MINUTES

Idaho State Capitol
700 W Jefferson Boise ID 83702
February 6th, 2020

Commission Members in Attendance:	Fred Hughes
Brian Wonderlich, Co-Chair	Lawrence Wasden
Mark Peters, Co-Chair	Janice McGeachin
Rose Bernal	Steve Laflin
Tom Kealey	U of I DESIGNEE
Jim Woodward	
Paul Arrington	Staff:
John Tippets	John Revier
John Chatburn	Elli Brown
Harold Blackman	Nate Fisher Jr
Noel Bakhtian	
Wendy Horman	
Rebecca Casper	
Scott Snyder	
Mark Nye	

Call to Order
Co-Chairman Mark Peters called the meeting to order at 8:04 am.

Welcome, Introductions, Approval of Minutes
Lawrence Wasden moved to approve the minutes from October 2, 2019. *Seconded.* ***Motion approved.***

Idaho Supplemental Agreement Panel
Panelists:

1. Madeline Lefton, *Office of Nuclear Energy – DOE, Senior Advisor;*
2. Darrel Early, *Office of Attorney General Wasden, Division Chief, Natural Resources Division;*
3. Brian Wonderlich, *Office of Governor Little, General Counsel*

The panel provided background on the 1995 Idaho Settlement agreement. Additionally, they gave their perspectives and goals throughout the negotiating process, as well as an overview of the agreements (agreements listed below) between the State of Idaho and Department of Energy (DOE). Both agreements support INL's research mission and ensure DOE remains committed to protecting the Snake River Plain Aquifer. Additionally, both agreements demonstrate how the State of Idaho and DOE can work together under the terms of the 1995 Settlement Agreement to ensure INL's research mission continues in Idaho and Idaho's environment is protected.

Agreement 1: 2019 Supplemental Agreement; *See PDF for agreement language.*
Agreement 2: Advanced Test Reactor (ATR) agreement; *See PDF for agreement language.*

Wasden: Recognized Madeline Lefton for her efforts as well as Secretary Perry and Secretary Brouillette, Governor Little and his staff, Dr. Peters, Fred Hughes with Fluor Idaho and finally Director Tippets and DEQ staff to achieve these two agreements.

McGeachin: In the 1995 settlement agreement, both TRU and HLW are defined by reference to the EIS. Is that specific to INL? Is that definition subject to change?
A: Early: It is the Environmental Impact Statement issued in 1995. The definition of HLW is the same as the Nuclear Waste Policy Act – therefore set forth in law. The definition of TRU waste is little bit different – it is defined by materials containing greater than 100 nanocuries per gram of transuranic isotopes. That definition has been used by DOE and NRC in other documents, but it is specific to the EIS. It is a more complicated question about if the definitions can change. The DOE is currently reviewing HLW – currently defined as source based not concentration based. For the purposes of the 2035 ISA milestone, HLW as defined at the time of the 1995 agreement will continue to be regarded by that definition for meeting any deadlines.

Tippets: We've heard for several years about the need to bring in research quantities in a timely manner to fulfill a specific project. It appears the project is still going forward -- has something changed or was the urgency overstated previously?
A: Lefton: The timing of the Byron shipment was not overstated. The Accident Tolerant Fuel (ATF) project cannot be completed until that shipment is received and undergoes post-irradiation examination. The timing is complicated by fuel availability being cycled out of the reactor. INL is being creative to complete the project. However, there have been consequences, fuel has been diverted to other laboratories due to Idaho's inability to receive shipments.

Woodward: Can you elaborate on the timing of fuel shipments?
A: Peters: It must be timed when there is an outage on the reactor schedule. There are certain windows of availability - roughly 6 month rolling windows. They are not going to work the outage unless they are ready to ship the fuel somewhere.

Tippets: It was our understanding clients were involved – South Korea specifically – are we able to complete the project and fulfill the client's expectations?
A: Specifically relating to the Joint Fuel Cycle Study – the project was rescoped, using fuels that INL already had on hand. Byron fuel is high burn up fuel and would have been optimal, but we have been creative in the interim and still need the Byron fuel to complete the project.

Casper: This topic was brought up within the Energy Community Alliance (ECA) discussions. It's not uncommon for other labs to mention if Idaho can't do the nuclear fuels testing then other laboratories should. If projects are sent elsewhere, I worry it threatens INL's lead nuclear laboratory designation.

