluating whether Idaho should consider becoming an interim storage site. While such an evaluation was not called for in our charter it was understandably and appropriately discussed at Commission meetings and addressed in presentations made to the Commission.

First, it should be noted that interim storage is not a research activity. As discussed above, and as a consequence of past decisions, INL is an interim storage site for about 300 tons of government owned spent fuel, a small fraction of the nation's inventory of nearly 70,000 tons. These 300 tons are in robust storage.

DOE's recently released strategy for management and disposal of used fuel and high level waste proposes a pilot interim storage facility that could accept on the order of 3,000 tons of spent fuel and be operational by 2021. It is clear that DOE would consider this pilot evolving into a larger national interim storage facility. DOE proposes that larger facility open by 2025.

While Idaho hosting an interim storage facility would not have to be done at the INL site and is not directly related to the lab's research mission, it is reasonable to assume and several federal officials have commented that a state that hosts such a facility can appropriately argue for benefits that justify the burdens. One of those benefits will probably include research activities, infrastructure and facilities that might otherwise be investments made at INL and in Idaho.

Finally, Continued and strengthened collaboration between INL, Idaho universities and colleges, and Idaho-based commercial enterprises offers the best hope of positioning the state to take advantage of these economic opportunities going forward. For example, one recommendation advanced by the LINE Commission's subcommittee on technology — establishing

"Gigantic Industrial Opportunity"

Dr. Peter B. Lyons, DOE Assistant Secretary for Nuclear Energy, offered this description of what awaits states that embrace broader engagement in the nuclear energy sector.

[20]Report of the Blue Ribbon Commission on America's Nuclear Future, p. 34

a new nuclear manufacturing research center in Idaho — could be instrumental in developing advanced technology solutions to meet the needs of current and future nuclear reactors and help Idaho-based firms compete effectively as part of the international nuclear supply chain. Such a research center could be modeled after the Nuclear Advanced Manufacturing Research Center recently established in the United Kingdom and could be led by a consortium that includes the educational and research institutions currently involved in CAES (i.e., BSU, INL, ISU, UI) as well as leading industrial firms such as AREVA, GE, and Westinghouse, etc. In this model, engineers and designers from private-sector firms would work hand-in-hand with university and national lab researchers to develop new concepts and products in response to rapidly evolving regulatory and market demands. Such collaboration has substantial potential to help ensure the long-term success and growth of Idaho's commercial nuclear interests, and thereby provide durable benefits for the state's economy as a whole.

BLUE RIBBON COMMISSION ON AMERICA'S NUCLEAR FUTURE

Overview and Recommendations

The Blue Ribbon Commission on America's Nuclear Future was formed by the Secretary of Energy at the request of the President, following the Administration's decision to terminate work on a planned nuclear waste repository at Yucca Mountain in Nevada. The Yucca Mountain project began in 1987, and the repository was intended to serve as the final resting place for much of the nation's spent nuclear fuel and other high-level waste. However, the state of Nevada never consented to host the repository, and stiff resistance from the state contributed to extensive delays in completing the project; by law, the repository was supposed to open by 1998, but at the time the project was terminated most estimates foresaw the repository opening in 2020 at the very earliest.

All told, at the time of the Administration decision more than $10 billion had been spent on investigations, repository design, license application development and other Yucca Mountain project activities. The President directed that the 15-member Blue Ribbon Commission be formed to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle and recommend a new strategy.

The nuclear waste management strategy recommended by the Blue Ribbon Commission includes eight key elements:

1. A new, consent-based approach to siting future nuclear waste management facilities.
2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.
3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.
4. Prompt efforts to develop one or more geologic disposal facilities.
5. Prompt efforts to develop one or more consolidated storage facilities.
6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.
7. Support for continued U.S. innovation in nuclear energy technology and for workforce development.
8. Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.

Congress directed the Administration to submit an implementation plan for the Blue Ribbon Commission report by July 2012. It was submitted in January 2013. Legislation was introduced in Congress in 2012 to implement many of the recommendations of the Blue Ribbon Commission, but thus far none of these legislative proposals have become law.

As discussed in the Introduction, the LINE Commission formed five subcommittees to aid in the investigation of specific areas included in the executive order that formed the Commission. Each subcommittee was tasked with developing a list of preliminary recommendations that respond to the key issues the subcommittee was asked to address. Full subcommittee reports, including additional background and analysis, can be accessed at www.line.idaho.gov.

COMMISSION RECOMMENDATIONS

The subcommittees brought forth an extensive set of recommendations to the full Commission. The subcommittee recommendations, along with public comment on the subcommittee recommendations, were reviewed and discussed by the full LINE Commission.

The LINE Commission has studied the burdens and benefits to the State of Idaho that accompany the nuclear research mission of INL and the presence of a strong nuclear sector in the state. We are confident the significant benefits outlined elsewhere in the report far outweigh the limited, and manageable, burdens that arise from the presence of INL in Idaho.

Therefore, recognizing that the nuclear energy industries sector faces significant challenges, the LINE Commission nonetheless believes that a proactive approach to strengthening and leveraging its existing nuclear competencies could be of substantial long-term economic and strategic value to the State of Idaho. In particular, the LINE Commission fully supports the lead laboratory designation and believes strongly that the state should endeavor to protect the designation and the lab's enduring nuclear mission.

Our analysis of this framework resulted in a series of findings or guiding principles that informed the LINE Commission's recommendations.

Finding No. 1: Safety and Environmental Protection are Non-Negotiable

Finding No. 2 Storage and Disposal Technologies Have Markedly Improved

Finding No. 3: The Decision on Yucca Mountain Demands the State's Attention

Finding No. 4: Nuclear Technologies Represent a Significant Industrial Opportunity

Specific actions recommended by the Commission are grouped according to six, overarching strategic priorities that form the core of the Commission's recommendations.

The Commission recommends that the State of Idaho:

1. Continue to work cooperatively with the U.S. Department of Energy and other impacted states to address remaining environmental risks and continue cleanup at the INL site.

2. Exercise leadership as the U.S. formulates federal energy and nuclear waste management policies
3. Capitalize on Idaho's nuclear technology competencies by supporting the growth of existing nuclear businesses, the corresponding infrastructure, and the attraction of new nuclear businesses
4. Invest in its infrastructure to enable INL and Idaho universities to successfully compete for U.S. and global research opportunities
5. Develop and promote the Center for Advanced Energy Studies as a regional, national and global resource for nuclear energy research
6. Strengthen and expand nuclear education and workforce training offerings

Each of these recommendations – and supporting actions – is discussed in detail below.

CONTINUE TO WORK COOPERATIVELY WITH THE U.S. DEPARTMENT OF ENERGY AND OTHER IMPACTED STATES TO ADDRESS REMAINING ENVIRONMENTAL RISKS AT THE INL SITE

The long-term viability of INL and of nuclear activities in Idaho is dependent upon the continued successful cleanup of the INL site and protection of the Snake River Plain Aquifer.

In short, the state should continue to work with the federal government to complete the cleanup efforts initiated by the 1995 Settlement Agreement. Idaho continues to benefit from the cleanup efforts that are currently underway at the INL site. In particular, the Settlement Agreement has given DOE and the Idaho Congressional Delegation substantial leverage in ensuring that Idaho secures its share of federal cleanup dollars. The Settlement Agreement also had the effect of raising environmental awareness at DOE and among its contractors and employees, which has helped foster a culture of ongoing environmental improvement at the INL site.

As we heard consistently throughout our investigation, Idaho's environment – particularly the Snake River Plain Aquifer – must be protected. We agree. Working closely with U.S. Department of Energy to secure the necessary funding to complete the remaining cleanup efforts, and to continue the highest level of safety going forward, are prerequisite to ensuring the long-term viability of INL and of nuclear activities in Idaho. Protecting Idaho's environment and the Snake River Plain Aquifer has been and must remain the highest priority for the state.

