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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
(ACRS)
+ + + + +
PLANT OPERATIONS SUBCOMMITTEE
+ + + + +
THURSDAY
AUGUST 21, 2025
+ + + + +

The Subcommittee met via Videoconference,
at 8:30 a.m. EDT, Gregory H. Halnon, Chair, presiding.

SUBCOMMITTEE MEMBERS:

GREGORY H. HALNON, Chair
VICKI M. BIER
VESNA B. DIMITRIJEVIC
CRAIG D. HARRINGTON
WALTER L. KIRCHNER
ROBERT P. MARTIN
SCOTT P. PALMTAG
THOMAS E. ROBERTS

ACRS CONSULTANTS:

RON BALLINGER

DENNIS BLEY

DESIGNATED FEDERAL OFFICIAL:

QUYNH NGUYEN

ALSO PRESENT:

MARLAYNA DOELL, NRR/DORL/LPL3

JEFFREY HERRERA, NSIR/DPR/RLB

PAUL KLEIN, NRR/DNRL/NCSG

JASON KOZAL, R-III/DORS

PHIL MCKENNA, NRR/DRO

KEITH MILLER, NSIR/DPR/RLB

APRIL NGUYEN, R-III/DORS/PRT

JAMIE PELTON, NRR/DORL

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

8:30 a.m.

CHAIR HALNON: Good morning. This meeting will now come to order. My name is Greg Halnon. I'm chairman of the Plant Operations Subcommittee of the ACRS. ACRS members in attendance in person are Craig Harrington, Bob Martin, Tom Roberts. And members that are virtually -- I believe we have Vicki Bier, and we expect a few more later on that we'll add to the record when we get there.

MEMBER KIRCHNER: Greg, I'm here. This is Walt. Good morning.

CHAIR HALNON: Walt Kirchner just joined us. Thank you, Walt. Any other members that I missed?

Okay, we do have a consultant in-person, Ron Ballinger, and virtually Dennis Bley is listening in. If I have missed anyone else, just interrupt me whenever you can. Quynh Nguyen of the ACRS staff is our Designated Federal Officer; we'll refer to him as the DFO.

We have received no member conflicts of interest for today's meeting, and we have a quorum for also today's meeting.

The ACRS was established by statute and is

1 governed by the Federal Advisory Committee Act, or
2 FACA, F-A-C-A. The NRC implements FACA in accordance
3 with our regulations. Per these regulations and the
4 committee bylaws, the ACRS speaks only through its
5 published letter reports.

6 All member comments should be regarded as
7 only the individual opinion of that member, and not a
8 committee position. All relevant information related
9 to ACRS activity such as letters, rules for the
10 meeting's participation, transcripts are located on
11 the NRC public website, and can easily be found by
12 typing about us ACRS in the search field on the NRC's
13 home page.

14 The ACRS, consistent with the agency's
15 value of public transparency and regulation of nuclear
16 facilities, provides opportunity for public input and
17 comment during our proceedings. For this subcommittee
18 meetings we have written statements. Written
19 statements may also be forwarded to today's designated
20 federal officer.

21 We have also set aside time at the end of
22 this meeting for public comments, which will be added
23 to the record and considered by the committee in
24 future deliberations. However, the committee does not
25 plan on responding to specific comments during today's

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1 meeting, and importantly the commenters are
2 responsible for the content of what they present.

3 Today the NRC staff will be discussing
4 with the committee their ongoing efforts regarding the
5 first-of-a-kind efforts to restart the shuttered
6 Palisades Plant. On July 24th, 2025 NRC staff issued
7 a group of licensing actions that allows the plant to
8 move from a decommissioning state to an operational
9 state.

10 A transcript of the meeting is being kept,
11 and will be posted on our website. When addressing
12 the committee, participants should identify
13 themselves, and speak with sufficient clarity and
14 volume so that they may be readily heard. Allegra is
15 our court reporter, and if she doesn't know who you
16 are when you're speaking, then the record won't be
17 right, and we have to do things behind the scenes.

18 So, it's important, if you're having an
19 ongoing conversation, that's fine, she'll be able to
20 figure it out from your voice. But if you're just
21 jumping in, make sure you state your name.

22 If you are not speaking, please mute your
23 computer on Teams. If you are participating by phone,
24 press star six to mute your phone, and star five to
25 raise your hand on Teams.

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1 And we've had recently quite a few
2 interruptions for people accidentally coming off of
3 mute. If we can mute you, we will. If we can't mute
4 you, then we'll kick you out of the meeting and you
5 can come back in and work your computer appropriately.
6 The Teams chat feature will not be available for use
7 during the meeting.

