

## Reshaping the Nuclear Waste Dialogue at the Stimson Center

Intellectually stimulating discussions that focused on present-day issues related to spent fuel storage and disposal, the impact of advanced reactors on waste management and repository design, how deep geological repositories will be safeguarded even after permanent closure, lessons learned from past failures in developing a repository program, and an anthropological view of nuclear waste issues were all covered in just under 12 hours over two days last week at the Washington, DC-based nonpartisan policy research center, The Stimson Center.

The event, titled, “Back-End to the Future: The Safeguards, Security, and Society of Deep Geological Repositories,” featured experts from as far away as Australia and Sweden, non-proliferation experts from the Nuclear Threat Initiative (NTI) and Oak Ridge National Laboratory (ORNL), academics from George Washington University, Stanford University, and the University of Texas at Austin, a start-up company working on an alternative to nuclear waste disposal, representatives from two nuclear waste management organizations – SKB in Sweden and the NWMO in Canada – and of course experts/researchers from the Stimson Center.

UxC led off the event with a high-level overview of spent fuel storage and disposal worldwide, touching on the global inventory of spent fuel, the need for a permanent solution for spent nuclear fuel (SNF) and high-level radioactive waste (HLW) in a deep geological repository, including some of the consequences of not having a repository anywhere in the world yet, current initiatives in the United States for consolidated storage facilities, and the status of dry cask storage in the US. Subsequent speakers zeroed in on issues such as perspectives in siting a mined deep geologic repository, specific plans and activities in Finland, Sweden, and the US, lessons learned from Australia, waste issues associated with advanced reactors, a potentially new way to dispose of SNF and HLW in horizontal boreholes deep in the earth, and the anthropologic perspective of communicating nuclear waste.

### Siting perspectives

Daniel Metlay, now an independent researcher but formerly with the US Nuclear Waste Technical Review Board, provided a “Cross-National Perspective on Siting a Deep-Mined, Geologic Repository.” Metlay emphasized that a repository site must be both technically suitable and socially

acceptable. Lisa Frizzell, Vice President of Stakeholder Relations at Canada’s Nuclear Waste Management Organization (NWMO), emphasized that point later as well. Metlay suggested a stepwise or a staged approach to siting, where a country would begin with many potential sites, then narrow down the number of potential sites by filtering them through the lens of technical suitability and social acceptability.

Metlay discussed the characteristics of a “consent-based” siting process, and emphasized that the necessary conditions for a successful siting process should include: early community engagement using multiple techniques and approaches; establishment of clear rules that will govern the relationship between the implementer and the community; establishment of a group that is broadly representative of the community to foster ongoing interactions with the implementer; specification of the basis for when, why, and how a community can withdraw from the siting process; sufficient funding for communities to participate in the process; an independent review of the implementer’s technical arguments; openness and responsiveness by the implementer to questions and challenges by the community; partnerships between the community and the implementer; and clear articulation of the benefits the host community is likely to receive.

Repository siting is a very long-term effort, as Metlay showed in the table below.

HOW LONG DOES IT TAKE TO FIND A REPOSITORY SITE?			
COUNTRY	SITE- INVESTIGATIONS STARTED	SITE SELECTED	TIME TO SELECT SITE
CANADA	2002	No	13+ years
CHINA	1985	No	30+ years
FINLAND	1980	Yes	20 years
FRANCE	1987	Yes	19 years
GERMANY	1968	No	47+ years
JAPAN	2000	No	15+ years
SWEDEN	1980	Yes	29 years
SWITZERLAND	1978	No	37+ years
UNITED KINGDOM	1987	No	28+ years
UNITED STATES			
HLW/SNF	1965	Yes	37 years
TRU (WIPP)	1972	Yes	26 years

Lovely Umayyad, who manages the nuclear security portfolio at the Stimson Center, noted in her introduction of a session titled, “Emerging Technologies and DGRs,” that siting a deep geological repository (DGR) is a “multi-generational challenge” that, if not resolved, will be an even more

complicated issue in the future. Lindsay Krall, a post-doctoral MacArthur Fellow in the Institute of International Science and Technology Policy at George Washington University, called nuclear waste the nuclear power industry's "inconvenient truth," but asserted that this waste should not be an obstacle with light water reactor (LWR) expansion since the Nuclear Regulatory Commission's (NRC's) Continued Storage Rule affirms that spent fuel can be stored indefinitely if necessary. Krall is studying the policy implications for the management of wastes generated by advanced reactors, in addition to other proposals for spent fuel disposition such as in deep boreholes.

