UNITED STATES

NUCLEAR REGULATORY COMMISSION

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BRIEFING ON REGULATORY RESEARCH PROGRAM ACTIVITIES

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THURSDAY,

FEBRUARY 24, 2022

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The Commission met via webcast, Christopher T. Hanson, Chairman, presiding.

COMMISSION MEMBERS:

CHRISTOPHER T. HANSON, Chairman

JEFF BARAN, Commissioner

DAVID A. WRIGHT, Commissioner

ALSO PRESENT:

ANNETTE VIETTI-COOK, Secretary of the Commission

MARIAN ZOBLER, General Counsel

NRC STAFF:

DANIEL DORMAN, Executive Director for Operations

RAY FURSTENAU, Director, Office of Nuclear Regulatory Research (RES)

THERESA LALAIN, Deputy Director for Division of Safety Analysis, RES

KENNETH ARMSTRONG, Chief, Code and Reactor Analysis Branch II, RES

NANCY HEBRON-ISREAL, Senior Grants Specialists, University Nuclear Leadership Program, RES

ROBERT TREGONING, Senior Level Advisor, Division of Engineering, RES

P R O C E E D I N G S

10:02 a.m.

CHAIRMAN HANSON: Good morning, everyone, we'll

now begin our briefing on regulatory research activities here at the NRC.

I think it's important to keep the public informed of the NRC's regulatory research activities that are essential for the Agency in its preparedness to evaluate novel nuclear technologies.

I've been impressed with our research program for some time.

We have a relatively modest budget and I think the way it collaborates with industry organizations such as EPRI as well as licensees directly, as well as the Department of Energy and the National Labs, in my view, does a remarkable job of leveraging the significant amounts of data out in the world as well as generating new data that directly benefit our regulatory activities here at the NRC. So, it's a real pleasure for me to have this meeting. It's been almost three years since we've heard from our research program and I'm excited about the presentations that we have before us this morning.

But before we begin, I'll ask my colleagues if they have any remarks they'd like to make? Great, we're going to hear first from Dan Dorman and then onto our Director of Research Activities, Ray Furstenau.

We're going to hear from Terri Lalain and Ken Armstrong and Nancy Hebron-Isreal and finally from Rob Tregoning. And I look forward to it, and Dan, I'll hand it off to you.

MR. DORMAN: Thank you, Chairman, good morning Chairman Hanson, Commissioner Baran, Commissioner Wright.

The Staff are pleased to be here today to provide an update on the Agency's regulatory research activities, which provide essential support

to agency preparedness across our business lines from the reactor to the materials programs.

The office is uniquely positioned to deliver on our agency vision as a modern risk-informed regulator. We achieve mission excellence in a diverse, inclusive and innovative environment with a highly skilled, adaptable, and engaged workforce.

The Office of Nuclear Regulatory Research is a powerhouse of deep technical expertise and they apply their knowledge and analytical tools to support programs across the Agency.

They help fuel Agency innovation through research. Additionally, they lead many collaborative activities with both domestic and international partners to smartly leverage resources to essential agency readiness for a variety of new nuclear technologies.

Next slide, please. I'd like to now follow up on the Chairman and introduce the panelists who will talk today about the Agency's research activities. First will be, as the Chairman indicated, Ray Furstenau, the Director of the Office of Nuclear Regulatory Research.

Ray will provide an overview of the Agency's research activities, program, and external engagement that plays a key role in supporting NRC's safety and security missions.

After Ray, Terri Lalain, the Deputy Director in the Division of Systems Analysis will talk about how the research program technical activities achieve results that support mission readiness and efforts that are underway to foster innovation.

Kenneth Armstrong is a Branch Chief in Research for the Code and Reactors Analysis Branch and Ken has led Research's reviews of our scientific computer codes and has developed with peers a code investment plan to support Agency budgeting and planning to ensure readiness of state of the practice codes to support advanced nuclear technologies.

Then Nancy Hebron-Isreal, a senior grants specialist who leads the Agency's University Nuclear Leadership Program, will talk about the benefits this program provides in advancing our research program and developing support to nuclear talent and leadership.

Finally, Rob Tregoning, senior level advisor in Research for the Division of Engineering, will discuss the focused research program and how it supports agency readiness for emerging technologies.

Rob will also discuss how the research program supports and strengthens the Agency as it conducts its mission. This concludes my opening remarks so without further ado, I'd like to hand the presentation over to Ray Furstenau.

MR. FURSTENAU: Thank you, Dan, and good morning, Chairman and Commissioners, it's a real pleasure to be here today to talk about our research activities and how we are helping the Agency be ready for innovative nuclear technologies.

It's hard to believe I've been with the NRC over three and a half years now and I've been so fortunate in these past three and a half years to be able to lead such an extraordinary group of people in the Office of

Regulatory Research.

I think to best summarize the progress and direction of the Office of Research over these past few years, I'd like to quote from a December 13, 2021 ACRS biannual review report on our safety research program, quote, We, the ACRS, note that RES is evolving from what was a static reactive organization to a more dynamic, forward-looking one.

Also from the summary of their biannual report, quote, RES programs, position the Agency well for the changing environment, as illustrated by improving ongoing processes, prioritizing projects, finding new ways to develop and maintain core competencies and exploring ways to apply existing capabilities.

These activities are all signs of a healthy research organization and should support the Agency's broader efforts to transform itself into a modern risk-informed regulator.

Next slide, please.

I'd like to touch briefly on how we're maintaining and building our capabilities in the Office of Nuclear Regulatory Research. I'll touch a little bit on people, scientific computer codes and tools and partnerships.

Starting with people, you'll see on the left there a little montage of some of our recent hires in the Office of Research over the past 18 months or so, some external and some within the NRC.

I've been really most impressed by the competence and the credibility and dedication of our Staff to our nuclear safety and security missions.

As a support organization, I think it's important for Staff to be able to articulate the relevance and impact of our research activities to the Agency. That can be difficult sometimes but I think our Staff is doing a really good job of that.

We need to be adaptive in our office and ready for the application of advanced nuclear technologies to the current reactor fleet as well as to new and advanced reactors.

I wanted to note our full-time equivalent utilization last year was slightly over 100 percent and since we're engineers, I'll give you a more precise number. We had a 197.2 actual utilization versus 197 as our target.

But I bring that number up because it's important that we maintain our FTE utilization numbers up in order to support or adequately support our business line partners. And the strategic workforce planning process I think has really helped us anticipate our workforce needs to be ready for the future.

Regarding scientific computer codes and tools, a key element of our capabilities is a suite of validated modeling and simulation codes to perform our confirmatory analysis for a wide variety of safety applications, for example source-term calculations, thermal hydraulics, fuel performance, and accident analysis.

You'll hear more from Kenneth Armstrong later in the briefing about our computer code investment plan that will help us ensure our readiness to review emerging issues and new technologies.

