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NUCLEAR REGULATORY COMMISSION

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 Petitioner – 10 CFR 2.206 Petition
 Regarding Hardened Containment
 Vents for Boiling Water Reactors with
 Mark I Containments

Docket Number: (n/a)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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10 CFR 2.206 PETITION REVIEW BOARD (PRB)

CONFERENCE CALL

RE

HARDENED CONTAINMENT VENTS OF ALL BOILING-WATER

REACTORS WITH MARK I CONTAINMENTS

(EPID L-2020-CRS-0003)

+ + + + +

WEDNESDAY

FEBRUARY 3, 2021

+ + + + +

The conference call was held, Perry
Buckberg, Petition Manager, presiding.

PETITIONERS: MARK LEYSE

PAUL GUNTER, Beyond Nuclear

PETITION REVIEW BOARD MEMBERS

BRIAN SMITH, NRR/DANU

BRIAN LEE, NRR/DSS/SCPB

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Adjourn.....

P R O C E E D I N G S

2:01 p.m.

MR. BUCKBERG: Good afternoon. I'd like to thank everybody for attending this Nuclear Regulatory Commission, or NRC, public meeting. The purpose of today's meeting is to provide the petitioner, Beyond Nuclear, an opportunity to address the Petition Review Board, or PRB, regarding their petition to require that the hardened containment vent system venting capacity be increased for boiling water reactors with Mark 1 containments.

My name is Perry Buckberg, and I'm the petition manager for this petition. I'm also a Senior Project Manager in the Division of Operating Reactor Licensing in the NRC Office of Nuclear Reactor Regulations. I'm also the NRC's Agency 2.206 Petition Coordinator.

A Petition Review Board, again PRB, typically consists of a petition manager, a chairman at the Senior Executive Service level, an office or agency petition coordinator, and other Board Members who are determined based on the technical content of the petition.

The PRB Chairman is Brian Smith, Deputy Director of the Division of Advanced Reactors and

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Non-Power Production and Utilization Facilities in the Office of Nuclear Reactor Regulation.

We will introduce the other PRB members later. As part of the review of their petition Beyond Nuclear has requested this opportunity to address the PRB.

This is a Category 1 meeting. The public is invited to observe this meeting, and will have an opportunity to communicate with the NRC after the business portion, but before the meeting is adjourned.

Any licensee staff may respond to questions if they choose.

There are three categories of NRC public meetings. More detailed information of these meetings can be found on NRC public website, www.nrc.gov.

As this is a public meeting there will be no safeguards, nor official use only information discussed. This meeting began at 2:00 p.m., and is scheduled to end at 3:00 p.m. Eastern Time. After introductory remarks, Beyond Nuclear will address the Board, and then there will be a brief question and answer phase.

The meeting is being moderated and recorded by the NRC Operations Center, and will be transcribed by a court reporter. The transcript will

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become a supplement to the petition, and will also be made publicly available. Is the court reporter present and able to record the meeting?

(No audible response)

MR. BUCKBERG: Thank you. Now we'll do introductions. I have at least a partial list of people attending the meeting. When I read each person's name, please acknowledge you're on the phone by clearly stating your name, your position, and the office or organization you work for, so we have the information for the record.

Again, my name is Perry Buckberg. I'm a Senior Project Manager in the Division of Operating Reactor Licensing in the Office of Nuclear Reactor Regulation. That's DORL for short, for others that follow me.

For the PRB members first I have Brian Smith on the line.

MR. SMITH: Yes. This is Brian Smith. I'm here.

MR. BUCKBERG: Brian Lee.

MR. LEE: Yes, I'm on the line. This is Brian Lee. I'm a safety engineer.

MR. BUCKBERG: Brian, are you dialed into the phone number?

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MR. LEE: Brian Lee or Brian Smith

MR. BUCKBERG: Brian Lee.

MR. LEE: No, I'm not.

MR. BUCKBERG: You're going to need to do that. That's, I'll give it to you real quickly, 800-772-3842. And pass code is 2206.

MR. LEE: One more time.

MR. BUCKBERG: Sure. 800-772-3842. Pass code is 2206.

MR. LEE: Okay.

MR. BUCKBERG: Anybody else who's connected virtually through the NRC needs to call that same phone number, if you haven't already. Thanks. Let me continue. Don Algama.

MR. ALGAMA: Yes, sir, I'm here. Don Algama, Reactor Systems Engineer in the Office of Research.

MR. BUCKBERG: Thank you, Don. Bob Bernardo.

MR. BERNARDO: Yes, I'm here. It's Bob Bernardo in NRR, Division of Operator Reactor Licensing. And I'm a Project Manager.