8 For everyone in the room, please put all
9 your electronic devices on silent, and mute your
10 laptop microphones and speakers, otherwise we'll get
11 that echo that you sometimes hear. In addition,
12 please keep sidebar discussions in the room to a
13 minimum, the ceiling microphones are live. So, these
14 green lights, there's ceiling microphones all around.

15 So, if you're holding a conversation, you
16 see a green light, careful, you might be on the
17 record. For the presenters, your microphones are very
18 unidirectional, you're going to need to speak in front
19 of the microphone to be heard online. If you have any
20 feedback for the ACRS about today's meeting, we
21 encourage you to fill out the public meeting feedback
22 form on the NRC's website.

23 And with that, I will pass to Jamie
24 Pelton. But before I do that, Vesna Dimitrijevic did
25 join us. And I think that's -- and Scott Palmtag has

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1 joined us, both members. So, I'll turn it over to
2 Jamie Pelton, the deputy director of division of
3 operator licensing. Jamie?

4 MS. PELTON: Good morning, thank you so
5 much. Again, my name is Jamie Pelton. I'd first like
6 to thank the members of the committee for the
7 opportunity to speak with you today. Before I go into
8 opening remarks, I'd like to have each of the speakers
9 introduce themselves.

10 MS. NGUYEN: Yes, so, good morning. My
11 name is April Nguyen, and I'm the lead for the restart
12 projects in Region III, specifically with oversight of
13 Palisades for this meeting.

14 MR. KOZAL: Good morning. Jason Kozal,
15 director of the Division of Operating Reactor Safety,
16 Region III, responsible for the oversight portion of
17 the Palisades restart.

18 MR. MCKENNA: Good morning. I'm Phil
19 McKenna. I'm the acting director of the Division of
20 Reactor Oversight in the Office of Nuclear Reactor
21 Regulation, and I am one of the three co-chairs of the
22 Palisades restart.

23 MR. KLEIN: Good morning. I'm Paul Klein,
24 senior materials engineer in corrosion and steam
25 generator branch, and I'm one of the two technical

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1 reviewers on the Palisades LAR related to sleeving
2 along with my colleague, Andrew Johnson, who is also
3 here in attendance.

4 MR. HERRERA: Good morning. My name is
5 Jack Herrera, I'm the senior emergency preparedness
6 specialist in the Reactor Licensing Branch in the
7 Office of Nuclear Security and Incident Response, and
8 I did work on the emergency preparedness license
9 amendment.

10 MS. PELTON: And then I would like to go
11 to Marlayna Doell online.

12 MS. DOELL: Good morning, as Jamie said,
13 my name is Marlayna Doell, I am a project manager in
14 the Division of Operator Reactor Licensing, I am one
15 of the project managers on the Palisades restart team,
16 and previous to that I was the decommissioning project
17 manager for Palisades when it transitioned into
18 decommissioning. So, I was able to bring some of
19 those insights to the team as we worked to transition
20 it from decommissioning back to operation.

21 MS. PELTON: Thank you, Marlayna. And
22 again, I'm Jamie Pelton, the acting director of the
23 Division of Operating Reactor Licensing, and one of
24 the co-chairs of the Palisades restart panel. So, as
25 was mentioned, since last year's meeting in October,

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1 the staff has made significant progress on the review
2 of the Palisades restart.

3 As you mentioned, sir, the staff has
4 completed the review of the licensing bundle that
5 allows the site to transition from a decommissioning
6 status to an operational status, and we're continuing
7 to coordinate our risk informed oversight reviews with
8 the region in close coordination with the licensee.
9 We've also continued our engagement with our internal
10 and external stakeholders to ensure that our process
11 is transparent.

12 Next slide please. So, today we are here
13 to give you an update on a number of topics, including
14 our restart process, an update on our licensing
15 actions, our emergency preparedness status, and then
16 various inspection activities and updates on technical
17 topics of interest. So, we look forward to your
18 insights and questions as we move through today's
19 discussion. And with that --

20 CHAIR HALNON: Yeah, thanks, Jamie. I
21 wanted to encourage the members and consultants to
22 just jump in and ask question as we go. We've got
23 plenty of time to get through this, so it's not going
24 to be a rush at the end I don't think. So, let's make
25 sure that we understand everything that we need to

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1 before we get out of here this morning. Thanks, go
2 ahead.

