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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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33RD REGULATORY INFORMATION CONFERENCE (RIC)

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SPECIAL PLENARY SESSION ON THE  
10TH ANNIVERSARY OF FUKUSHIMA

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THURSDAY,

MARCH 11, 2021

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The RIC session convened via Video  
Teleconference, at 9:30 a.m. EST, Andrea Veil, Acting  
Office Director, NRR, presiding.

PRESENT:

CHRISTOPHER T. HANSON, NRC Chairman

DAN DORMAN, Deputy Executive Director for Reactor and  
Preparedness Programs, NRC

KOJI TOMITA, Ambassador, Extraordinary and  
Plenipotentiary to the United States of America

WILLIAM MAGWOOD, Director General, Nuclear Energy  
Agency

JUAN CARLOS LENTIJO, Deputy Director General,

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International Atomic Energy Agency

ROBERT WILLARD, President and Chief Executive Officer,  
Institute of Nuclear Power Operations

SHUICHI KANEKO, Director-General for Oversight,  
International Affairs, and Fukushima, Nuclear  
Regulation Authority, Japan

ANDREA VEIL, Acting Office Director, NRR

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## P R O C E E D I N G S

9:29 a.m.

MS. VEIL: And now I'm very pleased to welcome Chairman Hanson who will begin our special session on the tenth anniversary of the Fukushima accident.

CHAIRMAN HANSON: Good morning, and welcome to the final day of the RIC. I'm pleased to have the opportunity to welcome you and a panel of very distinguished speakers to this special plenary session to commemorate the Fukushima Daiichi accident.

Today marks a decade since the Fukushima accident, initiated by the great Tohoku earthquake and subsequent tsunami. Although I was not part of the Commission in 2011, I am keenly aware of the profound impact of this day on the Japanese people and the extraordinary work they and the government of Japan undertook in the aftermath of both the natural disaster and the Fukushima accident.

The strength and resilience of the Japanese people were demonstrated countless times in response to the disaster over the last ten years. Sadly, over

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20,000 people perished. In honor of those who lost their lives in the tragedy, please join me in a moment of silence.

Thank you. Honoring the accident at Fukushima is not just looking backwards, it's learning from it and moving forward. The impact of the accident on the United States and the global nuclear community has been profound. The NRC, nuclear regulators worldwide, and international organizations have worked diligently to share information and implement the lessons learned to enhance global nuclear safety.

Implementation of the lessons learned has differed around the world. I recognize that each regulator and nuclear operator has its own unique set of circumstances to contend with. But these lessons learned have been implemented with the same goal in mind, increased plant safety.

I firmly believe that due to the actions taken by the nuclear community worldwide operators have a greater ability to mitigate future beyond design basis events. However, we must remain vigilant in our nuclear safety activities.

While I'm confident in the actions the United States has implemented to enhance nuclear

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safety, I remain dedicated to continuing to ensure the US reactor fleet fully implements, maintains, and exercises those measures required in the aftermath of the Fukushima accident.

I will conclude by noting that engaging in the type of dialogue we will hear in this session, and throughout the RIC, is key to continuing to ensure we remain cognizant of global nuclear safety practices that can inform and strengthen our respective regulatory programs.

I look forward to hearing from this session's respected panelists as they reflect on the Fukushima accident and share how their respective organizations will continue to implement the lessons learned in the future as well as their thoughts on the accident's legacy on nuclear plant safety.

I'd like now to direct your attention to a video message from the Ambassador Extraordinary and Plenipotentiary of Japan to the United States of America, Koji Tomita.

AMBASSADOR TOMITA: Hello to all of you gathered for this important conference. Every Japanese has his or her own memories of the day, ten years ago exactly, when the earthquake and tsunami hit.

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I was working in Tokyo at the Foreign Ministry as Deputy Director General of the North American Bureau. I saw things moving on my desk. I saw the concern on people's faces. But up in Tohoku, much more deadly and serious things were happening. I don't need to list the destruction that occurred.

As I told a group the other day, I saw the support that the US sent. It was a moving thing to witness, all the service members, the aircraft, the ships, the disaster aid coming together in this arsenal of friendship. We feel deeply appreciative.

With the accident at the Fukushima Daiichi Power Plant, the US government dispatched responders from NRC, DOE, the White House, OSTP, and also the US Navy. A decade has since passed, and the reconstruction is making visible progress.

The decommissioning of Fukushima Daiichi has also progressed, but it will take 30 to 40 years to complete the process. It will require tremendous efforts as well as international cooperation.

The government of Japan is proceeding with the decommissioning with transparency based on scientific evidence and with support from international organizations like IAEA and OECD NEA.

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I would also like to recognize the process that's been made in communications between regulators and operators around the world to enhance nuclear safety. For example, the Japan Nuclear Regulation Authority was established in 2012. And just last year, in 2020, it introduced a new safety scheme modeled on the NRC's reactor oversight process to clarify the responsibilities of regulators and operators.