David Klaus, the William J. Perry Security Fellow at Stanford's Center for International Security and Cooperation (CISAC), contended that policymakers' fear of siting a nuclear waste disposal is "not normal." Industry is not making a strong enough case why a repository is needed, he said, because human nature dictates that if something is perceived to be needed, then the perception of risk related to that activity is reduced. The way people think about a repository needs to be changed, and he noted, for example, that research shows the concept of "burial" causes a negative reaction in that we bury the dead; therefore, just the notion of "burying" nuclear waste can generate a negative emotion.

Klaus also emphasized that "by its very nature a nuclear waste management strategy must be an effort that addresses technical and societal issues." His other key recommendations are as follows:

- Create a new nuclear waste management organization and a new funding scheme. The new organization would be utility-owned – "polluter pays."
- Develop a new process of public engagement in which a consent-based process is based on a redistribution of power among affected parties.
- Integrate all activities at the back-end of the nuclear fuel cycle by aligning incentives to the final goal of geologic disposal.
- Revise the regulatory approach such that quantitative probabilistic analysis is only one element of a safety case approach to the safety assessment.

Citing research by the Pew Research Center, Klaus noted that although public trust in government increased in 16 of 28 countries between 2017 and 2018, public trust in the US government is near an historical low, with a 14% decrease in trust of the government in 2018 compared to 2017. This was the greatest decrease in all the countries surveyed, with the next closest being Columbia, which declined by 8%. Those who trust business increased in 14 of 28 markets, but in the US, trust of business declined by 10% compared to 2017.

#### Canada's NWMO making steady progress

Siting activities in Canada, Sweden, and the US have been covered extensively in this publication, so are not repeated

## Industry Calendar

- July 22-26, 2018  
**INMM 59<sup>th</sup> Annual Meeting**  
[www.inmm.org/events](http://www.inmm.org/events)  
Baltimore Marriott Waterfront Hotel  
Baltimore, MD
- July 29-August 1, 2018  
**Women in Nuclear National Conference**  
Von Braun Center  
Huntsville, AL  
<https://www.nei.org/conferences/women-in-nuclear>
- September 4-6, 2018  
**RadWaste Summit**  
[www.radwastesummit.com/](http://www.radwastesummit.com/)  
Green Valley Ranch, Henderson, NV
- October 1-2, 2018  
**Nuclear Decommissioning & Used Fuel Strategy Summit**  
[www.nuclearenergyinsider.com/nuclear-decommissioning-used-fuel/](http://www.nuclearenergyinsider.com/nuclear-decommissioning-used-fuel/)  
Ritz-Carlton Hotel, Charlotte, NC
- October 24, 2018  
**NWTRB Fall 2018 Board Meeting**  
[www.nwtrb.gov](http://www.nwtrb.gov)  
Location to be determined
- November 14-15, 2018  
**Division of Spent Fuel Management Regulatory Conference**  
<https://www.nrc.gov/public-involve/conference-symposia/dsfm.html>  
NRC Headquarters, Rockville, MD
- January 22-24, 2019  
**INMM Spent Fuel Management Seminar**  
[www.inmm.org/events](http://www.inmm.org/events)  
Hilton Alexandria Old Town  
Alexandria, VA

Details are available at:

<https://www.uxc.com/c/data-industry/Calendar.aspx>

here in detail, but more than one attendee complimented Canada on its approach to repository siting as a "model" for what will hopefully be a successful siting process. Frizzell noted that the current approach was developed in 2002 after previous siting efforts failed. She emphasized that in NWMO's model, neither the technical suitability nor the social acceptability side could be identified as being more important than the other – both are absolutely essential to successfully identifying a site.

The NWMO is making measurable progress, as evidenced by the following milestones:

- First exploratory borehole has been drilled and more are planned to learn more about the technical suitability of sites that are still in the process;
- Partnership discussions with stakeholders have begun;
- Hundreds of engagement activities have been conducted;

- Indigenous knowledge is being acquired by working with elders and youth of the tribal communities;
- Several components have been built to demonstrate the ability of the NWMO to manufacture engineered barriers;
- International cooperation agreements have been signed and renewed.