MR. BUCKBERG: Thanks, Bob.

Rao Karipineni.

MR. KARIPINENI: Yes. Rao Karipineni.

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I'm a Plant Systems Engineer, Safety and Plant Systems Engineer in the Division of Safety Systems of Nuclear Reactor Regulation.

MR. BUCKBERG: Thank you. For other PRB contributors, I have Hossein Esmaili. Are you on the line, Hossein? Brett Titus. Hossein or Brett, either one of you? Rob Carpenter. Please make sure you unmute your phones before you try to talk, in case I, in case you were trying.

I'll continue with other NRC staff I believe are in attendance. Caroline Carusone?

MS. CARUSONE: Hey, Perry, this is Caroline. Yes, I'm on the call. I'm the Deputy Division Director for the Division of Operating Reactor Licensing.

MR. BUCKBERG: Thank you. Undine Shoop. Nate Jordan. BP Jain. Jenny Tobin.

MS. TOBIN: Hi. This is Jenny Tobin, J-E-N-N-Y, T-O-B-I-N. I am a Project Manager in DORL. And Peach Bottom is one of my plants. Thank you.

MR. BUCKBERG: Thanks, Jenny. Andy Hon. Zack Stone. Any members of the NRC whose names I didn't call?

MS. SHOOP: This is Undine Shoop. I'm the Branch Chief in DORL, with oversight of the 2.206

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process.

MR. BUCKBERG: Hi, Undine. I'm sorry. I called your name earlier. I hope I didn't talk over you.

MS. SHOOP: I know. No. Actually I was a little bit late. I apologize for that.

MR. BUCKBERG: Not at all. Anybody else from the NRC?

MR. SEBROSKY: This is Joe Sebrosky. I'm late, Perry, sorry.

MR. BUCKBERG: Thanks, Joe. Any other NRC staff on the phone?

MR. TITUS: Perry, this is Brett Titus. I don't know if you called my name earlier as well. I was joining the phone call.

MR. BUCKBERG: That's good. I've got Joe and Brett now. Any other NRC staff want to identify themselves?

MS. LIU: Tilda Liu. I'm from NMSS.

MR. BUCKBERG: Please mute your phones if you're not talking. I'll get to it later but *6 is the way to mute. You can probably mute your phones otherwise the old fashion way. Thanks, Tilda. Anybody else from the NRC? Please speak up.

MR. ESMAILI: Perry, did you get my name?

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This is Hossein.

MR. BUCKBERG: I did. At least, I called on you. But thanks for verifying. I'll move on to the petitioners. Mr. Gunter, Paul Gunter, are you on the line?

MR. GUNTER: Yes. Can you hear me?

MR. BUCKBERG: I can hear you fine. Thank you. Mark Leyse.

MR. LEYSE: Yes, I'm on the line.

MR. BUCKBERG: Thank you. Licensee staff. Anybody from the licensees? BWR Mark 1 licensees who would like to identify themselves?

MR. ENFINGER: Hey, Perry. This is Tim Enfinger from Southern Nuclear.

MR. BUCKBERG: Thank you.

MS. HULVEY: Kimberly Hulvey of Tennessee Valley Authority.

MR. BUCKBERG: Thank you, Kim.

MS. DEWHIRST: Linda Dewhirst, Nebraska Public Power District.

MR. BUCKBERG: Thank you.

MR. ORF: Tracy Orf, Tennessee Valley Authority.

MR. BUCKBERG: Good afternoon. Thank you. Any other licensee staff? I'll move on. It is

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not required for members of the public to introduce themselves for this call. However, if there are any members of the public on the phone that wish to do so at this time, please state your name for the record.

Any members of the public? Hearing none, I'll continue.

I'd like to emphasize that we each need to speak clearly and loudly to make sure that the court reporter can accurately transcribe this meeting. If you do have something that you would like to say please first state your name for the record.

For those dialing into the meeting, please remember to mute your phone to minimize any background noise or distractions. If you do not have a mute button this can be done by pressing the keys *6. To unmute, press the *6 keys again. Thank you.

The agenda for today's meeting, after this introduction, is for the petitioner to provide new information to the PRB, for the PRB to consider in the petition's acceptability for review or final assessment.

After the petitioner's presentation we will enter a brief question and answer phase. At this time I'll turn it over to the PRB Chairman, Brian Smith.

MR. SMITH: All right. Excuse me. Thank

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you, Perry. Welcome, everyone, to this meeting regarding the 2.206 petition submitted by Beyond Nuclear. I'd like to first share some background on our process.

Section 2.206 of Title 10 in the Code of Federal Regulations describes the petition process, which is the primary mechanism for the public to request enforcement action by the NRC in a public process.

