UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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BRIEFING ON MANAGEMENT OF LOW-LEVEL WASTE,

HIGH-LEVEL WASTE AND SPENT NUCLEAR FUEL

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THURSDAY

SEPTEMBER 18, 2014

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ROCKVILLE, MARYLAND

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The Commission met in the Commissioners Hearing Room at the Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, at 9:00 a.m., Allison Macfarlane, Chairman, presiding.

COMMISSIONERS PRESENT:

ALLISON MACFARLANE, Chairman

WILLIAM C. OSTENDORFF

KRISTINE L. SVINICKI

NRC STAFF PRESENT:

LARRY CAMPER

CATHY HANEY

MARK LOMBARD

MARK SATORIUS

ALSO PRESENT:

THOMAS COTTON, PhD, Complex Systems

CHARLES MAGUIRE, Texas Commission on Environmental Quality

NIGEL MOTE, US Nuclear Waste Technical Review Board

JAMES WILLIAMS, Western Interstate Energy Board

JEFFREY WILLIAMS, US Department of Energy

P R O C E E D I N G S

9:04 a.m.

CHAIRMAN MACFARLANE: Good morning, happy to welcome everybody to the meeting this morning.

We're going to focus on a broad spectrum of radioactive waste management issues today.

I'm very happy to have this meeting not only because I'm particularly interested in this area, but I think it's really important for us to focus on the back end of the nuclear fuel cycle. There's a front end, so there will always be a back end, but it needs attention.

And I think it's incumbent upon us at the Nuclear Regulatory Commission to make sure that we are paying attention to the variety of issues at the back end of the nuclear fuel cycle.

So, we're going to hear about quite a few of these issues today dealing with Spent Nuclear Fuel and storage, dealing with Low-Level Waste, dealing with transportation of these materials. So, I'm looking forward to this meeting.

What we're going to do is we're going to have an external panel as we usually do of experts and then we will have questions, we'll take a short break and we'll have our own staff come up and inform us about what they're working on and more questions then.

So, let me just highlight who's going to be

on the external panel.

We have Jeffrey Williams who is the Project Director of Nuclear Fuel Storage and Transportation, the Office of Nuclear Energy in the Department of Energy. Welcome.

We have Charles Maguire who is the Director of the Radioactive Materials Programs for the Texas Commission on Environmental Quality.

We have Tom Cotton, Vice President of Complex Systems and general expert on high-level waste issues.

We have Nigel Mote who is Executive Director of the U.S. Nuclear Waste Technical Review Board.

And we have Jim Williams, the High-Level Waste Radioactive Waste -- sorry, High-Level Radioactive Waste Program Manager from the Western Interstate Energy Board.

So, we welcome all of you.

So, we're really interested in your perspectives this morning. Just a reminder to stick to eight minutes so we can get through everything and please avoid to the greatest extent possible the use of acronyms so we're not the only ones in the room here. There are others watching on the web and we want to make sure this is as transparent as possible for everyone.

So, let me first see if my fellow Commissioners would like to make any opening remarks. No? All right, then we're going to start off right away with Mr. Williams, please?

MR. JEFF WILLIAMS: Good morning, it's a pleasure to be here. I am Jeff Williams, I'm in the Department of Energy's Office of Nuclear Energy and I'm the Director of the Nuclear Fuel Storage and Transportation Planning Project, the acronym is often referred to as NFST.

I want to thank you for giving me the opportunity to discuss the work that we're doing. Throughout our discussion I'd like to highlight areas where engagement with the staff would be beneficial.

The NFST project was established following the Blue Ribbon Commission report basically to lay the groundwork for implementing interim storage included the associated transportation per the Administration's strategy.

The strategy endorses a waste management system containing a pilot and armed storage facility, a larger full scale interim storage facility and a geologic repository in a time frame that demonstrates the Government's commitment to addressing nuclear waste issues, builds the capability to implement a program to meet that commitment and prioritizes the acceptance of

spent fuel from shutdown reactors.

Each of these elements is guided by an overarching commitment to have community support for such activities.

Our project is working within existing legislative and budgetary authorizations while the Administration works with Congress to develop legislative changes to the nuclear waste management program that would be consistent with the strategy.

The objective of our work is to identify and begin the implementation of activities. Four major elements, the first one, support the deployment of interim storage, improve the overall integration of storage as a planned part of the waste management system and prepare for the large-scale transportation of nuclear fuel as well as develop foundational information, data and capabilities that would be needed to support any implementation decision and actions.

An overarching goal is to develop options for decision makers on the design of an integrated waste management system.

With respect to deployment of consolidated storage, our initial focus is on a pilot interim storage facility which would accept spent fuel and dual-purpose canisters from the shutdown reactor sites.

Current and planned activities that may be

of interest to you include developing interim storage design options including the development of a Topical Safety Analysis Report which I'll refer to as a TSAR for submittal to NRC.

This is a key activity that we believe can be performed now to help reduce uncertainties and mitigate potential risks associated with full implementation in the future.

Spent fuel is currently stored at shutdown nuclear power plants in welded stainless steel canisters contained in casks. When this spent fuel is moved to an interim storage facility, these canisters will have been in storage for decades, years to decades, at existing ISFSIs or Independent Spent Fuel Storage Installations stored in accordance with 10 CFR 72 regulations.

Those canisters are going to need to be transported in accordance with your 10 CFR 71 regulations before being placed back into storage at a pilot interim storage facility. We refer to this as 72/71/72 operational sequence which raises some 72/71 regulatory sequence issues that require discussions.

This would include the approach for ensuring the contents of the arriving canisters meet Part 72 requirements for restoring them to service. For example, inspections, plans for the capability to

remediate a nonconforming canister, plans for aging management of canisters that have previously been in service for many years at independent spent fuel storage installations.

The timing and approach for canisters system license renewals and plans for the capability to prepare dual purpose canisters for shipment to a disposal facility eventually.

A TSAR submitted to the NRC would allow the staff to review and establish regulatory positions on these issues in advance of a license application and provide feedback on pilot interim storage facility functional capabilities and regulatory approach.

Additionally, the design concepts and accompanying waste management systems analysis that we're working on will provide a range of viable concepts and alternatives related to a larger interim storage facility that would have sufficient capabilities to begin reducing the Government's liabilities.

The design and operation of a larger ISF will consider spent fuel management practices at utilities, acceptance strategies and may ultimately require both wet and dry systems.

There's over 20,000 metric tons of spent fuel in more than two dozen dry storage systems presently. Our consolidated storage facility will

need to handle all of these.

Consistent with the strategy, a future interim storage facility would be deployed in phases using the modular design concepts. The engineering work that we're developing now would inform future design options and provide information into a potential environmental impact statement.

Related to transportation, we are preparing for the large-scale transportation of spent fuel. We're focused on the long lead time aspects of transportation infrastructure.

Related to institutional infrastructure, we've been collaborating with stakeholders through state regional groups, travel representatives and industry organizations. Jim Williams is here as a representative from Western Interstate Energy Board.

We're working too on the Nuclear Waste Policy Section 180c policy which, for those that don't know, is a methodology for providing funding and training for jurisdictions affected by transportation. We're working to update a preliminary national transportation plan that lays out organization responsibilities and other things. We're also working on routing methodologies.

With respect to transportation operational functions, we're evaluating what it takes to remove

spent fuel from shutdown reactor sites. We've developed a new routing tool to support our stakeholder interactions and we're collecting cask data, developing transportation cask-specific models and applying data and models to evaluate aspects that may impact the transportability of loaded canisters.

With respect to transportation hardware, we're working on -- we're planning for the design of railcars, certified per the American Association Standard S2043 which is a standard that provides specifications for trains used to carry spent fuel.

In addition, we're performing system studies to determine what additional hardware needs, for example, casks that would be needed to eventually move spent fuel.

The storage and transportation work that I just discussed needs to be done in the context of an integrated waste management system and so we're performing a range of systems integrations and systems analysis to support this.

This involves development and application of waste analysis tools and data to inform future decisions and the analysis activities are being provided to provide quantitative estimates and impacts of utility and Federal actions on the waste management systems including cost, benefits and impacts of one or

more storage facilities.

This activity also is focused on identifying opportunities for better integration of storage into the waste management system including standardization.

I'd like to conclude by saying that we'd be happy to share the details of all our systems, storage concepts and transportation information that we're developing and the NRC review of these activities such as a pilot ISF TSAR is essential to implementation of the Administration's strategy.

And thank you, that concludes my remarks.

CHAIRMAN MACFARLANE: All right, excellent timing.

Okay, Mr. Maguire, over to you.

MR. MAGUIRE: Good morning, Chairman, Commissioners. I'm Charles Maguire, I'm Director of the Radioactive Materials Division at the Texas Commission on Environmental Quality.

I'm honored to be here before you this morning and want to commend you for taking up a dialogue on the important subjects that are on your agenda this morning, well done.

I'm going to focus my remarks about low-level radioactive waste management and disposal strictly on the site that we licensed in Andrews County,

Texas.

Next slide, please

The first thing that I want to talk to you about is the Compact of the Federal Low-Level Waste Policy Act passed by Congress in 1980 and amended in 1985 gave states or authorized states to create -- to form Compacts.

Next slide, please

Texas and Vermont established the Texas Compact and Vermont has paid Texas $25 million for waste disposal guarantee.

Several Compacts were formed. The site we licensed in West Texas is a one and an only in the last 30 years to be licensed. The site provides waste disposal pathways not only for Texas and Vermont but 36 other states.

Next slide, please

The next thing I want to focus on is community support. The lack of community support is hampered numerous public and private ventures in nuclear energy and radioactive waste processing.

My agency and Waste Control Specialists have worked to develop a good relationship with the community at the county level and at the state level. Andrews County issued a general obligation bond for $75 million to the company for construction of the facility.

Next slide, please

Waste Control Specialists supports over 160 full-time jobs in Andrews County and, to date, has create $4 million in county revenue and $16 million in state revenue from disposal fees.

Next slide, please

What you have here is a birds-eye view of the 600 acre site at Waste Control Specialists. It sits in the middle of a 15,000 acre area that's owned by WCS. There's no small amount of courage and capital and commitment required to establish the public/private partnership that you see before you.

The Compact waste disposal facility, the Federal waste disposal facility, byproduct disposal facility, hazardous waste disposal facility and storage and processing facilities.

Next slide, please.

The comprehensive radioactive waste disposal storage and processing license has over 200 licensed conditions. It's very comprehensive. Since the first waste was disposed of in the Compact facility in April of 2012, there have been 54,000 cubic feet and 206,000 curies disposed of in the Compact facility.

The Federal facility, the first waste was disposed in June, 2013. Fifty-one thousand cubic feet and 87 curies were disposed of there.

We're currently working with your staff on rulemaking process looking at the greater than Class C waste streams. We're also look at rulemaking in our own rules to create some volume-reduction criteria for imports into the Compact facility.

Next slide

We have good collateral provided by WCS for the site. There's $85.31 million surety bond that provides to the State of Texas funds needed for unplanned closure, post-closure, institutional control and corrective action should the state have to hire a third-party contractor to perform those tasks.

Next slide

The WCS landfill design is all about clay and concrete. I'm frequently approached by generators seeking to dispose of their waste in this facility and they always tell me it's over-engineered and too expensive. My response to that is, of course.

We want this facility to meet Texas' standards for excellence and it's also important that the state be compensated for the risk.

There are over 640 borings at this site to understand the geological conditions and to determine that WCS landfill does not sit over an aquifer.

Next slide

When the site opened, particularly as the

site was opening in April, 2012, we quickly realized that we were going to have to step up our technical capacity. I call it embracing our inner geek. We've also asked WCS to embrace their inner geek.

We have a very sophisticated state of the art performance assessment model. It's probabilistic, we can run numerous scenarios looking at the dose, response to dose. The WCS landfill design holds up well under those reviews.

All the services that WCS -- next slide, please -- I'm sorry.

All the services that WCS offers require a great deal of coordination. We have two resident inspectors that are at the site all the time. We attend their planning meetings in the mornings. We work with them on their training exercises.

All of the planned shipments, my staff in Austin, myself, our resident inspectors, we all participate in those in terms of what we're expecting to arrive at the gate and then our resident inspectors stay very involved with the waste that's being shipped in all the way through to disposal or to its storage location.

That coordination requires a lot of communication. You have here a picture of the Compact facility. It's licensed for nine million cubic feet

and 3.8 million, 3.89 million curies.

The waste -- the cell that you see constructed there is roughly nine percent of their licensed capacity. The waste that you see in the concrete canisters on the floor of the cell belongs to the State of Texas as it's disposed of. And so, as a regulating entity, we pay careful attention to that.

We use state of the art communication tools like SharePoint. My resident inspectors have iPads. We can actually see in real time the actual manifest that comes in that they sign off on that goes for disposal.

Next slide, please

We've also had to embrace our creativity. What you see here is the Federal waste facility. It's licensed for 26 million curies, I'm sorry, 5.6 million curies and 26 million cubic feet. What's built at the present time is about ten percent of the licensed volume.

When we started -- when WCS started receiving waste from Los Alamos National Labs, we got some really large glove boxes. We did some engineering, some procedural changes to allow them to build the triple-wide, if you will, concrete canisters on the floor of the cell.

All of this has taken a great deal of cooperation. We appreciate the cooperation that we've

gotten from NRC and thank you for the time here today.

CHAIRMAN MACFARLANE: Great, thank you. You guys are doing a great job here. Thanks, Mr. Maguire.

Dr. Cotton

MR. COTTON: Thank you. My name is Thomas Cotton. I've been working on spent fuel management issues since 1978 and I appreciate the opportunity to be here today and share with you my personal observations, and I stress personal, about changes since the Nuclear Waste Policy Act was passed in 1982 that I think are worthy of consideration as the regulatory structure for spent fuel management is reviewed and updated.

Next slide

Jeff Williams has already emphasized that we need to look at spent fuel management as an integrated system and not a set of independent components and this slide is just making the unfortunate point that while there are three main components to the system, the only one that's available today is the one that was available in 1982 and that's at reactor storage.

But, nonetheless, I'm going to address each of them in turn in the hopes that eventually we'll have the whole system.

Next slide, please

So, in at reactor storage, what's changed? Well, the graphic makes the main point. When the Nuclear Waste Policy Act was passed, there was no serious expectations that there might be over 90,000 metric tons of spent fuel in storage at reactor sites by the time Federal waste acceptance began or that a substantial portion of that would be in a wide variety of large, welded shut dry storage systems which hadn't even been licensed as a technology at that time.

The chart also makes clear the logistics challenges we're now facing with a nominal waste acceptance rate of 3,000 metric tons a year, it takes 2,000 tons of that just to stop the growth of inventory at reactor sites, leaving only a thousand metric tons a year left to start removing the backlog that's already built up. And there's a lot of momentum in this system is the point and nothing is going to change quickly.