Today's panel discussion is another opportunity to share the lessons learned as we increase nuclear safety going forward. Thank you for the work you are doing and my best wishes to you all.

MR. DORMAN: Thank you, Chairman Hanson and Ambassador Tomita. Good morning, afternoon, and evening to you all. My name is Dan Dorman. I am the Deputy Executive Director for Reactor and Preparedness Programs for the NRC, and I have the privilege to be the session moderator today.

As we go through the session today, please feel free to ask any questions that you may have using the Q&A feature on the right side of your screen. And as we get toward the end of the session, we will answer as many questions as time allows.

At this point, I'd like to begin

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introducing the panel members for today's discussion. Shuichi Kaneko is the Director General for Oversight, International Affairs, and Fukushima for the Nuclear Regulatory Authority of Japan.

Following the accident ten years ago, Mr. Kaneko had the role to coordinate governmental counter measures at the Crisis Management Center in the Office of the Prime Minister of Japan. He also participated in the preparations to establish the new regulatory body in Japan, which is now the Nuclear Regulatory Authority, where he holds leadership responsibilities.

So I welcome Director General Kaneko, and thank you for joining us today at the end of a very long day in Japan.

Juan Carlos Lentijo is the Deputy Director General of the International Atomic Energy Agency. He joined the Agency in 2012 and in 2015 was appointed deputy director general and head of the Department of Nuclear Safety and Security for the IAEA.

Prior to joining the IAEA, Deputy Director General Lentijo served with the Spanish nuclear regulatory body starting in 1984, and from 2003 to 2012 served as the general director for Radiation Protection.

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Deputy Director General Lentijo, thank you for joining us today, and welcome.

William Magwood IV is the Director General of the Nuclear Energy Agency in Paris, France. He was, from March 2010 until August of 2014, a commissioner of the US Nuclear Regulatory Commission.

He has extensive experience in both the regulatory and developmental aspects of nuclear energy, including at the international level. And while a Commissioner of the NRC, he advocated the importance of nuclear regulatory independence and the necessity of maintaining strong, credible, and technically sound nuclear regulation in all countries that use nuclear power.

Prior to joining the NRC, from 2005 to 2010, he provided independent strategic and policy advice to US and international clients on energy, environment, education, and technology policy issues. And from 1998 to 2005, Mr. Magwood was the director of the US government's civilian nuclear energy program at the US Department of Energy.

Director General Magwood, welcome and thank you for joining us.

And finally, Admiral Robert Willard,

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President and Chief Executive Officer of the Institute for Nuclear Power Operations. Admiral Willard was elected president and chief executive officer of the Institute of Nuclear Power Operations in 2012.

Prior to that, he had a distinguished career in the United States Navy. Beginning as an F-14 aviator, he served in a variety of fighter squadrons aboard several aircraft carriers rising to command of the nuclear-powered aircraft carrier USS Abraham Lincoln.

As a flag officer, Admiral Willard twice served on the Joint Staff, was deputy and chief of staff for the US Pacific Fleet at Pearl Harbor, Hawaii, commanded the Carrier Group 5 aboard the USS Kitty Hawk, and commanded the US 7th Fleet in Yokosuka, Japan.

In March of 2005, Admiral Willard became the 34th vice chief of Naval Operations, and in May of 2007, he assumed command of the US Pacific Fleet.

And in October of 2009, he became the commander, US Pacific Command. He retired from the Navy after a distinguished career in 2012.

Admiral Willard, welcome to the session, and thank you for joining us today.

I appreciate each of you agreeing to

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participate today as we mark the tenth anniversary of the accident at the Fukushima Daiichi Nuclear Power Station. Each of us were involved in one way or another, either directly dealing with the immediate effects from the accident or striving to learn the lessons to make the safe use of nuclear power even safer.

So first I'd like to take a brief look back at ten years ago, where we were, what we were doing, and any reflections on that event. In March of 2011, I was a senior manager in the NRC's Office of Nuclear Material Safety and Safeguards.

And during the first week after the earthquake and tsunami, I led the executive team in the NRC's Response Center here in Rockville supporting a team that we sent to Tokyo, that you heard about earlier from Nathan, and working with US stakeholders to develop strategies for sustainable cooling at the reactors at the plant.

On March 18th I was asked to go to Tokyo to support the US Ambassador there and to engage our Japanese colleagues who were valiantly striving to address the challenges at the plant. Upon my return to the US in early April, as you heard from Nathan, I was privileged to serve as a member of the NRC's Near-

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Term Task Force tasked with identifying early lessons from the accident.

The objective of that task force was to conduct a methodical and systematic review of relevant NRC regulatory requirements, programs, and processes and their implementation and to recommend whether the Agency should make near-term improvements to our regulatory system in response to the events in Japan.

Many of the actions taken in the US over the last decade, which have been discussed in various plenary and technical sessions throughout this conference, find their roots in the work of the Near-Term Task Force.