And lastly, I'd like to touch on partnerships. The Office of

Nuclear Regulatory Research relies heavily on strong partnerships within the Agency and externally.

Externally, we use those partnerships to leverage research and resources being supported by other organizations to address safety topics and anticipate future needs.

Briefly, I'll mention some examples, our partnerships with DOE for example. Our partnership expansion with DOE was enabled by the Nuclear Energy Innovation Capabilities Act of 2017, also known as NEICA.

An MOU was created out of that Act and it was signed by the Chairman and the Deputy Secretary of Energy in 2019.

And then we had subsequent addenda to that MOU that provide for coordination between DOE and NRC for technical readiness and sharing of technical expertise on advanced reactor technologies and nuclear energy innovation, including through the DOE's National Reactor Innovation Center, also known as NRIC, that's located at the Idaho National Engineering Lab.

In fact, we're taking advantage of the opportunity to observe and learn about technologies developed through NRIC by having one of our Office of Research engineers assigned to a one-year detail to NRIC to learn about new and advanced construction techniques.

Internationally with the Nuclear Energy Agency, we're participating in joint projects using irradiation testing and post-irradiation examination facilities worldwide to gain knowledge and fill data gaps for new and existing materials and fuels.

The NEA recently established a Framework for Irradiation of Experiments, also known as FIDES, to help fill the gap left by the 2018 shutdown of the Halden test reactor in Norway. And I'm happy to be the Chairman of the governing board for FIDES.

We also partner with DOE on some of the joint projects coming out of the FIDES framework. We have a separate agreement with DOE on how we partner on FIDES to best benefit both agencies.

And with EPRI just recently in September of 2021, we renewed our MOU with the Electronic Power Research Institute for our cooperative nuclear safety research programs, which include six addenda that cover research areas such as advanced nuclear technologies, data science, management of materials and aging and degradation of long-term operations.

The NRC and EPRI first established this cooperative research agreement in 1997 and I think it's really a good working relationship in sharing opportunities we have with EPRI.

And of course, internally we work closely with our partners in NRR, NMSS, and NSIR to make sure we're performing timely research that's relevant to the mission.

With that, I'll turn it over Terri Lalain to provide more details on our research activities.

Terri?

MS. LALAIN: Thank you, Ray. Good morning, Chairman Hansen and the Commissioners.

Today it is my have pleasure to walk you through our

research innovation activities and share how the NRC is leveraging my 18 years of experience with the Army in assessing new technologies being deployed in the field.

From 2018 to 2020, I participated in the NRC's Senior Executive Service Candidate Development Program where I shared best practices between the Army and the NRC.

Since joining Research last March, I've been using my Army experience enhancing NRC processes such as the code investment plan which you'll hear later today.

I'm enjoying my time at the NRC and one thing I particularly appreciate is the Agency's focus on its people, including how we make decisions, interact, innovate, and collaborate, and I look forward to the discussion today.

Next slide, please. The NRC Staff is committed to enabling nuclear innovation in the existing fleet through regulatory engagement and research cooperation.

We are supporting nuclear innovations in the areas of high burnup fuels, wireless technologies, and risk tools to better enable the adoption of these technologies in operating reactors.

We recently published a Research Information Letter to provide NRR with technical interpretations of fuel fragmentation, relocation, and dispersal, or FFRD, phenomena for high burnup fuel under LOCA conditions.

The RIL is one piece of information that can be used to

evaluate the safety of FFRD. Research will work with NRR and follow the progress of risk-informed FFRD efforts through early interactions with vendors and licensees.

Our electronic engineers and cybersecurity specialists are performing several research efforts to enable the safe and secure use of advanced wireless communications.

With NSIR, we are collaboratively studying the secure use of wireless by leveraging insights from other organizations who have implemented this technology in safety-critical facilities.

With NRR, we are researching the potential safety hazards associated with the increase use of wireless communication technologies and the considerations for enabling safe use at nuclear facilities.

Our engineers and cybersecurity specialists also participate in the external standards development organizations and intergovernmental working groups to maintain awareness of these developments.

The SPAR models are the Agency's independent risk assessment models used in several risk-informed regulatory programs. The SPAR-DASH project aims to make the SPAR model risk results easily accessible to the Staff for incorporating risk insights into their work.

SPAR-DASH uses complex data from SPAR models to develop simple dashboards for inspectors and technical reviewers to gain quick risk insights to inform licensing and regulatory activities.

The research project team collaborated with Staff in NRR and the regional offices to capture their insights and leverage modern data

science tools to automate extracting key risk results from the models and display them in a user-friendly dashboard.

The dashboard supports ranking important contributors to plant risk, prioritizing tasks and resources, and allows for quick assessment of potential degraded or off-normal plant conditions.

Next slide, please. Advanced reactor readiness is a priority for the NRC safety and security mission.

Our ongoing readiness efforts will require forward thinking and planning to use our risk-informed insights as we identify and resolve challenges associated with industry proposals to use new and emerging technologies.

A key element of our readiness strategy is the development of codes and analytic tools to support confirmatory analyses that may be used in advanced reactor licensing actions.

Our code investment plan, which you'll hear from Ken Armstrong today, is aiding us by long-range planning for the necessary investments to be ready to support the regulation of new and advanced technology.

Research is able to rapidly respond to NRR's request for assistance in non-LWR applications due to the successful execution of the SCALE neutronics and MELCOR severe accident code readiness planning.

Research is leveraging the fluoride salt-cooled high temperature reactor reference model to significantly reduce the lead time in performing design-specific analyses to support NRR's review of the HERMES

construction permit to develop safety-focused request for additional information.

The NRC Staff is developing guidance to facilitate licensing reviews for advanced reactors in support of the Part 53 rulemaking including scalable human factors engineering reviews, flexible staffing approaches, and tailored operating licensing requirements.

Given the wide variety of advanced reactors designs and concepts of operations, the new guidance aims to be risk-informed, performance-based and technology-inclusive to enable more flexibility in how the NRC Staff performs reviews based on the safety significance of human actions.

The Staff has developed a new regulatory guide, 1.247, for determining the acceptability of PRAs used in non-LWR regulatory activities.

The guidance benefits the 20-plus years of experience the NRC has gained related to the implementation of Reg Guide 1.2, the analogous light-water reactor guidance document.

Research is preparing for the review of advanced non-LWR designs related to high-temperature materials, component performance, molten salt fuel cycle, and consensus standard improvements from both technology-inclusive and design-specific considerations.

Our Staff issued a significant number of reports on molten salt compatibility, high-temperature materials and component integrity, and graphite aging and degradation.

Staff completed Reg Guides to endorse ASME Section III

Division 5 high-temperature materials, paving the way for Applicants to use code-qualified materials.

Staff is engaged with NMSS to address technical and regulatory considerations on the front and back end of the MSR fuel cycle and potential safety impacts to advanced fuel cycle facilities. Next slide, please.