This process permits anyone to petition NRC to take enforcement-type actions related to the NRC licensees or license activity. Depending on the results of its evaluation NRC could modify, suspend, or revoke an NRC-issued license, or take any other appropriate enforcement action.

The NRC staff's guidance for the disposition of 2.206 petitions request is Management Directive 8.11, which is publicly available.

The purpose of today's meeting is to give the petitioner an opportunity to provide any relevant additional explanation in support for the petition, after having received the PRB's initial assessment.

This meeting is not a hearing, nor is it an opportunity for the petitioner or other members of the public to question or examine the Petition Review Board on its merits or the issues presented in the

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petition request.

During the question and answer phase the NRC staff may ask clarifying questions of the petitioner and the licensee. The licensee may ask the Petition Review Board questions related to the issues raised in the petition, and then the petitioner and the licensee may ask the Petition Review Board questions related to the 2.206 petition process in general.

No decisions regarding the merits of the petition will be made during this meeting. Following this meeting the Petition Review Board will conduct its internal deliberations. The outcome of this internal meeting will be provided to the petitioner in a letter.

I would like to summarize the scope of the petition under consideration, and the NRC activities to date.

Beyond Nuclear submitted a petition to the NRC on October 16th, 2020. The petition requested that the U.S. Nuclear Regulatory Commission take enforcement action against licensees of all boiling water reactors with Mark 1 containment systems, in the form of a suspension of operating licenses until all hardened containment vent systems are replaced.

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The basis of your petition is that the hardened containment vent requirements in NRC Order EA-13-109 do not account for the thermal energy produced by chemical reactions that would occur during a severe accident and therefore would not prevent a BWR Mark 1 primary containment from failing in a severe accident.

The petition includes various severe accident phenomena that could cause higher flow than what the hardened containment vent is designed to pass.

To provide some background, the Petition Review Board first evaluates petitions using Management Directive 8.11, Section 3(c)(1) as criteria for accepting petitions, to assess whether or not further review is warranted.

A petition must basically provide facts not previously reviewed and/or resolved by the NRC to warrant further review.

On December 18th, 2020 the petition manager contacted you to inform you of the Petition Review Board's initial assessment that your petition did not meet the criteria for accepting petitions.

This is because in issuing NRC Order EA-13-109 the hardened containment vent system was not intended to be used by itself to prevent containment

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failure. The hardened containment vent system is one of a range of tools, along with severe accident water addition and severe accident water management, that the operators could use to prevent or mitigate an environmental relief and containment failure.

Also, a study documented in NUREG-2206 demonstrated that the hardened containment vent system was a beneficial part of strategy for preventing and mitigating releases under many severe accident scenarios, and concluded that additional regulatory requirements were not justified.

NUREG-2206 documents the simulation of accident progression and source term for a range of severe accident scenarios.

Consistent with Management Directive 8.11, Section III.C.1(b)(ii), because the issues that you raised in your petition have previously been subject of a facility-specific or generic NRC staff review, the Petition Review Board then concluded that none of the following Section III.C.1(b)(ii) additional circumstances apply.

Those being, the prior review did not resolve the issues raised by the petitioner, or the resolution of the issues in the prior review does not apply to the facts provided by the petitioner to support

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the requested action, and the petition provides significant new information that the staff did not consider in the prior review. Essentially, none of those circumstances apply.

The petition manager offered you an opportunity to address the Petition Review Board to clarify or supplement your petition in response to this assessment. And you requested to address the Petition Review Board in this forum.

As a reminder for all participants, please identify yourself if you make any remarks, as this will help us in the preparation of the meeting transcript that will be made publicly available. Thank you.

Beyond Nuclear, Mr. Paul Gunter, I will now turn it over to you to provide any information that you believe the Petition Review Board should consider as part of this petition.

MR. GUNTER: Good afternoon. My name is Paul Gunter. I'm on staff for the petitioner, Beyond Nuclear, which is based in Takoma Park, Maryland.

The October 16, 2020 enforcement petition in today's supplemental information request to the NRC to suspend operations of 19 General Electric Mark 1 Boiling Water Reactors cited in Alabama, Georgia, Illinois, Pennsylvania, Michigan, Minnesota,

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Nebraska, New Jersey, and North Carolina, that are identified with the acknowledged design flaw, and severe accident vulnerability involving the volumetrically undersized GE pressure suppression containment system.

This same undersized containment structure demonstrated a 100 percent failure rate for the three Tokyo Electric Power Company's Fukushima Daiichi units that were at full power on March 11, 2011, and following the Tohoku earthquake and tsunami, experiencing multiple severe nuclear accidents, breach of containments, and the widespread release of radioactivity.