3 MS. PELTON: Perfect, thank you very much.
4 And with that, I will turn it over to Marlayna Doell
5 to update you on our restart process and licensing
6 actions.

7 MS. DOELL: Thank you so much, Jamie. And
8 I apologize for not being able to join you all in
9 person today. I managed to fracture my ankle a couple
10 weeks ago, and so I'm laid up and at home this week,
11 but I'm happy to joining you guys virtually. If I
12 could get the next slide please? As Jamie mentioned,
13 we've been working through many of the licensing
14 activities throughout this process.

15 Since we last talked to you guys in
16 October, we have been continuing under the guidance
17 and leadership of the Palisades restart panel, and
18 leveraging technical expertise across the agency to
19 continue our review of several licensing actions, and
20 many different technical areas.

21 In all cases, and as part of the process
22 for reviewing these different licensing actions, we
23 have been basically leveraging the fact that
24 throughout this process Palisades has continued to
25 maintain a valid operating license, and the commission

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1 has previously concluded that we are able to use the
2 existing regulatory framework to evaluate and assess
3 the requests to return Palisades to an operating
4 plant.

5 Therefore, we were able to use the
6 standard amendment and exemption process, as well as
7 a license transfer, to return Palisades from a
8 decommissioning status to an operational status. The
9 evaluation approach that we used for all of these
10 licensing actions was to review each request to see
11 where the difference were from what the plant had
12 requested -- sorry, between what the plant had when it
13 last operated in May of 2022 to what it had been
14 requesting to return to operations.

15 And now we had our focus of all our
16 reviews on any of the changes between those two
17 requests. So, if it was a like for like change, for
18 example for the technical specifications, or the
19 emergency plan, or any of the other evaluations that
20 we were reviewing, we were able to more easily address
21 any of the areas where they were requesting to go back
22 to basically the same criteria, or regulatory stance
23 that they had when they were last operating.

24 We were able to focus all of our reviews
25 on areas where they were requesting changes, and maybe

1 form different analyses, or making previous approaches
2 from before, and in most cases those were very few and
3 far between, or very small changes that were being
4 made as either editorial improvements, areas where
5 they were updating certain requirements, or adopting
6 different versions of the regulations in order to make
7 improvements to the overall licensing basis for the
8 plant.

9 Throughout all this process, the focus was
10 on making sure that they were meeting the same safety,
11 security, and environmental requirements that were in
12 place during the previous period of operation, and
13 making sure that going forward, that they would have
14 a strong operational licensing basis on which to go
15 forward with their continued period of operation.
16 Next slide please.

17 CHAIR HALNON: This is Greg Halnon, could
18 you explain what you meant by they maintained their
19 operating license? I mean, they did shut down, they
20 did take the fuel, they did give a cessation of
21 operations letter, I assume, and they emptied the
22 vessel, and went to spent fuel. I mean, what does
23 that mean?

24 Does it just mean you meant a Part 50
25 license they maintained, so that they were able to --

1 MS. DOELL: Correct, yes, correct. During
2 their transition to decommissioning, similar to the
3 way we're transitioning them back to operations, they
4 underwent a series of decommissioning -- in that case
5 decommissioning transition amendments and exemptions
6 to alter their licensing basis and alter their license
7 to become a plant in decommissioning.

8 So, in that case they were reducing all of
9 their requirements that were applicable to the site
10 because of the reduced level of risk inherent in a
11 decommissioning plant. So, they in no way gave up or
12 got rid of their Part 50 license in any way, they
13 simply shrank down the requirements under that Part 50
14 license to reflect the fact that they were a
15 decommissioning plant.

16 So, the Part 50 license still was in
17 effect, and existed throughout this period, that's the
18 case for all decommissioning plants. They do not get
19 a separate decommissioning license, they can give up,
20 or have rescinded their Part 50 license during the
21 process, they just have it tailored to fit the fact
22 that they're in decommissioning.

23 So, the Part 50 license for Palisades
24 existed throughout their shutdown period, and
25 therefore we were able to use that same process of

1 exemptions and amendments to alter it to then reflect
2 their continuing period of operation without having to
3 start from scratch, or reissue a new license to them.

4 CHAIR HALNON: Okay, so from a pure
5 regulatory sense, we are not relicensing the plant?

6 MS. DOELL: Correct, we are simply
7 amending the license back to a different state of
8 operational readiness.

9 CHAIR HALNON: Okay, thanks for that
10 clarification.

11 MS. DOELL: So, as has already been
12 mentioned several times, on July 24th we issued sort
13 of the main set of licensing actions, which we have
14 officially been calling the bundle the last couple of
15 years. That was the set of actions that for all
16 intents and purposes returned the Palisades licensing
17 basis to an operational stance.