Next slide, please

I think an even less expected development was that managing spent fuel at shutdown reactor sites might become a very significant part of the system.

The chart shows the accumulation of spent fuel at shutdown sites with a wave that's beginning to -- are expected to start in 2030s and if the movements off site doesn't start until the 2020s, it's going to be hard to catch up with that.

And other significant developments have complicated the issue that's increasing burnups, the increasing size of storage canisters and the fact that thermal limits for storage are substantially higher than those for transportation so that the canisters may have to sit where they're first loaded for a long time before they can be moved somewhere else.

Next slide, please

This chart shows the system wide implications. If current trends continue, and they don't have to but if they do, it might take a much longer time than was ever expected to clear the shutdown reactor sites of spent fuel, terminate the cost of continued maintenance and make the sites available for other uses.

And you can see that in the red curve which shows the number of shutdown sites that have been cleared as a function of time, assuming spent fuel is only picked up in canisters that are loaded according to these current trends with the standard assumptions about 3,000 ton a year acceptance and oldest fuel first priority.

Now, at a certain point, you can see this to the right of that curve, the clearance rate starts declining and that's because the movement is becoming limited by the rate at which the canisters cool down

enough to be moved and not by the acceptance capacity of the system. And that tail goes out a long way, like 2021, I think or 2100.

And the blue curve shows that you can cut that tail off by taking bare fuel directly from reactor pools to a central facility which stops the addition of storage at the sites.

Now, what's the implication? Well, I think key implication is that it would be very helpful if improved designs and/or regulatory approaches could reduce the aging period that we need before canisters can be transported after they're loaded so we're not inadvertently locked into extended storage at shutdown sites whether we like it or not.

Improvements in this area would also facilitate transfer of fuel to a central location before any of the uncertainties about the ability to move canistered fuel after extended storage might be resolved in an unfavorable direction, perhaps requiring some repackaging.

Next slide, please Oh, excuse me, there we go, centralized storage.

Well, centralized storage has been a hardy perennial in the spent fuel management policy garden for a long time and a timely move into central storage was the key Blue Ribbon Commission recommendation that's

been adopted in the Administration's position.

Next slide, please

But the expectations about what that storage might be have changed and Jeff, I think's already made the point that a central storage facility is going to have to handle a wide variety of storage canisters that have already been stored at reactor sites for various and perhaps extended periods.

Now, this is very different from earlier concepts in which standard storage systems would be used at central facilities and if they were loaded at reactors, they'd be shipped directly to the facility fairly quickly without a long period of on site storage.

Next slide, please

So, to me, the main implication here is that when you're updating regulations that are applicable to central storage, you need to address this wide variety of canisters that are going to have -- a previously stored canisters that will have to be stored and also the possibility, not certainty, but possibility, of a large-scale bare fuel handling.

Now, let's turn to the repository which is the ultimate end point specified by the Nuclear Waste Policy Act. It was reiterated by the BRC, Blue Ribbon Commission, and endorsed by the Administration.

The Blue Ribbon Commission recommended

that the current generic repository regulations be updated before a siting process is well under way. And this suggests that action sooner rather than later if the target of having a site, the Administration's target, by 2026 is to do that.

Next slide, please

There are two kinds of issues, pre-closure and post-closure. The pre-closure one is straightforward. The fact is, we may be performing the same kind of spent fuel handling operations at any one of the locations in the system. For example, repackaging fuel from existing canisters to others could be done at reactors, a central storage facility or a repository, but each of those is subject to its own regulatory requirements, a different regime.

When storage regulations and the repository pre-closure regulations are reviewed and updated, it would be helpful to seek a review -- a degree of uniformity across these locations where activities might be conducted to avoid any inadvertent impacts on system architecture decisions that might be due to these regulatory differences.

Next slide, please Post-closure.

The multiple parallel site characterization that was set up by the Nuclear Waste Policy Act was predicated on expectations that the scope

and cost of site characterization before licensing would be limited, less than $100 million a site and perhaps the 1,000 feet of at-depth tunnel.

By '67, these estimates had escalated to close to a billion dollars per site and this shocked the appropriators and was a major factor in the decision to eliminate the original robust siting process that was set up by the Act and focus all the attention on one site.

At the end of the day, I think pre-license application effort at Yucca Mountain involved more than five miles of tunnel and multiple -- $8 billion I think, somewhere in that vicinity.

I'm not certain that today's budget process could sustain an effort of that magnitude again at the same time as we're trying to construct and operate a large-scale storage facility.

So, I would hope that in updating generic repository regulations, a hard look can be taken at the U.S. experience and experiences in other countries that are using site characterization programs that are more on the scale that was initially expected here and see if a more streamlined decision focused process can be used the next time.

And finally, let me turn to a system issue which is staged development. That's been on the table for quite a while. There's a lot of interest

internationally since the Academy study in 2003 and it's the basis of Canada's siting process.

The Academy study concluded that the existing regulations were compatible with such an approach but the Blue Ribbon Commission recommended that the updated regulations should go further and explicitly recognize and facilitate a staged approach.

I would hope that this point would also be considered with respect to storage facility regulations to accommodate evolution of a central facility from a small pilot handling only canisters to a much larger scale operation potentially involving spent fuel.

And all I've got is conclusion -- I can stop at that point. Thank you very much.

CHAIRMAN MACFARLANE: Okay, thank you.

All right, Mr. Mote

MR. MOTE: Chairman, Commissioners, ladies and gentlemen, good morning.

I'd like to thank the Commission for inviting me to speak today on behalf of the Nuclear Waste Technical Review Board and to discuss issues the Board considers important related to the management of spent nuclear fuel.

While I'm here to represent the Board, I should be clear that formal Board positions are recorded in reports, correspondence and other documents on the

Board's website.

I'll start by saying a few words about the Board and then I'll discuss work completed recently by the Board and what the Board currently has in progress related to the management of spent nuclear fuel.

This seems to be an appropriate way to capture the spent fuel management issues the Board considers important as necessarily this means the Board has identified them as appropriate for its review.

Next slide, please

The Board was established in the 1987 Nuclear Waste Policy Amendments Act as an independent agency in the Executive Branch. The Board has 11 members appointed by the President from the slate of candidates nominated by the Academy of Sciences and the members serve staggered four-year terms.

Board members also have part-time and have full-time responsibilities at their respective academic institutions. They're supported by a small full-time staff in Arlington, Virginia.

Next slide, please

The Board is tasked with reporting its findings to Congress and the Secretary of Energy and with making recommendations related to its mission.

Excuse me, I'm out of step, could I go back one slide? Thank you.

The Board is tasked with reporting its findings to Congress and the Secretary of Energy and making recommendations related to its mission. That I'll cover on the next slide.

The Board's findings and recommendations are recorded in reports, correspondence and other forms such as testimony before Congressional committees.

The Board's mission is to evaluate the technical and scientific validity of activities undertaken by the Secretary including site characterization, packaging or transportation of high-level waste or spent nuclear fuel.

In practice, this means that the Board reviews DOE's activities related to transportation, potentially interim storage and disposal of spent fuel from utility sites as well as the storage, processing and disposal of spent fuel and high-level waste at DOE sites.

To achieve its mission, the Board identifies DOE activities appropriate for its review such as research and development related to long term storage of spent fuel or evaluation of generic disposal options for spent fuel and high-level waste in different geologic media.

The Board then presents its findings and recommendations in reports to Congress and the

Secretary of Energy.

The Board also holds public meetings at which it requests DOE to arrange presentations on issues related to a specific topic or a range of related topics.

In August, the Board held a public meeting in Idaho Falls on DOE's activities related to storage and processing of spent fuel at the Idaho National Laboratory.

Next month, the Board will hold a meeting in Augusta, Georgia on the storage of spent fuel at Savannah River Site, vitrification of high-level waste and storage of the vitrified product.

At these meetings, the public can provide comments and ask questions and these are recorded in transcripts of meetings as part of the official record.

I should also note that we are pleased to have members of the NRC staff attend many of our meetings and we appreciate the contribution they make.

After each meeting, the Board prepares a letter to DOE recording the Board's findings and recommendations following the presentations and discussion at the meetings.

Next slide, please

Now, I would like to discuss some recent Board reports and activities that the Board has in progress to review DOE's activities.

Following cessation of work on the Yucca Mountain project, DOE transferred responsibility for managing the project records from the Office of the Civilian Radioactive Waste Management to the Office of Legacy Management which meant transferring all paper and electronic records from the project offices in Las Vegas to the Legacy Management Business Center in Morgantown, West Virginia.

DOE requested that the Board oversee the transfer and the Board was also instructed by the House Appropriations Committee to give support to DOE as it completed that activity.

The Board's findings and recommendations from overseeing the transfer are recorded in a report to Congress and the Secretary of Energy which is on the Board's website.

The main finding was that the project documents were preserved and can be accessed and retrieved following transfer to the LM facility.

The two main recommendations were that the review exercise should be repeated after three years and that consideration should also be given to preserving other project materials both for a future repository program and for the broader technical community.

Next slide, please

Actually, though, the possibility of

disposing of some radioactive waste in deep bore holes has been considered for many years and recently there have been a number of reports issued and articles published in the technical press.

DOE also held a workshop on deep bore disposal in January of this year. And consequently, the Board reviewed the potential advantages of deep bore hole disposal as well as the challenges in developing this as a practical disposal technology. And a fact sheet recording the Board's findings is available on their website.

The Board did not complete a comprehensive review of the technical literature, but based on information presented by DOE at Board meetings and in reports on the plans for potential research in the United States, the Board concluded there would be significant challenges in developing the technology.

It also noted that the strategy for deep bore hole disposal relies primarily on the geology and the depth of burial rather than multiple barriers.

Both because of the challenges that will be faced and because deep bore hole disposal would not void the need for a model geologic repository, the Board recommended to DOE the work on developing deep bore hole disposal should not delay what it considers to be higher priority research on developing a geologic repository

and recorded this in a letter to DOE which is also on the Board's website.

Next slide, please

The Board has also reviewed DOE's program for research and development related to long term dry storage of spent fuel from commercial nuclear power plants including the high burnup cask research and development project which is now being developed by EPRI under contract to DOE.

While the Board recognizes that DOE has limited resources in funding, it's concerned that more work is not being done in this area. The program is currently limited to investigation of the performance of high burnup fuels stored in a single cask and it's not clear from the test plan what results other than temperature measurements will be available until the end of the initial ten year storage period.

Consequently, the Board recommended that DOE consider installing additional instrumentation in the cask and commended DOE for being prepared to consider the possibility of examining fuel stored in other casks as part of the project.

The Board noted the lack of the necessary infrastructure to support examination of spent fuel in canisters after periods in dry storage and recorded its view that high priority should be given to establishing

this capability.

Next slide, please

Now, I would like to talk about two projects the Board has in progress today.

At a Board meeting in January 2012, DOE reported initial results from the study to investigate the potential of spent fuel storage canisters of different sizes in different geological media other than welded tuff.

Since that time, this work has advanced and DOE has recently released a report on the potential for direct disposal of large dry storage canisters being located at commercial nuclear power plants.

In parallel with this work, the Board is considered the potential issues raised by managing these large canisters to the various operations prior to disposal and the impact on post-closure repository performance as well as the implications of repackaging spent fuel from large canisters into smaller units for disposal.

As the Chairman knows well because she was a keynote speaker there, the Board held the workshop late last year to solicit input to its consideration of these issues. The transcript of the workshop and a summary of the main points are on the Board's website and we're preparing a report which will be available

before the end of the year.

Finally, I'd like to say a little about an activity -- next slide, please

Finally, I'd like to say a little bit about an activity related to the management and disposal of DOE spent fuel.

I referred earlier to Board meetings held in Idaho Falls and an upcoming meeting in Augusta. Both of those meetings will support the Board's review of DOE's management of its own spent fuel including the facilities in which it is stored and the processing and packaging that is either in progress or planned to prepare for disposal.

The report includes a record of all of the fuel stored at DOE sites and discusses issues such as the programs for managing the aging of spent fuel storage facilities. And again, we expect a report to be out by the end of the year.

That's the end of my prepared remarks. I'll be pleased to respond to questions in the panel discussion.

CHAIRMAN MACFARLANE: Great, thank you, Nigel.

Mr. Williams

MR. JIM WILLIAMS: Good morning. I appreciate the invitation to be here and I could take

the first slide.

The Western Interstate Energy Board, or WIEB, is one of four state regional groups that have cooperative agreements to consult with Jeff and his organization on spent nuclear fuel transportation system design.

I'll make a few observations about our current program, I'll mention the concern and then make a suggestion that may address that concern.

Next, please

Both the National Academies in 2006 and the Blue Ribbon Commission in 2013 strongly recommended cooperation with states on system design for spent fuel and how and what ways to transport with substantial lead time.

Jeff has made a special effort under difficult program circumstances to follow through on that recommendation. This we applaud and appreciate.

Next, please

In our recent core group meeting in Denver, Jeff was very clear about the constraints on his current program. He suggested that we should simply review a long list of transportation issues, be as clear as possible about what we do and do not know and where we do and do not yet agree.

That's not quite transportation system

design with destinations and schedules, but it's a useful focus, there are plenty of topics, there's plenty of work. It draws on the accumulated knowledge of people in states and in DOE who may soon retire.

We hope this process includes a systematic and specific review of each of the National Academies recommendations in 2006 and each of the transportation related recommendations of the Blue Ribbon Commission in 2013.

Next, please

One useful initiative has been a set of visits with shutdown reactor sites by a DOE team with state and Tribal representatives invited.

The Blue Ribbon Commission recommended that spent fuel from shutdown sites should be first in line for acceptance at a consolidated waste storage facility and noted that the National Academies recommendation that this might serve the National Academies 2006 recommendations for a pilot program that demonstrates storage of older fuel over short distances, relatively short distances.

Our visits were conducted without a shipping destination in mind and there's no current policy that assures this fuel will be first in line for acceptance. Even so, the visits gave all participants a much better understanding of the situations that will

be encountered if and when.

Next, please

Another initiative is focused on the Section 180c of the Nuclear Waste Policy Act which involves training for safe routine transportation of spent fuel and for appropriate local response to transportation accidents and incidents.

The main challenge here is how to appropriately allocate funding given the great diversity of conditions along these potential transportation routes.

Jeff authorized an inter-regional team to work through these issues. The team has basically used cooperative agreement funding to support travel for face-to-face discussion. I think we're making progress.