Of course, not all wastes present the same level of risk to people and the environment. The Settlement Agreement placed the cleanup focus where it belongs – on getting the riskiest wastes (such as liquid tank wastes, buried transuranic wastes and spent fuel in long-term wet storage) into safer configurations; removing and solidifying tank wastes, exhuming and stabilizing buried transuranic wastes, and moving spent fuel from wet to dry storage for the long-term. A factual understanding of these various wastes, and of the dramatically different level of hazard they present to people and the environment, will be essential to future decision-making.

As noted in the first part of the Executive Summary, cleanup efforts to date have advanced steadily and largely on track. Technical issues at the ICP's Integrated Waste Treatment Unit (IWTU) have delayed the treatment of some liquid wastes, but these issues do not seem insurmountable and the liquid waste is being safely stored in the interim. The Commission recommends that the state closely monitor progress at the IWTU and take firm action, including penalties if necessary, under existing agreements if start-up and processing does not commence in a 2013–2015 timeframe.

More broadly, the Commission recommends that the state continue to sustain and communicate its commitment to safety and the environment. This could include an effort to highlight the important and effective role played by the Settlement Agreement and by the Idaho Department of Environmental Quality's INL Oversight Program. The latter agency is the appropriate body to investigate and respond to concerns raised by the public; it also plays an important role in coordinating the state's role in transportation and emergency response measures for the INL site.

With regard to current activities at the INL site, the Commission believes the State of Idaho should continue to support:

- The work being done at the Naval Reactors Facility (NRF), including the NRF's approach to implementing dry storage for used nuclear fuel. Given the important national security dimensions of this work, the Commission endorses and advocates for continuing the NRF's mission and recapitalizing its facilities as proposed.

- The continuation of the Advanced Mixed Waste Treatment Project (AMWTP), to process other DOE wastes after fulfilling its cleanup obligations under the Settlement Agreement. Over $1 billion has been invested in this facility, which is a national asset. Once the Idaho cleanup efforts are completed the facilities at the AMWTP could be effectively used to assist in the characterization and cleanup being performed at other national locations.
- The approach being taken at ICP's Radioactive Waste Management Complex (RWMC) to exhume, sort, categorize and ship buried waste out of Idaho. To follow up on this project, the state should require a formal monitoring and research effort, conducted in Idaho, to ensure that planned remediation measures, including a future cap over the site, remain effective in protecting public health and safety.

The Advanced Mixed Waste Treatment facility

As noted in the Settlement Agreement discussion, one aspect that may warrant further investigation is the 2035 deadline for processing calcine waste into a "repository ready" form for disposal or storage outside of Idaho. Industry experts acknowledge this type of waste poses very little risk to the environment in its current form. The state should be mindful of past precedent where the Settlement Agreement has been modified in negotiating arrangements that are in the state's best interests and advance the fundamental mission of the lab. Thus, the state should be open to alternative approaches for the calcine; this could include the possibility of keeping the calcine in its current, safe storage configuration so long as any change in plans brought commensurate value to the State of Idaho, such as redirecting the funds saved to other INL projects.

1995 SETTLEMENT AGREEMENT

ENDURING STRENGTHS (Non-negotiable)	CONSIDERATIONS FOR CHANGE
AGREEMENT PROVIDED NECESSARY LEVERAGE TO INITIATE CRITICAL, AND LARGELY SUCCESSFUL, CLEANUP WORK. 1. Stopped disposal of other states' nuclear waste at INL. 2. Accelerated remediation of threats to Snake River Aquifer. 3. Substantially mitigated further contamination to the environment. 4. Initiated use of engineered landfills and other disposal strategies to protect the aquifer.	FAILURE TO LICENSE THE YUCCA MOUNTAIN REPOSITORY MAY JEOPARDIZE IDAHO'S INTERESTS WITH REGARD TO NUCLEAR WASTE MANAGEMENT: 1. Recent policies confirm the federal government will not likely have a repository for Idaho waste by 2035. 2. May relegate Idaho to a "de facto interim storage site" without meaningful financial rewards in return.
PRIORITIZED THE PROTECTION OF IDAHO'S ENVIRONMENT AND THE SNAKE RIVER AQUIFER. 1. Established priorities and deadlines for removal of highest environmental risks. 2. Initiated predictable provisions for moving forward. 3. Created permanent focus on the Snake River Aquifer and its current and future beneficiaries.	THE FINANCIAL PENALTY IS SUBJECT TO CAVEATS. 1. Fine is not guaranteed; subject to appropriation by the federal government. 2. Could create significant court and legal costs for Idaho to enforce. 3. Fine is not adjusted for inflation. By 2035, deterrent value will be significantly diminished. 4. A diminished fine may create incentive for federal government to not remove waste.
ESTABLISHED LEGAL, CONTRACTUAL PROVISIONS FOR IDAHO TO HOLD THE FEDERAL GOVERNMENT ACCOUNTABLE. 1. Established fixed timeframes and milestones for cleanup activities. 2. Established a financial penalty to benefit Idaho for non-performance. 3. Allowed mission critical fuel shipments to continue (Navy, DOE). 4. Enables state to block future shipments if deadlines are missed.	TO CONTINUE INL'S ABILITY TO PERFORM NEW RESEARCH, ADDITIONAL ACCOMMODATIONS, BEYOND THE CURRENT RESEARCH ALLOWANCES, MAY BE NECESSARY. 1. Future research missions will likely include fuel storage safety and technology. Research quantities would exceed current allowances. 2. Calcine waste is stable in its current state. Future funding intended for "repackaging" could be redirected for additional research missions.

EXERCISE LEADERSHIP AS THE U.S. FORMULATES FEDERAL ENERGY AND NUCLEAR WASTE MANAGEMENT POLICIES

Monitor, Influence and Act on Federal Nuclear Policy

Federal nuclear waste policy is in flux. While this uncertainty raises very real questions about the fate of the spent fuel and high-level waste already being stored in Idaho, it may also present opportunities for both the private and public sectors in the state. The state should seek to participate in, influence, and capitalize on nuclear waste policy formulation and implementation over the coming years and decades.

For example, the Commission believes that INL should lead any federal research effort on long-term dry fuel storage research; such research is both a natural extension of ongoing work at the lab and is consistent with the provision in the Settlement Agreement that names INL the lead DOE lab for spent fuel research. Such an effort may include the addition of a few commercial spent fuel storage casks to the dozens of dry storage casks already located at the site.

Given the significant and growing competition among DOE laboratories for limited research funding, the LINE Commission believes the lab's long-term viability would be significantly harmed by an inability to acquire appropriate and necessary research materials. Therefore, the LINE Commission concludes the state should be open to limited waivers of, or changes to, the Agreement to enable INL to fulfill its lead laboratory mission. The LINE Commission points to the 2011 agreement on small research quantities of spent fuel as an example of the type of modest accommodation that may be needed again in the future to facilitate the ongoing mission of the laboratory. As mentioned previously the BRC recommended consent-based interim storage sites. The Administration recently endorsed this path forward and will be seeking legislation. Some commercial interests and local governments have suggested that Idaho explore the possibility of hosting of a consolidated commercial spent fuel storage facility. The Commission believes consolidated interim storage could be conducted safely and securely within Idaho's boundaries, and that, as stated to the Commission by DOE Assistant Secretary Pete Lyons, such a storage facility represents a substantial economic opportunity.

While the Commission believes consolidated storage can be (and is) conducted safely and securely within Idaho, current federal waste management policy has not evolved to the point that gives state governments enough clarity or sufficient leverage to negotiate and enforce siting agreements with the federal government.