Research is well respected across the nation and worldwide in nuclear safety and security research. Our research activities are performed by professionals who are experts in their field and their work directly supports the NRC mission.

In addition, Research supports the program offices by conducting in-depth confirmatory research on a breadth of safety and security topics. Central to our mission, our priorities are retaining our core technical capabilities, maintaining our worldwide recognition, and developing skills in emerging areas.

We are committed to ensuring our people have the right training, skills and abilities to accomplish the important work in front of us. We use strategic workforce planning to better identify skill gaps and workload trends.

To recruit the workforce of tomorrow, we are leveraging the NRAN, intern, and co-op programs to meet our priorities and support the NRC needs. Given the competitive marketplace for talent, recruiting experienced staff continues to be a challenge.

To attract this talent, we are utilizing recruitment incentives to the maximum extent possible. We are also cultivating the talent of our highly

skilled workforce by investing in comprehensive training and developmental opportunities.

Our primary product is knowledge. We are committed to establishing a self-sustaining knowledge management program which includes use of our wiki-type online encyclopedia called Nuclepedia.

We also provide formal transfer training sessions to strengthen our Staff's skills across the Agency. Lastly, as shown by the testimonials on this slide, Research Staff are dedicated to offer critical expertise and perspectives on nuclear safety and security research across the nation and the world.

Next slide, please. Strong partnerships across the Federal Government, industry, and international counterparts are essential for meeting our mission.

External awareness through these engagements is critical to our readiness to support future licensing actions and ensure we share experience, knowledge, and collaborate where possible.

The Halden Human Technology Organization Project has been conducting innovative research with cutting-edge simulation technologies. The research results support the NRC's review of innovations in the nuclear industry.

For example, Halden's research of evaluating operator performance in digital control rooms focused on teamwork, workload, and procedure use.

This research provided technical basis for the NRC's review

of innovative control room staffing strategy in advanced reactor design.

Halden's future automation lab develops various innovative automation prototypes and studies how adaptive automation works with human operators as a cohesive team.

Advanced manufacturing technologies, AMTs, offer innovative opportunities to produce optimal reactor components for improved performance. Research supported an Agency-wide AMT action plan to address technical and regulatory preparedness, expand external stakeholder engagement and knowledge management.

The Staff issued several reports on the assessment of near-term technologies, generic technical information and technology-specific guidelines to be addressed in AMT submissions and workshops.

Staff formed partnerships with research organizations in the international community to continue to develop the expertise and capabilities to enable future applications of AMTs in the nuclear industry.

Artificial intelligence is one of the fastest-growing technologies globally and is the next frontier of technical adoption for the nuclear industry.

Research is leading the Agency's efforts to ensure AI regulatory readiness and utilization of AI tools in our business processes.

To increase awareness of AI's technical adoption in the nuclear industry, we held three public workshops during 2021, bringing together the nuclear community through the current and future state of AI. Finally, the NRC is not alone when it comes to overseeing the safe and secure

deployment of AI.

We are meeting with other government agencies and my colleagues in the Army to identify new partnerships to leverage their expertise and experience in AI.

Next slide, please. Research has a be-ready mantra and is well positioned in supporting regulatory readiness for future technological innovations as we look to the next five to ten years now to be ready for that future.

Recognizing the unique worldwide situation with several nuclear power plants simultaneously decommissioning, Research has developed a novel strategy to assess harvested material, components, and concrete from previously operating reactors.

The strategy matches the component attributes with the Agency's priorities to reduce uncertainties associated with the long-term operation of safety-significant components in challenging nuclear environments and potentially provide a basis for updating regulatory positions.

Research participates in multiple cooperative research projects such as SMILE and FIDES that have enabled opportunities for the harvesting and testing of materials.

Research will pursue harvesting opportunities as they arise through domestic and international partnerships. As I mentioned earlier, I joined the NRC from the Army where one of the areas in my portfolio was to test infrastructure to assess the safety and performance of AI systems.

Coming to the NRC, the NRC and the nuclear industry have

a similar interest in the potential of these capabilities.

As a modern risk-informed regulator, we must keep pace with technological innovations and reduce barriers while ensuring the safety and security of AI in nuclear facilities.

To prepare the Agency for this future, Research has initiated development of an AI strategic plan that includes goals for AI partnerships cultivating the NRC AI-proficient workforce, utilizing tools to enhance NRC processes and ensuring NRC readiness for future AI decision-making.

In Summer 2022, Research will engage with Agency stakeholders in soliciting feedback on our AI strategic plan and we expect to finalize this plan in the fall of 2022. As we look further down the horizon, the future-focused research program supports the exploration of potential regulatory challenges three or more years out.

These projects enable Staff to explore these challenging areas as a first step towards readiness for future program office needs. Rob Tregoning will provide specific examples of these exciting projects in his briefing.

With our expert Staff, modern and adaptable analytical capabilities, and expensive external partnerships, Research is well positioned to support nuclear innovations for the existing fleet and advanced reactor licensing.

This concludes my presentation and I will turn it over Ken Armstrong. Thank you.

MR. ARMSTRONG: Thank you, Terri, and good morning,

Chairman and Commissioners.

Scientific computer codes are used by the NRC, industry, academia, and the international community to understand advances in technology and support regulatory decision-making.

The NRC generally uses these codes to support the development of independent technical basis along with any needed analysis to confirm the safety of the operating fleet, fuel cycle facilities, spent fuel storage and transportation packages, and new application and amendment requests.

Next slide, please. In 2019, as part of the FY2021 budget review, the Commission requested a long-term investment plan to ensure the NRC's inventory of computer codes were appropriately resourced.

In response, the Staff has developed a new process and implemented a comprehensive review and identification of long-term needs for our codes.

This process provides the NRC with an integrated management tool for its codes, accounts for and stabilizes annual resource requirements, informs future budget formulations and helps to identify Staff expertise requirements.

This plan is a living document with formal updates on an annual basis. This is our first year of formally using the investment strategy and we expect to continue to refine this process over the coming years as we gain experience using it.

Next slide, please. RES surveyed the NRC offices and

identified 40 scientific codes which the agency was supporting for current and future development activities.

Most of these codes are led by Research, though several fall under NMSS.

The table shown in this slide groups these codes by technical analysis area. These range from complex integrated codes with close to a million lines of text that often take days or weeks to run to much simpler ones that can run in seconds.

Nine of these codes are not expected to support decision-making activities within the next seven years and were placed in an archival state.

31 of the codes require ongoing investments to support expected regulatory decision-making. These codes require ongoing maintenance and the development that represent the current pace of advancements made by industry.

4 codes are currently undergoing code modernization and 7 codes are being consolidated into 2 codes in the radiation protection area.

Most of these computer codes are supported by international code-sharing programs, where resources provided by the participants assist the NRC in development, assessment, and training activities.

We also share codes with domestic users and other federal agencies like the Department of Energy. Next slide, please.