Next

Now, for my concern. I was quite interested in the November 2013 white paper produced by NRC on proposed risk management regulatory framework and its forthright statement that an essential factor in risk informed performance based processes is an accurate and complete description of the limitations of the methodologies and risk assessment tools used to generate the risk information.

Now, the white paper, I fully realize, was

focused on NRC regulations, but that statement seems equally relevant to any process in which risk and risk assessment are key decision factors.

Regarding spent fuel transport, the limitation of Probabilistic Risk Assessment include the widespread and deep concern about the radiological content of this material that we're proposing to ship through an undetermined number of corridor communities.

The likely concern about property values, damage to local economies and stigma, the limited direct stake of these communities in this program since they are neither origin nor consent-based destinations and their limited legal recourse under the commerce clause.

Another limitation is the logistical complexity of a large scale long term cross country transport in the U.S. and the many opportunities for things to go wrong in small ways or perhaps larger sending signals to the rest of the system.

And finally, the lack of trust these days in even well-intentioned Federal program managers. I believe that these limitations can be worked through, but only if taken seriously in program planning and only in the context of an overall strategy that makes a convincing case for the amount of transport needed for a particular program purpose.

From the corridor communities' point of

view, a cogent explanation of why it's actually necessary to ship this nasty stuff through us.

Now, this in turn requires attention to a topic that, through circumstances, was not considered in the National Academies study in 2006 nor the Blue Ribbon Commission study in 2013 nor the DOE strategy and that is the geography of nuclear waste in the U.S.

The NAS study accepted the 1987 amendment as given. The BRC study had a broad charter and introduced several important new elements to the program puzzle but it was also constrained not to be a siting agency.

The result is that these key documents read as if geography does not exist and imply that the amount of transport need have no link to its program purposes.

Next, please

I think transport is needed as part of the nuclear waste transport program initially to stop the breach of contract fiscal drain, for example. But I think that transport is a much greater potential impediment to program implementation than is implicit in the current DOE strategy and this impediment stems mainly from what the National Academies called social risks.

I think these social risks can be addressed but effectively only in the context of an integrated

program that tailors the amount of transport to that needed for immediate program purposes, not to long term intentions that impossibilities that may not be real for decades.

So, what might such an integrated program look like? One first, consent-based siting should be purposeful, patient and active, not passive as it necessarily is at the moment.

You want me to quit? Okay.

CHAIRMAN MACFARLANE: Well, just wrap up, that'd be great.

MR. JIM WILLIAMS: Then a number of other elements in a possible program to address this and that was where I intended to end.

CHAIRMAN MACFARLANE: Okay, great, thank you.

Okay, now we will have some questions. We'll start off with Commissioner Svinicki.

COMMISSIONER SVINICKI: Good morning to each of you and I want to thank you for your presentations. You're all individuals of extensive knowledge and long experience on the topics that you've addressed.

I'll begin with you, Mr. Maguire because you may feel a little bit like your topic is not quite associated with the rest of the presenters.

I do appreciate that we have heard something about low-level waste this morning. I think it's a variant of the two neglected topics, it may be the more neglected of the two. Frankly, I think high-level waste gets a certain amount of attention. But, it may be at a level of attention calibrated to the fact that we do have facilities such as WCS in operation in the United States. So, the U.S. has demonstrated the capability to address low-level waste.

I have had the opportunity to visit the WCS site and as I was listening to your presentation this morning, I was reflecting on the fact that I was struck maybe by a similar observation when I visited which is really the extensive amount of technology behind this.

I regret that people refer to such a site as a waste dump. I think that the amount of engineering that goes into its development and the technology that goes behind all of the tracking of materials, some of which you talked about in association with your resident inspector program.

And I also was regretting a bit that I perhaps didn't know about that program when I visited. I would have enjoyed an opportunity to speak if any of your resident inspectors had been present. I regret that I neglected to do that.

But, a facility like this is indeed very

extensive, a very complex undertaking and I think through your presentation you've reminded us all of that and also of the careful oversight that is done by the State of Texas and also the very active involvement of the state.

And also, I think when people refer to these facilities as kind of less complex than they are, it also does a disservice to the women and men who work there, who are often the near neighbors of such a facility and I'm unclear on what their motivation would be to be at all careless in their work. So, it seems a bit that that would be inconsistent with the proximity that most of them have to the facility.

So, again, I don't know that I have any questions. I appreciated my opportunity to visit out there and, again, just want to acknowledge that your part of the presentation, I think, is very important.

If you want to react to anything I said, please do.

MR. MAGUIRE: Well, and we're so glad that you came. We would invite all of you. We're very proud of the site and it is complex and I think after seeing it, you can fully understand what I meant when I said we had to embrace our inner geek to be able to adequately regulate that site.

COMMISSIONER SVINICKI: Okay, thank you.

The remainder of the presenters addressed high-level waste topics and I wanted to begin just with a reflection, you know, I have noted, I think all members of our Commission, have noted the role that we play as an independent Commission which, at bottom, is not to advance or advocate for changed policies.

I think in some quarters there was an unfortunate misunderstanding of what our action on what we now call the continued storage rule was. In some quarters it was interpreted as some sort of policy departure on the part of the Nuclear Regulatory Commission or embrace of long term storage of materials at sites even though the Statement of Considerations which accompanied the rule expressly communicated that the Commission was not advocating that policy. So, I think, in some quarters, though, that it was imperfectly understood.

But, our Commission, a little bit like the Nuclear Waste Technical Review Board, you know, we have a scope and authority given to us by the Congress and so our role is pretty well prescribed for us in these topics.

That being said, I have testified in response to questions from the U.S. Congress about NRC's role that I do support some level of ongoing awareness of emergent research and development. There is a

policy dialogue that is occurring, although NRC doesn't lead that dialogue.

I think it's important that NRC's technical experts have some ability to be cognizant of that dialogue and maintaining those activities. So, I have indicated in response to some very, very direct questioning that I think that level of involvement for us is appropriate.

That being said, our experts do engage in some, or at least monitor, some of EPRI's work on what Jeff Williams described as the 72/71/72 operational sequence which is something that I think bears looking at closely.

For any of you who spoke on the high-level waste topic, some of you mentioned in the case of the Nuclear Waste Technical Review Board, some oversight and review of R&D activities.

Jeff, I think that the Office of Nuclear Energy is very deeply involved in working with EPRI and the National Laboratories on some collaborative research and, Mr. Cotton, you may have involvement.

Could anyone just address -- describe at a high-level the breadth of activities going on, who's involved and kind of what the research objectives are? I don't know who might like to go first.

MR. JEFF WILLIAMS: Okay, yes, actually in

our office, we've divided our used fuel program in to two separate sides. And I'm responsible for the implementation side and not responsible for the R&D. However, I do know what's going on in the R&D side and I chose not to describe that to you because I think in terms of the spent fuel and extended storage and the work with EPRI, I felt you were very familiar with that and your staff.

So, that is going on with a contract with EPRI, Dominion to load a cask at Dominion -- at Surry, North Anna, actually. And eventually, open it to, and as Nigel said, to take samples, gas samples and temperature samples. But it's not an area that I'm actively working on.

In addition, there's other work going on on geologic environments other than salt, clay, crystalline work.

I don't know if that addressed everything.

COMMISSIONER SVINICKI: But I think maybe the important point in the division that you described is that it would be, and correct me if I'm wrong, but that the results of that research would feed into the work under your purview, would it not?

MR. JEFF WILLIAMS: Oh, yes, exactly. However, we believe that the pilot storage facility, although it does have some of these 71/72/71 issues and

corrosion and so forth, we believe it's a little more straightforward than some of the things that are going on. But, yes, it would feed in.

COMMISSIONER SVINICKI: Okay.

MR. JEFF WILLIAMS: I mean today, all the shutdown reactor sites have dual purpose canisters that are certified by NRC for storage and transportation and other than this other issue about moving them, we think it doesn't need a whole lot of research.

COMMISSIONER SVINICKI: Okay, thank you.

Mr. Cotton or Mr. Mote, did you want to add anything to that?

MR. MOTE: No, I don't want to add anything at the high-level. I think that covers everything. We tend to see the whole R&D program, but it's what Jeff said.

COMMISSIONER SVINICKI: Okay, thank you. Thank you, Chairman.

CHAIRMAN MACFARLANE: Commissioner Ostendorff

COMMISSIONER OSTENDORFF: Thank you, Chairman.

Thank you all for your presentations and for coming today.

I'm going to follow some parallel construction to my colleague, Commissioner Svinicki's

questions. I'll start with Mr. Maguire also.

I haven't had a chance to go to Waste Control Services and I also -- I resonate with your comment on the over-engineered feature, which is a good thing.

One question I wanted to ask you about, and I know that, you know, you're in Austin, right?

MR. MAGUIRE: Yes, sir.

COMMISSIONER OSTENDORFF: I'll come back to that in a minute.

But, with respect to the Andrews community and how, you know, all the controversies and so forth that we associate with high-level waste does not appear to us to have been present with Andrews site.

Can you comment on how you see the communications between Waste Control Specialists and the local community with respect to radiological risk at that site and how do they, in the context of risk, build trust with the community?

MR. MAGUIRE: They did a really good job early on and engaging the opinion leaders in that community. I think what everybody in that community fully understood was the opportunity to bring additional economic diversity to the community.

It's an area in Texas where there's a lot of oil and gas production. WCS offered, if you will,

a sort of a different economic opportunity for the community. They were excited about that.

Our involvement with the community has been to participate in discussions with them. We try to maintain a very transparent approach within the agency. WCS has been encouraged to also be transparent.

We have meetings. The county Judge is on the Compact Commission and so we see him on a very regular basis.

But, I think the key is communication and being intentional about engaging the people and answering their questions when they have questions and providing data when they need data. And we work pretty hard to do that because we do not take community support for granted.

And so, we stay on top of things. And, you know, we said frequently hats off to WCS because they are very intentional about engaging that community and in making sure that they hear about things that WCS is doing at WCS before they read about it in the newspaper and I would say that's a big deal.

COMMISSIONER OSTENDORFF: Thank you. Well, also my segue into the other line of questioning starts with Austin.

I can remember 31 years ago when I was a student at your arch nemesis at the University of Texas

at Austin in their law school, and I think you're an Aggie, right?

MR. MAGUIRE: Yes. That's okay.

COMMISSIONER OSTENDORFF: It's noted for the record.

MR. MAGUIRE: We can still be friends.

COMMISSION OSTENDORFF: Exactly. So, I remember 31 years ago being at a Holiday Inn that's no longer there in downtown Austin and going to a Department of Energy hearing on high level waste repository siting options and certainly, there's commentary that could be made, which I'll avoid on this progress made since then, but that was 1983.

So, now I'll turn to our Department of Energy representative, and I'm not going to put you on the spot, Jeff, too much.

But, you know, and I really appreciate, I think, the fact that our Chairman's on the Blue Ribbon Commission, it adds value to our discussions. It's very helpful that Chairman Macfarlane was part of that important effort.

But, I also note that here we are in, you know, September of 2014, that report came out over two and a half years and can you update me on where the legislation is moving or how it's moving in the Senate?

I know it's not your personal

responsibility, but can you give us some sense of where that's headed?

MR. JEFF WILLIAMS: I really don't know. I mean, you know, I know what I read which is the same thing about the bills that were introduced and associated with Appropriations and those sort of things, the House and Senate marks are all different and I really can't comment on this --

COMMISSIONER OSTENDORFF: Okay, that's fine. I just, you know, just for my commentary here, it seems like, you know, two and a half years after the -- or more after the report comes out and a number of you saw it into to existing Nuclear Waste Policy Act language as far as programmatic issues, yet the Administration appears to be -- we're kind of in a limbo status. That's my words, I'm not trying to put words in your mouth.

And I just say that it's difficult for me to see how we move forward with some repository solution and that a lot of the stuff you're talking about, my personal viewpoint on consolidated interim storage, I'm not opposed to that, but the interface of that with repository siting is so important that there's an elephant in the room that we're really not talking about.

So, I'll ask you a technical question and

get out of the politics. You mentioned, as I believe, that the consolidated storage facility might need to have a wet capability?

MR. JEFF WILLIAMS: Yes, and --

COMMISSIONER OSTENDORFF: Can you comment on what the scenario would be to require a wet facility?

MR. JEFF WILLIAMS: Well, basically, as the Blue Ribbon Commission pointed out and I think as a lot of people have noted, we have these liabilities out there. We have 12 shutdown reactors, all their fuel is in dry storage. And it would make sense to remove that first.

As you look and you do a systems evaluations of trying to reduce the liability, if you're going to have a repository in the 2048 time frame consistent with the Administration's strategy, you get to a point where you start to remove, say, 3,000 tons a year, and you to a point where you've run out of fuel that's in dry storage, if that's what you accept.

Then you're next step is, okay, well what do you do after?

COMMISSIONER OSTENDORFF: Okay.

MR. JEFF WILLIAMS: Okay.

COMMISSIONER OSTENDORFF: Okay, I see where you're headed, that's fine. You've answered my question.

MR. JEFF WILLIAMS: You could put it in dry storage, but it might not make sense to do it at reactors.

COMMISSIONER OSTENDORFF: Okay. So, Dr. Cotton, do you want to --

MR. COTTON: No, just to point out, it could be a pool, it could be dry handling. But, you may need to be having bare fuel --

COMMISSIONER OSTENDORFF: Right.

MR. COTTON: -- at the central facility.

COMMISSIONER OSTENDORFF: So, then I'll address this question to, I guess, everybody but Mr. Maguire.

So, you know, I'm trying to sit back and think about this as a systems issue. So, you've got canisters and Commission Svinicki referred to the continuous storage rule this Commission affirmed at the end of August. So, we have canisters and dry cask storage on site at a number of reactor plants in the United States.

So, there's a canister compatibility kind of question or consistency or whatever you want to phrase this, you're going from a site at a nuclear power plant and an existing canister, perhaps to a consolidated interim storage facility and at some point in time, to a repository wherever that may be.

Are there mechanisms in place that are going to harmonize or get the consistent standards such that we're not talking about having to do canister replacement one and then canister replacement two prior to getting it in a repository? How do y'all look at that? Dr. Cotton, we'll start off with you.

MR. COTTON: I don't think there are any systems and any mechanisms in place to make that happen. But, it's -- at this point -- but it's certainly worth looking at. And a standardization is one of the issues that's being looked at in Jeff's program.

But right now, there is, in my view, what's needed is more of the kind of systems analysis that is being done which is to identify what kind of simplifications there might be that could substantially improve the operation of the system, demonstrate analytically at least that those are really worth doing and then we can try to figure out if there's a mechanism to make those things happen.

It's all complicated by the contractual relationships between the utilities and the Government and I think the first thing to do is to determine what might be done to improve things significantly and then see if we can work out --

COMMISSIONER OSTENDORFF: Okay.