At this point, I'd like to turn to Director General Kaneko and ask you to share, sir, your reflections of what you were doing in March of 2011 and the days that followed.

MR. KANEKO: Thank you very much, the chairman and the coordinator. Good morning, everyone, gentlemen and ladies, and also good afternoon and good evening.

First of all, please let me say thank you very much giving us the opportunity to join the session.

And also I'd like to express my gratitude to NRC for

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a huge amount of support after the accident to recover at disastrous situation and reinforce our regulatory framework so far. And also my appreciation is not only to NRC but also to the international colleagues during the investigation.

In response to the question from Dan, there are many lessons from our early stage of the response.

Of course, the first one is the things not prepared is not operable. So those are the quite important things we learned.

However, based on my personal experience from the early morning of the second day of accident, so the confusion was actually met, and even in the center of our government Crisis Management Center.

And information sharing and control lines are really important. So the kind of lines, and of course the situation of that Command Incident System is quite important to respond to the kind of catastrophe of the situation.

So that is one of the prepared situations for the incident command line, like such things. So this is our and my great reflection from that first two or three days of the accident.

Thank you very much for the question.

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MR. DORMAN: Thank you, Director General.

I want to turn for a moment to Admiral Willard. You were the commander of the US Pacific Command. You were responsible for US forces stationed in Japan during this time. And, sir, I'd welcome your reflections on your experience at that time.

MR. WILLARD: Yes, thank you, Dan. And thank you for having me at the RIC and greatly appreciate the effort that all of you have made to make this regulatory conference so successful this year, albeit from remote settings.

When the earthquake struck Japan, I was in my headquarters in Hawaii. It was a work day for us, and in the afternoon. The tsunami and typhoon center for the Pacific is located coincident with the US Pacific Fleet commander. So we were immediately notified that the earthquake had happened and that a tsunami warning was in effect.

And from my office I have a very profound memory of, on television, the tsunami waves lined up heading toward northern Honshu. And in addition to our concerns for the Japanese people, obviously in the path of all this and having been struck by the earthquake, the United States military has about 50,000

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service members in Japan alongside their families. So our tasks were immediately to determine what impact the disasters may have had on the service members and their families that were in the country.

But as the tsunami unfolded, our concern really shifted to the forces that we had in the area that we might access to bring to bear and offer to General Oriki, the Chief of Defense of Japan, in support of what were inevitably going to be his efforts in search, and rescue, and so on. And ultimately, it was a carrier strike group, two amphibious ready groups, and many of our commands in Japan that became the supportive element for General Oriki going forward.

In all, we supplied over 20,000 troops that included ships and aircraft that operated in and around the tsunami-stricken region to include in support of the Fukushima Daiichi accident. We were able to bring to bear many technologies, including intelligence technologies, that could help to characterize the disaster area to include the Fukushima plant.

And once I was able to break away from my commitments to keep the Pentagon and the White House informed of things, my wife and I flew to Japan and joined the Ambassador and his spouse for a tour of the

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tsunami-stricken region. And I would tell you that the destruction that the Japanese people were contending with was indescribable.

And we ultimately met with some of the survivors, and it was heart rending to see what had occurred in northern Honshu. And over the next several weeks, it was really the focus was, for us, had shifted to the support for General Oriki's forces and the Fukushima disaster itself.

And I would tell you that there were countless lessons that we learned through all of this.

It was a profound experience, both for us in command and for the troops on the ground. Ultimately, we were decontaminating ships, and aircraft, and personnel through all of this. So again, many, many lessons learned for the US Armed Forces in this and for the Japanese Defense Forces. A remarkable situation.

MR. DORMAN: Thank you, Admiral. Let me turn to Director General Magwood. You were on the Commission here in Rockville at the time. Would you share your memories and reflections of those early days of the event?

MR. MAGWOOD: Yes, Dan, and it's good to see you. You're an excellent public servant and it's

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been a pleasure to serve with you and to see you again.

Let me just begin by congratulating Chairman Hanson and all the NRC team for putting on such a fantastic virtual RIC, particularly Ray and Andrea. I know how much goes into doing this, and I think they just did an extraordinary job this year, so congratulations.

When I think about this period, I actually think about the day before March 11th. I think about March 10th. And I think about March 10th because it was last day of the RIC, and it had been a long day. And my very last meeting on March 10th was a very long, very technical, very detailed, very late, meeting with the Japanese Nuclear Safety Commission.

And they had come to tell us about all the great work that had been done in Japan to prepare for potential earthquakes at nuclear power plants. So we had a lot of analysis they were showing us, and tools they had developed. And they were very proud of this.

And we spent more than two hours going over this. So when I went home, I was very tired. I went to bed.