The NWMO plans to have a site identified in 2023, begin detailed site characterization in 2024, obtain the construction license in 2032, start design and construction in 2033, and begin disposing of waste in 2043.

### Sweden's siting considerations

Fredrik Vahlund, a safety assessment expert at the Swedish Nuclear Fuel and Waste Management Company (SKB), explained that Sweden's waste management system includes several components: (1) an operating repository for low- and intermediate-level waste generated from nuclear power plants and the health care industry and research; (2) an interim storage facility for spent nuclear fuel at Clab; (3) an encapsulation facility that will be located near Clab; and (4) the final repository for spent nuclear that will be located near the Oskarshamn plant in Forsmark.

When identifying the repository site, SKB factored in the following:

- Safety-related site characteristics such as the bedrock composition and structure; future climate; rock mechanical conditions; groundwater flow; groundwater composition; retardation; biosphere conditions; and the overall site understanding.
- Technology for execution such as flexibility; technical risks; technology development needs; functionality and operational aspects; synergies; and costs.
- Societal resources such as suppliers and human resources; public and private services; and communications.
- Health and environment factors such as occupational health and radiation protection; natural environment; cultural environment; residential environment; and management of natural resources.

SKB selected the Forsmark site because the rock offers much better conditions for long-term, safe disposal since it is homogenous and has few water-conducting fractures at the repository depth, has good thermal conductivity that allows for a compact repository layout, and has less rock mass and material for backfill. In addition, buildings above ground can be built within the existing industrial area, and the public was willing to accept the facility.

### US policy successes and failures

Low-level waste (LLW), transuranic (TRU) waste and high-level waste (HLW), including spent fuel were the focus

of Eric Knox's presentation. Knox is Vice President, Strategic Development of Nuclear & Environment for AECOM. Knox explained what TRU waste is and that its disposition path is the Waste Isolation Pilot Plant (WIPP) in New Mexico. He also provided a history of the efforts and legislation that were necessary to allow construction of the facility, including the resistance to the facility at the time, and noted it is now considered a model of success and has brought great economic benefit to the community and state.

DOE (formerly the Atomic Energy Commission) issued a record of decision to proceed with WIPP construction in 1981 and the first TRU waste was received in 1999; the first shipment from the Hanford Site was received in 2000 as was the first shipment of "mixed" TRU waste, followed by the first shipment from the Savannah River Site in 2001. Many other significant milestones were identified on a timeline, including the 8,000<sup>th</sup> shipment in 2009, after WIPP had operated safely for 10 years; in 2014, however, operations were suspended after a fire on a salt-haul truck and then few days later, unrelated to the first event, a radiological release occurred underground. Waste emplacement resumed in January 2017, and waste shipments resumed in April 2017.

After showing a timeline of the status of HLW and spent fuel disposal decisions, activities, and policy reversals since the Nuclear Waste Policy Act (NWPA) was passed in 1982, Knox concluded by noting that the US has a record of progress and success when decisions are made and adhered to, but that constantly changing course erodes public confidence and prevents success.

### Lessons learned from Australia

In 2015, South Australia's (SA) Premier Jay Weatherill recommended that SA consider the practical, economic, and ethical issues of increasing SA's participation in the mining, enrichment, energy, and storage of radioactive materials. A Nuclear Fuel Cycle Royal Commission was formed and recommended in May 2016 that SA should pursue opportunities related to storing and disposing of international intermediate-level waste (ILW) and spent nuclear fuel. A Citizens' Jury was convened, which consisted of more than 300 "randomly selected" South Australians to answer the question: "Under what circumstances, if any, could South Australia pursue the opportunity to store and dispose of nuclear waste from other countries?" The jury only considered high-level waste and spent fuel (see *SpentFUEL* No. 1098, February 19, 2016, No. 1110, May 13, 2016, and No.1134 November 4, 2016).

"Major errors" were made during the process, according to John Carlson of the Nuclear Threat Initiative (NTI) in Washington, DC. Carlson explained that the mistake was that people were invited to be on this jury, when normally these citizens' juries are selected totally at random. Only 1,100 people applied, most of whom were strongly anti-nuclear. The jury that was selected did not want to hear from any government experts – they wanted to hear from their own experts, so they

called in anti-nuclear experts. The jury then returned with two-thirds of them saying “under no circumstances” would they approve of this opportunity. A minority of jurors came forth after the process and complained about the bias in the evidence presented to the jury. Polls were taken of the public at large, and poll results showed the exact opposite of the jury outcome – two thirds wanted more information.