MR. COTTON: -- a way to get there.

COMMISSIONER OSTENDORFF: Mr. Mote?

MR. MOTE: I don't think there's anything in place now, but one of the things the Board has looked at is the implications of where you do what operations.

If, for example, you did need to repackage fuel, then where you do the repackaging will have a major impact on the transportation system. If you chose to repackage at a storage facility, then the transportation in will be in the multifarious designs of canisters. So, you have a logistics issue with siting the right equipment to the right time and the right place.

Downstream of the facility, if everything's repackaged, then you need a completely different transportation, but not a different system, but you need different hardware because at that point, you have standardized packages which are presumably different from the designs of packaging coming in.

COMMISSIONER OSTENDORFF: But right now, there's no forcing function in place that’s going to harmonize all this.

MR. MOTE: No.

COMMISSIONER OSTENDORFF: Okay. I've only got 45 seconds, Mr. Williams, do you want to say anything on this?

MR. JEFF WILLIAMS: When you look at where

you do what, that involves likely transportation and I made an encouragement to link the transportation to its immediate program purpose in order to make transportation workable.

COMMISSIONER OSTENDORFF: Okay. Thank you all for being here and for your presentations. Thank you, Chairman.

CHAIRMAN MACFARLANE: Okay. So, as you might imagine, I have lots of questions. So, I'll try to get through them.

So let me start with the transportation issue. Something I recall, and I wasn't on the correct subcommittee on the BRC, but I recall hearing critiques of the draft BRC report at that time. And some of the critiques talked about the limitations of the rail lines themselves that might be used in transportation, that they would be -- they were too narrow, they weren't rated to take the heavy weights that would be used.

And when you talked about what you were looking at, that wasn't part of what you were looking at, is it?

MR. JEFF WILLIAMS: Well, we're doing some of that specifically around shutdown reactor sites right now. And that's where many of the issues are is around shutdown reactor sites.

In terms of the overall rail network that's

out there, there's lots of good track and positive train control systems in place. But, the issue is getting the fuel to those places and we walked up and down tracks and see railroad ties that are rotten.

CHAIRMAN MACFARLANE: I mean that -- we had, on the Blue Ribbon Commission, we had a presentation form rail experts who threw up a lot of pictures of inadequate track. And so, there seems to be a safety issue there associated with getting that coordinated and lined up and make sure that we understand what the limitations are.

MR. JEFF WILLIAMS: And there are ways to get around that. You can replace ties that have been --

CHAIRMAN MACFARLANE: Right, but it seems a good estimate of how much -- how many resources will be needed and how much lead time, et cetera would be really worthwhile.

MR. JEFF WILLIAMS: That's right. That's right. And the Federal Railway Association has a program in place where people can apply for grants and they give grants to short line railroads to upgrade them.

Now, you have to identify which ones you're shipping from and where -- to identify which ones you want to upgrade. And then you also have other options

such as barge or heavy haul, depending on what the site is, and they're all different.

CHAIRMAN MACFARLANE: Are the states doing anything on this?

MR. JIM WILLIAMS: We're responding to DOE, basically. Jeff has a draft National Transportation plan and that, I think, that's sort of the context in which we will hash through these issues.

And as I mentioned, very good move, I think, to include states and travel reps on these visits to shutdown sites.

CHAIRMAN MACFARLANE: All right, let me turn to spent fuel and there is a number of interwoven issues here which, of course, you're all very well aware of. And I think this sort of falls into the category of unintended consequences.

So, Tom, you talked about how we have the system now, we've got a variety of casks that are out there that are being used and they're being loaded and there are storage ratings, the amount of heat that they can withstand for storage is different from the amount of heat that's allowed for transportation and there is a potentially huge time lag in between on the order of many decades.

MR. COTTON: It could be.

CHAIRMAN MACFARLANE: Yes, okay. So, I

wonder if there's awareness at the reactor sites of what folks are getting into? Do you guys have any sense of that?

MR. JEFF WILLIAMS: Well, I mean what they're doing is they're trying to do -- they have a requirement to offload spent fuel to keep their plants operating. And so, the vendors that design the storage casks are trying to design them to hold the hottest fuel that they can.

CHAIRMAN MACFARLANE: Right, but so, you know --

MR. JEFF WILLIAMS: Right.

CHAIRMAN MACFARLANE: Do you have a sense that there's awareness?

MR. COTTON: I don't have a sense.

CHAIRMAN MACFARLANE: Yes, okay. So, there's also this related issue of maintaining what you sort of got into a little bit with Bill, maintaining the integrity of the cladding over time, right? So, we have to understand how we maintain the integrity of the cladding it seems to me because if you have problems with the cladding at these sites, you have a lot of sites where -- a growing number now where you'll just have the spent fuel, the ISFSI and nothing else.

And so, then is it okay to transport damaged fuel or, if not, do you have to repackage it? Do you

repackage it on site? How do you do that? How much does that cost? Who's going to be responsible for that? Who pays for that? Do we have to be thinking about that, you know, who pays for that? I mean how does that get integrated into this whole planning thing?

MR. JEFF WILLIAMS: Right, and yes, that's a good question and it is being evaluated. For example, at Maine Yankee they have high burnup fuel, not knowing whether it's damaged or not and their approach to getting an NRC license was to put the damaged fuel or I mean the high burnup fuel in damaged-fuel cans. And so, through that process, they were able to get a transportation license.

Actually, one the tasks we're working on is to design the transportation cask that has integral damaged-fuel cans to address that issue.

There are others, there's a situation I know at Rancho Seco where damaged fuel was loaded. When it was loaded, it wasn't damaged, however, as I understand it --

CHAIRMAN MACFARLANE: Now, that's right. See, that's the question.

MR. JEFF WILLIAMS: Right, right, right. And that's going to require additional analysis and interaction between the vendor and NRC to determine whether or not it -- what can be done with that.

CHAIRMAN MACFARLANE: Right.

MR. COTTON: I was going to add that this is exactly the reason that sort of policy argument for providing a central facility of some sort sooner rather than later and starting that orderly transfer before you get surprised and wind up having to do things at reactor sites to repackage, for example.

And I would note, I went back after reading the generic EIS which I felt that I needed to do --

CHAIRMAN MACFARLANE: Poor you.

MR. COTTON: I went back and checked, you know, there's a reference and discussion of the dry transfer system which can be used, the small dry transfer system, to repackage at reactor sites.

But, so, I went back and read the reference from Idaho report and the interesting thing was that they -- their recommendation, however, was that they really wouldn't like to do that at large scale reactor sites and that the objective ought to be to move the -- to ensure that spent fuel is transported to its final destination or destination with the necessary repackaging capabilities before the need for repackaging arises.

So, it's just an argument to say we've got uncertainties that could resolve in an unfavorable direction.

CHAIRMAN MACFARLANE: Right. Back to you, Administration. No, don't respond to that.

Okay, just a quick techie question. Does each canister require unique tools to be handled and opened, each design?

MR. MOTE: Not unique, but there's many different types.

CHAIRMAN MACFARLANE: Yes.

MR. MOTE: And periodically each of the cask vendors, the three main vendors, increase sizes. There's two increases in the canister sizes in the pipeline right now and that means that you get even less consistency because squeezing another assembly or two assemblies into a canister improves the economics for the utility.

CHAIRMAN MACFARLANE: Right.

MR. MOTE: But it changes handling requirements.

CHAIRMAN MACFARLANE: Right.

MR. MOTE: So, you end up with another variant which needs a different overpack and different transportation hardware.

CHAIRMAN MACFARLANE: Okay. And different regulations could be, so, something --

MR. MOTE: You meet the regulations a different way, maybe.

CHAIRMAN MACFARLANE: Right. So, who -- do we know the percentage of casks that are not transportable because of thermal limits?

MR. JEFF WILLIAMS: We do know.

CHAIRMAN MACFARLANE: Okay.

MR. JEFF WILLIAMS: I can guess, but it's --

CHAIRMAN MACFARLANE: Guess, doesn't fill me with -- you know, I'm a scientist, yes, no?

MR. JEFF WILLIAMS: Yes, yes, yes, we do know. All right.

CHAIRMAN MACFARLANE: Data, yes?

MR. JEFF WILLIAMS: Yes, we can get that information for you.

CHAIRMAN MACFARLANE: Okay. That'll be good, I like that.

MR. COTTON: It's not so much the ones that are loaded now, it's what happens out in the future --

CHAIRMAN MACFARLANE: The ones that are --

MR. COTTON: -- as we get up to the 50, 55 gigawatt day, high burnup load.

It's going to be the last cask that gets loaded at a site that determines --

CHAIRMAN MACFARLANE: Right.

MR. COTTON: -- when you --

MR. JEFF WILLIAMS: That's why you might

want to ship it to an interim storage facility as a rule.

MR. COTTON: Just move it bare, just move it before you do that.

MR. JEFF WILLIAMS: In the transportation cask that would handle that load.

CHAIRMAN MACFARLANE: Right, right. Like the French do, for instance.

MR. JEFF WILLIAMS: Exactly.

CHAIRMAN MACFARLANE: Or the Swedish.

MR. JEFF WILLIAMS: Exactly.

CHAIRMAN MACFARLANE: Or whatever, they transport within a year or 18 months.

MR. JEFF WILLIAMS: Exactly.

CHAIRMAN MACFARLANE: Yes.

MR. JEFF WILLIAMS: Exactly.

CHAIRMAN MACFARLANE: Yes, I've seen it, it's doable, yes.

Well, so how do you make that happen?

MR. JEFF WILLIAMS: How do you -- you would need to design a transportation cask that has the capability to do that.

CHAIRMAN MACFARLANE: You need a policy?

MR. JEFF WILLIAMS: Well, that's true, that's true. And right now, as I said --

CHAIRMAN MACFARLANE: We're a safety agency, we don't set those kinds of policies.

MR. JEFF WILLIAMS: That's right and at the present time, we've got enough issues with trying to deal with the shutdown reactors and the fuel that's old and cold that's going to take us a while to figure that out.

CHAIRMAN MACFARLANE: I know, but this is something coming down the road it seems that's going to really bite us in the rear if we're not careful.

MR. JEFF WILLIAMS: You're right, you're right.

CHAIRMAN MACFARLANE: Excuse my -- he appreciates it.

Okay, I'm going to -- do you guys have more questions? No? Okay, I'm just going to go and ask a few more while I have you sitting here.

Let me just applaud your use of the term geologic environment. I've been trying to move people off of rock types for a long period of time because it's not really the rock type that's so relevant, it's the entire geologic environment including the physical environment, the fracture systems, the chemical environment, et cetera, so, thank you.

MR. JEFF WILLIAMS: I don't like to admit it, but actually my degree is in geology --

CHAIRMAN MACFARLANE: Excellent.

MR. JEFF WILLIAMS: -- I think we talked

about this before.

CHAIRMAN MACFARLANE: Excellent.

(Simultaneous speaking.)

MR. JEFF WILLIAMS: -- in my geochemistry. But, I've been doing engineering for a long time.

CHAIRMAN MACFARLANE: Good, good, well, you know, reach back to that experience and keep pushing that forward. I appreciate that.

So, let me ask a question on low-level waste and that is, if I can find it, has to do with -- so, can you discuss the recent approval of the disposal of depleted uranium? What was the safety basis that the State of Texas or Texas relied upon to look at the long lived?

MR. MAGUIRE: We, as I mentioned in the discussion, we asked WCS to develop a very rigorous performance assessment model. They presented that model to us. There was a lot of back and forth discussion between my staff and folks at WCS to gain some comfort with the model itself and its rigor based on the rigor of the model, based on our comfort that the model is, at least at this point, giving us a good read on long term dose.

We looked at extremely long term scenarios to gain comfort that the depleted uranium would be okay in the facilities that we have at the WCS site.

CHAIRMAN MACFARLANE: Okay. Okay. I'm going to stop there because otherwise I think I'll have a mutiny here and thank you very much for your presentations and look forward to the staff's panel.

But, we'll take a break for five minutes.

(Whereupon, the above-entitled matter went off the record from 10:20 a.m. to 10:31 a.m.)

CHAIRMAN MACFARLANE: We're going to get started. Although I know we would all like to spend you know, an hour or two talking to each other and catching up. Unfortunately we have business to do here, so.

We are now going to hear from the staff on the same topic. I will turn things over to Mark Satorius, our Executive Director of Operations to start us off.

MR. SATORIUS: Thank you Chairman and good morning. And good morning Commissioners. Today the staff's going to give you a status briefing of efforts that we have undertaken in the area of low level waste, high level waste and spent nuclear fuel, including current and emerging activities from the NRC staff's perspective.

As nuclear power continues to play an important role in the supply of electricity for the United States, the NRC, other federal agencies, Agreement States and the industry continue working

together to ensure the safety of spent nuclear fuel and safe disposal of high level and low level waste. We continue to look at storage of spent nuclear fuel over an extended period of time to include conducting research on spent nuclear fuel safety and environmental impacts.

Transportation of spent nuclear fuel and other nuclear materials can be and is currently being accomplished safety. Low level waste disposal facilities have been successfully developed in the United States and internationally. And we continue to improve NRC's low level waste program.

Today after a quick overview by Cathy Haney, the Director of the Office of Nuclear Material Safety and Safeguards, we're going to have two main discussions. First, we're going to have a discussion on low level waste. And then following that a presentation on spent fuel and high level waste management.

But before I turn it over to Cathy for her remarks and the beginning of the presentations, I want to take this opportunity to thank Brian Holian who is seated behind me here. He'll be moving very quickly or soon to a new position in the Office of Nuclear Reactor Regulation as a Deputy Office Director.

Brian came to FSME about two years ago as

the Deputy Office Director. And for the past 13 months has been the acting Office Director in the absence of an Office Director. Brian's done a great job. I appreciate his sharp safety focus, his support of the agency's goals, his energy and straightforwardness in dealing with issues that he has met within the past year or so.

I also appreciate his flexibility, especially in tackling some of the challenging issues such as source security and the merger of FSME and NMSS. So, thank you Brian.

MR. HOLIAN: Thank you.

MR. SATORIUS: And I'm sure he'll continue to excel in his new position at NRR. So with that Cathy, if you would go ahead, thanks.

MS. HANEY: Thank you Mark. Good morning Chairman and Commissioners. I'm very happy to be here today. Let me first introduce the others at the table with me. To my right is Larry Camper who is the Division Director in our Division of Waste Management and Environmental Protection in the Office of Federal, State Materials and Environmental Programs. And to my left is Mark Lombard. Mark is the Director of the Division of Spent Fuel Storage and Transportation in the Office of Nuclear Material Safety and Safeguards.

So if we could go to slide four please.