18 The bundle consisted of six actions for
19 Palisades, which was a license transfer, an exemption
20 from the requirements of 10 CFR 50.82, and four
21 license amendments, and I'll go into a little more
22 detail on the next slide of what those four license
23 amendments were. Those license amendments had been
24 under review for a little over a year a piece in most
25 cases, but were all issued on the same day for reasons

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1 I'll go into on the next slide.

2 All of them except the license transfer
3 are going to be -- the license transfer was effective
4 immediately, and implemented on July 24th. On August
5 25th, all of the rest of those will go into effect.
6 So, August 25th will be the official transition date
7 for Palisades from being a decommissioning plant to
8 being an operational plant.

9 On that date, all the license amendments
10 in the exemption will go into effect, and it will
11 serve as the official transition date for the site.
12 Which means the inspection stance, the regulatory
13 stance, the fee billing stance, all of those things
14 for Palisades will return to an operational status.
15 The big one is they will resume under the ROP for
16 inspection activities.

17 Again, from a regulatory side they'll be
18 treated as an operational plant, they'll return -- on
19 our public website they'll return to being an
20 operational plant, things like that. So, past August
21 25th they will be considered an operating plant again,
22 and all of their operational tech specs, all of their
23 operational programs will be in full effect.

24 And they will continue to go through their
25 restart progress as an operational plant using their

1 operational technical specifications and other
2 programs to continue up through the mode changes and
3 on until actual restarting the plant.

4 DR. BLEY: Excuse me, this is Dennis Bley.
5 That explains the license situation, had they actually
6 begun to remove any equipment, cut into pipe, that
7 sort of thing that they're having to replace? You're
8 probably going to get into this later, but just a
9 quick request.

10 MS. DOELL: We'll get into it later, but
11 the short answer is no. At Palisades they had been
12 shut down a short enough period of time, and were
13 starting to think about restarting early enough in
14 their shutdown period that they had not taken any
15 major decommissioning actions. There were no systems
16 or components that had been removed, or taken out of
17 the plant that needed to be put back in place, or
18 piping that needed to be redone.

19 They had done, I think a little bit of
20 minimal work outside the plant with I believe filling
21 in some -- sorry, I'm losing my word here.

22 MR. KOZAL: Service water piping.

23 MS. DOELL: Thank you, service water
24 piping, I can see it in my head, and I can't remember
25 the name of it. Thank you, Jason.

1 CHAIR HALNON: That was Jason Kozal.

2 MS. DOELL: Thank you, Jason Kozal. Yes,
3 other than that, they had not made any modifications
4 to the plant that had to be reversed as a result of
5 decommissioning.

6 DR. BLEY: And were there any upgrades
7 that they would have been required to do back before
8 they started decommissioning, or needed to be finished
9 before they can start up again?

10 MS. NGUYEN: This is April Nguyen, we're
11 going to get into that in the second half of the
12 presentation, if you can just hold the thought for a
13 little bit.

14 DR. BLEY: Okay.

15 CHAIR HALNON: And Dennis, this is Greg,
16 we're going to go soup to nuts through this, so those
17 are good questions probably at the end if you didn't
18 hear it. But I think we're going to cover some of
19 that stuff later on. Since I've got the mike, Phil,
20 are you going to cover how the transition from no PIs
21 to PIs is going to work relative to some of the ones
22 that take task orders to take a look at?

23 MR. MCKENNA: So, yeah, this is Phil
24 McKenna, I do not think we have a slide on that, so I
25 can talk to that now for an answer.

1 CHAIR HALNON: Okay, go ahead -- well,
2 I'll get to it when we talk about the oversight aspect
3 of it, I just wanted to put that thought in your head.
4 Marlayna, go ahead, please.

5 MS. DOELL: All right, I think we're ready
6 for the next slide. So, this is just a reminder, I
7 believe we had a similar slide during our October
8 presentation, but a reminder of what the six actions
9 were that were in the bundle that was issued on July
10 24th. As I mentioned, the license transfer was the
11 only one that was effective immediately.

12 That was because the previous licensee for
13 Palisades, which was Holtec Decommissioning
14 International, part of that license, when it was
15 transferred to them, made it pretty clear that they
16 were only licensed to do decommissioning work at the
17 site. So, the license transfer was to Palisades
18 Energy, LLC, which is now the licensed operator of
19 Palisades.