The jury report that was submitted to the government said it was based on information provided to the jury. Carlson said that the jury process was handled “in the worst possible way. Any kind of public information campaign must not get derailed by propaganda.”

### **Innovation in nuclear waste disposal**

The start-up company, Deep Isolation, has been in existence for about 2.5 years, according to co-founder and CEO Elizabeth Muller, who said that she and the other co-founder Richard Muller (her father) were advised not to get into the business of nuclear waste disposal because “nothing ever changes.” They were told not to even try because “you will fail.” Muller pointed out that the entire industry has expressed “frustration and depression and an inability to move forward in a major way since the 1980s.” As an outsider, they understood that the status quo is not working, and that since decisions made in the 1980s have not moved this issue forward, they saw an opportunity for something new.

Muller noted that the “incredibly rapid innovation” in other industries such as the shale gas revolution “came out of nowhere.” Many things from that industry can apply to nuclear waste disposal, such as the ability to robotically drill a mile deep into the earth, which is now routine, thanks to the shale gas revolution. Even if something gets jammed, such as the pipe, specialists can pull it back out. Industry has moved past the idea that once something is put deep into a hole it cannot be retrieved. Furthermore, shale has been in the earth for millions of years, so in terms of licensing, this is beneficial because when a company would apply for a license, it would have to demonstrate that what is put in that borehole will be safe for the long term.

Deep Isolation’s method would be to construct smaller repositories in a modular approach, so that instead of one repository for all the spent nuclear fuel and HLW in the country, several sites could be identified. This would reduce the transportation of the spent fuel and HLW and would address the environmental justice concerns of emplacing all the nuclear waste in the country in a single location. The waste could stay in the same state or area in which it was generated.

Muller has no illusions of having all the answers to the nuclear waste disposal issue, but the company does want to offer another option, while not asking for money or any changes to regulations or laws at this point. The company is currently building partnerships and listening to communities.

The Mullers have generated some interest from politicians, and in fact, Muller had to leave the event right after her presentation to meet with a senator. The politicians recognize that the status quo is not working, she said. Having another option in addition to Yucca Mountain could be helpful in moving spent fuel off the reactor sites sooner rather than later. In addition, this approach would be “dramatically” less expensive than a mined repository. The idea would be to take the spent fuel assemblies out of the pool or repackage assemblies currently in dry storage, place them in a disposal canister, and place that disposal canister in the borehole. Every site would need a license.

Deep Isolation is actively looking at dozens of potential sites across the country. Community support, state support, and appropriate geology are all important. When asked how the rock would be qualified for disposal, she pointed out that one of the best parts of working with a very mature industry – the oil and gas industry – is the large amount of research in understanding shale at these depths, and all the data and research already conducted by that industry is public. So, the company has a great starting point to identify sites.

(See *SpentFUEL* No. 1213, June 1, 2018 and No. 1203, March 23, 2018 for more information about Deep Isolation.)

### **Communicating nuclear waste anthropologically**

A very interesting and unique presentation was given by Vincent Ialenti, an anthropologist who studies nuclear waste expert cultures. Dr. Ialenti spent 32 months in Finland, during which time he recorded over 115 interviews with geologists, managers, chemists, physicists, lawyers, and others, many of whom worked on the safety case for Finland’s repository project at Olkiluoto. During this time, he immersed himself in the lives and the culture of the people to develop an ethnographic study of the people who worked on the safety case.

*National Public Radio (NPR) and Physics Today* have published “storytelling experiments” that were inspired by Posiva Oy’s safety case. As an anthropologist, Ialenti wondered if insights garnered from the daily activities of the experts who developed the safety case – which is intended to demonstrate that the repository will protect the public and the environment for thousands of years into the future – could help to rethink humanity’s place within the history of the environment. The *Physics Today* article, titled, “Death and succession among Finland’s nuclear waste experts,” was published in October 2017.

In the context of climate change debates as well as other issues related to the long-term survival of the human species and the earth on which we live, Ialenti questioned if the repository safety case could be translated from its “technocratic jargon” into more lively science journalism or academic non-fiction prose and thus also serve as a tool that could give today’s societies an “intellectual workout” to look far into the future.