The Commission notes its decision to exclude from its recommendations a provision contained in the progress report related to a Pilot U.S. Regional Interim Storage Facility. The Commission heard both support and opposition to that idea during the public comment period, but, as stated previously, believes federal policy has not evolved sufficiently to consider such a decision.

Idaho's interest in the lab needs to be protected. To ensure that the nation benefits from Idaho's 60 years of experience in nuclear energy technology, the state should exercise leadership as the U.S. considers changes to its nuclear waste management policies. This can best be achieved by forming a standing Nuclear Advisory Council that would monitor and periodically review federal developments and make recommendations regarding federal nuclear waste policy. The Council could also, at the request of the Governor, review the burdens and benefits of hosting INL, identify commercial nuclear sector opportunities, and coordinate with the Governor's Idaho Strategic Energy Alliance to provide advice on nuclear energy policy and related scientific and technical issues.

Long-term dry storage casks at INL

In particular, the Commission recommends the proposed Nuclear Advisory Council engage closely in the evolution of national policy as it addresses DOE's strategy for management and disposal of used fuel and high level waste and particularly in the area of interim storage. The Council should advise state leadership and the public on progress, opportunities and challenges in this area.

Elevate the Conversation with the Citizens of Idaho

The following comment received from the League of Women Voters of Idaho highlights another very important leadership role the state needs to provide:

> "Citizens who lack full information or access to a robust and entirely open dialogue will always move to a less productive position. The citizens of Idaho need time, spaces and means to learn, frame, and consider the inevitable choices and their pros and cons. Sound public process will require access to balanced information and opportunities for the citizens of Idaho to generate and own their choices.
>
> At the end of the day, we have all been beneficiaries of nuclear power. As such, we all have the related obligation to be part of an informed search for a responsible approach to the management of the waste. This is truly a national challenge that crosses state boundaries, but the existence and work of the LINE Commission has brought this search to our state. It is time to provide a public process respectful of the citizens of Idaho. The recommendations from the LINE Commission can and should provide the starting point."[21]

We agree. The nuclear industry and its legacy in Idaho, coupled with the opportunities and related challenges, presents one of the most important issues in the history of the state. The citizens of Idaho need ample time and the ability to continue a balanced discussion regarding these issues. Important decisions for the state were finalized in 1995 by Governor Batt. Meanwhile, significant shifts have occurred in federal policy, advancements have occurred in technology, and chang continues to require adjustments within the industry. These changes have created new questions and warrant the state's renewed attention. These new and important questions on both the near horizon and the long term horizon need to be addressed for the state to effectively support INL and determine the appropriate policy for the state.

The Commission recommends the Governor initiate and monitor an effort to provide "access to balanced information and opportunities for the citizens of Idaho to generate and own their choices." These duties could be delegated to the Nuclear Advisory Council recommended above or another comparable group to facilitate these efforts. Regardless of how it is provided, the citizens of Idaho deserve ample time and information to understand these complex and critical issues and make choices on balanced and accurate information.

In addition to advising the state's political leadership, the Council could:

- Work with Idaho's Congressional Delegation to persuade federal policy makers — including Congress, OMB and DOE — that the nation's fiscal interests are best served by concentrating and consolidating nuclear energy research capabilities, to the maximum extent practicable, in Idaho at INL.
- Pursue increased collaboration and funding for R&D from foreign governments and overseas commercial businesses in those countries that have active nuclear power expansion initiatives.
- Coordinate the State of Idaho's involvement in planned and proposed events like the American Nuclear Society's Global 2013 conference, an international conference on nuclear safety, and a Western Regional Energy Summit to promote a strong political voice for our energy rich region of North America.

CAPITALIZE ON IDAHO'S NUCLEAR TECHNOLOGY COMPETENCIES BY SUPPORTING THE GROWTH OF EXISTING NUCLEAR BUSINESSES, THE CORRESPONDING INFRASTRUCTURE, AND THE ATTRACTION OF NEW NUCLEAR BUSINESSES

Idaho's nuclear-trained workforce and its commercial, research, education and training activities represent a key Idaho competency and a major economic driver. The nuclear sector also plays an important role in the diversification of Idaho's economy, which has traditionally been highly reliant on agriculture, forestry and mining. The Commission recommends the state take several steps to set the stage for future investments in nuclear energy research and operations in Idaho.

[21]Public comment received via LINE Commission website from League of Women Voters on January 1, 2013.

- Support new options for promoting research, development, demonstration and deployment (RDD and D) and public-private partnerships. DOE's ability to facilitate such partnerships for nuclear energy RDD&D is constrained by contractual limitations in financial risk sharing, indemnification, intellectual property rights and other typical commercial terms and conditions. The state should encourage its Federal Delegation to examine this issue and create some new mechanisms to support public-private partnerships to advance nuclear energy technologies.
- Encourage investment in small modular reactors (SMRs), which may present the most promising new nuclear technology opportunity for the industry and for Idaho. Because states that get involved early will have a competitive advantage in attracting manufacturing investment if markets for SMRs materialize, Idaho's Department of Commerce should be charged with working directly with SMR developers to tout Idaho's advantages (including a skilled nuclear workforce, low energy costs, pro-business environment and access to road, rail and barge transportation) and to explore the types of incentives that would make the state more attractive as the host of an SMR demonstration project or an SMR manufacturing facility. The department should also be charged with exploring clean energy and other incentives that could help lower the amount of up-front capital needed to construct a demonstration plant.
- Consider and adopt legislation to create appropriate, competitive tax policies and promote a stable regulatory environment aimed at promoting investment in Idaho's nuclear industry. This could include assembling and aggressively marketing an "Idaho Energy Research Incentive Package" that includes an enhanced state investment tax credit, real property improvement tax credit, and R&D credit, while possibly also including county-authorized property tax exemptions, industrial revenue bonds and - potentially – authorization from DOE to offer some of its facilities/resources as a "Nuclear Energy Park Initiative" test bed.

The new Irradiated Materials Characterization Lab at INL

INVEST IN INFRASTRUCTURE TO ENABLE INL AND IDAHO UNIVERSITIES TO SUCCESSFULLY COMPETE FOR U.S. AND GLOBAL RESEARCH OPPORTUNITIES

Advance Existing Nuclear Specialties

The existing research infrastructure at INL and at the state's universities includes some of the best and most versatile nuclear and critical infrastructure testing facilities in the world. This infrastructure represents many billions of dollars of investment, primarily of federal and state taxpayer funds, and many of the facilities in Idaho are one-of-a-kind or would be prohibitively expensive to replace. Maintaining and building on this capability will require investments from the federal government, the state, and private entities.

Having reviewed this infrastructure and sought expert input, the Commission believes the State of Idaho should charge the proposed Idaho Nuclear Advisory Council with reviewing and, as appropriate, identifying avenues and means for the state to support, through advocacy and appropriate investment incentives, efforts to bring additional facilities, capabilities, and programs to INL. This could include new or restored reactor, post-irradiation examination, energy system demonstration and computing capabilities.

Additionally, the state should work to establish an Advanced Nuclear Manufacturing Research Center in Idaho, modeled after a similar center recently established in the UK. The purpose of this new institution would be to develop advanced manufacturing solutions for current and future nuclear reactors, help members be part of the international nuclear supply chain, and support skills development and quality management.

Advance Non-Nuclear Capabilities

The Commission welcomes the recent designation of INL's wireless test bed as an official DOE National User Facility. This designation will support national missions in smart grid and spectrum allocation research, and increase federal/commercial funding in INL's research. The State of Idaho will benefit economically from industry

collaboration as major carriers access INL as well as small business incubation in a newly evolving technological area.

The state should advocate for designation of the INL site electrical grid as an official DOE National User Facility – a move that would support national missions in smart grid research, increase federal and commercial funding for INL research, and encourage incubation of new small businesses in an evolving technological area.