First I'd like to recognize the importance of NRC as well as the entire industry integrating our activities across the entire fuel cycle. I'd like to start out today with two areas where we're integrating.

Just as some examples, one area is how we're examining different types and designs of fuel and how they may impact the back end of the fuel cycle. For example, the most proposed Small Modular Reactor fuel is similar in form to the current United States Light Water Reactor fuel. But it's different in dimensions.

Therefore the dry storage and transportation casks that we're using for the Light Water fuel may -- the fuel coming from the Small Modular Reactors may differ from those currently certified. So we are focused in that area.

Another example of our efforts to integrate across the fuel cycle is our engagement on accident-tolerant fuel. We're meeting regularly with the Department of Energy, Fuel Cycle Research and Development Program on topics such as DOE's advanced fuels campaign on the accident tolerant designs. As these designs advance, we'll continue to examine their potential impacts on the back end of the fuel cycle and spent fuel management.

Integration of waste management also includes management of spent fuel in wet and dry storage

at operating and at decommissioning sites. And our staff within NMSS as well as within FSME is engaging with the Nuclear Reactor Regulation Office on technical areas of common interest for behavior of spent fuel in pools and dry storage. One such item would be the potential degradation of neutron absorber material.

Our presentation today will focus on spent fuel and low level waste management. But I want to assure you that all our activities in these areas are integrated across all programmatic business lines. So if we could move to slide five please.

Staff is mindful of DOE's strategy for the management and disposal of used nuclear and high level radioactive waste. And especially we've been focused in the area, one of the areas we focus is in the area of ultimate disposition of the high level waste and spent nuclear fuel. And as we go forward, we will certainly identify any items for Commission consideration, any proposed changes that may affect the NRC's regulatory framework.

We'll also continue to maintain awareness of technical issues and progress in international programs for all waste types including spent fuel and high level waste disposal in other countries. And we also continue to contribute in the international arena.

One way that we're contributing in the

international area is through active participation in our International Atomic Energy Agency and Nuclear Energy Agency programs. Some examples include NEA's radioactive waste management committee, of which I'm a member, and a member of the bureau.

And also some IAEA activities, which include participation in safety standards committees with Larry's work there. And then cooperative research programs on different aspects of dry storage. And then lastly initiatives on safety of high level waste repositories.

And of course, the NRC along with the Department of Energy, the Environmental Protection Agency and the Department of State, is preparing for and participating in the fifth review meeting under the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. We recognize that NRC's role in implementing a waste strategy and is prepared to continue to fulfill our mission for protection of public health and safety in the environment. Can we move to slide five.

As Mark said, we have a successful regulatory framework for safety and securely managing current and future spent fuel inventories. This framework for dry storage is well established and demonstrated by successful deployments with no

significant incidents. We have more than 1,900 casks loaded at 26 general licensed Independent Spent Fuel Storage Installations, or ISFSIs. And 15 specific licensed sites in 34 states.

We have nine additional reactor sites that are now pursuing a general licensed Independent Spent Fuel Storage Installation. And we are prepared for continued ISFSI license renewals using a learning aging management approach.

We also have equally successful framework for certification of transportation containers. It covers a full range of containers from small packages to transport casks for commercial spent fuel for naval reactors and transuranic waste.

Our certificates are aligned with international standards for harmonization of international shipments. And we're working closely with regional and tribal groups on transportation routes and related issues through the National Transportation Stakeholders Forum and other meetings, presentation and webinars. Slide seven please.

The NRC also has a successful regulatory infrastructure which is used by the Agreement States to ensure protection of public health and safety regarding low level radioactive waste disposal in the U.S. All four low level waste commercial sites in the U.S. are

operated following our regulatory requirements.

Good communication with the Agreement States is an important part of our integration efforts for waste management, especially for those States that host low level waste disposal sites. And I propose with this introduction that I transition to Larry to provide more details on our approach for low level waste management and then Mark will follow with a discussion on the management of spent fuel and high level waste.

MR. CAMPER: Thank you Cathy. Chairman, good morning. Commissioners, it's a pleasure to be with you this morning.

I would like to provide an overview of the commercial low level management and disposal process in the United States and reference international activities as well. I would note that I will not be speaking about waste incidental to reprocessing or uranium recovery waste mill tailings and so forth because it's not commercial waste. So we choose to focus upon commercial waste in our presentation today.

There are certain underlying principles that apply to all waste programs nationally and internationally, including protection of human health, protection of the environment, protection of future generations, national legal framework and safety of facilities among others. Next slide please.

In terms of our topics this morning, in the U.S. we do have an interesting, complex, and arguably successful legislative and regulatory program for the commercial waste disposal that does embody those principles which I just cited. There are several timely and important activities taking place now within our NRC waste program which continue to improve the effectiveness of our program. And finally, I want to address current and future communications with the Commission. Next slide please.

Under the Atomic Energy Act of 1954 as amended, the AEA, the NRC regulates the disposal of waste. Other statutes were created due to early problems with the management and disposal of waste. Specifically, the Low Level Radioactive Waste Policy Act of 1980 and as amended in 1985, set forth the federal government's policy that waste disposal was best handled on a regional basis and added incentives for States to form compacts. You heard Mr. McGuire speak about the Texas Compact, and expanded the federal government's responsibilities.

States have created ten compacts and most states are members of a compact. The regulatory framework includes specific regulations in Parts 20 -- 10 CFR Part 20, 51, 61 and 62. Part 20 sets forth our radiation protection standards and the authorization

for waste disposal.

Part 51 sets forth our environmental protection regulations designed to ensure NEPA, National Environmental Policy Act, compliance. Part 61 is the primary regulation for the disposal of low level waste. It is a risk informed, performance based and an integrative systems approach that uses institutional controls and performance objectives.

Part 61 and its guidance is the regulatory tool that is used by the Agreement States that actually operate the existing commercial sites. And of course it's based upon their regulations as adopted. Part 62 is a safety valve. It's an emergency access provision that allows access to these disposal sites if needed. We've never had to enact that. Next slide please.

The 1980 and '85 Acts that I've cited establish the existing compact system. Currently, there are four disposal facilities, all regulated by an Agreement State. The Northwest Compact has two disposal sites. There are four inactive disposal sites, Beatty in Nevada, Maxey Flats in Kentucky, West Valley in New York and Sheffield in Illinois. And their closure and the events around their closure is what lead to the creation of Part 61 promulgated in 1982.

Worldwide, there are over 60 near surface disposal facilities operating. For example, the

United Kingdom, Spain, France and Japan, with a wide range of designs. Other facilities are under development such as in Belgium.

The Joint Convention on the Safety of Spent Fuel and on the Safety of Radioactive Waste Management is an important international agreement. Every three years a national report is prepared satisfying the requirements of the Joint Convention, describing the details of the waste programs, facilities and waste volumes for both low level waste and spent nuclear fuel. The report is peer reviewed by the 69 contracting parties to that Convention. Next slide please.

The Nuclear Regulatory Commission does not have responsibility for ensuring adequate disposal capacity. However, a question that is often asked is whether the four disposal facilities have enough disposal capacity for the volume of waste that is produced and given that the Acts when created, actually there were discussions at that time of a dozen or more sites taking place.

The figure that you see on the slide is taken from DOE's Manifest Information Management System, MIMS. It indicates the volume of utility waste disposed from 1986 through 2011. We present the data from reactors because they are a major contributor to the total waste volume obviously.

You will see a remarkable decrease in the figure between 1986 to 2000, which could be the result of the legislative history, the established regulatory scheme as well as industry's concerted effort to reduce the volume of waste, considering the ever increasing cost of waste disposal. Until 2000 the volume of waste remained in a steady state. The large peak beginning in 2005 was due to several nuclear power plants undergoing decommissioning.

Today based upon industry estimates as well as our interface with the Low-Level Waste Forum, we believe there is adequate capacity for waste disposal except for greater than Class C waste, which I'll speak to later. Next slide.

However, the waste volume should increase due to decommissioning activities in the future as seen by this Electric Power Research Institute, or EPRI figure. This EPRI graph shows the estimated waste volume -- disposal volumes for operating life and for the decommissioning period of power reactors.

EPRI assumed that there is a fairly even projected volume of low level waste through 2035 when the first of the current operating plants are expected to commence decommissioning. Assuming that the reactors begin immediate decommissioning, the volume of waste will increase dramatically commencing in 2035 as

shown.

Given the current trends, there may be some slight changes in the timing, but we believe the trend holds true. Today industry estimates that the four disposal facilities that exist currently could accommodate the expected increase in decommissioning waste. This of course assumes that all four of them continue to operate or that certain of them could be expanded if need be. Next slide.

Comparison of the International Atomic Energy Agency system and the NRC waste classification system provides the inner relationship between the two systems. It's important to note that the IAEA waste classification system is a waste management system. And NRC's waste classification system is a disposal system. And thus the differences you see in the various categories in the table.

Perhaps the most significant difference is the exempt waste category because there is no floor in our system for Class A waste. The fluid releases are viewed as being analogous to exempt waste although they are conducted under regulatory control. Next slide please.

Turning to ongoing activities to improve program effectiveness. The first of course is our proposed rulemaking for Part 61. In 2013 the staff

submitted a draft proposed rule to revise Part 61 and associated guidance which would address the disposal of large quantities of depleted uranium, other unanalyzed waste streams and blended waste.

In February of this year, the Commission approved publication of the proposed Rule and the associated draft guide for public comment subject to certain comments and changes. NRC staff is currently revising that proposed Rule and the associated draft guidance consistent with that Commission direction.

The next major issue or topic is the authorization for disposal under 10 CFR 20.2002. NRC and the Agreement States can authorize waste disposal by means other than a Part 61 or Agreement State disposal facility. Approximately 10 to 12 requests are received per year by the NRC for this methodology.

Those disposals typically occur in hazardous or municipal waste facilities permitted under the Resource Conservation and Recovery Act, RCRA. Staff has prepared a draft internal procedure covering the review and approval of these waste disposals under an annual dose criterion of a few millirem, and we do plan to issue a final procedure once we've tested the draft guidance a few more times.

Manifest of waste -- the management of waste for disposal, excuse me. There are two

initiatives associated with the management of waste for disposal. The staff has recognized the importance of financial assurance to account for total life cycle cost including disposal.

The 2007 programmatic assessment included an activity to perform a scoping study of the need to revise or expand byproduct material financial assurance. Resource constraints unfortunately delayed that initiative. However, it has become more important and timely based upon the recommendation of the 2014 Radiation Source Protection and Security Task Force report as well as a report prepared by the Low-Level Waste Forum Task Group on disused cell sources. And the staff now intends to focus on this important and emerging issue.

The other initiative is accounting for the so called Phantom 4 isotopes: tritium, carbon-14, tech-99 and iodine-129, which are very mobile isotopes and large dose contributors for waste burial sites. Part 20 of Title 10 Code of Federal Regulations, Appendix G requires that an NRC uniformed waste manifest be prepared for waste intended for disposal and requires separate manifest totals for the so called Phantom 4 isotopes.

As required in Part 20, if the radionuclides are present in a shipment at levels lower

than the lower limit of detection or LLD, the LLD value must be reported, which then in turn results in an overestimation of disposal of these isotopes. We are working with industry on finding solutions. We've issued a draft Regulatory Issue Summary or RIS on this topic. And the final RIS will be issued in November.

And the last major initiative that we'll discuss this morning is the update to the Branch Technical Position of concentration and the averaging and encapsulation. Lovingly referred to as the BTP.

Part 61 allows concentrations of radionuclides that are used to determine the waste classification to be averaged over the volume or weight of the waste. The guidance document is used extensively by practitioners on a daily basis, especially within the nuclear power industry.

The staff reviewed the constraints on the mixture of solid items and encapsulation of sealed sources and on cartridge filters and brought to bear more realistic scenarios and more practical application of the BTP to make it performance based. Next slide please.

Continuous improvement is obviously a major goal of the program. And for many years the NRC waste program has been in a maintenance mode with limited resources, yet it faced many internal and

external pressures. The workload simply stated was higher than the staff available to do the job.

The staff conducted a programmatic assessment of the program in 2007 in order to prioritize that work. As a result of the programmatic assessment, a list of activities was developed and those activities were assigned priorities of high, medium and low. And ranged from narrowly focused activities such as revising the part -- the BTP to broader activities such as suggesting legislative changes to Congress. The staff has focused on the set of high priority tasks.

As the national waste program continues to evolve, the NRC staff believes it is time to update that programmatic assessment. We have extensively engaged stakeholders to identify the activities to focus upon over the next five to ten years that would address the changing national waste circumstances. Next slide please.

Turning to a very interesting topic. Greater than Class C waste. In 2011 the Department of Energy published its draft Environmental Impact Statement, EIS for disposal of greater than Class C waste and low level radioactive waste, GTCC-like waste. The Act that I cited earlier assigned responsibility for GTCC waste to the federal government, which the Department of Energy assumed and licensing

responsibility to the Nuclear Regulatory Commission.

The NRC staff has and will continue to engage the Department of Energy to clarify the responsibility related to GTCC waste disposal licensing authority, including disposal of AEA, Atomic Energy Act, generated material in a DOE facility. Sources collected under the Department of Energy Global Threat Reduction Initiative/Off-site Recovery Project and commingling and co-locating GTCC and GTCC-like waste.

In 1989 the Commission amended its regulations in Part 61 to state that GTCC waste is generally not acceptable for near surface disposal. And such waste must be disposed of in a geologic repository as defined in Part 60 and Part 63 unless proposals for disposal of such waste in a disposal site licensed pursuant to Part 61 are approved by the Commission.

There are no specific technical requirements at this time in Part 61 for GTCC waste disposal and the staff is reviewing the need for requirements and whether the new site specific analysis requirements that are to be proposed could be applied to GTCC waste disposal. The staff plans to prepare a paper to discuss NRC's regulatory history on GTCC waste disposal for the Commission in the near future.

Turning to the last slide. Communication

with the Commission present and in the future. Regarding the proposed Part 61 site specific analysis rulemaking, there has been extensive communication with the Commission and we have received direction on revising the proposed rule. We plan to provide the Commission with the revised proposed rule in February 2015.

As directed by the Commission, we will confer on risk-informing the waste classification scheme and will consider the efficacy of continuing this assignment once the final Part 61 rule making that is ongoing for site specific performance assessment is completed in FY16. We will provide the ongoing programmatic assessment findings and prioritize that work in a paper to be shared with the Commission for approval.

In 2015 we will also provide the Commission with a paper on GTCC waste, given the lack of GTCC waste disposal currently as well as the lack of existing requirements in Part 61. And of course the ongoing development of the Department of Energy Environmental Impact Statement.