With that question as his base, Ialenti wrote about how the safety case models simulated western Finland's lakes, rivers and forests that will appear and disappear as a result of future soil erosion, floods, and fires over the next 10,000 years. He wrote about the future Ice Ages fifty or sixty thousand years from now that are referenced in the safety case and the seismic events that could occur once the three-kilometer thick ice sheet retreats. He wrote about models of how the current Olkiluoto island site will eventually become an inland site as Finland's shoreline ultimately widens into the Baltic Sea and merges into Finland's mainland. These are but a few of the scenarios he pondered in his writings.

Ialenti contended that these safety cases could be used to create powerful tools for raising public awareness about nuclear waste disposal if the technical documents are translated into more interesting, headline-grabbing, topical prose, then connected to other pressing societal issues. If that is done, he asserted, each repository license application becomes a science journalism "goldmine."

Further, he argued that the natural and archaeological analogue studies in the safety case for Finland's repository could also be used as a powerful resource for inspiring thinking far into the future, so he wrote about how Finland's, Canada's and Sweden's nuclear waste programs studied an ice sheet in Greenland, including the permafrost and groundwater surrounding it, to help understand the potential implications of ice sheets in the far future on repository performance (*SpentFUEL* No. 1126, September 9, 2016 covered this research).

He wrote about how the safety case explored clay deposits in China that have preserved trees for millennia as analogues for how bentonite clay will preserve Finland's nuclear waste drums for thousands of years. He wrote about how a bronze cannon from the shipwrecked 17<sup>th</sup> century Swedish warship *Kronan*, which has been submerged for 300 years in Baltic seawater, is an analogue for how a future KBS-3 copper repository canister will or will not corrode.

Ialenti concluded that if the technical documents were translated into more accessible formats they could become powerful communication tools. As a teaser for the book he is writing, he asked if the "nuclear waste repository projects could be one of the best tools for re-thinking humanity's place within the deeper history of the environment." And if "societies opening themselves to these deep geological timescales – in ways explicitly inspired by safety case models and analogue studies – inspire positive change in our ways of living on a damaged planet?"

[Written with permission from Dr. Ialenti's written remarks. He has also written about other nuclear topics that were published in *Forbes* and an article will be published soon in the *Bulletin of Atomic Scientists*.]

A video of the event and the presentations are available on the Stimson Center website at [www.stimson.org](http://www.stimson.org).

## Top Story

### Czech Republic and Slovakia sign MOU in field of radioactive waste disposal

SÚRAO, the Radioactive Waste Repository Authority in the Czech Republic, announced it signed a Memorandum of Understanding (MOU) on June 4 with the Slovak agency for the decommissioning of nuclear facilities and the management of radioactive waste, JAVYS, that will bring closer cooperation between Czech and Slovak experts in the field of radioactive waste disposal. A similar Memorandum was signed three weeks ago between SÚRAO and PURAM, Hungary's public organization for the preparation and implementation of the disposal of spent nuclear fuel and management of radioactive waste.

SÚRAO stated that the aim of the agreement is to "enhance cooperation via the sharing and exchange of information, knowledge and experience, participation in joint projects in the field of spent nuclear fuel disposal and mutual support with respect to participation in pan-European projects." The MOU also marks a "further step towards developing a common strategy for enhancing the safety of radioactive waste and spent nuclear fuel management in the context of the development of deep geological repositories in the two countries."

Both agencies said the agreement was "of significant importance" in terms of international cooperation in the back-end of the nuclear fuel cycle for the Visegrad Four (V4) countries. The V4 was formed in 1991 as a cultural and political alliance between central European countries and currently consists of the Czech Republic, Hungary, Poland, and Slovakia.

In early November, experts from central and southeastern Europe will gather for a meeting in Budapest to share knowledge and experience from ongoing waste management programs, including lessons learned from countries that are more advanced than the Czech Republic and Slovakia in terms of determining a site for constructing a deep geologic repository.

The agencies stated in their joint press release, "We believe that the upcoming introduction of joint programming at the European level co-funded by the European Commission in the context of various EURATOM scientific cooperation, research and innovation programmes will exert a significant impact on the improvement of communication between experts and the wider public which, in turn, will help us all to determine a safer approach to deciding on the best course of action concerning the management of low- and intermediate-level waste as well as spent nuclear fuel and other high-level waste."