20 So, that license transfer became effective
21 immediately, and the other five licensing actions were
22 then issued to Palisades Energy, so that when they
23 become effective on Monday, August 25th, they will be
24 able to go forward, and use all of these other five
25 licensing actions as they continue through the restart

1 process as the license operator for Palisades. So,
2 just wanted to run through those.

3 And again, the big changes are they're
4 putting back in the operational technical
5 specifications, back in the operational emergency
6 plan, and the exemption from 50.82, which 50.82 is the
7 decommissioning regulations. The exemption basically
8 allows them to reverse the certifications of permanent
9 removal of fuel from the reactor vessel, and permanent
10 cessation of operations.

11 So, that's a one-time exemption to allow
12 them to reverse those notifications, and then
13 basically reset that requirement so that when they
14 decommission in the future, they will be able to use
15 it again to submit those certifications in the future.
16 Next slide please. So, as I mentioned, the bundle was
17 not the only set of licensing activities that have
18 been underway for Palisades.

19 There is actually at least as many
20 licensing actions still underway as were in the
21 bundle. Several of these are almost complete, or will
22 be talked about later, but I just wanted to mention
23 them briefly here. The other actions that are still
24 underway will need to be completed before -- well, the
25 first three of these will be completed before the

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1 plant restarts.

2 The relief requests are just coming in
3 now, and are part of just sort of the normal process
4 of working through licensing for the plant. But the
5 leak before break methodology is being basically
6 updated to a new topical report for the plant. The
7 steam generator repair license amendment is underway,
8 and we have several slides on that coming up in just
9 a moment, so I'm not going to go into detail on that.

10 And there is a fire protection license
11 amendment that is in house that is changing the
12 implementation schedule for their NFPA-805
13 modification. Again, not changing the modifications
14 themselves, just the implementation schedule for those
15 modifications. And then as of this morning we have
16 four relief requests in house for the site affecting
17 various ISI pieces and activities for the site.

18 These are all standard relief requests
19 that multiple plants have sought in the past, so we
20 are processing all of these again, under our normal
21 requirements and normal processes. So, I just wanted
22 to mention the work that's still ongoing for Palisades
23 in the licensing words.

24 CHAIR HALNON: And Marlayna, you may have
25 said it, this is Greg, these licensing acts are not

1 required for the operational license portion of it,
2 but are they required prior to actual operation? I
3 get the general repairs are obviously there, but --

4 MS. DOELL: Yes, the three amendments are
5 required before the resumption of operations, yes. I
6 believe the relief requests are not, they'll just be
7 processed as part of the normal -- under the normal
8 schedule for relief requests.

9 CHAIR HALNON: Thanks.

10 MS. DOELL: And then I think my next slide
11 please. My final slide is just to highlight the fact
12 that throughout the licensing process, and throughout
13 the Palisades restart project in general we have
14 really strived to have as much public outreach as we
15 can on all of the activities that have been underway
16 at Palisades.

17 We have kind of put together this little
18 graphic here to show that we have had really a lot of
19 public meetings, not just on individual licensing
20 actions, but obviously we've had quite a few larger
21 public interactions under the tenets of the Palisades
22 restart panel out at the site. We've had pre-
23 submittal meetings, and in process meetings on almost
24 every licensing action that we have either in process,
25 or completed at this point.

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1 We have spent quite a number of hours on
2 all of those activities, and we will continue to do so
3 throughout the remainder of this project. You can
4 also see from the round graphic that we really picked
5 up on the number of hours that we've spent on
6 inspections. I think we just updated this for this
7 meeting.

8 And previous to this meeting, I think the
9 number of inspection hours, everyone was at about 30
10 percent across the board, but the inspection
11 activities have really picked up greatly since April,
12 which was the last time we had updated this graphic,
13 and things are really getting busy at the site in
14 terms of boots on the ground.

15 So, just sort of wanted to again highlight
16 the fact that we have been out in the public as much
17 as possible to try to make clear the work that's being
18 done, and the work that is ongoing to get us ready to
19 move from the position we are in now from the
20 transitional piece from decommissioning to operations
21 to actually being ready for a full operational status.

22 And with that, I think I am going to turn
23 it over to Paul Klein, he is going to talk more about
24 the ongoing steam generator license amendment request.

25 CHAIR HALNON: This is Greg, you're not

1 off the hook yet, Marlayna.