A portion of INL's isolable electric grid

The state should also encourage establishment of the Pacific Northwest Cyber Center (PNCC), a new Idaho-centered concept intended to address the national challenge of sharing national security information between the U.S. government and infrastructure asset owners. Fundamentally, PNCC would be an INL-located, Idaho-led initiative to provide surrounding states and their infrastructure asset owners (utilities) access to actionable intelligence on industrial control system cyber security threats.

From a capability consolidation and operational collaboration perspective, the state – through the Nuclear Advisory Council – should advocate as appropriate for non-nuclear capabilities and infrastructure improvements and for expanded use of INL facilities by other federal agencies in diverse areas such as emergency first response training, regulatory support, physical and cyber security, and supercomputing.

First Responder Training is particularly important to ensure cities and states are protected against radiological threats and that responders are proficient in threat mitigation. The state should advocate for INL to provide first responder training regionally to hospitals, medical facilities and industrial sites. The state should also assist INL in recruiting government agencies such as NRC, DOT, EPA, and FAA to consolidate their research, testing, training, and inspection program work at INL. The state should advocate for INL to support regional regulators.

The INL computing center is now at capacity. INL, in collaboration with the state universities and the Idaho Regional Optical Network (IRON), has formed the Idaho Computing Consortium (ICC) intended to share research level supercomputing across all institutions for collaborative research and to gain economy of scale on these very large investments. An additional $6-10M will more than double INL's and the Idaho Computing Consortium's capacity enabling the next 10 years of simulation, modeling, and general research. The state should endorse this expansion and seek the resources to make this investment in the ICC. The state should also consider expanding the ICC regionally. The state should also consider partnering with IRON and INL for nonprofit, education, virtual rural health care, and statewide research to expand high speed bandwidth to all communities in central and southern Idaho.

- Finally, from a physical facilities standpoint, the State of Idaho should investigate working with Bonneville County, the City of Idaho Falls, and private developers on development of a Science and Technology Park north of the existing University Place and the University Boulevard Campus. The state should also investigate transportation improvements in the INL area, including options to expand Highway 20 or take other actions to improve safety and reduce congestion; the possibility of transferring responsibility for road maintenance on the INL site to the Idaho Transportation Department; protection of right-of-way interests on roads that run through INL; opportunities to locate fiber optic cables during road construction; and improved pedestrian access among facilities at University Place and the University Boulevard Campus. Methods should be formalized that protect INL desert operations site from noise-generating external infrastructure to the maximum extent possible and consistent with DOE's mission to promote development of energy generation and transmission infrastructure.

Finally, the state should encourage improved communication and interaction between INL security forces and state and local law enforcement targeted towards physical security, cyber security, critical infrastructure protection, and interoperable connectivity.

DEVELOP AND PROMOTE THE CENTER FOR ADVANCED ENERGY STUDIES AS A REGIONAL, NATIONAL AND GLOBAL RESOURCE FOR NUCLEAR ENERGY RESEARCH

The Center for Advanced Energy Studies partnership among Idaho's research universities and INL has proven to be one of the most successful collaborations among federal and state government and private industry. Other states, such as Tennessee, Illinois, and New Mexico, have a long history of working collaboratively with the federal government on national laboratory-related projects that can benefit both the federal government and the state (particularly state-funded universities). The capabilities at CAES provide numerous opportunities to implement research and education programs that advance Idaho's role in energy research and collaboration.

The Center for Advanced Energy Studies (CAES) in Idaho Falls

The Commission recommends the Governor enter into discussions with neighboring states to expand the role of CAES into a regional research facility and establish joint funding and research collaboration with those states. Aligning the collective capabilities and resources of the intermountain states would strengthen the strategic role the intermountain region could play in energy research and elevate the capabilities of CAES under the expanded collaboration.

In addition, the Commission recommends using CAES as a focal point for several new initiatives:

- Implement an upgrade plan for the facilities, instrumentation, equipment and other nuclear science, engineering and technology research infrastructure at Idaho's universities and technical schools to facilitate world-class undergraduate and graduate education.
- Assess the long-term feasibility of establishing a non-degree-granting "Idaho Polytechnic Institute," a statewide educational collaboration between Idaho's universities and its community and technical colleges with the goal of providing applied science and technology degree options at all levels.
- Determine, in cooperation with the International Atomic Energy Agency and the World Association of Nuclear Operators, the role Idaho educational institutions can play in assisting emerging nuclear power countries.
- Expand the mission of CAES to address water quality issues.
- Expand the role of CAES to include a focus on education and training for nuclear and workplace safety, including the development of partnerships with academies and professional societies.
- Develop a partnership between INL, the Idaho Department of Commerce, and Idaho universities to identify areas where nuclear energy RDD capability can be leveraged to non-nuclear global energy markets from Idaho-based corporations.
- Establish an industry-driven Nuclear Talent Task Force to define and resolve workforce issues and challenges specific to the rigor, discipline and requirements of the nuclear research, development and operations community.
- Leverage and systematically integrate existing K-12 and STEM education initiatives throughout the state with efforts described in the above recommendations to improve post-secondary nuclear science, engineering and technology education and the readiness of students to enter these programs.

STRENGTHEN AND EXPAND NUCLEAR EDUCATION AND WORKFORCE TRAINING OFFERINGS

Idaho's universities and colleges have long played an essential role in meeting the workforce needs of INL and other Idaho concerns. The Commission believes this important capability can be augmented by the appropriation of $5 million from the Idaho General Fund to build on existing collaborations between the state's research universities and technical colleges and to expand the reach and scope of Idaho's STEM channels for nuclear energy education and workforce development. Specific actions could include:

- Implementing a sustainable funding model for the Nuclear Operations/Engineering Technology Associate in Applied Science Degree Program at Idaho State University's Energy

Systems Technology and Education Center (ESTEC) and upgrading the two remaining ESTEC energy technician programs.

- Expanding the role of Idaho's universities in INL activities. The universities could also take advantage of INL's cutting edge research to develop unique nuclear science and technology courses that could help catapult Idaho into the leadership in nuclear engineering education.
- Facilitating stronger/more fluid working relationships between INL and Idaho universities and between Utah and other regional universities and industries with complementary technical strengths and interests
- Establishing Idaho's eighth "Funded Research Center" to focus on ways the state could take advantage of its substantial thorium/rare earth element deposits to accelerate R&D on rare earth and thorium utilization including power systems, electric vehicles, renewable energy sources, energy-efficient lighting, and national defense systems.
- Creating an Idaho Energy Storage Center of Excellence to lead research into more efficient/cost-effective grid stabilizing energy storage systems.

SUMMARY OF RECOMMENDED ACTIONS

The table on the following page summarizes the recommended actions and the rationale for each recommendation. Most of these recommendations can be accomplished by existing organizations without the expenditure of additional state funds. However, several of the recommendations, particularly those related to educational and facility infrastructure improvements, may require investments by the state. While the Commission sees value in the broad categories of investment it has recommended and is aware of multiple sources of funds that could be accessed, it has not conducted a detailed cost-benefit analysis of each of the many possible projects in which the state could invest. In particular, individual Commissioners had occasion to confer with the Idaho Congressional Delegation on the issue of federal funding. We are confident that Idaho's Congressional Delegation will support the state's interests and INL's future.

Further, we are mindful of the numerous promises made to the Idaho Congressional Delegation, beginning in 2002 and continuing through the re-competition of INL's management contract, that savings achieved from the completion of cleanup activities would be re-invested in the Laboratory. In numerous documents obtained by the Commission, DOE directly, and repeatedly, pledged to turn cleanup savings over to the Laboratory.