None of the actions to date by the Nuclear Regulatory Commission and the operators here in the United States have corrected the GE pressure suppression system's underlying design flaw and operational vulnerability first identified and then suppressed by the Atomic Energy Commission in 1972.

The petitioners charge that the Agency and the industry's post-Fukushima compensatory actions as stipulated by NRC Order and Enforcement Action 2013-109 leave the public at unreasonable and undue risk.

Today's supplemental materials and remarks are presented to the Petition Review Board by

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our petition's principle researcher and author, and co-petitioner, Mr. Mark Leyse. Mark.

MR. LEYSE: Hi. Thank you, Paul. This is Mark Leyse. And I first want to say that the way the petition was described is actually, it's not incorrect what you said. It's just not really the primary point of the petition.

You said that, you know, because the NRC didn't account for the thermal energy produced by chemical reactions that, you know, that's basically the point of the petition.

That's, like I say, that is not incorrect.

But the petition is very simple. The petition just says, basically, the vents required by Order EA-13-109 cannot be guaranteed to prevent failure of the primary containment because they do not have the capacity to discharge the total amount of thermal energy that would be generated over some periods of time in various severe accident scenarios.

That is the essence of the petition. And then we also requested that the NRC revoke the licenses of any BWR Mark 1 units that are not modified to have a venting capacity that would guarantee prevention of containment failure under severe accident conditions.

So, this total amount of thermal energy,

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yeah, it would include chemical energy, like from the zirconium-steam reaction. It would also include decay heat. But there are points in time where there's just so much more thermal energy generated by the chemical reactions.

So, that's the real point. Anyway, I have sent a letter responding to statements that the Petition Review Board made. That's a letter that was sent December 18th, 2020. So, what I discuss in this presentation is explained in more detail, and referenced in the written response that I sent to the Petition Review Board.

So, I just want to start now basically.

We cited evidence showing that the vents required by Order EA-13-109 lack the capacity to perform reliably under severe accident conditions.

Idaho National Engineering Laboratory, now it's INL, reported that in order to successfully operate in a severe accident, a hardened containment vent needs to have the capacity that is seven times as great as that of the vents that are required by Order EA-13-109.

That is one of the items that we presented that I note that in the Petition Review Board's statement they did not acknowledge what Idaho National

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Labs had said, nor did they address that.

Anyway, so we presented that along with a lot of other evidence just showing that over some periods of time, they may be very brief, there can be tremendous amounts of thermal energy generated, which would overwhelm a vent.

For example, you could have 25 percent of the entire thermal power level of the reactor that could be generated. It would be a power level of over 25 percent. And it would sustain for a period of, you know, say one minute. And that would just blow the vents, and the containment wouldn't work.

Anyway, so that is, like I said, that's thoroughly documented in the petition. It's also documented in the letter that I sent as a reply. But anyway, the Petition Review Board, as you said, the initial recommendation is to not accept our petition for review.

And I just want to note that a number of petitioners, and I would be among them, allege that Petition Review Boards are biased. A report from 2017 by the NRC's Office of the Inspector General, on their audit of the Petition Review Board process states, quote, some petitioners said that 10 CFR 2.206 petition process is a conflict of interest.

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Specifically, petitioners assert that NRC cannot objectively review petitions that appeal or challenge NRC decisions, because the staff performing the review are the same staff who made the original decision, end of quote.

So now, in the Fukushima accident, March 2011, hardened vents that were installed in Mark 1 primary containments failed to prevent hydrogen gas from leaking into reactor buildings, and exploding.

And the NRC became very concerned that the vents that had been previously voluntarily installed in Mark 1 units in the United States were inadequate.

So, after tens of BWR Mark 1 units had operated in the U.S. for roughly four decades, the NRC finally, prompted by the Fukushima accident, decided to impose legally binding requirements to finally solve the problem of Mark 1 primary containment overpressurization.

Among other things, Order EA-13-109 stipulated that the new BWR Mark 1 vents must have the capacity to handle a continuous thermal energy input at a rate equal to one percent of the reactor's rated maximum thermal power while maintaining the primary containment at a pressure lower than its design pressure.

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The NRC has explained -- and also I just want to say, this was not acknowledged in the statement that the Petition Review Board sent on December 18th last year. It was not addressed.

And also, anyway, basically in 2013 the NRC explained that the venting capacity stipulated by Order EA-13-109 is based on quantities of thermal power that are generated by decay heating.

According to the NRC, after the reactor shuts down in an accident, the wet well suspension pool is typically capable of absorbing the nuclear fuel's decay heat for a period of three hours. After three hours the thermal power from continuous decay heat generation has typically decreased to less than one percent of the reactor's rated maximum thermal power.