2 MS. DOELL: Sure.

3 CHAIR HALNON: And one, if I remember,
4 question I'm going to ask each of the presenters at
5 the end is what lessons did you learn from the process
6 from your perspective, and what might you change going
7 forward? And the potentially two other applications
8 that may come in, I say applications loosely, but
9 anything that you can share with us?

10 MS. DOELL: Sure. I think we learned a
11 lot obviously during the Palisades review because it
12 was the first of a kind. So, I think we'll be able to
13 take a lot of just the work that was done, and the
14 thinking that was done in how we setup the evaluation
15 process, and how we setup obviously having the
16 inspection manual now, and a lot of the things that we
17 were doing sort of as -- the expression we were using,
18 building the plane while we're flying it for
19 Palisades.

20 Where in this case now we have so much of
21 it setup, and so much of it has been written down, and
22 done once, I think that is going to help us a lot for
23 the ongoing reviews. I think in terms of one of our
24 bigger lessons learned for Palisades, I think the
25 communicating early and often, we can't do enough of

1 that.

2 There will be a little more time for the
3 other two plants that are pursuing this same path, so
4 I think that's going to be a real benefit for both of
5 those projects that will have a little more time to
6 have those pre-application interactions, talk to them
7 as much as possible about what's going to be
8 happening, what their processes are going to be.

9 So, from my perspective I think we were
10 very successful in doing that on this project, but
11 having even more time, and kind of opportunity to take
12 that breath, and plan out those interactions is going
13 to be a great benefit for those projects as well.

14 CHAIR HALNON: Thank you. Anyone else
15 have any questions for Marlayna? Okay, let's move on.

16 MR. KLEIN: Can I have the next slide
17 please? Good morning ACRS, I'm Paul Klein. My
18 understanding is you would like a brief bio from
19 technical speakers this morning. So, by way of
20 background I have a bachelor's degree in metallurgy,
21 and a master's degree in material engineering. In
22 terms of work experience I've been at NRC for the past
23 22 years, and in reactor regulation.

24 And prior to that I spent 13 years at a
25 utility initially as a steam generator inspection

1 engineer, and later in the corporate metallurgy lab,
2 and prior to that I had five years' experience at a
3 Navy corrosion center doing corrosion research. So,
4 these next two slides we're going to focus on steam
5 generator tube degradation at Palisades.

6 From the licensing perspective, later on
7 in this presentation, April is going to address the
8 inspection related activities for the steam
9 generators. So, initially I wanted to discuss just a
10 little bit of background about the Palisades steam
11 generators that are a Combustion Engineering Model
12 2530 steam generators installed in 1990.

13 There is two steam generators in the
14 plant, each has 8219 tubes, they are the Alloy 600
15 high temperature mill annealed tubing, which of the
16 three tubing materials in service in U.S. PWRs, that
17 is the most susceptible to stress corrosion cracking.
18 The tubes are nominally three quarter inch diameter,
19 and .042 inch wall thickness with the C design.

20 The lower rows are a U bend design, and
21 the higher rows are the square bend design. In terms
22 of tube support, there is up to, depending on the row,
23 there is up to eight horizontal lattice type supports,
24 which will also be referred to as eggcrate supports in
25 this presentation. And then the upper tube bundle U

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1 bend is supported by diagonal supports that are
2 sometimes called batwing supports in the design, and
3 also grapple straps.

4 In terms of our initial interaction with
5 Holtec, it involved a September 3rd, 2024 phone call
6 between the Corrosion in Steam Generator Branch and
7 Holtec to discuss ongoing steam generator inspections,
8 accession number is provided in this second bullet for
9 reference. At that time we realized Palisades had
10 experienced a significant increase in axial outside
11 diameter stress corrosion cracking indications, or
12 ODSCC at the eggcrate supports.

13 And to provide some numbers to put it in
14 perspective, prior to the shutdown outage inspection,
15 which they term 1D28, the previous inspection of steam
16 generators was performed in 1R27. And at that point
17 there were a total 56 stress corrosion cracking
18 indications in the generators during the inspection.
19 The 1D28 had 1427 SCC indications, so it was a
20 significant jump.

21 And the NRC released a preliminary
22 notification on September 18th, 2024 about the
23 degradation in the Palisades steam generator tubing.
24 By way of update, I'd also like to mention that NRC
25 and Holtec had a follow up call a week ago on August

1 14th. And now that all inspection and additional work
2 has been done in the steam generators, it was a chance
3 for the staff to get an update on the condition of the
4 steam generators.