In August of this year, we provided the Commission with an information memorandum on the status of the Joint Convention National Report. And the report is actually due to the International Atomic

Energy Agency in October and the Commission will receive a copy of the final U.S. National Report to satisfy the Joint Convention reporting requirements.

In July of this year, major changes to the concentration averaging BTP were identified to the Commission in a memorandum. The staff plans to issue the final concentration averaging BTP at the end of the calendar year 2014.

And the last comment I would like to make as I finish up is, I would like to point out the extent to which the low level waste program has gone that actively in engaging stakeholders over the last few years. To say that that outreach effort has increased by orders of magnitude would be an understatement. The wonderful thing about it is we've had lots of good discussion, lots of good input and it's actually affected things that we've done within our program.

So with that I'll stop. I look forward to your questions and Mark will take over now. Thank you.

MR. LOMBARD: Thank you Larry. Good morning Chairman Macfarlane, Commissioner Svinicki, Mr. Ostendorff. Commissioner Ostendorff it's good to see you without your supplemental support device this morning, so I hope that's good sign.

COMMISSIONER OSTENDORFF: It's a good sign.

MR. LOMBARD: Okay. The next slide please. We have a robust regulatory framework in place for Transportation and storage in Part 71 and 72 respectively of the Code of Federal Regulations. As well as the regulatory guides, standard review plans, interim staff guidance, Office Instructions that make up this regulatory framework.

To keep this framework in a robust state and to meet our goal to be a trusted, independent, transparent and effective regulator, we continuously monitor the regulatory, technical and operational environment and conduct periodic self-assessments to define enhancements to our framework. We implement a diligent approach for internal and external communication that's integrated across fuel cycle from front to back.

Internally we interact with the Offices of Nuclear Regulation, Nuclear Regulatory Research, New Reactors, Federal and State Materials and Environmental Management Programs, General Counsel and Administration. Externally we interact with members of the public, licensees, Nuclear Industry Institute and Spent Fuel Storage and System Vendors as well as other members of the Waste Control Specialists contingent ,who has some folks here this morning, and the National Transportation Stakeholders Forum through

the Department of Energy, participating with them.

Other agencies, we interact with the Department of Energy, the Office of Nuclear Energy on a very frequent basis on several topics. Cathy referred to one of them with regards to acts intolerant and advance reactor fuel designs as well as spent fuel research and development. And Commissioner Svinicki you referred to that earlier. We're very cognizant of the DOE's work in this area in research and development.

As you know, they conduct research and development. We only conduct research. But we meet with them quarterly to discuss research and development topics of a mutual concern and then we make sure that the government's money's being spent appropriately and the fact that we are getting our regulatory issues addressed.

Lastly, implementation of the DOE High-Level Waste Management Strategy, we meet with Jeff and his folks quarterly as well to discuss topics of mutual concern including things that might be coming our way in the future. Which I'll touch on in the last slide.

We also meet with the Department of Transportation on a very frequent basis. I'm sure you are aware, they are the competent authority for Transportation in the United States as well as the

Nuclear Waste Technical Review Board.

International partners, again frequent interaction with the International Atomic Energy Agency, which Cathy referred to. Nuclear Energy Agency as well as other countries such as the United Kingdom, South Korea and Taiwan. We had two folks in Taiwan just a few weeks ago spending a week over there helping them with their license renewals process.

We engage in very active and ongoing public outreach including a recent two-day Category 3 public meeting on license and certificate renewals. We also support the San Onofre Community Engagement Panel through meetings and also direct engagement with them by phone. And also direct engagement with members of the public by email, phone and in person.

Our focus in these interactions is to educate and engender the trust of our stakeholders. We want them to know who we are, what we do, why we do it and how we do it, as well as the values that drive us in these operations.

We engage in active and effective collaboration with licensees, certificate holders and other members of the industry in public meetings on a variety of topics such as request for additional information responses, pre-application meetings, and a variety of other technical topics.

We continue to factor the input that we gain during those interactions into our regulatory processes and provide feedback to the folks we do interact with every time we have interactions with them as we move forward to enhance and implement our regulatory program. Next slide please.

We're currently reviewing three dry cask storage renewals. Two of them are independent spent fuel storage installation renewals, Calvert Cliffs plant here in our home State of Maryland, Prairie Island up in the northern part of Minnesota and the VSC-24 which is a certificate of compliance renewal.

One thing that we found is that the licensees and certificate holder have really stepped up the plate over the last year or so as we have built our revisions to our program, which I'll talk about in a minute, by listening to our expectations and refining applications and revisions to their applications that respond to our questions and meet our expectations. And we're in the process of really closing the door on all three of those, especially the Prairie Island and Calvert Cliffs renewals. Next slide please.

As we dug into these renewals, we found that our regulatory processes had not fully considered agency's lessons learned and as a result needed enhancement. Our goal was a sustainable framework that

would provide reasonable assurance of safety and security while also providing a needed predictability and flexibility to respond to indications that may be found during inspections of dry cask storage systems over the renewal periods of up to 40 years.

We recognize that our best path forward was to apply lessons learned from past experiences of reactor operating license renewals. Integrating from the front end to the back end, to develop an operations based approached similar again to what was done on the reactor side, to storage system aging management.

So we put together a cross office team, folks from the Offices of Nuclear Reactor Regulation, Nuclear Regulatory Research, General Counsel along with folks from our own team. And they've done a fantastic job. We gave them a very tough challenge about a year ago, actually less than a year ago now, to put together a revised framework for aging management programs.

And they've put together, we have an excellent Branch Chief in that area and a team lead who have taken that cross-office team and have moved forward to make significant progress in this ten-month period. Next slide please.

This task also included early and frequent engagement of industry and other stakeholders to solicit their ideas, identify inspection capabilities

and techniques and limitations and promote improvement in inspection methods and technologies. At the same time we wanted to capitalize on the voluntary industry pilot inspections that have been done to date.

The first was done at the Calvert Cliffs plant which is a horizontal AREVA TN NUHOMS system and the Hope Creek and Diablo Canyon utilize vertical Holtec systems. To understand inspection capabilities and limitations, the inspection capability is really the core of aging management programs for license and certificate renewals going forward.

And these techniques are not specifically designed for dry cask storage systems as you can imagine. So again, we're working with industry and promoting the improvement in those technologies going forward. And there's actually a seminar at the end of this month.

Electric Power Research Institute is holding a two and a half day seminar in Charlotte to discuss inspection technologies. They're trying to marry up the industry with folks that supply those technologies again, to understand the limitations and what our needs are for the future.

The industry volunteered early on in this process to develop guidance which conserved NRC resources while also maintaining the ability to ensure

that our expectations are reflected in the industry guidance. That guidance is due to us by the end of September.

We continue to interact frequently with industry and the public in open and transparent forums. And again, we consider all the input received during these interactions. We're working on a revision to NUREG-1927 which has a very long title, Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance. We're preparing that to meet with the ACRS in January of 2015 and hope to provide that for public comment soon after that.

Now what we also plan to do in NUREG-1927 is not only incorporate the lessons learned from the reactor side and our lessons learned, and what we've learned over the last ten months as we've built this program, revisions to the program. But also intend to endorse either in whole or in part the industry guidance.

Now we also have told the industry as recently as two days ago that expect that we will have comments on that guidance. And they said they will turn it around in a very timely manner to support our schedule.

As a result of these diligent efforts over

the last ten months, we are much better prepared to review future renewals of certificates and licenses. We have one that we know is coming in. We've had four I think pre-application meetings with AREVA TN on the 1004 certificate of compliance. It affects six different canister designs at 17 sites around the country. Had we not done the work we had done over the last ten months, we would be in much worse shape to review that application when it comes in the next month or two. Next slide please.

Redirected material is being transported safety as Mark said earlier. There are more than three million shipments of radioactive material packages every year. And a small number of those are Type E packages. Those include medical sources for cancer treatments, well logger sources and devices as well as radiography cameras.

Now we talked to the Commission about two years ago in September, October 2012, that expired Type E packages were being phased out. And I'm happy to report that there are no NRC licensees utilizing expired Type E packages at this time.

There is still one DOE certified Transportation package that we also provide reviews for and it's only being used on very limited basis. But we're 99.999 percent of the way there on expired Type

E packages. Next slide please.

Continuing on to NUREG-2125, the Spent Fuel Transportation Risk Assessment. It's the fourth study of this type that was conducted by the NRC and it was issued in January 2014. The first study is NUREG-0170 that was published in 1977. As you can imagine in those almost 40 years, analysis tools and techniques having greatly improved and there's a wider availability of the associated data that you need to conduct this risk assessment.

The original study in 1977 also utilized generic cask designs and the recent study utilized actual cask designs. As a result the estimate of accident risk from this Transportation of spent nuclear fuel in the updated study is approximately five orders of magnitude less than what was estimated in 1977.

I've shown in the graphic you see the large yellow circle there. That's the estimated dose from all sources of background radiation which is 7.56 person-sieverts. And the small line to the right is that is what estimated to occur from Transportation of spent nuclear fuel, 0.0037.

I tried to put that in a context by telling you that estimated collective annual dose for a chest x-ray is almost 13 thousand person-sieverts. So as you can see, the risk from the Transportation of spent

nuclear fuel is extremely small and it continues to demonstrate that NRC regulations provide adequate protection of public health and safety during these transportations. Next slide please.

The long term storage and Transportation of a full range of fuel cladding types is safe and as you're very much aware, this topic has received a significant amount of discussion over the last 12 to 18-months from coast to coast. From San Onofre to the Pilgrim plant.

Through it all the NRC position remains the same in that NRC research and analysis activities continue to affirm that long term storage at least 60 years, and eventual Transportation of all cladding types that we have reviewed and approved to date, is safe. Our engagement with NRR has taught us, I'm sorry the Office of Nuclear Reactor Regulation has taught us that the environment in the reactor is more severe, especially during accident conditions then what you would expect to see in dry cask storage even under normal and accident conditions.

We plan to continue to approve applications for high burn up fuel storage and Transportation as long as those applications meet our regulatory expectations. A recent example is the AREVA TN Model MP-197. It's a transportation package, it's authorized contents include high burn up fuel, up to 62 gigawatt-days per

metric ton uranium.

It's the first canister package to be approved by the NRC. That means it utilizes a canister design, a stainless steel canister design. And it meets all of our safety and security requirements.

We conduct research activities to confirm the safety of operations and enhance the regulatory framework to address any changes in technology, science and policies. Examples include, and if you look at the picture there on the slide, that's a picture of a test apparatus that we're utilizing at the Oak Ridge National Lab.

And the test sample is placed in the bottom of the test apparatus there. We're utilizing H.B. Robinson fuel that was burned up to 62 gigawatt per metric ton uranium, a high burn up fuel obviously. And then there's a force applied to the upper arms, we've put a bending moment on the test sample below. I know it's hard to see because it's a very small picture.

The force that we applied during phase one of the testing is actually higher than what we expect to see during normal Transportation. And the fuel samples have withstood ten million cycles of bending moment that have been applied to it. That represents at least a Transportation from coast to coast.

We also monitor work that's done within the

Department of Energy as I said before, and Argonne National Lab has conducted a whole suite of analysis on high burn up fuel. The work that's done there that we have reviewed and worked with those folks and have talked to them extensively to make sure that we understand the basis for their analysis, it continues to affirm that our position is solid.

We continue, we don't just want to rest on the laurels of the work that we have done to date and the work that has been done in the industry. So we continue to interact frequently with members of the public and other stakeholders to ensure that we're hearing a variety of perspectives on this topic.

And we consider their viewpoints while keeping up with current research results across the United States and around the world as well as other related activities such as the DOE Demonstration Project. And you heard from the NWTRB from Nigel earlier, that we also share their concerns and the monitoring priorities for the DOE Demonstration Project.

And we have met with Dominion several times and also the DOE folks who are working on this project. And they've heard our concerns, we've made comments on the original test plan and they've incorporated many of those concerns going forward. Next slide please.

Extended storage and Transportation program is moving forward. We issued the technical information news report in May 2014. As you know, we've been directed by the Commission to examine the technical needs and potential changes to the regulatory framework that may be needed to continue licensing of spent fuel in storage and eventual Transportation over periods of greater than 120 years.

The report summarized and prioritized the tactical information needs referred to as the TIN Report, the T-I-N Report. Not that this dry cask storage systems are made of tin, but that's just the acronym that results. For extended storage and Transportation we issued as I said in May 2014.

Top priority areas and you know that chloride-induced stress corrosion cracking in stainless steel canisters and welds is again a topic of great discussion. That's the top number one priority area there.

Swelling of fuel pellets due to helium ingrowth and thermal calculations for more realistic predictions of actual cask conditions effects the residual moisture after normal drying operations. And the one is the core of Aging Management Programs, in-service monitoring methods for storage systems and components. We continue to work on these identified

needs and coordinate our efforts with stakeholders including the Department of Energy.

Next and last slide. The NRC, we are ready to review applications for storage only interim consolidated facilities with no changes to the Part 72 regulations now storage only with packaging operations. You might, some people could say repackaging, under Part 72 they're called packaging operations. They are covered adequately under Part 72.

We know that entities may want additional activities to be conducted at an interim consolidated storage facility such as research and development. Those may be able to be licensed under a different regulation, but clearly not under Part 72.

So we've had specific stakeholder interactions, we've had some so far with the Eddy-Lea Alliance, with folks from Waste Control Specialists and certainly with the Department of Energy. And their intention to submit an application for a Topical Safety Analysis Report to identify what exactly are those research and development needs that you see, that you would want to conduct at that site, so then we can determine which areas of the regulations would be able to cover those. Or we might have to look at new regulations to cover those activities.

We as I said, meet with Jeff Williams and

his folks regularly to talk about their plans to submit to us a Topical Safety Analysis Report for review. As you heard from Jeff, it's more than storage, it's more than packaging. There may be some other considerations as they look at what is really need to go to that 72, 71, 72 and another 71 depending on where the independent -- the interim consolidated storage facility is located.

It's not located at the repository site, then there will be another Transportation after that. So it's complicated, yes. It's doable, we believe within the current regulations. But again, we want to make sure we understand those additional activities that a person or an entity may want to conduct.

So with that I look forward to your questions and I turn it back to Mark.

MR. SATORIUS: And that completes the staff's presentation, we're ready for questions.

CHAIRMAN MACFARLANE: Great, thank you very much. We'll turn to Commissioner Svinicki.

COMMISSIONER SVINICKI: Good morning and thank you to each of you for the presentations and to all the staff who contributed to preparing you for today's Commission meeting. I'm going to start with a couple of observations.

Mark I appreciate your acknowledgment of

Brian's hard work. He stopped doodling now and looked at me since I said his name. You know, I have to advise you that the movements of a pen for doodling are very different.