As mentioned, computer code investment plan provides a

proactive approach for identifying funding over a seven-year timeframe. For our active computer codes, major resource investments are depicted in this pyramid and looking at it from the ground up.

First, we need to maintain our computer codes to ensure usability and distribute updated versions to our user groups. We do this by fixing bugs identified by the user groups and making sure that we are ready for the latest operating system and IT security requirements.

Next, we develop these codes in line with regulatory drivers from industry and needs from the regulatory offices. Examples of this would be in ensuring that we are able to model accident-tolerant fuel, high burnup fuel, and advanced reactors.

These efforts continue to be closely aligned with the NRC's licensing offices as future needs continue to evolve. We also enhance our codes through new features to improve analysis run time and confidence in the models.

Finally, this approach allows us to plan large resource needs over time, like computer code modernization where the code is fundamentally updated to take advantage of modern programming practices, and co-consolidation, where multiple codes are combined into one.

Next slide, please. We plan to initiate the investment planning process each summer, in advance, to help inform future budget planning.

The investment process at a high level starts with justifying the need for a computer code and being aware of options that exist to meet

the intended purpose.

Then one will identify ongoing maintenance and distribution resources needed as well as any developments to the code to ensure utility for an intended application.

Finally, all this gets planned out over time using the intake chart shown on the right.

For each code this chart includes a description of the code's current state, if it meets requirements for that code, the impacts for not funding those activities, deliverables such as new code releases and a resource table that consolidates those needs over time.

These resource numbers are entered into the annual research prioritization list in support of future budget formulation. This concludes my presentation and I'll turn the presentation over to Nancy.

MS. HEBRON-ISRAEL: Thank you, Ken. Good morning, Chairman and Commissioners, my name is Nancy Hebron-Isreal and I am a senior grant specialist within the Office of Research.

I have a wealth of experience and knowledge with grant management and implementation. This morning I'll be providing some information about how the University Nuclear Leadership Program, UNLP, encourages researchers at U.S. institutions to bring innovative ideas to the NRC, as well as the program’s benefits to the workforce needs of the Agency and the nuclear industry broadly.

Next slide, please. The UNLP began in fiscal year 2020. Formally, it was known as the Integrated University Program.

This program traditionally supported educational grants for students and faculty through scholarships, fellowships, and faculty development.

In 2020, the program was broadened to support research projects relevant to the programmatic mission of the Agency. As a result, RES invited the submission of university-led R&D projects to complement current and future research needs.

RES seeks to leverage universities' capabilities through these R&D grants. Next slide, please. We recently completed the second year of the UNLP.

We're excited at the overwhelming response to the R&D funding announcement where we received and reviewed over 200 proposals for Fiscal Years ‘20 and ‘21.

Our Fiscal Year ‘22 research funding opportunity announcement is now open and will close on April 5th. We also continue to coordinate with our UNLP partners, DOE, and NNSA.

This coordination ensures that our programs are complementary and provide adequate coverage of technical areas. Additionally, RES began hosting research recipient presentations to learn more about the research institutions are conducting under the program.

To date, four recipients presented to NRC Staff. Last month, Oregon State presented on its research project related to nuclear cybersecurity. This event was announced to NRC Staff and resulted in nearly 90 Staff attending and participating.

This project directly addresses the objectives of the NRC, providing risk-informed security through understanding of cyber risk and vulnerabilities associated with nuclear plant instrumentation and control systems.

An area where we've recognized where the program is lacking is in the participation of minority-serving institutions. To incentivize this, our recent funding announcement for research projects encourages institutions to include partnerships with MSIs.

We are also exploring how the UNLP funds can be utilized to support the reinstatement of the MSI grant program managed by the Office of SBCR. These R&D grants complement our research portfolio.

As an added benefit, these grants directly engage students in work of relevance to the Agency, and thus, they also provide a pipeline of capable and experienced university graduates.

Next slide, please.

Turning now to educational grants, under the UNLP, student recipients are required to obtain nuclear-related employment. This employment may be with nuclear-related industries, the NRC, other federal agencies, state agencies, national laboratories or academia.

The UNLP provides direct benefits to the NRC's workforce development staffing needs. OCHCO recruited NRC grant recipients for the Agency's NRAN program, the resident inspector development program and other entry-level positions.

Of the 45 members of the inaugural 2020 NRAN cohort and

the incoming 2022 cohort, 35 members were grant recipients.

Recently, under the resident inspector development program, two trainees were from the grant recipient pool and one resident inspector position was filled by a grant recipient.

Several other grant recipients were referred NRC program offices and regions for immediate entry-level opportunities, and some are in the process of receiving offers.

The UNLP is an important tool to fill entry-level skill gaps identified through the Agency's strategic workforce planning process. NRC grant-funded scholarship and fellowship recipients who meet eligibility requirements may be non-competitively selected for NRC positions.

As an example, in 2020 RES utilized a grant program and onboarded two grant recipients, one in the Division of Systems Analysis, supporting specialized research and analysis in fuel and cladding performance and design, and the other in the Division of Engineering to support the Agency's Regulatory Guide program.

This concludes my presentation and I'll now turn it over to Rob Tregoning.

MR. TREGONING: Thank you, Nancy.

Good morning, Chairman and Commissioners, I'm Rob Tregoning, the senior level advisor for materials in the Division of Engineering in the Office of Research and today I'm providing an overview of the Agency's future-focused research or FFR initiative.

Next slide, please. The program was developed to position

the Agency for upcoming technical and regulatory challenges by initiating research on topics that are expected to be important.

In essence, the program is attempting to identify what's next for the Agency, and then using modest resources, implement some initial research and planning so that the Agency can most effectively fulfil our mission in the future.

The FFR program is fueled by the Agency's best resource, our Staff. The program encourages Staff to momentarily step back from daily near-term activities and identify potential regulatory topics within the next three to five years that may require new knowledge, tools or skills.

The FFR program then provides an opportunity to develop cognizance of the cutting-edge research underpinning these topics and determine if enhancements to the Agency's framework could promote effective regulation on that topic.

The program also promotes outreach to academic, Government, and industry leaders to identify relevant partners and programs that may be leveraged if the Agency pursues future development in these underlying technologies.

In this manner, the FFR program intends to energize Staff by directly investing them in the Agency's future success while simultaneously building essential long-term capabilities.

Next slide, please. There are three components of research and development, or R&D, that support regulatory decision-making.

The most fundamental piece is foundational knowledge,

which consists of the expertise, experience, skills, and creativity needed to address a particular challenge.

This knowledge is then applied to develop those general analysis tools and information that buttress the supporting technical basis.

These tools are then exercised using the specific characteristics of the problem at hand to ultimately reach the intended decision.

To provide a simple example, foundational knowledge of fluid flow, thermodynamics, computational modeling and programming were used to develop the NRC's TRACE thermohydraulic code, which has then been used to evaluate a plethora of design basis accident scenarios in reactor licensing applications to assess the likelihood of subsequent fuel damage.