And so when I woke up the next morning, the very first thing I heard was the news about the tsunami. And my immediate reaction, of course, was

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to rush to the office. But I wasn't thinking about anything nuclear. I was thinking about all the friends and colleagues I have in Japan, and I tried to reach people. And of course, communications were terrible. You couldn't reach anyone.

And my staff and I were watching the situation unfold, watching the horrible images of the tsunami. And I think it's important, and I'm glad that Chairman Hanson highlighted this, to remember that the true tragedy of 3/11 was not necessarily the nuclear accident. It really was the tsunami, 20,000 people lost from that terrible tragedy. And I think that sometimes gets forgotten over the period of time in many places.

But it was later that morning we started to hear about the problems at the Fukushima Daiichi plant. And of course, the more we heard the more concerned we became, and it started to take our attention. And it's really fair to say that Fukushima Daiichi has held our attention really for the last ten years.

Because there has been so much that has come from this, mostly lessons learned that we have absorbed around the world to improve nuclear safety,

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but also some recognitions that perhaps there were some things that we had not quite understood about the whole nature of operating nuclear facilities.

And I think that some of it was just the recognition about the vulnerabilities that come from the human aspects of nuclear safety. Something I think we all understood, and we all knew about safety culture and the importance of training, but I don't think we fully appreciated how instrumental the decisions made on a daily basis can mount up for a nuclear facility.

When you look at the Fukushima Daiichi facility and the decisions that were made over the course of years, not just during the incident but really years before the incident, choices that were made that perhaps would not fully reflect a safety culture, how that mounted up over a period of time to create the situation that we saw.

And that includes the decisions made by the regulatory body. You know, we recently, at the NEA, issued a new report looking at how to manage the strength in safety culture regulatory bodies.

And this is work that has come out of this whole incident, recognizing that if the regulator, the operator, all of those involved, don't do their utmost

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to maintain a high level of safety, the vulnerability still exists. And it doesn't matter how good your designs are. It doesn't matter how much equipment you have onsite. So the people aspect remains very important. I think we realize that.

But my recollection, of course, is really more about the tsunami that first day than the nuclear facility. But of course, as I said, the facility sort of took over from that point forward, has been our attention for the last decade.

MR. DORMAN: Thank you, DG Maywood. Let me turn now to Deputy Director General Lentijo from International Atomic Energy Agency. You were not there yet at this time ten years ago. Share with us please, sir, where you were and what were your impressions at the time?

MR. LENTIJO: Thank you. Especially, thank you so much for inviting me to this panel with the company of these very distinguished colleagues and professionals.

Well, I was on my way back from Washington to Madrid after attending the RIC conference. In fact, it was a very long day for me, because in the evening of Friday, the 11th, I had my flight to return back

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to Madrid, but it was delayed.

And then when it was delayed, when I arrived in London where I have a connection, I missed my connection to Madrid. And I was in a waiting area watching several TV monitors where I could see a lot of images about a disaster in Japan. And some of them included a nuclear power plant, but it was not very clear what was happening with this nuclear power plant.

When I arrived Madrid very late on Friday, it was amazing, because I received immediately a phone call from the emergency center of the Nuclear Safety Council. I was an official of the Nuclear Safety Council, the regulator in Spain.

And they told me, they informed me that an accident, a nuclear accident was ongoing in Japan at Fukushima. And they told me, well, you need to get ready to attend a meeting immediately in our emergency center where we will prepare our strategy to deal with that.

Okay, I was extremely tired because my traveling was for more than 20 hours. But then I attended this meeting where they informed about the accident. And of course, this triggered a crazy time where I had to attend hundreds of meetings with Spanish

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authorities, with the government, with the Embassy of Spain in Tokyo, I don't know how many interviews with the media, et cetera.

What were my first thoughts? Well, let me tell you, my first thought was, of course, I was very worried about the impact on human life from the earthquake and tsunami. I don't think, we didn't know what was the scope of this nuclear power plant accident.

And it felt like the scope was, well, this is boiling water reactor. I know very well this technology. And I was sure, I assumed that the accident was under the design basis accident envelope. So that my initial thought was, okay, so the operable systems and procedures, the accident won't progress, and they will recover.

But unfortunately, this didn't happen. And the situation, as you well know, evolved dramatically and very rapidly towards the three reactor core meltdowns and the hydrogen explosions. This was very shocking for all of us, for all the professionals in the nuclear community. And then we started to follow this, I will mention now, following the information coming from the Incident Emergency Center of the IAEA.

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At that time, at the very beginning, the information was a little bit odd. It was very difficult to understand what was happening. So we recognized that they will, they were very active in promoting an improvement in the format and information that they share with us.

So this information, we were very conscious that the accident was very serious. And I was invited to participate in the first fact finding mission that was conducted by the Agency in Japan. It was impressive. This was an impressive experience. I had the chance to see firsthand the degree of destruction, not only off site but especially onsite and where it would impact our plant.

Well, as you can imagine, we saw these reactor buildings were totally destroyed, many times were displaced, with some cars were on the top of the tanks or on the top the buildings. It was really, really amazing, this experience.