John Wagner, INL Associate Laboratory Director, Nuclear Science Technology provided an overview of the new era for nuclear energy in the US and beyond – and INL. *See PowerPoint.*

Tippets: Microreactors sound very exciting especially with the potential to fill the need in rural communities. When you are talking about placement of these reactors – especially in remote/rural areas – how are you addressing risk and security?
A: Safety and security are being considered in the development of these systems. Safety would be regulated and approved (or not approved) by NRC which is the gold standard. A key safety component is these systems are simple with low power density – a big departure from past designs. Security comes down to cost and how can you meet the security requirements from NRC. It could vary from a security force to engineered features such as sensors or delayed features that would provide enough time to bring in a security force.

Tippets: As we go forward for applications and capabilities with the potential microreactors, I am very supportive of the concept, but my concern continues to be around security and would like to be kept up to date as these decisions progress.

Kealey: The potential for these projects is exciting and from the Idaho Department of Commerce perspective, we are looking forward to continuing to dedicate ourselves to be a part of the conversation and potential economic opportunities for Idaho.

Advanced Reactor Demonstration Execution Panel
Panelists:

1. Ashley Finan, *Director, National Reactor Innovation Center*

2. Madeline Lefton, *Senior Advisor, Office of Nuclear Energy*
3. Corey McDaniel, *Chief Commercial Officer, Nuclear Science & Technology, Idaho National Laboratory*

Moderator: John Wagner

Q: Madeline, Can you give us a sense of your role at the Office of Nuclear Energy?
A: See my role as the hub of communication on a variety of administration priorities -- the Office of Nuclear Energy isn't always good at telling their story.

Q: Ashley, can you give a brief overview of NRIC?
A: National Reactor Innovation Center (NRIC) was authorized by NEICA and established in the fall of 2019. NRIC will empower innovators to test and demonstrate reactors by enabling access to sites, materials and expertise at INL. It is a national program but headquartered in Idaho.

Q: Corey, give us a sense of your new role at INL?
A: As the Chief Commercial Officer, I will be working to align the work of GAIN and NRIC to capitalize on the global market for advanced reactors.

Q: Madeline, you spoke earlier about the Idaho Supplement Agreement and the relationships between DOE and the State of Idaho. Can you elaborate a little bit more about the importance of those relationships and how it will enable the future proposed projects at INL?
A: The value of being able to execute timely research at INL is incredibly important. With the ISA waiver executed and research being able to take place at INL, when the agreement is met, we are capitalizing on the overwhelming bi-partisan support. This includes the Idaho delegation, NEMA, NEICA, and the current Administration. We see a clear path forward to make the advanced reactor opportunities a reality – this includes building test reactors at INL and being able to deal with the variables that come along with that potential siting.

Q: Ashley, you recently moved to Idaho from Rhode Island – can you tell us why you did that?
A: Despite the snow being a deterrent, there is a good answer. My passion stems from air quality. I believe nuclear is a large contributor to the solution. Even with NEICA and NEMA in place in support of the nuclear industry, the single most important thing we can do is to prove we can demonstrate and build reactors. I'm looking forward to working with a great team at INL to make that a reality.

Q: Corey, moving to advanced reactors – Can we commercialize them? Who are the buyers?
A: This is a common question around the globe – including from mining and power companies. Mining companies have shown great interest and investments in the advanced reactor companies. The national laboratories are the conduit to business and users. Demonstrating the reactors in Idaho will allow potential buyers to physically see what they are buying – something that does not currently exist in the United States, much like buying a car. Idaho can demonstrate they could be deployed to remote areas such as Alaska or Canada then the remainder of the developing world will be able to purchase the reactors. Much like a Boeing airplane.
A: Madeline: The international engagement and excitement for advanced reactor technologies is incredible. They have a strong interest in buying "number 2". Nobody wants to be first, but after we get the first one demonstrated the interest will be huge from countries all around the world.

Q: Madeline, how does advanced reactor demonstration fit within the NE priorities?
A: It is one of our top priorities and is aligning with the administration and congressional priorities as well. There has been boost in funding for these projects this year. We've set aside $230M for advanced reactor demonstration this year.