In a letter dated February 5, 2004, then-Under Secretary of Energy Robert Card, wrote to the Idaho Congressional Delegation, "…we believe the best contribution EM can make is to complete the accelerated cleanup safely and quickly, thereby allowing additional resources to be shifted to the growth of the Idaho National Laboratory."

In a January, 2004 overview of the Draft Requests for Proposals by then-Director of the Office of Nuclear Energy, Science, and Technology, William D. Magwood told the Idaho Congressional Delegation that the DOE, "Supports a rapid completion of the EM cleanup-up effort to create the opportunity to shift funds to the NE mission."

As noted elsewhere in this report, the cleanup funding profile at ICP includes roughly $400 million in annual appropriations. As cleanup moves toward completion over the next several years, some of the $400 million in annual cleanup funding should be moved to research effort at INL consistent with the promises of DOE to the Idaho Congressional Delegation.

The Commission recognizes that fulfilling the promises made to the Idaho Congressional Delegation a decade ago is subject to future appropriations and the competing needs within the Department of Energy. However, the Commission also recognizes that many of the recommendations contained within this report could be funded with a portion of the savings DOE will achieve from the completion of major cleanup activities in Idaho.

RECOMMENDATIONS: SPECIFIC ACTION STEPS

ACTION ITEM	RATIONALE
Hold DOE accountable for missing the Settlement Agreement milestone for liquid waste treatment.	Ensure the federal government and DOE understand that Idaho remains insistent on meeting the terms of the Settlement Agreement.
Establish an Idaho Nuclear Advisory Council, reporting to the Governor or his designee.	Ensure that Idaho's interests are protected, and ensure that the nation benefits from Idaho's 60 years of experience in nuclear energy research, development, demonstration and deployment.
Enter into discussions with neighboring states to expand the role of CAES into a regional research facility and establish joint funding and research collaboration with those states.	Meet state and regional needs in global energy markets, and improve post-secondary nuclear science, engineering and technology education.
Advocate for designation of the INL site electrical grid as an official DOE National User Facility.	Support national missions and funding for smart grid research. Encourage incubation of new small businesses in an evolving technology area.
Direct the Idaho Department of Environmental Quality to engage in a concerted effort to increase awareness of INL cleanup progress and status.	Raise awareness of environmental issues and progress at the INL site. Set the stage for a fact-based public dialogue about the future of INL.
Endorse the use of the AMWTP for treatment of other DOE waste streams, consistent with provisions in the Settlement Agreement.	Employ this valuable asset to help meet cleanup needs across the DOE complex.
Work with DOE to establish a formal monitoring and research effort, conducted in Idaho, to ensure that planned buried waste remediation measures remain effective in protecting public health and safety.	Protect the long-term health of Idaho's environment, particularly the Snake River Plain Aquifer.
Charge the Idaho Department of Commerce to work with small modular reactor (SMR) developers and other nuclear energy firms to explore the types of incentives that would make the state more attractive for investment by such firms.	Set the stage for future investments in nuclear energy research and operations in Idaho.
Maintain a dialogue with the Shoshone-Bannock Tribes and other interested Idaho tribes about the potential development of nuclear energy facilities at locations in which they have an interest.	Ensure that the rights of Idaho tribes are upheld and that tribal interests are considered in state decision-making.
Charge the Idaho Nuclear Advisory Council with reviewing and, as appropriate, identifying avenues and means for the state to support efforts to bring additional facilities, capabilities, and programs to INL.	Increase investment in and enhance the national and international relevance of INL and its research assets.
Investigate development of a Science and Technology Park adjacent to INL and Idaho university facilities in Idaho Falls.	Enhance INL/university/industry collaboration.
Investigate transportation and pedestrian access improvements in and around INL facilities.	Improve public and worker safety, and promote increased efficiencies at and around the INL site.
Use CAES as the focal point of new research and educational initiatives.	Enhance INL/university collaboration, and integrate K-12 and STEM education initiatives to improve the readiness of students to enter university engineering and science programs.

APPENDIX I: COMMISSION CHARTER

THE OFFICE OF THE GOVERNOR

Executive Department
State of Idaho
Boise

Executive Order No. 2012-01

ESTABLISHING THE GOVERNOR'S LEADERSHIP IN NUCLEAR ENERGY (LINE) COMMISSION

WHEREAS, for more than 60 years, the men and women of Idaho National Laboratory (INL) have played a leading role in carrying out President Eisenhower's vision of producing peaceful power from atomic energy; and

WHEREAS, the researchers working at INL brought historic and scientific distinction to the state as the place where a usable amount of electricity was first generated from nuclear energy in 1951, and where a total of 52 pioneering nuclear reactors were designed and built; and

WHEREAS, leadership and vision over the past 60 years, including negotiation of binding agreements between the State of Idaho and INL have guided successful cleanup efforts of legacy waste at the site, helped transition INL into the nation's lead laboratory for research, development and deployment of nuclear technologies and solidified Idaho's position as one of the only eight states to host a multi-program national laboratory; and

WHEREAS, today's Idaho National Laboratory performs critical work aimed at solving our state's and nation's most pressing energy, security and environmental challenges and actively involves all three of Idaho's universities in carrying out its mission; and

WHEREAS, the State of Idaho and its citizens have a special interest in seeing INL succeed owing to the scientific, educational and economic benefits it brings to its host state; and

WHEREAS, recent evaluations by Idaho's Commerce and Labor departments have identified a robust and expansive nuclear industries sector in the state — anchored by INL — that consists of more than 20 firms that employ thousands of Idahoans, contribute millions of dollars to Idaho's general fund and help realize our state's Project 60 goals; and

WHEREAS, strong leadership is necessary today to ensure the continued vitality of INL and Idaho's growing nuclear industries sector;

NOW, THEREFORE, I, C.L. "BUTCH" OTTER, Governor of the State of Idaho, by the authority vested in me under the Constitution and laws of the State of Idaho do hereby create the Leadership in Nuclear Energy (LINE) Commission.

1. The LINE commission will make recommendations to the Governor on policies and actions of the State of Idaho to support and enhance the long-term viability and mission relevance of Idaho National Laboratory.
2. The LINE Commission will also:
    a. Identify opportunities to ensure the unique research capabilities of INL continue to play an important role in our economic growth and the nation's energy security;
    b. Review Idaho's efforts to provide a nuclear workforce development program and make recommendations for improvement;
    c. Identify and possible long-term issues relating to operations at INL;
    d. Identify additional opportunities and investments that can be made in the Center for Advanced Energy Studies in furtherance of he mission of INL;
    e. Identify infrastructure needs (roads, rail, transmission, information technology) at INL;

f. Review the final report of the Blue Ribbon Commission and identify appropriate roles and opportunities for the enhancement of research and development at the INL, while adhering to the long-standing position of the State of Idaho under the 1995 Settlement Agreement that the state will not be a repository for spent nuclear fuel or high-level waste, and

g. Evaluate policy options for strengthening the broader nuclear industries sector in Idaho.

3. The duties of the Commission are solely advisory in nature.

4 The members of the LINE Commission shall be appointed by and serve at the pleasure of the Governor Members will include, but are not limited to:

a. The administrator of the Office of Energy Resources (OER) or his designee;

b. The Director of the Department of Commerce (DOC) or his designee,

c. The Director of the Department of Labor or his designee;

d. The presidents of the universities of the state or their designee(s);

e. A member of the Idaho House of Representatives;

f. A member of the Idaho Senate;

g. A mayor;

h. A county commissioner;

i. A representative of the current R&D contractor at INL;

j. A representative from a private-sector nuclear industries company; and

k. A member of the public.