The only person who ever tricked me was Dr. Dana Powers who does long series of equations and he's not moving the pen very much so I thought it was doodling, but it was solving equations. But I think you were doodling because it looked like doodling to me. Oh, taking notes, okay, all right, either that or you switched the paper out.

But Mark I think, I'm aware that maybe in prepared remarks you were going to acknowledge Brian's humor and when I noted that, you skipped over it, I don't think you said it. But that is something I really appreciate about Brian.

And so he is an experienced nuclear safety professional with a sense of humor. And as Forest Gump would say, even I know that's something you don't find every day. So I do appreciate that and I look forward to his -- this is sounding as if he's leaving us, he's just transitioning from one important position to the next.

I want to make a little bit of an organizational aside though on this topic, which has to do with the FSME-NMSS merger. Because as I listened to

these presentations and see representatives of both organizations at the table today, it's a reminder to me that I kept a very open mind about proposals to consolidate the two organizations up until I received the results of the staff's very thoughtful look at the matter. And they concluded that there were positives for the NRC as a whole to merge these organizations.

But I just want to communicate because I think we may have a number of FSME and NMSS staff here today, that I in no way discount both, how of necessity organizationally disruptive it will be for a time. And that it is also very logistically complex.

But I accompany that by saying I'm supremely confident that the organizations you know, also acknowledge and have long known the interconnectedness and the complementary nature of the work that they do. And that they'll you know, pull through this. But it will for a time I think be very front of mind for many employees.

Mark did you want to say?

MR. SATORIUS: Yes, I would agree with you fully and I know that Cathy and Brian worked very diligently to ease those transition pinch points. But you're right, they'll still be there.

And probably what complicates it to a certain extent is what we call the centralization of the

White Flint complex. As we move and incorporate people back to the White Flint complex and figure out how we're going to refurbish this building and all those things play -- that's going to be an added I guess, challenge that you'll find during the merge. And I think you've taken that into account, so.

I noticed that -- I know today that FSME is going to have an ice cream social out on the green. I don't know if you got an invitation.

COMMISSIONER SVINICKI: Oh, I wish they had better weather. Well at least this morning it was really overcast, so I hope it clears up.

MR. SATORIUS: and I think it's to come together and acknowledge many years of -- I think it's been six or seven years of the office being stood up and all the good work that they did. And kind of take a few minutes to celebrate that and to look forward on new challenges in the future.

COMMISSIONER SVINICKI: Well thank you for that. And again, the presentations today also remind us of all the important work going on in both organizations. And I hope, I know that we needed at the end of the day to have a structure, and it is looking like one organization is subsumed into NMSS and I understand that based on the titles, it looks like that.

But I know when I read the staff's

recommendation and really thought through whether or not in the end to approve the staff's proposal to combine, which at the end of the day I was accepting of that. I didn't so much think of it that way. I thought of it as two things coming together.

I know that one name or the other is the one that you have to go with. And NMSS has origins all the way back in statute. So I think that that tipped the balance in the favor of the new organization being called NMSS.

But I sure hope that the FSME staff don't feel in any way that that makes them kind of absorbed into. I see it as a joining of equals. And so I'm certain that we will approach it that way.

But speaking of these important topics that we've talked about today, Larry first for you. I think that for an organization like NRC that is not often literary, I sometimes think that we went from something quasi-literary in waste confidence to continued storage. I thought boy, there's you know, there we are, living up to embracing our geekdom, or whatever it was called in the first panel.

And it makes me joke about people refer to how the military does inventory you know, like a role of tape will be adhesive tape, clear, transparent, you know whatever continued storage to me was one of these

very bland named. But the Phantom 4 isotopes, you get an award for that. That I didn't realize there were creative things like that lurking out there. And that makes me sound like -- it sounds like a team of super heroes or something.

But I appreciate your inject of something that was a really creative naming. So I appre -- I don't have a question about it so much as just it was one of the most interesting phrases stated today.

MR. SATORIUS: That was act -- I think that was actually, we can't take credit for that. I think that that was formed through industry, is that right, Larry?

MR. CAMPER: It was, yes.

COMMISSIONER SVINICKI: Okay, all right. Well but just thank you for throwing something at least new to me in --

MR. CAMPER: We just embraced it.

COMMISSIONER SVINICKI: Yes. Into the mix. But maybe something that isn't creatively named, the programmatic assessment, that's another one of those names like continued storage. Isn't that just called just exactly what it is.

I know that you've described the 2007 programmatic assessment and said stakeholder input and staff's own view is that it's time to be updating that.

And that out of the original assessment, seven high priority tasks were identified. Can you help me understand though, other than it's just perhaps a little bit stale and needs to be relooked at.

What do we see as the organizational benefit to doing an update to the 2000 programmatic assessment? What might be an issue that would come out of it? And then what would be the programmatic benefit that we would derive from undertaking this right now?

MR. CAMPER: Thank you, great question. The first point I would make is from a purely operational standpoint. We continue to face some of the same challenges that we did in 2007 in that we have a limited staff in that particular program. It's staffed, that part of the program at five FTE per year.

And so if you think back over the policy issues that we've wrestled within the recent past, many of those continue. So we've got to figure out where we're going to expend those resources.

The other thing that's interesting though is we did have a meeting with a panel that followed the Waste Management Conference last year in Phoenix. It was a pretty August group of people. And when you read through the things that they raised that we should be looking at in terms of our program, some of them are clearly out of our regulatory purview.

But some of them are very intellectually interesting. And so as we -- at least we look at those, we're going to try to prioritize these things. jettison those that are not within our regulatory purview and then go back to a workshop in the summer and say does this look about right.

The point I would come back to also Commissioner, is the one that I made at the end. When we did the 2007 assessment, although we did do some stakeholder outreach, it wasn't nearly as much as we're doing now. And frankly, you hear challenging ideas.

And so I think that out of it will come a better focus of what we should be you know, focusing upon over time.

COMMISSIONER SVINICKI: Thank you. And Mark, just turning to your presentation. I did have a chance at Oak Ridge National Laboratory to meet with the researchers who were doing -- you had a photo of the test apparatus. I saw both the non-radiological work and then in the glove box I had a chance to look at the work going on there. So I appreciate your mention of that.

On the license renewals process, I understand as we look at updating our regulatory framework and maybe enhancing the process you said there are some things that are done on the reactor license renewal side that weren't being done here, that we're

looking at. But I guess that comes to mind for me is, not all of that is probably relevant.

So can you give an example of how you're looking not only at what they do. I think we encounter this programmatically across the board to say what we do on the material side and the reactor side, but sometimes differences exist for a reason. So could you just address that.

MR. LOMBARD: Yes, ma'am, thank you for that question. It's interesting, so if you look at the process that has been used and has evolved over time for the operating reactor license renewal, there are certain things that you can -- certain products that you can utilize also on the spent fuel storage site including GALL reports, the Generic Aging Lessons Learned report.

So it's going to look very different on our side then it looks like on the reactor side obviously because we have different materials, we have different functions. We have different approaches. But it will be a GALL-like report. So it's going to follow the same kind of format.

The content will be different, but the best thing about this as we do that, and you correlate those process ideas that really make sense to us and then customize them for our materials and constructions and

configurations, is that licensees can then utilize their existing inspection programs without having to create a whole new inspection program. They're using just an arm, an extension of the existing inspection program to implement the aging management programs for dry cask storage systems.

We wanted to provide a minimum benefit from there -- I'm sorry, minimum impact on their programs, but provide a maximum benefit from our standpoint. And I think we've achieved both of those goals.

COMMISSIONER SVINICKI: Okay, thank you. I look forward to learning more about that as you proceed. Thank you Chairman.

CHAIRMAN MACFARLANE: Okay. Commissioner Ostendorff.

COMMISSIONER OSTENDORFF: Thank you Chairman. Thank you all for your presentations. Mark thanks for your recognition of Brian. I've got to tell a little story about Brian.

My wife and I have Navy football season tickets and maybe two years ago, we were walking around Hospital Point to recall when we used to live in the yard over there. And I saw this figure in the distance running very fast. Hospital Point. Running very fast.

And I said that young Midshipman he must be

doing probably 4:50 in the mile run. My best time was five minutes in the mile run. So I've had some awe for this figure approaching me at a very high rate of speed. And low and behold my wife Chris and I look at this guy and it's Brian Holian running up there along the Seven River there at Hospital Point, you'll remember that.

And since then and when Brian has been the Office Director for FSME, we've had a monthly periodics and we've shared some sea stories from our common Navy background, but also --

MR. SATORIUS: So what was chasing him?

MR. HOLIAN: A big dog.

COMMISSIONER OSTENDORFF: He's got a son who's going to graduate and be I think a Navy pilot in his class of 2015. So Brian, along with Commissioner Svinicki and Mark and the Chairman, I know we really appreciate your service. And you've done well my friend, thank you.

I'm going to start out Larry with you with a couple of questions. Just caught my eye on two things I want to ask you about. On slide 12, the volume of waste disposal for utility generator, I was kind of looking at the pattern of that and I kind of said that's not a normal pattern for a steady state operation.

Any indication that nuclear power plant operators are kind of hoarding or keeping things on site

because it's too expensive or difficult to dispose of low level waste?

MR. CAMPER: I think if you look at the slide, that's '86 I think it starts. But actually there's data that goes all the way back to 1980 that shows the same thing. And you know, on one hand as I said, you'd like to think that the legislative history had something to do with it. You'd like to think that our regulatory process had something to do with it.

But I also think that there was a concerted effort by industry to make sure that whatever went in those drums for disposal was in fact radioactively contaminated. And they went through tremendous reductions in waste of all forms to ensure that it was disposed.

So I don't think that they've hoarded it per se, I think they've just change their operational approach to really make sure it was contaminated waste and they disposed of it. Because it became ever more expensive and still is.

COMMISSIONER OSTENDORFF: Okay. So I'm going to kind of stay in the general theme, going to slide 14, the comparison of waste management systems. What caught my attention was your statement that there's no floor for Class A waste.

MR. CAMPER: Right.

COMMISSIONER OSTENDORFF: You know from a risk informed perspective, should there be a floor? Are we perhaps disposing of things as Class A waste that don't need to be if you look at the big-picture risk?

MR. CAMPER: What a challenging question. Well as you know, in the United States, there have been to efforts within our organization to address this question of an exempt category of waste. The last one we stopped because there were higher priority rule makings going on at the time dealing with security issues.

But my personal view is that it would be fortunate if there was some worldwide international approach to some category of waste that has de minimus need for regulatory oversight. Now at the IAEA, what they've done is they -- their exempt is actually clearance and exempt. And it's on the order of ten micro-sieverts per year at one millirem. And that is the level at which they have determined that it doesn't need any additional regulatory oversight.

Under certain rare scenarios, it's 100 millirem. But a way to tackle that problem is twofold. One if you look at the chart there, you'll also notice that they have some other categories at the low end of the spectrum. That's why it's a management system. But you could, and we have talked from time to time about

is there a lower end of Class A that could be characterized differently. And perhaps it could be. It's an interesting policy question to ponder.

What happens as a practical matter is on those very low end activities, we tend to get at them through the 20.2002 disposal process. And they end up then being disposed at a RCRA facility and that does require an exemption being granted if it's going to a RCRA facility because it's not authorized to dispose low level waste.

Mark you want to add something there to this?

MR. SATORIUS: I just wanted to add one thing. Back in the early '90s, we -- the agency put into place a classification of below regulatory concern. And many of us remember that it lasted about a year before people just didn't understand that.

COMMISSIONER OSTENDORFF: It was a communications challenge.

MR. SATORIUS: I think that that was a big part of it. But that was unsuccessful.

COMMISSIONER OSTENDORFF: I know when I was on engineering commanding officer on submarines we used to you know, arrange shipment off of chem wipes and you know, other very low level waste issues for the nuclear propulsion program. And then when I got to

NNSA, it was probably six or seven years ago, they had tons of scrap metal at Pantex that were sitting there that didn't have any measurable dose, yet there were certain surfaces that were not accessible for monitoring with a radiac device.

And I don't know it just seems like it was not necessarily a risk informed approach. And when you struggle with the State of Texas or you're doing this, you know tons of material at Pantex and I don't, I left the agency and I'm not sure that it ever got resolved. But it's nearly that I think I'm just flagging, you caught my attention on that.

MR. CAMPER: No, the volumetric contamination is a real challenge, you're right.

COMMISSIONER OSTENDORFF: Yes. Mark let me go to your presentation. I appreciate on slide 25 that you provided a relative perspective comparison of the dose spent fuel during Transportation to chest x-rays. So thank you, I think it's important from a communication strategy for us to always kind of back up and provide something that will provide a relative order of magnitude. So think you for doing that.

MR. LOMBARD: Yes, you're welcome.

COMMISSIONER OSTENDORFF: I wanted to ask you a question that kind of surfaced the first panel. I'm going to ask it to you a little different. I asked

the first panel is there any forcing function that would require commonality or harmonization of canisters going from ISFSIs to you know, consolidated interim storage facility to a repository? And then we get into monitored, retrievable features or possibility with the repository.

From where you sit as a regulator, does this lack of harmonization cause any problems? Or do you see any future potential areas that it's going to be, oh my gosh, I wish ten years ago we had done X, Y or Z to ensure we don't get into some regulatory morass wrestling with different types of canisters in some stages of the cycle?

MR. LOMBARD: Can I answer that two ways?

COMMISSIONER OSTENDORFF: Sure, you can answer it however you want to.

MR. LOMBARD: You put me in the regulator box.

COMMISSIONER OSTENDORFF: Yes.

MR. LOMBARD: Which, from a regulatory perspective, and you may be familiar in Part 72 it says you should consider Transportation aspects in Part 72. You're not required to. And as the industry has moved forward, obviously onsite storage is the rule by now. And they've focused on building bigger and bigger canister designs. I think TN has a 68-fuel assembly

design now.

And just to make sure that their loading campaigns can go a little more efficiently and effectively, and they actually end up reducing dose as they do that as well. So the systems were not designed, built and approved, or submitted to us and approved with a full look towards Transportation.

So from our standpoint as the Chairman pointed out, we don't promote. We have to stay within the bounds as a regulator. And if that's the package they're submitting, we can do what we can within those bounds of the regulations. And again they don't require a look towards Transportation. They just say you should consider. So it ties our hands to a certain extent.

As a U.S. citizen, my response would be different. I would like to see a harder tie and more consideration. But it really goes over to Jeff Williams and his folks.

What do they see in the 2048 time frame as part of the high level waste management strategy? What's really going to be required? Is it going to be a TAD-type of disposal system, or is going to be something else?