Hughes: As part of these demonstrations have there been considerations in how you are going to handle the resulting waste and the potential environmental impacts?
A: Finan: Yes. It is a necessity we demonstrate how we are going to handle the waste in order to responsibly execute the demonstrations. We are completing detailed studies about what wastes we expect and what technologies will best handle it.

Blackman: We've been dealing with concerns with nuclear for years, including security. NRIC will understand the materials, fuels performance and engineered systems. As a part of your programs will you have a track, and resources applied, to understanding how to deal with those concerns? How will you communicate them? I am not talking about advocacy – I'm talking about clearly and honestly communicating associated risks and concerns that need to be dealt with.
A: Finan: It's an important question. One of the pillars of our mission is to inspire – that means answering questions and capturing people's imaginations of the possibilities these reactors can do for humanity. We are developing outward facing communications – for investors, customers and public. Virtual reality techniques could help us get people closer to the technology to help better understand its functions and systems. I've had early conversations with University of Michigan, Fastest Path to Zero Mission, which is currently addressing nuclear energy and society issues through research, action and engagement. This might be a framework for us going forward. We will put resources toward this question and would welcome input.
A: Lefton: Nuclear having a public relations problem in US was something that Secretary Perry wanted addressed. The office has undertaken campaigns to "make nuclear cool again". The efforts are hopefully changing public perception and easing fears. We should be able to capitalize on the progress to assist with NRIC education efforts.

Tippets: I'd like to ask another security question: Is this real and practical from a security standpoint? If a mining company were to purchase a microreactor, who manages the security for that reactor? How does the mining company manage that?
A: McDaniel: We are at the point where we are starting to answer those questions. We can't answer them yet because the technologies don't yet exist commercially. There will be numerous issues before we get to the final execution – the regulatory discussions are starting to address these issues.
A: Finan: The NRC regulates security for operating plants as well as new reactor plants. They test with mock attacks and evaluate design basis threat depending on location and access restrictions. INL's cyber security expertise will be a great asset to support these concerns.

Snyder: What is the anticipated lifecycle of the micro reactors? What thought has gone into decommissioning once the life cycle has been met?
A: Finan: There are two questions to address: demonstration reactors and commercial reactors. For the demonstration reactors, it could vary from 1 year to however long the DOE has research missions for the reactor. For the NRC licensed reactors, timing varies based on each company and business case, currently they are for 10 years to longer. Thought is being given to decommissioning – but no details yet.

Horman: Talking about access and infrastructure brought me to a practical conversation about home – what about the safety on Highway 20/26? Will there be a need to increase capacity to sustain these proposed projects?
A: Wagner: There have been initial discussion to address those infrastructure challenges. Currently there is not data to give a clear direction of what is needed. However, antidotally there has been discussion of expanding Hwy 20 to 4 lanes and other infrastructure upgrades INL will need to pursue.

Q: Madeline, can you provide some context on what DOE/NE is doing to provide sources of HALEU (High Assay Low Enriched Uranium) for advanced reactor demonstrations?
A: Having fuel sources is a critical part of ensuring success of advanced reactor projects. We currently don't have a domestic source that would support military use of a microreactor. DOE has taken leadership on finding a source of HALEU in the very near term. DOE has secured multiple lines of producing HALEU in the United States - one line is utilizing current material at INL that didn't have a clear pathway to use.

Q: Ashley, can you give us a sense of the companies that have expressed an interest in doing business with NRIC? What types of reactors?
A: There are about 15 companies in direct contact with NRIC. Many of the companies are microreactor companies. There also companies for small modular reactors, high temperature gas reactors, molten salt reactors, sodium cooled reactors and finally a light water small modular reactor. In some cases, these companies are looking to demonstrate the reactor at INL. In other cases, they are looking at another federal site or utility. NRIC's role will vary between each company.

Q: Ashley, can you give a sense of interest in NRC licensing vs DOE authorization?

A: It is probably 2/3 interested in NRC licensed demonstrations vs 1/3 interested in DOE authorization. Those interested in DOE authorization are likely earlier along in technology development and are looking to prove a concept. Those interested in NRC licensing are looking to build a first of their kind reactor, in order to sell commercially they will need NRC licensing.

Woodward: How are we defining advanced reactors vs LWR?
A: Finan: Advanced reactors are clearly defined in legislation. They must have significant advances over the existing fleet. This includes improvement in a variety of areas: safety, non-proliferation, cost, security, integration with renewable energy, modular to name a few. This could include a light water reactor as long as it has improved systems.