5. The Governor will appoint the chair or co-chairs of the LINE Commission.

6. The Commission will be staffed by the Office of the Governor.

7. The Commission may request consultation, information and technical expertise from Directors or their designees of the state agencies regarding environmental requirements, state natural resources, transportation, emergency response and law enforcement issues, including but not limited to the Department of Environmental Quality (DEQ), the Idaho Department of Water Resources (IDWR), the Idaho Department of Fish and Game (IDFG), the Idaho Department of Transportation (IDT), the Idaho Department of Lands (IDL), the Idaho Bureau of Homeland Security (BHS) and the Idaho State Police (ISP).

8. The Commission May request comments, information and technical expertise from the American Indian Tribes of Idaho and federal agencies, including but not limited to the U.S. Department of Energy (DOE) and the U.S. Navy.

9. The LINE Commission will provide its recommendations to the Governor no later than January 1, 2013.

IN WITNESS WHEREOF, I have hereunto set my hand and caused to be affixed the Great Seal of the State of Idaho at the Capitol in Boise on this 1st day of February in the year of our Lord two thousand and twelve and of the Independence of the United States of America the two hundred thirty-sixth and of the Statehood of Idaho the one hundred twenty-second.

C.L. "BUTCH" OTTER
GOVERNOR

BEN YSURSA
SECRETARY OF STATE.

APPENDIX II: SUBCOMMITTEE SCOPE

ORGANIZATION OF THE LINE COMMISSION'S SUBCOMMITTEES

To help develop recommendations for the Governor, the LINE Commission formed five subcommittees to focus on specific issues of direct importance to the Commission's mission and scope of work. Each subcommittee was chaired by a LINE Commission member and included Commission members as well as outside experts with specialized knowledge and expertise in particular subjects. The five subcommittee topics were:

- Safety and Environment
- Technology: Current & Future
- Education and Workforce
- Infrastructure
- National and Global Landscape

Each subcommittee prepared a report that included background, findings, and recommendations for consideration by the full Commission. These recommendations were presented to the full Commission.

The specific topics and questions contained in each subcommittee's scope of work are listed below.

SAFETY AND ENVIRONMENT

- Summarize the current strengths and deficiencies present in the national and global nuclear industry as it relates to safety and protecting the environment.
- Identify the current strengths and deficiencies present in the State of Idaho as it relates to the state's ability to support the expansion of its role in nuclear energy.
- Outline the potential environmental and safety risks that currently exist in the State of Idaho as it relates to the eventual cleanup of existing nuclear waste.
- Summarize the potential environmental and safety risks that may currently or potentially exist as it relates to the continuing nuclear research in Idaho. Recommend steps the State of Idaho could take to mitigate and/or eliminate these risks.
- Identify potential public/private partnerships or roles the state can play in supporting and strengthening INL's safety capabilities.
- Identify any additional recommendations or observations that would be important for the state to consider in its efforts to maintain and strengthen its commitment to safety and environmental stewardships.

Subcommittee Members:

- Sylvia Medina – North Wind (CO-CHAIRMAN)
- Dr. Mark Rudin – Boise State University (CO-CHAIRMAN)
- Dr. Robert Breckrenridge - Idaho National Laboratory
- Dr. Richard Brey - Idaho State University
- Roger Chase - Clearview Consulting; Idaho State Water Board
- Sharon Dossett - Idaho National Laboratory
- Don Glenn, Jr. - Union representative
- Scott Goodwin - Union representative
- Peggy Hinman - North Wind
- Amy Lientz - Idaho National Laboratory
- Brian Olmstead - Twin Falls Canal Company
- Willie Preacher - Shoshone-Bannock Tribes
- Susan Stiger - Bechtel
- Tom Wood - Idaho National Laboratory

TECHNOLOGY: CURRENT & FUTURE

- Identify current and/or future technologies that will likely determine the direction of nuclear energy in the nation.
- Summarize those technologies and their potential influence on the nuclear energy industry, their potential role in the industry and the expected timing for their development.
- Identify the strategic opportunities for Idaho to participate in, influence, and/or benefit from those technologies.

- Identify potential opportunities for Idaho to lead the development or implementation of the technologies in a national and global environment.
- Recommend steps Idaho could take to influence, promote and effectively participate in these developments in a manner that promotes the mission and competitive position of INL and Idaho's future economic opportunities.

Subcommittee Members:

- John Grossenbacher – Idaho National Laboratory (CHAIRMAN)
- Dr. George Imel - Idaho State University College of Science & Engineering
- Steve Laflin - International Isotopes Inc.
- Dr. Pete Planchon - Argonne West (Retired)
- Dr. John Sackett - Argonne West (Retired)
- Susan Stiger - Bechtel

EDUCATION AND WORKFORCE

- Identify Idaho's current strengths and deficiencies in the quality, availability and quantity of the necessary skilled workforce to support INL and its role in nuclear energy.
- Summarize the challenges related to age of existing nuclear workers and impending retirements in both civilian and defense related nuclear establishments.
- Summarize the ability of domestic educational programs to produce qualified graduates and review any opportunities and/or requirements associated with expanding the number of foreign workers as part of the nuclear workforce.
- Summarize how Idaho's programs/institutions compare to other state and federal education programs or institutions that address workforce training for the nuclear industry.
- Recommend steps that need to be undertaken to correct any deficiencies or opportunities that may exist to strengthen Idaho's competitiveness in developing workforce solutions for the industry.
- Outline opportunities for INL to enhance the development of new nuclear technologies in conjunction with Idaho's universities.

Subcommittee Members:

- Dr. Duane Nellis – University of Idaho (CHAIRMAN)
- Ben Baker - Idaho State University nuclear engineering student
- Dr. Harold Blackman - Boise State University
- Richard Holman - Idaho National Laboratory
- Rep. Jeff Thompson - Idaho House of Representatives
- Roger Madsen - Idaho Department of Labor
- Dr. Robert Smith - Idaho State University

INFRASTRUCTURE

- Identify the critical elements required to effectively support the existing and future growth of nuclear energy in the state.
- Outline any existing or anticipated deficiencies within Idaho's current infrastructure and provide recommendations for correcting those deficiencies.
- Recommend any strategic opportunities that may exist to complete, develop or build additional infrastructure that would enhance the unique capabilities of INL.
- Review INL security protocols in response to global threats and provide a summary of INL capabilities or recommendations to maintain the focus on security as a high level priority.
- Review current scope of additional INL research areas (i.e. national homeland security, energy research, and other technological research) and outline any important future infrastructure needs.

Subcommittee Members:

- Senator Bart Davis – Idaho State Senate (CHAIRMAN)
- Seth Beal - Butte County Commission
- John Chatburn - Governor's Office of Energy Resources
- Dr. David Hill - Idaho National Laboratory
- Mayor Jared Fuhriman - City of Idaho Falls
- Brian Ness - Idaho Transportation Department
- John Sheldon - URS
- Dr. Arthur Vailas - Idaho State University

NATIONAL AND GLOBAL LANDSCAPE

- Identify and summarize the national and global trends that currently or are anticipated to influence the direction of nuclear energy.
- Address the social, political, financial and regulatory impediments to future nuclear expansion.
- Summarize the national political activities that influence the development of or restriction of the use of nuclear energy in the nation's energy policy and future.
- Identify and summarize specific activities that other states are initiating or contemplating that could influence the future of INL and its missions.
- Outline the global trends in nuclear energy and identify opportunities for Idaho to compete in the global arena and markets.
- Identify any strategic opportunities to influence future research opportunities in all areas of INL's missions and research.
- Summarize and review the 1995 Settlement Agreement, milestones already met and progress toward future milestones under the Agreement.
- Summarize and review the role/impact of the Agreement on future cleanup activities, future research activities, and other potential opportunities amidst the national and global trends that may impact INL.