## News Briefs – Non-US

### IRSN assists with three projects to prepare for decommissioning Fukushima Daiichi

IRSN, the Institute de Radioprotection et de Sûreté Nucléaire, announced in a May 22 press release that it is working with the Nuclear Energy Agency (NEA) under the auspices of the Organization for Economic Cooperation and Development (OECD) on three new research projects launched by Japan to prepare for the decommissioning of the damaged Fukushima Daiichi reactors. One project, the Preparatory Study on Analysis of Fuel Debris (PreADES), is to prepare the recovery and analysis of fuel debris. Another project will be to examine the state of the damaged reactors in more detail, and the third project will be to thermodynamically characterize the fuel debris and fission products (TCOFF).

IRSN stated that it intends to share its expertise internationally “by contributing to the synthesis of knowledge acquired from the Fukushima Daiichi accident, by contributing its expertise to the analysis of debris samples from the damaged reactors,” and by upgrading its thermodynamic databases (NUCLEA, MEPHISTA).

IRSN expects that by participating in these projects, it will enhance its knowledge of severe accidents by gaining a better understanding of the limits of various tools and methods that have been developed through studies and research and applying them to the reality of an accident that has been thoroughly analyzed.

IRSN is a “Technical Safety Organization” (TSO) operating scientific partnerships and providing scientific cooperation, nuclear safety, security and radiation protection services in 39 countries, in the framework of bilateral agreements or of multinational consortia agreements, under the auspices of the European Union, of NEA or of the TSO Networks (ETSON in Europe), or in cooperation with the International Atomic Energy Agency (IAEA).

### FORATOM says EU must support long-term nuclear operation

The European Atomic Forum (FORATOM) issued a press release on June 20 in which it urged the European Commission and other European Union (EU) institutions to recognize and reward the long-term operation (LTO) of nuclear reactors, as that is a key component in meeting Europe’s long-term climate goals.

During a workshop held June 19 in Brussels, FORATOM Director General Yves Desbazeille stated, “Nuclear LTO pays off for a number of reasons. It incurs low capital investment costs, requires a relatively short realization time for upgrade works and – most of all – it enables a reliable, low-carbon and affordable source of electricity to be retained in the mix at lowest cost.” Desbazeille continued, “If the European

Union wants to meet its climate goals, nuclear LTO will play an indispensable role in the EU’s future energy mix. Therefore, the EU institutions should recognise and reward it with incentives for the benefits it brings to the system.”

FORATOM noted that there are currently 126 operational reactors in 14 Member States. These reactors provide more than one-fourth of the total electricity production in the EU. The European Commission stated in its 2017 Nuclear Illustrative Program (PIN) that nuclear power is expected to remain a significant source of electricity in Europe’s future energy mix up to 2050. To sustain that objective will require an investment in nuclear LTO of about €40-50 billion (US\$46.5-\$58.2 billion) by 2050. According to the European Commission, nearly 50 reactors are at risk of early closure over the next 10 years if their operators do not pursue LTO licenses.

Director General Desbazeille added, “The early closure of 50 reactors would translate into slowing down significantly the decarbonization of Europe, maintaining CO2 emissions at the current level and losing the equivalent of around 7 years of renewable energy expansion. Take a look at Germany, which is set to miss its 2020 emission targets by a wide margin. If the country had decided in 2011 to phase out 20 GWe of coal plant capacity instead of nuclear, it would have reached its emission targets and now it could be rightly recognised as the European climate champion.”

Tuesday’s workshop, titled “Shaping Europe’s Energy Mix of the Future – A Role for Nuclear LTO,” brought together stakeholders from various EU institutions, national regulators, and representatives from the nuclear industry. Invited speakers discussed a variety of topics including, the current status of LTO and its role in Europe’s future energy mix, the industry’s needs and challenges, the contribution of LTO to securing energy supply in the EU and fighting climate change, its role in preserving nuclear expertise and maintaining highly-skilled jobs, and the impact of LTO on national economies.

FORATOM is the Brussels-based trade association for the nuclear energy industry in Europe. The membership of FORATOM is made up of 15 national nuclear associations and through these associations, FORATOM represents nearly 3,000 European companies working in the industry and supporting around 800,000 jobs.