So, like I said, that's an explanation that the NRC had, 2013. It's also in NEI documents. And when -- and that's thoroughly documented in our petition, and at the end of the Petition Review Board statement there is a different, a table where it says on one side petition information. On the other side it says NRC response.

And the reply to what I just said was basically that NUREG-2206, that all phases of severe accidents had been considered, and including thermal

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energy generated by the metal-water reaction, et cetera.

But the problem is, you know, we just said how the NRC explained the venting capacity. And that was explained in 2013. And NUREG-2206 was completed three years later, published five years later.

So, I just, I was really bothered by that. It's like you're saying that a document that was completed in 2016 negates statements which again you did not acknowledge, that the NRC made in 2013.

And just as someone who put a lot of time into this petition, you know, I just would expect a more honest review, something that just acknowledges, yes, the NRC did say that back in 2013. Then maybe you could say, however, we subsequently realized, blah, blah, blah.

But you don't even acknowledge that the NRC made that statement in 2013. And that's among a number of other problems with your statement regarding your initial decision. And I'm going to now cover some of those.

Anyway, the problem is that the vents that are required by Order EA-13-109, they're incapable of discharging the total amount of thermal energy that would be generated under the harshest of severe

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accident conditions.

As stated in our petition, there are some severe accident scenarios in which very large amounts of thermal energy are rapidly generated over short periods of time, far more than that which is solely generated by decay heating.

So, you, your statement, the PRB statement says, quote, the PRB's initial assessment is that in issuing NRC Order EA-13-109, and since the NRC did not consider, I'm sorry, did, I'm sorry, the NRC did consider and/or analyze any document that severe accident conditions included in your petition, unquote.

In fact, I'm now going to talk about the MELCOR. MELCOR is a computer program. It simulates accidents. So, I'm now going to discuss the MELCOR analyses, which are discussed in NUREG-2206. And they did not simulate the harshest conditions that may occur in a severe accident.

So for example, none of the MELCOR analyses in NUREG-2206 -- I'll now refer to it just as the NUREG -- stipulated any postulated severe accidents with scenarios similar to ones which in a period of time of one minute, about seven, 6800 kilograms of zirconium would react with about 2700 kilograms of steam, to yield

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300 kilograms of hydrogen, and about 44,000 megajoules of thermal energy.

The NUREG does not disclose how many megajoules of thermal energy were generated in its MELCOR simulations. But we can actually see with some basic graphs how much hydrogen was generated, at what time. And from that we can kind of discern that the rates of thermal energy were not what I'm describing as those moments of time where it can just be a real blast of thermal energy.

Now, according to the OECD nuclear energy agency, flooding the melting-down reactor core with coolant water may generate from five to ten kilograms of hydrogen per second.

And now I'm going to refer to the letter I just sent you. Section 1 of my response in the letter, it's titled, quote, A Case of Cherry Picking.

The analyses of NUREG-2206 did not simulate phenomena as harsh as ones that occurred in the Fukushima Daiichi accident, unquote.

I'm paraphrasing. The PRB's statement discusses the MELCOR computer simulations of NUREG-2206, MELCOR-simulated molten materials relocating downward, and boiling off water located in the lower region of the reactor core, causing a pressure

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spike inside the reactor pressure vessel.

The PRB says that the primary containment is successfully vented at its pressure limit. And that's true. I read the NUREG. An example of the pressure spike is in Figure 3-10 of NUREG-2206.

Now, Figure 3-10 concerns Case 9. The pressure spike of Case 9 reached nearly 500 pounds per square inch absolute. Containment failure was prevented in Case 9 by employing water management and injection, as well as containment venting.

Now, Case 10 of NUREG-2206 concerns a MELCOR simulation of a severe accident at a Mark 1 unit in which there was a combination of severe accident water addition and containment venting. And there was a failure of the, containment was prevented.

And there was also a pressure spike in Case 10 from debris locating downward to the lower reactor pressure vessel. And it reached nearly 400 pounds per square inch absolute.

And NUREG-2206 says that both Case 9 and Case 10 were selected to represent a number of MELCOR simulations that were of similar scenarios that were done in the same study.

So, the Case 9 and Case 10 MELCOR simulations of severe accidents at BWR Mark 1 units

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did not simulate conditions as harsh as ones that were observed in the Fukushima Daiichi accident.

A huge pressure spike was observed in the Fukushima Daiichi Unit 3 reactor pressure vessel. It was ten days after the tsunami struck on March 21st, 2010. And they believe that it was after, there was a remelting of core contents. And the highest recorded pressure was measured at nearly 1,700 pounds per square inch absolute.