And what is going to be the heat level of the disposal facility? The heat load limits and what

does that mean to a disposal system design? Those are the questions that we don't know the answers to. We're not even ready to ask those questions at this point since we don't have the site.

So it's hard to fully consider those implications today. But from one standpoint it might be a little shortsighted as well, again speaking as a citizen of the United States.

COMMISSIONER OSTENDORFF: Anybody else want to add anything to that? Okay. Thank you all. Thank you Chairman.

CHAIRMAN MACFARLANE: Okay. Oh, where to start. We'll start with Brian. I'll be brief. Thanks for your transparency and your forthrightness. It will continue to serve you well at the agency. I appreciate all your hard work.

Okay, so let's start with Larry.

MR. CAMPER: Okay.

CHAIRMAN MACFARLANE: Okay.

MR. CAMPER: Sure.

CHAIRMAN MACFARLANE: We'll start on the low level waste side. So the -- you mentioned the scoping study that you guys are doing on byproduct financial assurance. I think it's timely given the recent Radiation Task Force report, Radiation Source Protection and Security Task Force report, let me be

complete. I want to make sure, I think the staff should provide the Commission with the results of this scoping study and provide recommendations for next steps, that would be very helpful.

MR. CAMPER: And the results are there.

CHAIRMAN MACFARLANE: Okay.

MR. CAMPER: If I may, although it was delayed before primarily because of resource constraints and we were working on some big ticket items like the Part 61 rule making or the BTP, it has continued to emerge in importance. Not only because of the Task Group report, but -- and it's obvious unto itself.

Also the low level waste forum, disused sources group had a similar recommendation. But also conditions have changed in the industry that we see as sites exist now.

CHAIRMAN MACFARLANE: Right.

MR. CAMPER: Type B shipping canisters are becoming more available. So it takes on even more importance for that reason. And so what we're going to do is we're going to look at it. I mean, clearly if you read the recommendations of the task force, it implies rulemaking to address financial assurance for sealed sources. We don't know that yet.

We're going to do the analysis and certainly we'll share with the Commission our findings.

And if there's policy in place, obviously we'll ask for a policy decision.

CHAIRMAN MACFARLANE: Great, great. Another area of concern that you brought up, and you spent a fair bit of time on this, is GTCC, greater than Class C waste. I'm concerned there aren't really any real disposal options right now for that material. And especially this becomes important for significant sealed sources.

Again, it sort of wraps into the Radiation Task Force report issue. So I'm glad to hear that you're thinking of a staff paper on that. I think the staff paper on this -- on GTCC waste disposal should include a discussion of the variety of types of GTCC waste streams and the disposal challenges. You maybe were already going to do that anyway.

But make sure you also include those significant risk -- sorry, sealed – risk significant sealed sources.

MR. CAMPER: We do plan to include an appendix that gets to that very point. But we'll give you credit for it.

CHAIRMAN MACFARLANE: Okay. You don't have to give me credit, I don't need that. So let me turn to another issue. On slide 14, you did the comparison of waste management systems. You talked

about the IAEA categories and our U.S. categories and the U.S. is somewhat out of sync, but that's okay. Where does depleted uranium fall on the IAEA management system?

MR. CAMPER: Well, actually it's interesting because depleted uranium is viewed more as something that is -- in the European countries and the countries that are member states of the IAEA, depleted uranium is viewed more as an asset that is stored over time rather than disposed. The idea being that at some point it becomes an asset given the price of uranium.

So it's not something that gets specific attention within the classification scheme.

CHAIRMAN MACFARLANE: So nobody else is thinking of it as a waste material?

MR. CAMPER: Not really. Not really.

CHAIRMAN MACFARLANE: That's interesting.

MR. CAMPER: Yes, I can't find a specific category for it in their table.

CHAIRMAN MACFARLANE: So given now that we've just heard that the State of Texas is moving forward with disposing of uranium, and I think Utah is going in a similar direction, how are we going to work this with the pending Part 61 rule. So if they go ahead and make plans to go forward and then we come out with the rule and it has -- talks specifically about depleted

uranium, how do we work that?

It seems like we're getting out of sync here.

MR. CAMPER: Yes, well the good news is that we have had extensive communications already with the State of Texas and the State of Utah about the design and review of the performance assessment. When we did our analysis back in 2008 and took a good look at depleted uranium, we identified a number of technical parameters and modeling approaches that need to be brought to bear when you're examining this particular radionuclide especially because it behaves different then the rest of the spectrum.

And so the work that's gone on in Texas by their applicant as well as by the reviewer, and what's going on currently in Utah, closely aligns with the kinds of technical parameters we were going to include within our guidance when we finish our rulemaking. So I don't think that they're technically out of sync at all.

Now there's got to be some levels of compatibility associated with that rulemaking that we'll have to go back and take a look at. But we'll deal with that through the process. But I think technically and in terms of the analytical technics, they're not that far afield from what we're proposing in our

guidance.

CHAIRMAN MACFARLANE: All right. Okay. Are you ready Mark?

MR. LOMBARD: I would have been disappointed if you had not asked me something.

CHAIRMAN MACFARLANE: Okay, well, I've got a whole bunch for you. Let me just point out then, you talked about long term storage being 60 years.

MR. LOMBARD: Yes ma'am.

CHAIRMAN MACFARLANE: There is, I just want to note, there is now a disconnect with the continuing storage rule of GEIS which talks about long terms storage being 100 -- essentially 160 years and short term being 60 years. I think we got to get on the same page with ourselves somewhere. Because otherwise we're going to confuse people.

MR. LOMBARD: Absolutely. And you're right. That's a very good point. And in the context of my presentation I'm thinking of the first renewals, 20 years plus the -- up to 40 years yields 60 years. So the work that we have done in the applications have been reviewed and approved to date. And the ones we're looking at now really focus on that 60 years. And that's -- you're right, we need to be kept on terms.

CHAIRMAN MACFARLANE: You need to and all sides of the house need to be talking to each other here.

MR. LOMBARD: Yes ma'am.

CHAIRMAN MACFARLANE: I'm not going to go further with that. Okay. So a couple specific questions and then a general discussion. Are decommissioned sites allowed to load storage casks and decommission spent fuel pools before having a Transportation certificate for loaded storage casks?

MR. LOMBARD: Yes, they are.

CHAIRMAN MACFARLANE: Why?

MR. LOMBARD: Again, because of the limitations in 71 versus 72. 72 says should and doesn't require a shall.

CHAIRMAN MACFARLANE: Is that reasonable?

MR. LOMBARD: Is it reasonable? Again, I --

CHAIRMAN MACFARLANE: Is it something we should think about?

MR. LOMBARD: It is something we should think about. And we're looking at that as we go through our licensing process improvements and we're look to -- at the compatibility of the 71 and 72 regulation. And this is one piece of that.

Because there are considerations that would change the way applications are actually given to us from the 72 side for storage.

CHAIRMAN MACFARLANE: Right, right, okay.

Do the general license provisions in Part 72 assume that reactor storage sites are going to have spent fuel pool facility? Something like that to mitigate any issues that might occur? We talked about this with the --

MR. LOMBARD: Forever?

CHAIRMAN MACFARLANE: I don't know, you tell me.

MR. LOMBARD: They do not require that to be in place.

CHAIRMAN MACFARLANE: So they don't assume there's any way to repackage?

MR. LOMBARD: They do not.

CHAIRMAN MACFARLANE: Okay. So let's turn to sort of more general issues. You talked about inspection technologies,

MR. LOMBARD: Yes ma'am.

CHAIRMAN MACFARLANE: EPRI's doing some work. Are these technologies, would they be internal to the casks or external?

MR. LOMBARD: No, none internal. Primarily look at the casks their selves.

CHAIRMAN MACFARLANE: So remote sensing?

MR. LOMBARD: They would be contact based inspection technologies.

CHAIRMAN MACFARLANE: Okay.

MR. LOMBARD: And that what we use -- what

we, the collective we. The industry used in the first three pilot inspections were actual devices that were measuring the salt concentration on the canister surface and then looking for cracks anywhere and along the welds that they could access.

But as you may imagine, in a dry cask storage system, you have the canister itself, and say for a Holtec system for example, there are four vents, two at the top and two at the bottom. Well you can run that inspection probe down those two vents and you can see that limited area there, but you can't see the rest of the canister.

CHAIRMAN MACFARLANE: It just makes me wonder if there are technologies that could be added internally to these casks that would enhance inspections in the future that we should be thinking about requiring.

MR. LOMBARD: Yes. There are some things that could be added and we're hoping through this effort and we're getting to that phase now with the EPRI Conferences being held later in September and in the work that we're doing with -- through NEI and directly with licensees to help promote those changes in cask designs going forward.

CHAIRMAN MACFARLANE: Right, okay. Do you guys have additional questions?

COMMISSIONER SVINICKI: I have one.

CHAIRMAN MACFARLANE: Yes, okay. All right, then I'm going to stop for a second and let Christine go and then I'm going to go again too. Okay.

COMMISSIONER SVINICKI: On this topic that the Chairman was just pursuing regarding the existence of spent fuel pools, are you familiar with technology development that was done by the Department of Energy in the '80s and '90s regarding the proof of concept of other technologies wherein you could transfer canisterized fuel in the absence of a spent fuel pool?

MR. LOMBARD: Um-hum.

COMMISSIONER SVINICKI: Put another way, is a spent fuel pool, the existence of that, is that the only possible technology option for transferring out of canisters?

MR. LOMBARD: I see when you think of what happens to fuel during vacuum drilling, it would be better it could be done without a spent fuel pool. From my standpoint I think it would be much better. But obviously hot cells are difficult to build and operate and maintain.

COMMISSIONER SVINICKI: But also, obviously I know the answer to this question, I'm being a little over cute in my construction here. But the Department of Energy also looked at technology

development for basically what would amount to a canister to canister kind of repackaging. You're nodding your head, so. A number of different concepts were examined.

MR. LOMBARD: So when you think about the realities of utilizing that, one thing that we try to avoid is cutting of canistered systems. And because there's dose and difficulty associated with that too. So that would require some sort of a cutting of one end of the canister so you could push or pull these fuel assemblies through.

But it's certainly feasible. There's no doubt about it.

COMMISSIONER SVINICKI: Okay, thank you.

CHAIRMAN MACFARLANE: Okay, so now to go back the question that Commissioner Ostendorff asked. Which is you know, are we thinking about the future. So you mentioned the newly approved AREVA TN cask up to

MR. SATORIUS: MP-197

CHAIRMAN MACFARLANE: 62 gigawatt days per metric ton. Does that have two different, shall I call them heat settings? The storage heat setting and the transport heat setting?

MR. LOMBARD: Well it has to meet the requirements on both ends of the spectrum.

CHAIRMAN MACFARLANE: Right, so it's got a

different -- it's got a different maximum heat allowance for storage than for transport?

MR. LOMBARD: There are technical specifications that you have to meet prior to your Transportation. So you'd have to meet those requirements.

CHAIRMAN MACFARLANE: Right, but that -- just tell me, is that lower than the lower for storage?

MR. LOMBARD: Oh, absolutely.

CHAIRMAN MACFARLANE: Like half?

MR. LOMBARD: It's -- it's -- yes. The limit on storage is 400 degrees C maximum.

CHAIRMAN MACFARLANE: Okay.

MR. LOMBARD: The limit on Transportation is 185 degrees C at the accessible surfaces.

CHAIRMAN MACFARLANE: Great numbers, I like it.

MR. LOMBARD: But if I could, I'd like to add that it depends on the loading strategy --

CHAIRMAN MACFARLANE: Yes, of course.

MR. LOMBARD: The statement that I made earlier that you have to wait so long to transport a certain canister or cask. And that may not necessarily be true depending on the loading strategy. And we're looking at an amendment with the loading strategy now that is a little different. It didn't wait until the

end of the campaign to load the high burn-up fuel, the hotter fuel. It's a mix so we can load essentially, almost consistent heat load across the target that we've made.

CHAIRMAN MACFARLANE: Will we keep track of the thermal output of these canisters? Do we understand -- do we know how our licensees are actually loading these canisters?

MR. LOMBARD: We don't formally.

CHAIRMAN MACFARLANE: Okay.

MR. LOMBARD: We've had that discussion previously I believe.

CHAIRMAN MACFARLANE: Yes, I always think it's good to keep track of these things.

MR. LOMBARD: It is. But I will say also that DOE on the R&D side, are really looking at the characterization of fuel across the country. And they're really monitoring and cataloging all that information. The EIA --

CHAIRMAN MACFARLANE: Right. I hope we're talking to them a lot. They're the ones --

MR. LOMBARD: We talk to them very frequently.

CHAIRMAN MACFARLANE: Okay.

MR. LOMBARD: And we're very interested because that information is helpful to us in doing

analysis of future designs.

CHAIRMAN MACFARLANE: So actually my real question here is are we considering, so -- I'm trying to understand, if this is the case, if some licensees are loading these casks up to the full maximum capacity because they want to get the most bang for their buck in terms of their money. Are we making them aware of what they're committing themselves to? Probably not.

MR. LOMBARD: We have those discussions frequently with members of the public and members of -- ISFSI operators and licensees absolutely.

CHAIRMAN MACFARLANE: So how do we then consider the implications of allowing high thermal capacity casks in the future? And I think this goes back to Commissioner Ostendorff's question and you said that well as a citizen I would like us to do that.

But it seems to me there is a safety issue there that we should be considering because if this means that a site will have these casks for a long time, and be allowed to maintain them for a long time, over that time period there might be more of a chance for something to go wrong in the cask. You might have a need for repackaging.

So it seems that we should -- it should be in my view incumbent upon us as a safety regulator to be thinking about this potential safety issue in the

future. So you could actually think about it, and.

MR. LOMBARD: Yes. Yes ma'am exactly. That's what we're doing in Extended Storage and Transportation Program, looking at what are the long term implications of greater than 120 years of storage and eventual transportation, what does that really mean?

If you look at static storage, what are the mechanisms that could actually affect fuel? And you look at things like this potential for fuel pellet swelling due to the hydrogen concentration and other things like that. So we are looking at that long term.

There's nothing that indicates short term that there are going to be mechanisms that could affect the -- could affect cladding integrity, but we totally can do it under the EST program, Extended Storage and Transportation.

CHAIRMAN MACFARLANE: Okay. Again, that 120 years, that's arbitrary and doesn't meet the GEIS, you know.

MR. LOMBARD: Yes. And you're right, we actually had that direction before Waste Confidence Continued Storage and we need to bring them together.

CHAIRMAN MACFARLANE: Yes, yes. Okay. Any other questions? No? Okay. Well I really thank you guys very much. It was a great discussion. I

appreciate all your hard work. And I consider this now closed, thank you.

(Whereupon, the above-entitled matter went off the record at 11:47 a.m.)