It is the strategic development of foundational knowledge that the FFR program intends to address. Such knowledge supports a more flexible, agile workforce as the underlying skills and capabilities can be applied to a broad array of challenges.

Sometimes the return on the investment in foundational knowledge may not be readily apparent, especially in the near term. As an example, in the early 2000s, the Agency devoted significant resources in developing structural graphite expertise to support the next-generation nuclear project, or NGNP.

In 2013, the NRC suspended all NGNP activities after DOE decided not to proceed with that effort. At that time, it certainly appeared the NRC's investment in developing structural graphite expertise was worthless.

However, about five years later, the expertise gained a decade prior was leveraged to review proposed ASME code rules on structural graphite for its potential use in several advanced non-light-water reactor designs.

The actual application of this foundational knowledge was most certainly not envisioned when the decision was made to develop that capability.

Thus far, in the incipient stages of the FFR program, Staff have submitted ideas that would enhance foundational knowledge associated with all aspects of the NRC's mission, including nuclear material tracking and inventory, licensing, rulemaking, inspection, waste storage and transportation, and decommissioning.

These ideas could impact existing, new, and advanced reactors.

It would establish new capabilities and expertise within well established technology areas, such as materials, consequence analysis, radiation protection and probabilistic risk assessment, as well as more nascent technology areas such as automation, artificial intelligence, and machine learning.

Next slide, please. The FFR program is not quite two years old, however, there have already been enough early successes to be optimistic about the role that this program can play in supporting the Agency's readiness for tackling future challenges.

I want to discuss three FFR programs initiated in 2020 to

illustrate this point; the first is a digital twin project. A digital twin is a connected digital representation of a physical asset.

The digital twin FFR project explored the technical issues and infrastructure needed to prepare the Agency for regulating digital twin applications. The project held two widely-attended workshops, published multiple technical reports, and identified likely nuclear digital twin applications, key technologies, and their associated technical challenges.

Currently, the FFR project is transitioning to business line funding to support significant industry interest in broadly applying this technology.

Another example is the FFR project to apply licensing modernization project, or LMP, to operating reactors.

This project combines the licensing modernization methodology developed to establish the licensing basis for advanced non-light water reactors with existing Level 3 risk insights for operating reactors to identify Part 50 requirements that could be risk-informed.

An initial pilot study evaluated the dose associated with internal events to demonstrate that the LMP methodology is feasible for light-water reactors and that the safety profile was consistent with non-light water reactor risk targets.

Additionally, the pilot study gleaned insights on both non-light water reactor licensing and light water reactor safety that had been shared with stakeholders.

The next phase of the FFR effort is using external event

probabilistic risk assessment to identify aspects of the standard review plan for transient and accident analyses that can be risk-informed.

The System-Theoretic Accident Model and Processes, or STAMP, is a causality model developed using system theory that can be used in lieu of or in conjunction with traditional PRA to identify risk-significant scenarios.

This approach has already been successfully applied in many industries. The FFR project confirmed that STAMP could potentially improve the efficiency of NRC's digital systems reviews and identify potential system errors that would not otherwise be considered.

Two Agency-wide workshops and other forums were held to increase Staff awareness of STAMP and identify enhancements to facilitate learning and applying STAMP.

The STAMP FFR provided Staff with timely knowledge to support growing industry interest in STAMP-based methods such as its limited use in NuScale design certification document application.

Currently, a business line activity is being developed to explore future implementation of STAMP at the NRC, Next slide, please.

While the FFR program is off to a promising start, the next challenge is to grow the program into an Agency-wide resource.

The intent is that FFR will become an incubator of those research ideas culled from across the Agency that align with being a modern risk-informed regulator.

We know that good ideas benefit from diversity and

crowdsourcing. Inspectors, licensing assistants, technical reviewers, project managers, administrative assistants and, yes, even managers all have unique perspectives that can germinate into a powerful idea.

To reach its full potential, the program's visibility needs to be increased and ultimately ingrained into the Agency's culture and collective consciousness such that when someone has a good idea they immediately think of sending it to the FFR for consideration.

The FFR uses a streamlined and simple submittal process to facilitate Agency-wide involvement and the program can provide support to nurture and execute good ideas if the submitters are not positioned to implement their idea.

We also need the FFR program to be flexible and agile. Resources will remain modest compared to the Agency's budget and the program will need to effectively steward those resources.

To do this, we intend to create synergies with both internal and external programs.

For example, research on promising FFR topics can be solicited through the NRC's University Nuclear Leadership Position that Nancy just discussed to promote contributions from the brightest academic minds.

Finally, it's recognized that other agencies such as DOE and DoD extensively fund basic technology development and FFR activities should explore leveraging these efforts to most efficiently tackle unique NRC challenges.

So, while we're off to a good start, much remains to be done

to realize the full potential that the FFR program offers. Next slide, please.

In summary, you've heard today about several ways in which the Office of Nuclear Regulatory Research provides integral support to ensure that the Agency effectively fulfils its mission.

This starts by identifying the right research.

We work closely with our partner offices to understand their technical needs, schedules, and priorities so that we can tailor our research activities to most effectively address these needs.

Our activities remain focused on safety as we seek to understand and address those issues that most impact safety through assessments guided by the Agency's risk-informed principles.

We're continuously striving to innovate our methods to provide new risk insights and ways to most effectively communicate this information to decision-makers.

However, pursuing these goals requires a continual investment in the assets needed to perform this work, particularly our research tools and the skills and capabilities of our Staff who are integral to our ultimate success.

We also realize that we can't do this alone, and we rely on a network of domestic and international partnerships with private and public organizations to both grow and augment our capabilities.

Finally, we would be remiss if we didn't keep one eye on the future so that the Agency can continue to best serve the public and nuclear community.

The FFR program, as you heard today, is a small but integral piece to ensure the NRC will be ready to meet our upcoming challenges. Thank you for your time and now I'll turn it back to Dan for closing remarks.

MR. DORMAN: Thank you, Rob. In conclusion, I want to again thank our Staff who continue to demonstrate NRC's commitment to supporting regulatory readiness through Agency research activities.

Their dedication, energy to innovate, and technical results provide the Agency with essential tools to aid efforts to accomplish our safety and security mission. We've now completed our presentation and we look forward to answering your questions.

Thank you.

CHAIRMAN HANSON: Thank you, Dan and Ray and the rest of the group. I'm starting off with questions this morning. I was really pleased with the presentations. I think there's a lot to celebrate and a lot to be proud of in the efforts of the Office of Research.

I want to just highlight one thing to start before I dive in on another topic and that's just the UNLP program.

I want to applaud some of the thinking that's going on there about how to engage with minority-serving institutions and I'm looking forward to getting, and I know the rest of the Commission is too, the paper from the Staff on the resurrection, if you will, of the minority-serving institution grant program and I look forward to hearing about how that will be connected to and potentially integrated with UNLP.