According to a Journal of Nuclear Science and Technology paper, the huge pressure spike can be interpreted as a consequence of a large amount of steam generation due to interaction of melting core materials with water. End of quote.

And analysis of the Unit 3 accident performed by Japanese experts estimated that the pressure spike that occurred on March 21st, 2010 actually reached a value greater than 1,900 pounds per square inch absolute.

So, none of the MELCOR analyses, including what you referred to, Case 9, discussed in NUREG-2206 simulated any accidents with scenarios in which there was a pressure spike as great as one that was actually recorded at the Fukushima Unit 3 reactor.

And so, like, again, this is documented

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in my, the letter I sent to you, referenced everything.

So, not analyzing conditions as harsh as what occurred at Fukushima, that's what is called cherry picking.

That's cherry picking.

So, as covered in our petition, an analysis of the Fukushima Unit 3 accident found that on March 13, 2010 a large amount of materials relocated downward in the pressure vessel rapidly vaporized a large amount of water. And the vaporized water, the steam, reacted with molten materials, rapidly generating large amounts of hydrogen and thermal energy, in a short time period of unspecified duration, but is quite short.

And about 14 -- I'm sorry, about 4,200 kilograms of water vaporized and reacted with core materials, rapidly generating about 472, 475 kilograms of hydrogen and nearly 70,000 megajoules of thermal energy.

So, none of the MELCOR analyses discussed in NUREG-2206 simulated any severe accident scenarios like that. Nothing even close. And by the way, one can look at the graphs in NUREG-2206 and see the hydrogen generation plot.

And we see that in Case 9 of NUREG-2206 hydrogen generation was negligible at the time that the core relocated to the lower plenum. And if that

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means, that also means that the thermal energy was also negligible.

So, how can one legitimately dismiss the safety issues that we raised in our petition based on the MELCOR analyses, and the analyses of NUREG-2206, which did not simulate conditions as harsh as ones that occurred in the Fukushima Unit 3 accident?

Now, Section, another part of my response to the Petition Review Board is titled, Worse than Worthless. Analyses that simulate unrealistic circumstances yield unrealistic results.

In a draft regulatory analysis for rulemaking activity the NRC did in May 2015, the NRC stated, operator actions to prevent or mitigate severe accidents are contingent on the availability and functionality of equipment and diagnostic instruments under severe accident conditions.

The operator relies on instruments to know when to add water and/or take other severe accident management actions.

So, in that same document the NRC also stated that the MELCOR analyses conducted for its regulatory analysis assumed that instruments measuring the reactor pressure vessel and containment water levels and pressures would be available and functional

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under severe accident conditions.

NUREG-2206 states that the MELCOR analyses it discusses are the same as those of the draft regulatory analysis for a rulemaking activity dated May 2015.

So, the MELCOR analyses of NUREG-2206 simulated unrealistic circumstances. There is no guarantee that instruments measuring reactor pressure vessel and containment water levels and pressure would be functional under severe accident conditions.

In fact, it's highly likely they would be unavailable or malfunctional. Analyses that simulate unrealistic circumstances yield unrealistic results.

The MELCOR, the results of the MELCOR analyses of NUREG-2206, they demonstrate, yes, they demonstrate a false narrative. Because plant operators, basically the false narrative is that plant operators will always have diagnostic instruments that are reliable under severe accident conditions.

And therefore, they will always save the primary containment by employing a combination of properly executed venting and severe accident management, and/or water addition strategies.

To say that the MELCOR analyses of NUREG-2206 may be worse than worthless, it sounds like

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an insult. But I don't mean it that way. I just mean it to actually describe the potential dangers of unrealistic analyses.

Unrealistic analyses that are nonconservative are dangerous, because they purvey a false sense of security. Plant operators should not be led to believe that instruments will be available and functional under severe accident conditions if they, well actually, if they may actually be unavailable or malfunctional. MELCOR analyses should be used to reduce risk, not increase risk.

An Oak Ridge, now an Oak Ridge National Laboratory report from 2015 says that in a severe accident there may be widespread instrument failure or inaccurate and/or misleading instrument indications.

At Fukushima Daiichi workers were misled during the early hours of the accident by erroneous readings of the Unit 1 reactor's condition. The reactor's water level appeared to be above the top of the fuel rods, when in fact they were uncovered and melting down. The water levels of all the stricken Fukushima reactors read erroneously high.

Now, that was in the petition that we submitted and documented. So, I think maybe before

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you started leaning on NUREG-2206 to just show us how wrong we were, maybe you should have actually reviewed NUREG-2206 to see that it had a premise where the instruments are supposed to always work.