Subcommittee Members:

- Senator Larry Craig – Retired, United States Senate (CHAIRMAN)
- Lane Allgood - Partnership for Science & Technology
- Robert Edmonds - AREVA
- John Kotek - Blue Ribbon Commission on America's Nuclear Future/Gallatin Public Affairs
- Dr. Harold McFarlane - Idaho National Laboratory
- Tom Perry - Office of the Governor

APPENDIX III: LINE COMMISSION MEETING SCHEDULE AND AGENDAS

April 7, 2012 – Idaho Falls

AGENDA

Saturday, April 7, 2012
9:00 a.m. – 4:00 p.m.

Idaho Department of Labor (1515 E. Lincoln Rd., Idaho Falls)

Time	Agenda Item	Owner
9:00-9:05	Welcome	Jeff Sayer, Chairman
9:05-9:15	Introductions	Roundtable
9:15-9:30	Overview of Executive Order and Charter	Jeff Sayer
9:30-10:30	Organization of the Commission • Commission Protocol • Future Meeting Dates • Presentations • Tours • Subcommittee Organization • Obtaining Public Input • Schedule of Recommendation Development • Logistics and Administrative Needs	Jeff Sayer
10:30-12:00	Overview of the Idaho National Laboratory (INL)	John Grossenbacher Director, INL
12:00-12:30	Lunch provided for Commission members	
12:30-1:00	Future of the Nuclear Industry	John Grossenbacher Director, INL
1:00-1:30	Overview of 1995 Settlement Agreement and Idaho Dept. of Environmental Quality Oversight	Susan Burke INL Oversight Coordinator, DEQ
1:30-2:00	Status of Clean-up at Idaho National Laboratory Site	Rick Provencher Manager, DOE-Idaho
2:00-3:00	Overview of Blue Ribbon Commission	John Kotek
3:00-4:00	Action for Next Meeting • Subcommittee Assignments • Next Meeting Goals and Objectives • Media and Outreach – website and email for public input • Speaker invitations	Jeff Sayer and Commission
4:00	Adjourn	

LINE COMMISSION TOUR OF INL

Wednesday-Thursday, May 16-17, 2012

Attire: Sturdy shoes with closed-toe and closed-heel are required. Must wear long, natural fiber slacks (cotton) due to the sensitivity of INL personal contamination monitors and their ability to read naturally occurring radon, which is attracted to synthetic fiber (i.e., polyester).

Jeff Sayer, Chairman

John Chatburn

Senator Larry Craig

John Grossenbacher

John Kotek

Dwight Johnson (Departing at noon on 5/17)

Sylvia Medina

Dr. Robert Smith (Only on 5/17)

Rep. Jeff Thompson

Dr. Richard Jacobsen

Tom Perry

Brian Whitlock

Megan Ronk

Corey Taule (Only on 5/17)

Mike Webster (Only on 5/17)

Wednesday, May 16 2012

Hilton Garden Inn

08:00 Depart hotel for Advanced Mixed Waste Treatment Project..... INL Transportation/Brian Whitlock

AMWTP, INL Site

09:00 Tour control room, compactor facility, briefing on future missions ..... Rick Dale
Director, AMTWP Communications

10:30 Depart for tour of subsurface disposal area... Rick Dale

10:45 Drive around exterior of SDA's, arrive at ARP for tour of processing facilities..... INL Transportation

11:45 Depart for Naval Reactors Facility.. INL Transportation

NRF, INL Site

12:15 Arrive at NRF, box lunch with Naval Nuclear Propulsion Program Overview lunch.....John McKenzie

12:50 Tour NRF

2:00 Depart for Idaho Nuclear Technology and Engineering Center ..... INL Transportation

INTEC, INL Site

2:15 Tour CPP-666 spent fuel basin, CPP-691, driving tour of TMI .....
.....Ken Brewer (666), Jimmy Spells (691), Randy Elwood (TMI), and Bill Lloyd (IWTU)
CWI Employees

4:00 Depart INTEC for Idaho Falls... INL Transportation

Hilton Garden Inn

5:00 Arrive Hilton Garden Inn

6:15 INL-hosted dinner .....John Grossenbacher
INL Laboratory Director

Thursday, May 17, 2012

Hilton Garden Inn

08:00 Depart hotel for INL site ..... INL Transportation

ATR Complex, INL Site

09:00 Arrive, badge into ATR Complex..... Don Miley
INL Tours

ATR

09:15 Tour Advanced Test Reactor floor and storage canals.
..... Don Miley and Mike Love
Director, ATR Programs

10:15 Depart for TREAT..... INL Transportation

TREAT, INL Site

10:45 Tour TREAT Facility .....Dan Wachs
Fuel Performance and Design

11:45 Depart for Materials and Fuels Complex.....
..... INL Transportation

MFC, INL Site

11:50 Arrive MFC, Badge in..... Don Miley

MFC, L&O Conference Room

12:00 INL hosted lunch with National and Homeland Security discussion..... Brent Stacey
Associate Laboratory Director, National and Homeland Security

1:00 Tour Hot Fuel Examination Facility..... Don Miley

2:00 Walking tour of IMCL constructions with discussion of MFC Capabilities .....Dave Hill/Steve Marschman
Hill, Deputy Laboratory Director for Science and Technology
Marschman, Science and Technology

2:45 Depart for Idaho Falls..... INL Transportation

Hilton Garden Inn

3:30 Arrive at hotel. ..... Person Responsible

Snow Eagle Brewing, 455 River Parkway

7:00 Optional Event: Idaho Section of American Nuclear Society hosting a reception for participants of the International Atomic Energy Agency Conference

DOE Participants:
AMWTP: Bill Lattin
SDA/ARP: Doug Pruitt
INTEC: Ken Whitham
ATR Complex: Daryn Moorman
MFC: Greg Bass
IMCL: Steven Sorrell

Additional INL Participants:
Ethan Huffman (5/17)
Dave Hill (5/17)
Don Miley (5/17)

Additional NRF Participants:
John McKenzie
Brady Haynes
Christopher Henvit (May 16 only)

LINE
Leadership in Nuclear Energy Commission

AGENDA - REVISED

Friday, June 29, 2012
9:00 a.m. – 4:00 p.m.

Idaho State Capitol Auditorium (700 W. Jefferson, Boise, Idaho)

Time	Agenda Item	Presenter
8:30	Continental Breakfast for Commission Members and Presenters Capitol Dining Room	
9:00-9:50	Welcome and Review • Recap of LINE Commission tour to INL • Update on LINE Commission website • Introduction of subcommittee membership/staff	Jeffery Sayer, Chairman
9:50-10:00	BREAK	
10:00-11:30	Governors Panel	Governor Cecil Andrus Governor Phil Batt
11:30-Noon	Presentation from the Attorney General	Attorney General Lawrence Wasden
Noon-1:00	LUNCH	
1:00-1:30	Presentation from Snake River Alliance	Liz Woodruff, Executive Director
1:30-1:35	Presentation from Idaho Conservation League	Rick Johnson, Executive Director
1:35-2:05	Presentation from Shoshone-Bannock Tribes	Nathan Small, Chairman
2:05-2:15	BREAK	
2:15-3:15	Presentation from Center for Advanced Energy Studies (CAES) on Nuclear Energy Economics and Opportunities	Dr. Raymond Grosshans – CAES Deputy Director, Idaho National Laboratory Dr. Darryl Butt – CAES Co-Associate Director, Boise State University Dr. Jason Harris – CAES Associate Director, Idaho State University Dr. Geoffrey Black – Chairman, Dept. of Economics, Boise State University
3:15-4:00	Public Comments Next Steps Adjourn	Jeffery Sayer

LINE
Leadership in Nuclear Energy Commission

AGENDA

Tuesday, August 7, 2012
9:45 a.m. – 11:30 a.m.