5 We intend to issue a public call summary
6 similar to what we did for the 9/3/24 call so that
7 members of the public will be able to make a direct
8 comparison between the initial and the final
9 inspection results, and that the numbers don't change
10 by very much, but there is always some differences
11 when inspections aren't done.

12 As you go through final analysis, total
13 numbers tend to shift around somewhat. During 2025 in
14 May --

15 DR. BLEY: Excuse me.

16 MR. KLEIN: Yes?

17 DR. BLEY: Dennis Bley again. In the
18 interim were these left in a dry layup or wet layup
19 condition?

20 MR. KLEIN: So, our understanding is the
21 plant was left in a wet condition, but it was an
22 uncontrolled chemistry, and there was very little
23 chemistry sampling. So, I think there is a total of
24 maybe three samples taken over the approximate two
25 year period that the steam generators were laid up.

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1 DR. BLEY: Okay, thanks.

2 DR. BALLINGER: This is Ron Ballinger. I
3 mean, just for the record, you are probably going to
4 talk about them a bit later, but to my knowledge no
5 Alloy 600 mill annealed steam generator now exists,
6 they've all been replaced in the past. The other
7 thing is there was an incident at a plant, I guess I
8 can't name it, where there was an inspection that
9 occurred, and that inspection tubing passed.

10 But subsequent to operation they had a big
11 leak where some of those defects which they missed
12 because the steam generator was not operated, let's
13 just say optimally, where those defects connected up,
14 and they have a 700 or so gallon a minute leak in the
15 steam generator tube. And they had to get that plant
16 depressurized in a hurry.

17 And so, I'm sure I'll pursue this later,
18 but I'm curious as to what kind of what amounts to
19 augmented inspections might be being considered going
20 forward to make sure that the steam generator doesn't
21 have a similar issue. Not to say that it will,
22 because sleeving was always, to my knowledge, a
23 stopgap measure prior to replacement. So, I haven't
24 heard anything here about a plan to replace the steam
25 generators.

1 MR. KLEIN: So, you asked a number of
2 questions, in terms of replacement, I can't speak to
3 that, since I don't really know what the plans are for
4 the plant, so I'm going to pass on that one. But in
5 terms of high temperature mill annealed tubing there
6 are -- if Palisades starts up, there are two units
7 that remain with high temperature mill annealed
8 tubing, Beaver Valley Unit 2, and Palisades.

9 Everyone else has replaced, so they either
10 have 600 thermally treated, or Alloy 690. Most of the
11 PWRs have Alloy 690 at this point. In terms of the
12 situation you described about the mis-indications that
13 linked up and then caused a leak, I would characterize
14 the inspections that were performed by the vendor as
15 extremely thorough.

16 In addition to the ball and coil, they did
17 a lot of close point inspections, and had indications
18 to characterize them, and so I have confidence that
19 you won't see a similar type thing at Palisades.

20 DR. BALLINGER: I'm sure you have
21 confidence, I'm just curious as to how you verify the
22 confidence going forward.

23 MR. KLEIN: Well, I mean it's a great
24 question, but I think at some point we do engage with
25 a lot of plants, and a lot of vendors with respect to

1 steam generator inspections, and so you get a sense
2 based on the inspection scope, and the follow ups that
3 are done, how much inspection is actually being
4 performed in the plant.

5 And I think in this case since they were
6 in extended shutdown conditions, they had the
7 advantage of time, and so I would characterize the
8 inspections that were performed at Palisades as very
9 Thorough.

10 CHAIR HALNON: Yeah, Walt, go ahead.

11 MEMBER KIRCHNER: Yes, thanks, this is
12 Walt Kirchner. So, these tubes passed. What were the
13 criteria for selecting the tubes, and then what does
14 it mean that they passed? This is just a simple hydro
15 test, or I assume these would be tubes that showed
16 stress corrosion cracking at the eight grade supports
17 specifically.

18 MR. KLEIN: So, that's a great lead in
19 question to the third bullet here, so let me talk
20 about the process. Normally when a steam generator
21 inspection is performed at a plant, they go through a
22 condition monitoring practice, and that's a look
23 backward, and so the idea is in the condition
24 monitoring, you're looking to demonstrate that the
25 tubes maintain tube integrity up to the point of the

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1 inspection.

2 And then the second part of the process is
3 the operational assessment, which is the forward
4 projection to demonstrate that you will maintain tube
5 integrity until the next steam generator inspection.
6 So, with this part of the condition monitoring
7 process, you take any current results that are
8 generated in the plant, and then you align those to
9 preset condition monitoring limits that you might have
10 at given locations in the plant.