So, thanks to Nancy very much for your presentation. With that, I want to start with the issue of FFRD, that is fuel fragmentation, relocation, and dispersal.

I think it's a really important technical issue needing some regulatory clarity, in my view, to support the effective licensing of accident-tolerant fuel and high burnup fuel.

The Office of Research Staff recently issued a regulatory information letter, or a RIL, on this topic and the ACRS recently wrote a letter on it as well.

The ACRS stated that the current data set on FFRD has been expanded but that there remains a significant degree of uncertainty in large part because the problem is multivariate and the experiments from which data are developed did not always represent actual light water reactor conditions.

From this, both the NRC Staff and the ACRS Staff appear to recognize there are some data gaps associated with the FFRD phenomenon.

In the meantime, industry is really interested in pursuing high burnup fuel and accident-tolerant fuel, and NRR, our Office of Nuclear Reactor Regulation, is already reviewing topical reports from fuel vendors.

But it's not clear, to me at least, that there's the regulatory line of sight that's needed to efficiently and effectively regulate these new fuel designs.

Terri, you touched on this earlier but I was wondering if you

could expand on how the Agency is planning to address FFRD for high burnup licensing applications and what's Research doing to help establish the appropriate technical basis for our reviews.

MS. LALAIN: Thank you, Chairman.

So, to help build Staff expertise and address data gaps important to the NRC interest, Research is participating and leading the technical discussions in several OECD NEA experimental programs, like the Studsvik Cladding Integrity Project for SCIP, and the Framework for Irradition Experiments, or FIDES.

Research is also working on methodology to estimate for core-wide fuel dispersal during loss of coolant accident using our computer codes.

And Research is also assessing the potential impacts of FFRD on the regulatory and technical basis of containment source term in Regulatory Guide 1.183 on alternative source terms for design basis accidents at nuclear power plants.

This guide will be used by Staff in NRR to support the high burnup fuel reviews and licensing. With that, Ray, is there anything else you'd like to add?

MR. FURSTENAU: I think that's a pretty good summary there. I think what you said, Chairman, with regards to your comments and those of the ACRS, I think the recent RIL, as you mentioned, it provided some insights that the licensing folks can use based on experimental data that was performed using testing in the past several years with zirconium cladding and

uranium dioxide fuel.

Which, of course, is a type of fuel being used now but there are going to be variants of that in the accident-tolerant fuel.

And some of the experiments we're planning, like Terri mentioned, with the OECD NEA and others will help fuel some of those data gaps and help reduce the uncertainties.

Because the research information letter does note there's large uncertainties with experimental data with the release of fission gas products that can have a significant impact on if and when a fuel rod in an accident condition would balloon and burst in a LOCA-type accident.

So, I think we do have more work to do on it, but it's kind of setting the stage for helping to know when to analyze for FFRD and what the missing data gaps may be that we need to address in the future.

CHAIRMAN HANSON: Thanks. Ray and Terri, that's super helpful.

As we think about how to set that research agenda which you've spoken a little bit about, we've gotten some comments from outside the Agency but we've also tried to tackle this issue of risk-informing our approach to high burnup fuel and ATF.

And of course, this FFRD issue is at the center of that and so, are we crafting our supporting research agenda on this issue to support risk-informed approaches to this.

And if so, how does a risk-informed mindset shape our research agenda there?

MR. FURSTENAU: I'll take a stab at that, Chairman. I think the point you bring out about how this is risk-informed with the research information letter that we had on this, of course, it's based on empirical data.

And then you have a lot of uncertainties and you have a lot of separate effects testing, but I think it starts to build the framework to look at what matters with regards to identifying the risk involved.

As you do these tests, you start to zero in on the phenomena that contribute to a bad day in case of a LOCA dealing with an FFRD. So, I think what we have to do in looking at this is trying to understand what matters.

To me, that's part of risk-informing, reducing those uncertainties and looking at sensitivities of what matters in an experiment program and zero in on those things that matter.

As we were talking about, there's a lot of factors that are involved in FFRD and we've got to use the experiment program and our research to help focus on the ones that matter from a regulatory standpoint.

CHAIRMAN HANSON: Ray, you're doing a great job of teeing up my next question on these things.

I want to take what you said with some of the stuff we heard from Ken about the codes and about probabilistic fracture mechanics and I'll call it the explorer code, XLPR code, and how what you previously said with our code efforts might come to support, again, these risk-informed approaches to this stuff.

MR. FURSTENAU: I'm fortunate on the panel here we have one of our experts on XLPR codes. So, if it's okay with you I'd like to

turn the question to Rob Tregoning who can address that. Rob?

MR. TREGONING: Thanks, Ray, and thanks for the question, Chairman. I don't know about expert, but I'll do my best. As you're probably aware, Chairman, XLPR is one of the codes we developed jointly with industry.

In fact, it was about a 50-50 split and while the initial applications of FFR were to do risk-informed evaluations of leak before break and some issues related to stress corrosion cracking that we've had in our pressurized water reactors.

And I might admit that it was very successful in addressing the initial intended purpose but from the beginning everyone recognized that XLPR would have broader applications and we're certainly starting to see interest in many of these applications, including we've heard from the industry that they're interested in using XLPR to address potential challenges associated with high burnup and accident-tolerant fuels.

And we also know that there has been a long-standing issue in using it as part of the design process for new reactors as well as, again, to help identify what the most risk-significant challenges are.

So, we continue to maintain and use and update XLPR with the notion that it will continue to have broader applications throughout not just the materials community but then also being able to inform some of these cross-cutting issues with very complex topics such as fuel fragmentation, relocation, and dispersal.

CHAIRMAN HANSON: Thanks very much, that's really

helpful and interesting. I have to say in my enthusiasm about FFRD I've completely lost track of whether or not I'm in my 10 minutes or not.

So, I'm just going to assume I'm way outside the bounds and thank everybody for a really interesting discussion this morning and I'll hand it over to Commissioner Baran.

COMMISSIONER BARAN: Thank you all for your presentations and your work. I'm really excited about the work the Office of Research is doing and the progress you're making. I want to make a few quick points before I ask my questions.

The SPAR models are so important for NRC's independent oversight role and you've taken their usefulness to a whole new level with SPAR-DASH. What a great way to leverage those models to gain risk insights for our licensing and oversight work.

I also appreciate your full utilization of FTE. We have a large number of employees who are eligible for retirement and we're seeing attrition each year of about six to eight percent.

That means we need to hire about 200 people from outside the Agency every year to sustain our workforce. It's about 300 this year. In the context of that increased external hiring, full utilization of budgeted FTE is critical.

The future-focused research program also is developing as well. As an Agency, we need to be ready for innovative technologies and part of being ready is looking a bit over the horizon at what is coming in a few years and then building the expertise and doing the foundational research in that

area.