And my feelings at that time were very, very clear. I saw that the Japanese had created some very robust centers to deal with this type of experience. For example, they have this seismic isolation center that was the onsite emergency center

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that was very robust and survived.

Then I had a thought that was, well, this is not only about Japan. This is not only about technology. This is mainly about persons. This is mainly about people, workers, working to mitigate the accident. And this is mainly about the international community of nuclear. We need to do our best to support Japan and to support ourselves in dealing with this accident. This was my initial thought. Okay, thank you.

MR. DORMAN: Thank you, Deputy Director General Lentijo.

So as we come from the immediate time and the crisis to bring stability to the plant, then we begin to focus to -- all of you have mentioned the need for change, the need to learn from this.

And so let me turn back to Director General Kaneko starting in Japan. Could you just touch on the most important changes that you learned were needed and that you have implemented over the last decade?

MR. KANEKO: Thank you, very much, Dan. I'd like to emphasize two things.

MR. DORMAN: Okay.

MR. KANEKO: The first one is the

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importance of the continuous improvement of safety. So as a regulator we are likely to, not likely to, but we have a tendency to satisfy the current situation of the safety. However the, **you know**, not estimated situation is coming in the not estimated future. So the continuous improvement of safety is really important.

There is a sort of Japanese saying, natural disaster comes when we forget it. This is the saying from the famous Japanese physician, Akihiko Hirata, who is maybe 100 years ago physician. So this is our very important in the fundamental lesson from the Fukushima Daiichi accident.

Because we did not change, we didn't change the regulatory standards about the coming tsunami or the earthquakes. At that time, even the new knowledge is pledged in the academic field and even to us and also to the licensees, those are somewhat, **you know**, they're thrown away from the safety field. So this continuous improvement of safety is the one.

And the other is the impact of the common cause failure in terms of the safety and security. It really has a critical impact to secure the safety and also to be prepared for the accident.

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So in terms of the redundancy, and also diversity of the counter measures are really key to protect the facilities and also the operation of the safety and security operation. So the common cause failure, it always has to be in mind. And the priority and the impact of the common cause failure is the first one in the current safety issues. Those are the two major lessons learned from the Fukushima Daiichi accident.

And actually we changed the regulatory framework to incorporate into our regulatory standard and the regulatory requirement to prepare for the common cause failure. And also we can incorporate the new knowledge and new findings into the current regulatory standard to be required.

Thanks for the question.

MR. DORMAN: Very good, thank you. Let me turn back to Deputy Director General Lentijo.

So, sir, as you make the transition in 2012 into the Agency, you have most of the last decade at the Agency. And I know there's been a tremendous amount of work at the Agency, both in the areas of nuclear safety standards and applying the lessons from the accident, and also applying the lessons into the peer

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review services of the Agency to strengthen the global nuclear safety. If you could just expand on those and perhaps share some examples.

MR. LENTIJO: Yes, thank you. Well, firstly, as you will note, the most important instrument that we put in place after the accident was the so-called accident plan on nuclear safety. That was an instrument to promote, not only through the Agency but through our member states, work together to strengthen nuclear safety globally.

And I could say that the distillation of this work was this Fukushima Report that we all know very well. This report was prepared by a group of more than 180 professionals, really the finest professionals in the relief of incidents. And it was prepared in a very systematic way.

Let me say, we collected the wisdom of the best experts in the world for putting together this report that described the accident, the safety implications, or the logical implications, et cetera.

And the most important is that, through the report, there are a good collection of, let's say, lessons learned to be implemented. There is no end for the lessons learned.

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I mean, it's better around the document.

So it is speaking to different subjects. But some of them are very technical, some of them are related to the improvement of the, let's say, site selection or the site impact of external events, the priorities, et cetera, et cetera. But some of these are mainly aimed to their root cause.

I concur 100 percent with Mr. Shuichi Kaneko. That the most relevant here is a safety culture. But the most important message from the Nuclear Safety Action Plan and from the report is that, okay, we identify lessons. But please, lessons are not just to put them in our book, in our very nice book.

They are to be acted upon and implemented in a real way, because there is no room for complacency in nuclear safety.

We have to emphasize that the safety first principle is of paramount importance. And behind this safety first principle, we have the safety culture. And we need to ensure that we promote the real integration of the safety culture along all the organizations dealing with nuclear safety.

And for doing that, it is obvious that there is a need of commitment, there is a need of definition

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of processes and procedures, there is a need for training. All the staff are called to participate in the safety culture to identify in a very active way progress and to seek solutions.

But it is mainly our leadership. So all our activities at the Agency has been moved to promote the leadership and safety culture around all organizations. If you'll allow me, we promoted our reflection of our main think tank in nuclear safety which is INSAG. You know already well that we have INSAG that was created after Chernobyl accident.