Idaho Education Network Teleconference

NOTE: This special meeting will be conducted via teleconference supported by the Idaho Education Network (IEN). Commission members can participate in this meeting at the following locations:

BOISE: Idaho State Capitol WW55 – Garden Level (700 W. Jefferson)

IDAHO FALLS: Eastern Idaho Technical College, Alexander D. Creek Building (Bldg. 5), Room 581 (1600 S. 25th East)

MOSCOW: University of Idaho College of Education Room #301 (921 Campus Drive)

Time	Agenda Item	Presenter
9:45 a.m.	Introduction and Opening Remarks	Jeffery Sayer, Chairman
10:00	Presentation – U.S. Department of Energy	Dr. Peter B. Lyons Asst. Secretary for Nuclear Energy Office of Nuclear Energy U.S. Department of Energy
11:30	Adjourn	

Additional Information:
EITC location map: http://www.eitc.edu/campus_maps-5.cfm

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Leadership in Nuclear Energy Commission

AGENDA

Friday, August 10, 2012
9:00 a.m. – 3:00 p.m.

Idaho State Capitol Auditorium (700 W. Jefferson, Boise, Idaho)

Time	Agenda Item	Presenter
8:30	Continental Breakfast	Capitol Dining Room
9:00	Welcome and Review	Jeffery Sayer, Chairman
9:05	Presentation by AREVA, Inc	Dr. Finis Southworth Chief Technology Officer Robert Edmonds, Jr., PE Director, Business Development
10:00	Presentation by The Babcock & Wilcox Company	John Ferrara, P.E. Director of Business Development
11:00	Presentation by NuScale	Bruce Landrey Vice President, External Affairs & Internal Sales
12:00	LUNCH	
1:00	Presentation by Office of Energy Development	Samantha Julian, Director
1:30	Presentation by Office of the Governor State of Wyoming	Rob Hurless Energy Strategy Advisor to Governor Mead
2:00	Presentation by Partnership for Science & Technology	Lane Allgood, Executive Director
2:30	Public Comments Next Steps Adjourn	Jeffery Sayer

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AGENDA

Friday, September 21, 2012
9:00 a.m. – 3:30 p.m.

Hilton Garden Inn (700 Lindsay Blvd., Idaho Falls, Idaho)

Time	Agenda Item	Presenter
8:30	Continental Breakfast	
9:00	Welcome and Review	Jeffery Sayer, Chairman
9:10	Presentation Nuclear Energy Institute	Marv Fertel President and CEO
10:15	Presentation by U.S. Nuclear Regulatory Commission	Kristine L. Svinicki Commissioner
10:45	Nuclear Industry Perspectives	Charles "Chip" Pardee Sr. VP/COO Exelon Generation
		Jim Lemons General Manager TVA, Reactor Engineering and Fuels
		Jeff Deshon Program Manager EPRI, Fuel Reliability Program
		John Goossen VP of Innovation and SMR Development Westinghouse
12:30	LUNCH	
1:30	Presentation Babcock & Wilcox	Jeff Crater Vice President, Government Relations
2:15	Presentation by Labor Unions	David Fry United Steel Workers
		Nate Millward Pocatello Central Labor Council
2:45	Public Comments Next Steps	Jeffery Sayer
3:30	Adjourn	

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AGENDA

Friday, October 19, 2012
12:30 p.m. – 5:00 p.m.

La Quinta Inn & Suites – Sawtooth South Room (539 Pole Line Road, Twin Falls, Idaho)

Time	Agenda Item	Presenter
12:30	Welcome and Review	Jeffery Sayer, Chairman
12:35	Overview of the Dynamics of Dry Storage	Rodney McCullum Director, Fuel Cycle Programs Nuclear Energy Institute
1:30	Transportation of Nuclear Materials and Emergency Preparedness	Russell Neely Chief Operating Officer Edlow International Company
2:30	Presentation by Idaho Department of Environmental Quality re: Snake River Aquifer	Gerry Winter Hydrogeologist, DEQ
3:00	High Burn up Fuels	Steve Marschman Manager, Idaho National Laboratory
3:15	Idaho Industry Panel	Steve Laflin President & CEO, International Isotopes Nathan McMasters President, Diversified Metal Products Kevin Poor Director, Portage Doug Sayer President & Founder Premier Technology
4:15	Public Comments	
5:00	Next Steps Adjourn	

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AGENDA

Friday, November 16, 2012
1:00 p.m. – 3:00 p.m. (Pacific Time)

University of Idaho – Student Union Building & Commons – Silver & Gold Rooms (709 Deakin Street, Moscow, Idaho)

Time	Agenda Item	Presenter
1:00	Welcome and Review	Jeffery Sayer, Chairman
1:05	University of Idaho Showcase: Overview of Graduate Nuclear Engineering Program	Dr. Vivek Utgikar Associate Professor of Chemical Engineering Dept. of Chemical & Materials Engineering
1:30	Discussion on Opportunities for Partnership with Carlsbad, New Mexico	John A. Heaton Chairman Carlsbad Mayor's Nuclear Task Force
2:30	Public Comments	
3:00	Next Steps Adjourn	

**NOTE: VIDEO CONFERENCE CONNECTIONS ARE AVAILABLE FOR THOSE UNABLE TO ATTEND THE MEETING IN MOSCOW

Boise: Idaho Wheat Commission – Idaho Grains Conference Room (821 West State Street)

Idaho Falls: University of Idaho – IF1/Tingey Administration Building, Room 350 (1776 Science Center Drive)

LINE
Leadership in Nuclear Energy Commission

AGENDA

Friday, January 25
9:00 a.m. – 11:30 a.m.

Idaho State Capitol Auditorium (Garden Level – 700 W. Jefferson, Boise, Idaho)

Time	Agenda Item	Presenter
9:00	Opening Remarks	Jeffery Sayer, Chairman
9:05	Summary of Public Comments to LINE Progress Report	Jeffery Sayer
9:45	Update on the U.S. Department of Energy's response to the Blue Ribbon Commission Report	John Kotek
10:15	Overview of Proposed Recommendations	Jeffery Sayer
	Six Proposed LINE Commission Recommendations: 1) Continue to work cooperatively with the U.S. Department of Energy to address remaining environmental risks at the INL site 2) Exercise leadership as the U.S. formulates federal energy and nuclear waste management policies 3) Capitalize on Idaho's nuclear technology competencies by supporting the growth of existing nuclear businesses and attract new nuclear businesses 4) Invest in research infrastructure to enable INL and Idaho universities to successfully compete for U.S. and global research opportunities 5) Develop and promote the Center for Advanced Energy Studies as a regional, national and global resource for energy research 6) Strengthen and expand nuclear education and workforce training offerings	
11:30	Adjourn	

ACKNOWLEDGEMENTS

Commission Members

Jeffery Sayer - Director, Idaho Department of Commerce (CHAIRMAN)

John Chatburn - Interim Administrator, Governor's Office of Energy Resources

Larry Craig - Retired, United States Senate

Bart Davis - Majority Leader, Idaho State Senate

Jared Fuhriman - Mayor, City of Idaho Falls

John Grossenbacher - Director, Idaho National Laboratory

John Kotek - Staff Director, Blue Ribbon Commission on America's Nuclear Future; Partner, Gallatin Public Affairs

Roger Madsen - Director, Idaho Department of Labor

Sylvia Medina - President, North Wind

Dr. Duane Nellis - President, University of Idaho

Dr. Mark Rudin - Vice President for Research & Economic Development, Boise State University

Nathan Small - Chairman, Fort Hall Business Council, Shoshone-Bannock Tribes

Jeff Thompson - Member, Idaho House of Representatives

Dr. Arthur Vailas - President, Idaho State University

Commission Staff

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www.line.idaho.gov