We don't want to find ourselves behind when a new technology is submitted for review. So, this is an important facet of what the Office of Research does. Now, let me turn to a few questions.

The high energy arc fault research has been an important ongoing activity. Ray, can you give us an update on the status of the HEAF research and what the Staff is finding?

MR. FURSTENAU: Sure, I'd be happy to do that, Commissioner Baran.

The HEAF research is really intended to reduce the uncertainty and really provide a more accurate assessment of the fire hazard associated with the HEAF and bring more realism to it.

Our current research shows the hazards that are posed by these events are highly dependent on a number of things, like the type and configuration of the electrical equipment, the energy involved in the HEAF event, some differences in copper versus aluminum.

And what we're doing in research and should be finishing up by summer is develop an improved methodology for analyzing the risk, the overall risk posed by these events. And we'll document those and seek public feedback.

And the NRR is using some of this new methodology as they do their LIC-504 review of HEAF events.

So, HEAF events are very plant-specific and the fire damage and plant impacts are specific. So, all of that need to be taken into

consideration, zones of influenceS are different, one size doesn't fit all.

And so those are those types of things we're looking at as we conclude our research on the HEAF events. Does that help?

COMMISSIONER BARAN: I'm look forward to seeing your results and the analysis and following the issue as we go forward and you continue your work.

I also appreciate the work the Staff is doing on harvesting passive components from decommissioning nuclear power plants for research.

We can use the resulting data to strengthen aging management programs for reactors operating long term. Ray or Terri, can you talk more about Research's current and future plans for harvesting materials?

You've touched on it a little bit in the presentation, I'm interested in a little more detail about that. My sense is there are several opportunities out there?

MR. FURSTENAU: Thanks for the question, Commissioner Baran. Why don't I start and then, again, we're fortunate to have Rob Tregoning who's been leading some of the harvesting efforts.

But like you said, there are good opportunities with plans being in the decommissioning mode. We've got a good sense of the type of maybe data gaps there may be on passive components and which plants and the conditions they operated at and for how long.

We can start to zero in on where our data needs are at and

we're working with our partners in DOE to help do that as well. Rob, can you add some specifics on what we're looking at?

I know we have harvesting being supported in the budget and we're going to take advantage of that with what I think is a well thought out program for harvesting. Rob?

MR. TREGONING: Thanks for that Ray, and Commissioner Baran, thanks for that question.

As you both alluded to, we're in a very unique time with respect to the nuclear community in the sense that there is a surplus of decommissioning plants worldwide that really offer us with a unique opportunity to understand how certain key components and systems have operated over, in some cases, more than 40 or 50 years of service.

So, I can tell you that we are pursuing, along with not just DOE but also the nuclear industry, several opportunities domestically to harvest. And we've also most recently done some concrete harvesting from SONGS as an illustration of that.

And we're in the process of developing contracts to finalize and actually put into play our harvesting plans domestically at several of these plants. But we just don't look domestically, we're looking internationally as well.

Terri mentioned the SMILE program, the SMILE program is getting materials from Oskarshamn 1 and 2, which are Swedish BWRs as well as Ringhals 1 and 2. Ringhals 1 was a BWR but Ringhals 2 was actually a Westinghouse 3 loop PWR that is essentially a sister plant to both Surry and

North Anna.

And there are some very unique characteristics of especially the Ringhals 2 plant that we think our broadly applicable to the remaining U.S. fleet.

So, the SMILE program in particular, I think right now there's 12 organizations from 7 countries and it's actually being run by NEA.

And these group-sponsored programs are really an effective way for us to leverage our resources because again, when you look at harvesting, especially of irradiated components, it's a costly proposition.

So, I think I'm being a little bit coy because I don't want to speak about the domestic plants because we haven't entered into agreements with but I think as we do we'll be able to announce publicly what some of those plans with the domestic plants.

And the Commission and the public will be hearing more about this topic, I would expect, in the spring or summer timeframe.

COMMISSIONER BARAN: Great, well I look forward to it.

As we think about new technologies that may be coming to the Agency for review in the coming years, fusion is a big one. Where are we on building the necessary expertise for those potential reviews in either areas of future-focused research related to fusion that we should be thinking about as an Agency?

MR. FURSTENAU: If I may, I'll take that question, Commissioner Baran.

In the area of fusion technology, the NRC Staff has formed

a working group with our technical experts from NRR, Research, and NMSS to look at and build the necessary capabilities to help develop a framework for regulating fusion technologies.

And to inform future activities, DANU in NRR is organizing a series of public meetings this spring to improve our understanding of proposed fusion technologies and to help develop a SECY paper in the fall on options for fusion regulation.

So, these public meeting interactions will help to scope and identify areas of technical need for us. With regards to FFR, future-focused research, we do have a proposal that was accepted and is funded in Fiscal Year '22 to review advanced manufacturing technologies for fusion reactor materials.

And because with fusion, it's a lot about material applications for fusion, high-temperature material applications is a big deal in choosing materials to confine the plasma.

So, FFR will enable our Staff to broaden their knowledge of state-of-the-art fusion materials and specialized advanced manufacturing technologies in challenge to their deployment.

We also included in the mission-related R&D notice of funding opportunity announcement that recently went out, we included fusion as one of the topic areas we're interested in hearing proposals from the universities on.

So, that's where we're at right now, Commissioner.

COMMISSIONER BARAN: Thank you all very much.

Great discussion. I really enjoy these meetings where we just hear a broad spectrum of what Research is doing, it's so important.

So, thank you, and I'll turn it back over to the Chairman.

CHAIRMAN HANSON: Thank you, Commissioner Baran. Now to Commissioner Wright?

COMMISSIONER WRIGHT: Thank you, Mr. Chairman. And again, we've all heard in the questioning, a lot of the questions are already taken so I'm going to endeavor to try to get some good ones to you with what comes to mind.

Great discussion and thank you for your presentation. I'm a fan of Research and what you do in your area. It just continues to guide the Agency as a whole and helps us make decisions.

You touch almost every aspect of what we do through your findings and insights and expertise, so again, thank you for what you do. I'm going to start with Terri, so good morning, and nice job on the presentation by the way.

I'm interested in the innovation steps you're looking into, for example I believe you talked about the SPAR-DASH thing and Commissioner Baran referred to it as well.

And I agree, I think it's a great step in the right direction in continuing our journey as a modern risk-informed regulator.

So, my understanding is that the survey results on the Agency's transformation efforts indicate that maybe some external stakeholders have some uncertainty about how the Agency uses risk

information in making decisions.

Can you maybe speak a bit about how this effort could influence that perspective?

MS. LALAIN: Yes, so for the licensees, they have access to their own SPAR models and SPAR-DASH, so they have that information and for the use of SPAR-DASH it can be described on the NRC's public website along with the other risk tools that are being used.

And the Staff are engaged with external stakeholders on how it applies SPAR-DASH in its oversight and licensing activities during public meetings and other public forums.