Now, back to the Oak Ridge Laboratory report. It said, during the Fukushima Daiichi accident numerous instrumentation measurements were unavailable as a result of loss of power supplies. Even after power was restored the instrumentation measurements were inaccurate, or differed in values, or trends across the instruments measuring the same parameters.

Temperature and pressure conditions in containment affected reactor level and pressure instrumentation, and may have complicated accident management. End of quote.

The rosy picture depicted by the results of the MELCOR analyses of NUREG-2206, they depend on how the idealistic circumstances that are unlikely to occur in a natural accident.

Without available or functional, without available and functional instruments operators will not know when to add water or to take other accident management actions.

In the aftermath of the Fukushima accident

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the NRC actually imposed, imposing regulation that would require enhancements to reactor and containment instruments.

Then in 2016, after evaluations the NRC announced that enhancements would, would not provide a substantial safety enhancement. And therefore, additional regulatory actions were not warranted. End of quote.

So, I have to say, you know, the degree of the NRC's cynicism is remarkable. Diagnostic instruments weren't available in the Fukushima accident. Nonetheless, the NRC decided against requiring that nuclear plants operate with instruments capable of providing reliable readings under severe accident conditions.

There is no guarantee that there would be reliable instrumentation essential to mitigating the severe accident that will be developed any time soon, that is, instrumentation robust enough to provide accurate readings throughout the duration of the harsh conditions of a severe accident.

So, I'll just say that the MELCOR analyses of 20, of NUREG-2206 found that the vents required by Order EA-13-109 are incapable of preventing the failure of a Mark 1 primary containment in the event of a severe

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accident.

According to the NUREG it, to successfully prevent containment failure the vents must be employed along with severe accident water management, or water addition strategies.

So, if there is an accident here in the U.S. it's likely that, instruments would likely be about as reliable as they were at Fukushima. And so, lacking reliable readings plants, operators would not know when to add water to either the reactor pressure vessel or the primary containment.

So, venting the containment would not be complemented with properly executed severe accident water management, and/or additions strategies. Containment would fail, enabling hydrogen gas to leak into and explode in the reactor building.

So, the NRC undermines nuclear safety by refusing to require enhancements to reactor and containment instruments that would ensure their reliability under severe accident conditions.

Then, in a display of cynicism the NRC decided the MELCOR analyses NUREG-2206 would assume that instruments measuring the reactor pressure vessel and containment water levels and pressures would always be available and functional in the event of a severe

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accident.

The MELCOR analyses of NUREG-2206 are also not legally binding, like some for design basis accidents. There's no requirement that the most severe postulated accident scenarios be simulated. So, that's also another thing.

So, you know, NUREG-2206, it can do these couple of very low kind of more simple, easy scenarios, not nearly as harsh as what even occurred at Fukushima.

And there's no problem because it's not legally binding.

Now, I realize we're coming to a close.

And not so much time. I request a little time to go over. But I'm almost done. So, I'd say, is the NRC really claiming that the problem of Mark 1 primary containment over pressurization in the event of a severe accident finally is solved?

NUREG-2206 says, venting alone is not adequate, as it does not prevent other modes of containment failure, such as liner melt through, and over temperature failure of the upper dry well head, by pass of the suppression pole, and direct release of radioactivity to the environment.

A combination of venting and water injection is required to prevent such failures. And

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the current work provides a sound technical basis that that effect thus, to that effect. Thus, supporting adequate protection of the containment.

And I'll just say, everything I quote, I'm going through it pretty quickly. It's all accurately quoted in the email I just sent to you. Anyway, Case 1 of NUREG-2206, it concerns a simulation where there was only containment, venting without the aid of water management or addition.

And the containment fails in Case 1, even under severe accident conditions that are not as harsh as ones that occurred at Fukushima. In Case 1 the dry well head is pushed upward due to over pressure, enabling hydrogen gas to leak into and explode in the reactor building. Destruction of the reactor building leads to a release of radioactive material into the environment.

So, is, like I say, is the NRC really claiming that the problem with Mark 1 primary containment over pressurization in the event of a severe accident is finally solved?

Now, it's claiming this NUREG-2206 provides a sound technical basis that demonstrates that the problem is finally solved after tens of BWR Mark 1 units have operated in the U.S. for decades, after

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decades of NRC coverups and false insurances regarding the safety, supposed safety of the Mark 1 primary containments, where now members of the public are supposed to believe this.

And, like I say, these are assurances that are based on analyses of, that cherry picked severe accident scenarios. And I ask, why would the NRC intentionally cherry pick the severe accident scenarios? That is, to make sure the scenarios were too, not too harsh that were analyzed for NUREG-2206.