Casper: Can we talk about the various generations of reactors and what that means?
A: McDaniel: Generation 2 = LWR mostly deployed around the globe today; Generation 3 or 3+ = passively safe reactors that are being deployed (AP1000) Generation 4 = cooled by something other than light water. There are 6 different types of coolants that are possible.

McGeachin: What are the plans for construction of NRIC? Will it be open to the public?
A: Finan: Having an open space for public and customer is important for the vision for NRIC and mission at INL. We will be looking to secure space by 2025.

Peters: Can we talk about the broader value propositions for these advanced reactors - What are the additional applications for these technologies?
A: Wagner: A lot of the applications are not just electricity production – can be a mix of energy products such as desalination, industrial heat processing and hydrogen production. Additionally, there is a need to fill the intermittent energy supply with renewables (wind, solar). Advanced reactors could provide the energy to the electrical grid when needed, then shift to produce other energy products when its energy isn't needed on the grid. The integrated energy system capabilities at INL will help fill a piece of the puzzle.

Q: Ashely and Corey, when NRIC is successful, and these proposed projects become a reality what will be some of the issues within the community? Opportunities? How will they learn about these projects? Public engagement? Challenges and opportunities that community and state face?
A: Finan: Speaking from experience, housing is already a challenge in the community. Workforce will without a doubt be another huge hurdle. At the peak it is estimated there will be a need for 5,000 construction workers, subsequent to that approximately 1,200 ongoing jobs such as reactor operators, maintenance and support staff, etc. As for the public engagement, formal notifications will be handled by DOE ID through NOIs (Notice of Intent). INL and NRIC are currently working on a strategy to reach the public before the NOI. Touching on the opportunities for the community and state, there is a real opportunity for Idaho to be a big part of the manufacturing supply chain for these advanced reactors.
A: McDaniel: I'll add a few things on workforce. Idaho Falls is lucky to have the College of Eastern Idaho (CEI). CEI is ramping up its programs in the areas of need for the area companies - that need is even more urgent. We will work with all Idaho universities; the need will be there. Additionally, we need to capture the younger and diverse workforce in the future.

Snyder: From the perspective of ISU, what are the specific workforce needs and the numbers? If we are going to stand up programs, we need to ensure the programs are going to fulfill jobs in need. There is currently a coordinated effort taking place on cybersecurity and could be replicated on other issues.

Bakhtian: We talked a lot about the need for construction workers and others to fill the supply chain which is important. However, I would urge we do not forget about the other side of the workforce, which is the people conducting the R&D with higher degrees.

Q: For all panelists, how will we ensure these reactor demonstrations are viable to be sold commercially?
A: McDaniel: The NuScale project has been a 20-year effort with a variety of stakeholders. These things take a long time. In my opinion we need to not pick winners and losers but allow them to find money themselves. We can cost share, through GAIN, and other partnerships. We can provide infrastructure, a place for them to demonstrate, which will provide certainty for investors, regulators and all the companies to demonstrate proof of concept. It is important these companies know we are open for business and have a transparent process to navigate.

A: Lefton: At the end of the day this will be a price choice, valuing the cost of nuclear is something that does not happen in the US. A huge part of this business will be international sales, so we need to ensure we have a competitive package to offer. We are currently developing a one stop shop within NE to help facilitate relationships with foreign countries.
A: Finan: First, the advanced reactor technologies need to be competitive – cost, safety. DOE is taking a proactive role, through cost sharing programs that help assist with the reality of the companies being viable. We need to be thinking about how these advanced reactor technologies are relevant to the 'grid of tomorrow' – integrated energy systems are an important opportunity. Lastly, we can look at supporting technologies that can assist with cost, as an example digital construction tools to help ensure coordination of timeline and prevent cost overruns as well as utilizing advanced construction techniques that would help control costs.

Justin Coleman, Senior Technical Advisor Microreactors, Idaho National Laboratory addressed potential Application for Micro Reactors. *See PowerPoint.*

Bakhtian: Can these microreactors be used for more than just electricity production?
A: Yes. Desalination or many other needs from the troops on the ground.

Casper: Can you talk about the scale of application? What about the Army application?
A: Not in the position to speak directly about the Army. They don't have the infrastructure to support these efforts. The NRC is embedded in this program, not to license but to observe and learn. It will be up to the Army to determine their engagement and interest. From an application space the application is very broad. For international use, there are complicating factors of international agreements and we intend to work through those over the next couple of years.