By the way, they promoted an INSAG publication about safety culture. This time, they prepare this INSAG-27 document which is about ensuring robust national nuclear safety systems which is a reflection on the role of these institutions involved in nuclear safety, in really promoting a strong nuclear safety framework in accounting, including regulators -- including operators and including all the institutions, mainly the government, to provide the appropriate resources to the regulators, et cetera.

So this is my main, let's say, thinking about our distillation in the Agency. Of course, as you mentioned before, we have improved many safety

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standards. We are still working. We improve all the requirements. We are now working with the safety guys.

And maybe you allow me something, which is important, is that we need to, all of you in your countries, performed what in Europe was called a stress test, in other parts you created the task force, et cetera, and it was obvious that you impacted the nuclear safety dramatically.

And this is important, is to build the future and to sustain this for the future. In my view, this is only sustainable through the real integration of the safety culture principle.

MR. DORMAN: Very good, thank you. Let me turn back to DG Magwood. So you made the transition from the NRC to NEA, and you lead a lot of multilateral efforts. You mentioned your report on safety culture. What other works of NEA engaged in looking at the lessons of the accident and anything else that you'd like to bring forward?

MR. MAGWOOD: Sure, thank you, Dan. Well, certainly there's been a series of reports looking at the Fukushima accident. The NEA reports have been less about the accident itself. I think the IAEA did a very good job of capturing the technical aspects of the

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accident.

We focused mostly on how people have reacted to the accident. And most recently we released a report called Fukushima Daiichi Nuclear Power Plant Accident Ten Years on, Progress, Lessons, and Challenges. We just released it last week.

And this really looks at the progress that's been made, both at the site and cleaning up the site, and around the world to incorporate these lessons, but also look into challenges that lay ahead.

And it's actually quite interesting to see how many challenges still are before us at this point in time, including further work in the area of safety culture. Juan Carlos mentioned this, I mentioned this, others have mentioned it, and I was not, and you probably don't remember this, Dan, but I was not really fully bought in to the whole safety culture discussion when I first came to the Commission.

Fukushima Daiichi completely changed my perspective on this. And I see safety culture as maybe the single most important issue that faces nuclear power going forward from a safety standpoint.

But another area that's very important to think about is the regulator itself. And I mentioned

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in our report on the safety culture, the regulator.

But when I was a commissioner, I spent a lot of time going to Japan talking to senior officials, talking to Diet committees, about why the NRC was such a good regulator and what do they need to do to bring that culture of an independent regulator to Japan.

We got into a lot of detailed conversations about how do you train people, how do you develop the staff, should you have a commission or a single administrator? We had all those conversations, really very powerful to reflect on that.

But when I look at the report that we just issued, something that really comes to mind for me is that the decisions that were made in the heart of the crisis on protective actions to evacuate people, immediate decisions made towards assuring that people were not exposed to radioactivity, many of the decisions had long term implications that quite frankly (audio interference) to the crisis.

But years later, we now see, and our report reflects this, we now see that these decisions had a lot of impact on the society, on the individuals. And I think this is now a thought process that we have to incorporate into our thinking about protective actions,

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not just protecting people immediately but protecting people in the long term. And that's something I think we have to reflect on.

One final thing I would highlight before, **you know**, moving on, is that one regulatory issue that has arisen from this, I won't say issue, it's a challenge, is that regulators are now in the midst of essentially regulating beyond design basis events.

To me this is the biggest single change from a regulatory standpoint that's occurred in the last ten years. This is not what regulators used to do. And now regulators are basically giving a lot of specific guidance on what to do in case of a severe accident, how to recover from a severe accident, how to prevent severe accidents.

And this changes the game for regulators around the world. And this is something that we're still sorting through, still understanding, and it'll probably be many, many years before we fully understand what the implications are.

MR. DORMAN: Good, thank you.

Let me turn to Admiral Willard here. So, sir, you came over to INPO. And INPO has a fairly unique role in the United States. We've heard about the

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importance of the safety culture and the regulatory body, but INPO is an industry driven organization that drives beyond the regulatory minimum, drives for excellence.

And so I'd welcome your thoughts as you've led that organization through the last decade of the lessons from Fukushima and how that has shaped the work of INPO and the performance of the US nuclear fleet.

MR. WILLARD: Thank you, Dan. I think if there was one word that would sum up the lesson learned from this very profound disaster, it would be prevention on the part of the nuclear industry.

And, **you know**, so part of that prevention was the work that the NRC undertook following the accident in terms of having our industry re-examine its beyond design basis physical plant to ensure that flooding hazards and other natural and/or manmade disasters could be contended with.

And I think the FLEX strategy that the industry undertook and invested heavily in is also part of that preventive measure that would have us avoid an accident like this in the future. And so prevention is truly what I think has, **you know**, been the single most profound approach that I think both the NRC and

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INPO have undertaken.

But there were many lessons from the accident at Fukushima. And INPO published a series of INPO event reports. And they ranged from the technical aspects of this particular accident to the leadership aspects.