And there's a simple answer. To provide results to define its decision to limit the capacity of the vents required by Order EA-13-109. The results of the MELCOR analyses, they also provide a false demonstration that the problem of over pressurization has finally been solved now, after Fukushima. And that spares owners the expense of providing an actual solution.

And I have to say, it's characterized, it's commonplace to characterize the NRC as a captured regulator. Deceiving the public to spare industry the expense of improving safety is par for the course.

And I also say that the NRC's decision that you just had in your petition to not consider it for review, it's based on those cherry picked results.

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And it's also based on the decision to assume that instruments are always reliable in the MELCOR analyses.

And I think to ignore the fact that instruments were often unreliable or malfunctional in the Fukushima accident is indefensible. So, like I say, I'm now concluding.

Basically last questions. Just, you know, how do plant operators perform all the water management and/or water addition strategies that you claim with, along with venting prevent the primary containment from failing in a severe accident, if their diagnostic instruments are unavailable or malfunctional?

And so, I leave you with that question.

And thank you for your time. And I appreciate your letting me go a little past 1:00 p.m. This is the end of Mark Leyse's presentation.

(Off the record comments)

MR. BUCKBERG: Thank you, Mr. Leyse for the presentation. Thanks for taking the time to provide the NRC staff with clarifying information on the petition you've submitted.

As stated at the opening we'll now enter into a question and answer phase. At this time do the members of the PRB have any questions for the

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petitioner? Hearing none, do the petitioner or licensees have any questions about the 2.206 process in general? Please speak up.

MR. GUNTER: This is Paul Gunter, Beyond Nuclear.

MR. BUCKBERG: We can hear you. Please.

MR. GUNTER: Okay. My question is, will we see the draft director's decision before it's published in the Federal Register?

MR. BUCKBERG: If the process goes that far. So, the initial assessment that I sent to you on December 18th was that we would not be accepting your petition for further review, which would mean that we would not be moving towards developing a director's decision. We're now going to consider the information you submitted today, and see if that initial assessment changes. If it does not we will end the petition's evaluation. If our initial --

MR. GUNTER: Okay.

MR. BUCKBERG: -- assessment is changed we would do a director's decision. But normally proposed director's decision are publicly available, and you would see a copy.

MR. GUNTER: Right. So, that leads to the follow-up question. Are you going to, is, will the

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Petition Review Board provide the petitioners with answers to the specific questions that this supplemental session has asked?

MR. BUCKBERG: We attempt to answer all of the petitioner's concerns. So, without having the time to really review what was just discussed I'd say that that's our goal in general. But we'll, we try to be thorough in our response.

MR. GUNTER: One additional final follow-up. Will the answers to this, any of the responses from the PRB to this supplemental session, will they be docketed in ADAMS? Or what, are we just going to get an email? But will that be docketed?

MR. BUCKBERG: Actually, the December 18th email is docketed in ADAMS. It's publicly available. The next document we will provide you is a formal letter on whether we're accepting or not accepting the petition. That will be publicly available in ADAMS as well.

MR. GUNTER: Okay. Thank you. I have no further questions.

MR. LEYSE: Mark Leyse. Just to follow-up with what Paul said. Yes. I would really appreciate it in your, after this meeting that you would actually address the two primary points that I, well,

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more than two.

But, you know, the two main things about NUREG-2206 that I allege, that it did not simulate accidents as harsh as with, conditions as harsh as what occurred at Fukushima. And then also its assumption that the diagnostic instrumentation would always be available.

I see those as, the second one I just think is terrible, especially in view of the fact of the decision I referred to that NRC published in 2016 regarding to abandon any regulation that would require better instrumentation. Anyway, if you would address that I would really appreciate it. Thank you.

MR. BUCKBERG: Thanks, Mr. Leyse. I appreciate you highlighting those points for us.

MR. LEYSE: You're welcome.

MR. BUCKBERG: Any other questions from the petitioners or members of the public, licensee. I'm sorry. Not members of the public just yet. Licensee or petitioner.

Hearing none, if there's any members of the public, please provide feedback regarding the 2.206 petition process. You can provide that now. However, as stated in the opening, the purpose of this meeting is not to provide an opportunity for you to, or the

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petitioner to question or examine the PRB regarding the merits of this petition request.

Any feedback from members of the public on the process? Hearing none, before we close does the court reporter need any additional information for the meeting transcript?

(No audible response)

MR. BUCKBERG: Thank you. We want to encourage the participants outside the NRC to provide public meeting feedback to the NRC staff, via the NRC public meeting website, if you feel so inclined. With that last comment, this meeting is concluded, and we'll be terminating the phone connection. Thanks for joining in everybody.

(Whereupon, the above-entitled matter went off the record at 3:09 p.m.)

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