So, the communication is underway to help with that.

COMMISSIONER WRIGHT: How does that seem to be going right now?

MS. LALAIN: From the licensee reviewers, the SPAR-DASH team there has been receiving feedback from the users and the ability to use the dashboard.

They're getting the information on the level of risk significance for a proposed licensing amendment so there's good feedback coming back in from the users of the SPAR-DASH tool.

COMMISSIONER WRIGHT: Thank you for that. Are there other similar applications being developed to provide risk-informed tools to inspectors, particularly our residents so that we continue to focus on the most important safety-significant issues?

MS. LALAIN: Yes, so for the inspectors the SPAR-DASH

is applicable for them to help prioritize inspection activities, select risk-informed inspection samples, compare with licensee's PRA information.

So, there's a wide range of tools for the inspectors as well with that.

COMMISSIONER WRIGHT: Thank you. There's been a lot of focus and talk on the whole artificial intelligence and with respect to the artificial intelligence that's being planned, what type of artificial intelligence tools and outcomes do you anticipate possibly being integrated to improve our agency's processes?

MS. LALAIN: AI can be used to enhance our NRC processes to help us better allocate our resources to higher-value activities and emerging priorities.

So, examples of some current business process applications would include a natural language processing type tool for resource prediction so we can compare historical actions to get better estimates for new actions.

Use of things like RESbots to help the researchers and machine learning for operating experience of that classification.

So, all of this, as we're drafting and working on the evidence-building plan that the NRC intends to finalize in March 2022, as required by the Evidence Act, the Agency will identify what NRC decision-making processes could then benefit from some of these tools that I've described and prioritize the data collections that would have the most significant impact on Agency decision-making, selection of the AI tools, and even future stakeholder

use.

So, all of that will come through that evidence-building act to hopefully and potentially make decision-making easier, faster, and more efficient for everyone.

COMMISSIONER WRIGHT: I'm going to skip to harvesting and we may go back to Rob again but if you want to jump in, or Ray wants to jump in, that's fine too. I'm really a fan of the harvesting idea and what happens there.

Unfortunately, we have more harvesting opportunities than we would probably like because we don't like to see any plants close when we see things can operate.

So, Rob, you're being a little bit coy, you've admitted that about where you can go because there were some agreements in place with certain people. Are you working with EPRI on this too by chance or DOE? Who else are you working with on this?

MR. TREGONING: We have both international and domestic harvesting teams, so we meet about every six weeks with both DOE and EPRI, and it's a strategic meeting related to harvesting where we review the current status of each other's harvesting plans and look for ways to leverage and cooperate.

So, that's been an ongoing interaction that we've been doing for the last two or three years. And then we also have a periodic similarly, but with an international community because, again, we're aware not just of opportunities in Sweden but also Korea and some other countries that we think

would be beneficial for the U.S.

The international ones are a little bit harder to pull off, as you might imagine, but still, we have to pursue every possible lead and it's one of these things where we have multiple contingency plans and we try to pursue all of them simultaneously because you recognize each individual one might have a relatively low likelihood of success.

But I think as we look over the next year, I think we're going to have some significant successes with respect to harvesting.

COMMISSIONER WRIGHT: That answers my next question. Do you think some of these agreements domestically will be put in place within the next year?

MR. TREGONING: I'm as confident as I can be given the current budget situation and the fact that we don't even have an approved budget. But I'm confident regardless of that particular fact.

COMMISSIONER WRIGHT: Thank you so much for that. I look forward to following up on that, it's very interesting when I've traveled around and seen components that have been harvested and some of the work that's being done on them; the concrete and steel.

So, thanks for that. I want to move over real quick to Nancy and ask you a question. I know the Chair brought up minority-serving institutions topic and he referred to the reports and papers that were coming up.

I don't particularly want to get into where you're at in all of that but I have an issue about communication on that, if you could answer

that? How are the institutions that are being made aware or will be made aware of the funding opportunities take advantage of them? What's the process for that?

MS. HEBRON-ISREAL: We do outreach to the institutions and the communities, making them aware of the funding opportunity announcements.

We communicate with the different organizations for nuclear engineering department heads, the Health Physics Society, as well as the MSI, HBCU, and HSI communities to make them aware of when our announcements are open and be assistant if they have any questions or anything regarding the announcement and what it entails.

So, hopefully that covers your question. If not, I'd be glad to clarify any areas.

COMMISSIONER WRIGHT: I just wanted to know what the process was for getting the word out. Is there a certain pipeline or do you go directly to the different institutions that would be able to apply for these things directly and to whoever that person is at that institution.

MS. HEBRON-ISREAL: We do have contacts that we communicate with for nuclear engineering department heads organization as I mentioned. They reach out to all the nuclear engineering schools for us.

We communicate with Health Physics Society. We work closely with the Office of Small Business and Civil Rights to ensure that we make the minority-serving institutions community aware of our announcements when they are available as well.

So, we collaborate with all.

COMMISSIONER WRIGHT: Ray, maybe you can chip in here. We've had some conversations about the university-level things and that program. So, does it follow the same process there?

MR. FURSTENAU: Yes, I wanted to add, if I may, one thing that we're trying to do in the current funding opportunity announcement as well for the mission-related R&D that Nancy mentioned that is open right now for applications.

We included in the evaluation criteria, points-weighted evaluation criteria for universities that partner with MSIs or HBCUs, and we think that'll help where schools that don't have large engineering programs can team up with those that do to encourage some participation by MSIs.

So, that's a very recent thing we're doing as well.

COMMISSIONER WRIGHT: This just came to mind, I'm going to close with this, Mr. Chairman, then you can take it back. I was at a meeting just last week at NARUC down in D.C. and I heard the outfit E4 that’s in North Carolina, South Carolina, we have a former Commissioner who was involved there.

I just happened to hear that they're putting a program together that's going to focus on MSIs as well, and it sounds like to me that might be something that can work as a partnership.

So, you might want to reach out to E4 and see if there's an opportunity to maybe do something even bigger. If that opportunity is out there, why not?

MR. FURSTENAU: Thank you for that.

COMMISSIONER WRIGHT: Mr. Chairman, thank you so much.

CHAIRMAN HANSON: Thank you, Commissioner Wright. I want to wrap this up this morning and thank the Staff for their presentations.

I want to particularly thank my colleagues. I think once again, I hope people see the benefits of a Commission approach where there's a lot of I think shared support for the research program on the Commission but also different areas of emphasis. I appreciated Commissioner Wright's interest in artificial intelligence and some of these questions about the grant programs.

Commissioner Baran did some deep dives on the harvesting for decommissioning plants and there are a whole set of other things that we probably didn't touch on but could have given more time.

So, I want to express appreciation for my colleagues and appreciation for the Staff and thank you all again. With that, we are adjourned.

(Whereupon the above-entitled matter went off the record at 11:22 a.m.)