### Japan plans to cap plutonium stockpile amid US concerns

According to a June 17 report in the *Asahi Shimbun*, Japan is planning to enhance measures to curb surplus plutonium that is extracted from the reprocessing of spent nuclear fuel from nuclear power plants, and also plans to cap the country’s stockpile of plutonium. The initiative was prompted after the US and other countries called for Japan to reduce ex-

cess plutonium in an effort to support nuclear nonproliferation and to reduce the threat of terrorist attacks involving nuclear materials.

The Japan Atomic Energy Commission will incorporate the measures in the five-point basic nuclear policy that is expected at the end of this month. This will be the first revision to the policy in 15 years. The measures to reduce the volume of Japan's plutonium will also be identified in the government's basic energy plan, which will be revised next month.

The *Asahi Shimbun* stated that Japan currently has about 10 tons of plutonium inside the country and possesses about 37 tons that are held in the UK and France, which are the two countries that were contracted to reprocess spent nuclear fuel.

In a policy announced in 2003, the government affirmed Japan would not possess plutonium that had no useful purpose. After the Monju prototype fast-breeder reactor was abandoned, however, the country's stockpile of plutonium has become questionable. Monju was designed to use plutonium recovered from spent fuel generated by other reactors as part of the nuclear fuel recycling program. In 2016, the government decided to decommission the reactor, which rarely operated over the last twenty years and encountered numerous problems.

Japan can reprocess spent fuel under the Japan-US Nuclear Cooperation Agreement, which is expected to be automatically extended beyond its expiration on July 16. After the expiration, the agreement will be terminated six months after either party notifies the other of its intention to do so.

The government's draft policy would allow the retrieval of plutonium based on the amount that is projected to be used as mixed plutonium-uranium oxide fuel (MOX fuel) at conventional nuclear reactors. Additionally, electric power companies would be expected to cooperate with each other in the use of MOX fuel, so the amount of Japan's overseas surplus plutonium can be reduced.

The *Asahi Shimbun* wrote that for example, "Kyushu Electric Power Co. and Kansai Electric Power Co., two utilities that began using MOX fuel ahead of other utilities, will consider using more MOX fuel at their nuclear plants for the benefit of Tokyo Electric Power Co., whose prospect of bringing its Kashiwazaki-Kariwa nuclear power plant in Niigata Prefecture back on line remains uncertain."

When the 2.9 trillion-yen (\$26.37 billion) reprocessing plant in Rokkasho begins full operations, about 8 tons of new plutonium will be added each year to Japan's surplus plutonium stockpile. The Federation of Electric Power Companies of Japan (FEPC) has said that MOX fuel could be used in 16 to 18 of light water reactors in Japan; however, of the nine reactors that have resumed operations since more stringent safety standards were introduced after the 2011 Fukushima disaster, only four of those reactors can use MOX fuel. The

policy revision to cap plutonium will significantly affect the operation of the Rokkasho reprocessing plant, if it ever is completed.

## News Briefs – US

### Senate approves naval nuclear fuel recycling pilot program

On June 20, a bipartisan proposal to fund a program to recycle spent nuclear fuel from naval reactors to be used in advanced nuclear reactors passed the full Senate. The \$15 million amendment to the Fiscal Year 2019 Energy and Water Appropriations bill, which was backed by Sens. Mike Crapo and Jim Risch, R-Idaho, and Sheldon Whitehouse, D-R.I., was adopted by the full Senate on an 87-9 vote. The amendment would provide funds for Idaho National Laboratory (INL) to research and conduct a demonstration project to blend high-enriched uranium (HEU) fuel to a mixture that could be used in advanced nuclear reactors.

In a statement released on his office's website, Sen. Crapo stated, "This bipartisan collaboration will keep Idaho and the work being done at Idaho National Lab at the forefront of new innovation and use of nuclear energy. By reusing spent fuel to power advanced reactors, we can supply the inputs necessary for critical research initiatives, such as those at the INL, and provide a cost-saving and environmental service by reducing the amount of spent waste otherwise stored or cleaned up." He added, "There is strong bipartisan agreement in Congress that nuclear energy is underappreciated as a reliable, safe, clean and efficient part of our national energy portfolio. This provision will help expand and grow the use of nuclear nationwide."