And I guess the final comment I would make is the importance of leadership in crisis to be effective and the need for our industry to be made up of strong leaders that can lead in normal times but, more importantly, can lead when crises develop.

And to put my commander's hat back on just for a moment, **you know**, when I look at what we contended with in Japan following the tsunami and as the Fukushima accident grew in proportion, the chaos that existed in the area, the level of misinformation that was being communicated in the public domain, the challenge to decision making across the government and, **you know**, in support of what had happened at the plant, all of that had been affected by this overwhelming disaster that had taken place.

And if we zero in on the site itself, I was struck during this entire engagement with how isolated TEPCO and the site seemed to be from the rest

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of the nuclear power industry. And I would like to believe that, at a time when a site needs mutual support from its industry members, we would always have it in the future.

And I think we take great pride in the United States with regard to the amount of mutual support that's evident every day across our industry.

And it's especially key in crises like this one.

MR. DORMAN: Thank you, Admiral. I appreciate the focus on prevention. A number of our panelists have touched on the scope of the disaster in Japan well beyond the nuclear issue.

And I know my impressions from the weeks that I spent in Japan in March of 2011 were largely of communities 150 miles, 250 kilometers from the plant that had been completely destroyed.

And the scope of, I think somebody touched on the 20,000 or so that lost their lives from this disaster. There were millions without water and without power. And they didn't have homes that had their basements flooded that they would go back to and dry out their home. Not only their home but their entire community was destroyed.

And that backdrop just impressed upon me

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that in a disaster, in a natural disaster that puts a nuclear power plant at risk, the civil society has so much more to deal with that it's essential that the nuclear industry is able to keep the reactors safe.

And I observed that the operators that remained at both Fukushima Daiichi and at Fukushima Daini, both were dealing with challenges from the tsunami. And they knew what they needed to do. But they did not have the equipment and the procedures available to them, and so they were scrambling. They were working very hard to restore stability to those plants. And at Fukushima Daini, they were able to do so. And at Daiichi, they simply ran out of time.

And so it's that what I took back to the NRC's Near Term Task Force. And the recommendations that ultimately became the US industry's FLEX program and, in fact we haven't mentioned it here today, but the FLEX program includes two response centers in Tennessee and Arizona that will provide backup equipment.

So we have equipment at the US nuclear power plants, but then there is backup equipment that can be delivered to any plant in the country within 24 hours to make sure that the operators have the resources that

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they need to prevent the disaster outside the plant from becoming a disaster inside the plant.

So thank you, thank you all for your thoughts on that. We are getting some questions from the audience. I'm going to turn first to Director General Kaneko. It was noted that there was fairly significant seismic event off the east coast of Japan last month. And any updates you can give us on the conditions at the Fukushima Daiichi?

MR. KANEKO: Yes, thanks for the opportunity to explain that kind of situation. On actually February 13th we had a quite large earthquake in the Fukushima area which was less magnitude earthquake, but the vibration at the surface of the land was just a little bit smaller than ten years ago.

And in the Fukushima Daiichi site the kind of stacked pile of the containers which stores solid, slightly radioactive -- or sort of collapsed. And the tanks containing water after the treatment of the radioactive material removal are slightly moved in the several locations. And also water level inside the primary containment vessel in Units 1 and 3 has been slightly decreased.

Those are the sort of effects, but the

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consequence of the radioactive pollution or the effects to the environment is not detected. So the consequence is very small. So that's a kind of update from that February earthquake.

MR. DORMAN: Good, thank you for that update.

Director General Magwood, in looking to the future, what is the NEA doing to help implement lessons about understandable radiation protection standards and the health effects of both low dose radiation and the impacts of the fear of low dose radiation?

MR. MAGWOOD: Well, those are challenging issues. And we're dealing with them as best we can.

I think the first thing we've started to do is we've started to work with the organizations that fund low dose research around the world to coordinate their efforts so that they don't duplicate their research, so that they magnify the effect of the work that they do pursue to try to understand the science behind low dose radiation which is very difficult.

But also we are taking a real leadership role in pushing the optimization agenda. This is something that is very complex. It is a way of looking

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at regulations in the context of society and making decisions not just simply based on the doses but recognizing that, perhaps in some cases, a little more dose is better if, in the long term, it would benefit society.

So we're looking at those sorts of issues.

They are going to be very complex, and there's a long conversation. But one thing that Fukushima Daiichi did is it created a global dialogue among all the regulators and all the operators the like of which we've never seen before. And so we do see this conversation taking place on a global basis. And it's very satisfying.

MR. DORMAN: Good, thank you. And as we shift our focus to the future, I note we have about five minutes left, Deputy Director General Lentijo, in a recent IAEA bulletin, DG Grossi indicated IAEA will be hosting a conference on the international -- Conference on a Decade of Progress After Fukushima Daiichi. Can you give us a preview of that?