Peters: Can you speak to the security requirements you are dealing with?
A: Starting with cybersecurity, it is required and a key component from DOD. Shielding is another component of this specific technology. It will be protected like any crucial asset out in the field. After the assessment of threats is completed, they will develop shielding that will be battle harden against the threats identified by DOD.

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DOE Idaho Operations Office Overview by Bob Boston, Manager, Idaho Operations, DOE ID. *See PowerPoint.*
Tippets: It's my understanding traditional commercial reactors have operated with fuel that is enriched to about 5%. As we are looking to the next generation of reactors, we will use HALEU - fuel enriched up to 20%. If there are advantages to using HALEU, why have traditional reactors utilized fuel only enriched to 5%? Was safety a consideration or other reasons?
A: A lot of it comes down to cost. HALEU is significantly more expensive to produce. However, HALEU provides the ability for longer operations (10 to 20 years) which makes it more cost competitive. That technology was not reviewed in great detail decades ago when the current fleet was established.

Tippets: Will the new reactors - beyond micros and SMRs - utilize HALEU?
A: It is unlikely large commercial operations will use 20% enriched uranium. There are current discussions with DOE and NRC to move accident tolerant fuels up to 7% enriched- that will allow for longer operation time and more time between outages.

Tippets: Why wouldn't the commercial reactors use the higher enriched fuel?
A: The large reactors are so complex you will never get the passively safe designs like the microreactors and SMRs – therefore it would be highly unlikely they would be able to make the safety case to the NRC to go much higher.

Wonderlich: How is the reprocessing of the EBR-II fuel proceeding?
A: The EBR-II fuel is on track and anticipate we will meet the milestones discussed in the negotiations.

McGeachin: Can you talk more about the HALEU fuel? Can you talk about the sources?
A: HALEU, which is anything between 5 and 20% enriched, is not currently being manufactured. The only places to the locate the fuel in the future is civilian enrichment facilities – there is funding and programs in place to incentivize that sector to produce the fuel. The other option is to down blend high enriched uranium, there is significant stockpile owned by NNSA. However, there are other strategic uses for that limited supply beyond commercial reactor operations.

Nye: Would appreciate the chance to talk to you about air space safety above the site.

DOE ID Cleanup Update by Connie Flohr, DOE ID. *See PowerPoint.*
Wasden: Connie, Congratulations on your promotion as manager of Idaho Cleanup Project. I look forward to working with you. When IWTU is up and running, I'd be pleased to come visit.

McGeachin: Can you talk more about IWTU and the ceramic filters fragility? What are the alternatives?
A: We aren't currently talking about alternatives. The ceramic filters are the medium chosen. They are very fragile and can crack, we just need to figure out how to fill them without breaking.
A: Hughes: We did have a number of filters crack, but we're getting better and adjusting as necessary. We are conducting more tests in the 40-60 days.

Casper: Tell us about your budget - Are you getting what you need?
A: We've been very fortunate and are receiving more appropriation than we've asked for. Ike White has told us, the way to maintain such an appropriation is to perform.

Casper: Can you tell us more about the procurement process upcoming?
A: See ICP talking points document for specific answer on procurement.

Public Comment Period
Richard McPherson: Long history and interest in nuclear energy. Idaho and Tennessee are two of the leading states in the nuclear energy space. There are many concerns about unprotected grids. LINE Commission should recognize the University of Idaho for their recent work.

Thomas Eiden: Founder and CEO of Atomic Alchemy, a radioisotope application company. They are in the process of NRC applications. The US has little involvement in this space and there's a tremendous market. Currently we rely on foreign countries and reactors. I'm a former ATR engineer and look forward to working more with LINE Commission moving forward.

Commission Discussion
McGeachin: I agree with Mr. McPherson that we should recognize the University of Idaho's accomplishments with Center for Advanced Energy Studies and elsewhere. Would recommend Governor Little draft a letter of congratulations. **Moved by McGeachin, seconded by Casper. Passed unanimously.**

Casper: I'm excited about the development of advanced reactors and the future of INL and nuclear research in Idaho.

Closing Comments
Next Meeting: June 9th, Sandpoint

Adjournment
Wasden moved to adjourn the meeting at 2:26pm.