### House subcommittee advances four bills that address key nuclear energy challenges

The House Subcommittee on Energy advanced four bills to the full Energy and Commerce Committee this week that address key challenges facing the nuclear industry. The *Advancing U.S. Civil Nuclear Competitiveness and Jobs Act* would require the Secretary of Energy "to assess the impact of regulatory, policy, and legal requirements on the domestic nuclear energy industry and make recommendations to improve the competitiveness of our civilian nuclear commerce policies in global markets. Additionally, the legislation would streamline cumbersome portions of Department of Energy's (DOE) 'Part 810' export review procedures and improve the timeliness of the approval process."

H.R. 1320, *the Nuclear Utilization of Keynote Energy (NUKE) Act*, "would revise the Nuclear Regulatory Commission's (NRC) fee recovery structure and increase the predictability, transparency, and efficiency of the NRC's regulatory processes." According to [www.congress.gov](http://www.congress.gov), this bill was originally introduced on March 2, 2017, but on June 21,

2018 it was re-introduced, and forwarded to the full committee. It would establish new transparency and accountability measures on the commission's budget and fee structure and develop the regulatory framework necessary to enable the licensing of advanced nuclear reactors.

H.R.6141 (no title reported) would require the Secretary of Energy “to develop a report on a pilot program to site, construct, and operate micro-reactors at critical national security locations, and for other purposes.” H.R. 6141 was referred to the House Committee on Armed Services.

H.R.6140, the *Advanced Nuclear Fuel Availability Act*, would require the Secretary of Energy to “establish and carry out a program to support the availability of high-assay low enriched uranium (HA-LEU) to help enable advanced nuclear energy technology development. The legislation provides for a public-private partnership to address regulatory and market challenges associated with advanced nuclear fuel for nuclear engineers and scientists to develop and deploy innovative nuclear energy technologies.”

The US Nuclear Industry Council (NIC) issued a statement on June 20 stating that it joins ClearPath in a 4-point plan to support the availability of HA-LEU. The NIC noted that one “critical element” that almost all the new designs for more cost-effective, deployable, and safety-enhanced reactors share is the need for access to higher enrichments of uranium, or HA-LEU. The US does not currently enrich uranium at this level, so Congressional action is important and timely. The 4-point plan calls for the Secretary of Energy to do the following:

- Establish an adequate “strategic reserve” of higher assay LEU at an enrichment of 19.75% to support near-term need for lead test assemblies. Optimally, the reserve should contain at least 6 MT by 2020 and at least an additional 30 MT by 2025.
- Develop a fast neutron test facility with a design requirement that utilizes higher assay LEU to serve as a catalyst for the early production of this material.
- Conduct a study of various alternatives to procuring domestic uranium, enriched up to 5% to use as the feed-stock for the down-blending of HEU to 19.75%.
- Facilitate procurement of HA-LEU in the domestic or international commercial market.

## Senate defense authorization bill omits Yucca Mountain funding

On June 18, the Senate passed the *National Defense Authorization Act* (NDAA) for fiscal year 2019. The bill excludes any language that authorizes funding for Yucca Mountain. The House version of the bill, approved on May 24, contained \$30 million to revive the licensing process.

## DOE appeals MOX order

The Department of Energy (DOE) is appealing the recent order issued by a federal judge in South Carolina that granted a preliminary injunction that blocks the proposed termination of the Mixed-Oxide (MOX) Fuel Fabrication Facility currently under construction at the Savannah River Site (SRS) in South Carolina (*SpentFUEL* No. 1214, June 8, 2018). The *August Chronical* reported June 19 that DOE is also asking the 4<sup>th</sup> Circuit Court of Appeals to set aside that order while the appeal is heard.

The stop-work order issued by Secretary of Energy Rick Perry would have gone into effect on Monday, June 11. South Carolina Attorney General Alan Wilson argued that closure of the MOX Facility would turn the state into a permanent nuclear repository and contended that the Secretary's order was illegal. In its appeal, DOE argued that any harm “would occur at the earliest by 2046,” and thus is too far into the future to be considered an “imminent injury... particularly when the State's preferred alternative – the construction of the MOX facility – is not estimated to be completed until 2048.”

**Correction:** Last week we wrote in the cover story that SKB's application to build a nuclear waste repository system has been tested by the Swedish Radiation Safety Authority, SSM, pursuant to the Nuclear Technology Act and the Danish Environmental Court. It should have read it has been tested by SSM pursuant to the Swedish Environmental Code. We regret the error.

### It's Loud

What sound does a sleeping tyrannosaurus rex make?

A dino-snore.

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