MR. LENTIJO: Yes, of course. Initially we planned this conference, a high level conference to reflect, to promote the reflection of what happened at Fukushima but mainly to project ideas for the future

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to continue contributing to strengthening nuclear safety globally.

It was planned to be held around the 11th of March this year. But unfortunately, a pandemic situation prevented us to do it, because we reflected, and preferred to try this with strong potential in-person, in-person conference to facilitate some networking. It's not only about a conference finally, or conference speakers to say things, but also to promote networking.

So the idea now is to move this conference to November this year where we cross our fingers and expect that the situation would have been improved. And I see so far we have already, and there's a lot of time between the 8th and the 12th of November this year, and the idea on this is to build on the lessons learned and to prepare the system to continue, let's say, facilitating exchange of information, which is our main role, to facilitating our services, and especially to facilitating the places for dialogue, and for comment, reflection, and promoting nuclear safety.

So I invite you. I think that your Chairman, Christopher Hanson, is one of the members

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of the special committee that we put in place to prepare this conference. And I am very confident that the conference will be really implemented in November, maybe as not only in person but maybe hybrid so that we will have also others, not only people coming to Vienna.

And I attach a great relevance to this conference as we mentioned before to facilitate building a better future. So this is one of the instruments that we've tried to put in place to elaborate what we have learned in real implementation of safety improvements or safety procedures. Thank you so much.

MR. DORMAN: Thank you. So in the very short time we have left, I have a quick question for all of our panelists. There is a lot of conversation about climate change, and the demand for power, and the need to reduce carbon, and the role of nuclear in that. And in that context, there are a number of countries that have not had nuclear power that are seeking to develop programs for nuclear power.

And as you reflect on the lessons from the Fukushima accident, what's the key message that you would give to a country that is establishing the

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infrastructure to build a nuclear program. And I'm going to start with you, Deputy Director General Lentijo.

MR. LENTIJO: Well, thank you. Yes, it's obvious that nuclear can play a role in helping the human kind dealing with this very difficult situation.

My insight is very simple. I think that we have lived, and now we have nuclear power plants which are safer than they used to be in the past.

And if you remember one of the things that the community did, the contracting parties of the Commission of Nuclear Safety, was to put together data.

They, let's say, adopted this Vienna declaration principles early to encourage the designers and the community to design safer nuclear power plants.

But there is also a very strong commitment in upgrading the system of nuclear reactors towards the same objectives, to prevent, let's say, the large accidents with large consequences.

And the third criteria, as I said, the principle, it is the Vienna declaration on nuclear safety is very important. Because, you know, that our safety standards are not mandatory for countries. But for this principle, there is a very clear encouragement

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to the regulators, to the authorities, to the operators in the countries, to use our agency safety standards as a benchmark to prepare the national regulations.

So that in my view, nuclear has learned and is ready to continue promoting safer facilities for safer work and contributing to the outcome of the change to countries. Thank you.

MR. DORMAN: Thank you. DG Magwood, a quick thought.

MR. MAGWOOD: Sure. I think that I have learned that while there are new technologies coming, there will be some very interesting innovations with small reactors and micro-reactors and Fluor reactors.

It comes back to something I said earlier, which is it comes back to the people. So I don't think that the technology, the modifications matter as much as having a well trained work force that works in the right kind of culture with the right leadership, to echo Bob Woodward's very pertinent remarks. But also with an independent, strong regulator that has resources to be able to oversee.

I think if you have these elements safety is in pretty good shape. If you don't have those elements it doesn't matter how good your technology

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is you are going to run into problems. So that is the focus I would bring to these newcomers. Get the regulator right, get the culture right, train your people, develop leaders and you will be fine.

MR. DORMAN: Thank you. Admiral Willard.

MR. WILLARD: I would offer how important it is to learn from the past. I think that this opportunity that the NRC has taken to bring Fukushima lessons forward is a good example of that. Having taken on those lessons, as all of us did in the international nuclear community, we have made ourselves more resilient and it is frankly a set of lessons we can never forget. So regardless of new technologies and the opportunity to build resilience into our future reactor designs. I think so long as we keep the lessons of the past before us we will be much better prepared to deal with beyond design basis situations or any situations that we are confronted with going forward.

MR. DORMAN: Great. Thank you, and for the final word Director General Kaneko.

MR. KANEKO: Thank you. Just one word. Learning from other countries' experience is very important. Not only the safety, the research activities, operational experience in generating

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achievements, and other aspects surrounding nuclear energy should be taken into account for each country's situation. Thank you.

MR. DORMAN: Thank you and I want to thank everybody who stayed with us. We are a couple of minutes over but I want to thank every member of the panel for taking the time out of your very busy and important schedules and sharing your thoughts with us today. This concludes this Fukushima anniversary plenary session. Thank you.

(Whereupon, the above-entitled matter went off the record at 10:33 a.m.)

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