11 And so, sometimes you do that, and all
12 indications pass without any additional refinements
13 needed. Sometimes some of the indications are close
14 to your condition monitoring limit, and then it
15 requires additional flaw profiling by inserting eddy
16 current probes. And then if you still analytically
17 can't demonstrate condition monitoring, then you move
18 on to the next step, which is the in situ pressure
19 testing that's described in the third bullet here.

20 And so, in terms of the 17 tubes in Steam
21 Generator A, I have the numbers here if I can find
22 them. I think that six of those were tested as a
23 result of single axial indications at tube support
24 plates. 11 of the tubes were actually tested because
25 of indications at the top of the tube sheet, and the

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1 explosive expansion transition region, which is also
2 an area of high stress.

3 And then in Steam Generator B there was a
4 total of five that were tested. One was due to a
5 single axial indication at the top of the tube sheet,
6 one was due to a single axial indication at the
7 diagonal hot bar. And then two of those were single
8 axial indications at the tube support plates. And the
9 fifth one was a tube that had an obstruction that they
10 couldn't get an eddy current inspection on, so it went
11 to an in situ pressure test to demonstrate tube
12 integrity.

13 And in terms of how it's done, yes, you
14 isolate the tube, and then you pump it up to pressures
15 that would correspond to the main steam line break
16 pressure in order to demonstrate leakage integrity.
17 And then for most of these indications you'd also do
18 a proof test, which would be three times the normal
19 operating differential pressure between the primary
20 and secondary pressures in the plant.

21 So, that satisfies the accident induced
22 leakage criteria, and the structural performance
23 criteria that are in the plant tech specs. When we
24 say that all tubes passed, it meant that there was no
25 leakage, and no tube burst in this perspective.

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1 DR. BALLINGER: And there were no
2 circumferential indications that had to be plugged?

3 MR. KLEIN: There were circumferential
4 indications that required plugging. Ten of the tubes
5 that had in situ pressure testing were actually
6 circumferential indications at the top of the tube
7 sheet.

8 CHAIR HALNON: Paul, this is Greg. How
9 confident are you that the damage mechanism that
10 occurred with the uncontrolled chemistry during the
11 layup timeframe after '22 to when they decided to
12 recontrol the chemistry, how confident are you that
13 the damage mechanisms and potential hideout of bad
14 chemicals if you will, has been rectified, and
15 identified, and is part of the repair plan going
16 forward so that we can be confident that when the
17 plant starts up the generators are in a shape that is
18 sufficient for safety?

19 MR. KLEIN: That's a very good question,
20 so let me try addressing that a couple different ways.
21 I guess in terms of the actual degradation mechanism
22 that's occurring, I think the plant causal analysis
23 attributed it to two different things, one of which is
24 the uncontrolled water chemistry that you mentioned.
25 But I think another very important factor is that

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1 there was a long-term buildup of deposits, especially
2 at the support plates.

3 And if you look back at some of the
4 recommendations that were made for chemical cleaning
5 no later than 2015, 2016 timeframe, and then as the
6 plant reached end of life with the previous owner,
7 they deferred that chemical cleaning due to the cost,
8 and the approaching end of life. So, really it's a
9 combination of the two.

10 And there are other CE plants in the past
11 that have had very aggressive cracking at the support
12 plates due to deposit build ups. And so, it's not
13 unprecedented, the amount of tubes that had cracking
14 that were noticed at Palisades. St. Lucie, circa
15 2005, 2006, they actually plugged more tubes after one
16 cycle than Palisades has here.

17 But I think in terms of safety moving
18 forward, I think there is a few things that give us
19 confidence. One is that the sleeving process will
20 take care of the known indications that were detected
21 by eddy current. More importantly, there is chemical
22 cleaning that is scheduled for next month that will
23 work to remove some of those deposits at the support
24 plate, and that should slow down the rate of growth of
25 stress corrosion cracking moving forward.

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1 But in terms of -- I don't think there is
2 any assurances that they won't continue to see some
3 cracking, because within the NE technique, you don't
4 have a threshold value of zero. So, there are some
5 shallow cracks that were not detected by eddy current,
6 and we would expect at the next inspection those will
7 become detectable.

8 And so, moving forward you will see some
9 more ODSCC that occurs at the support plates. But I
10 think when you add all the things up, a thorough eddy
11 current inspection, the chemical cleaning, the fact
12 that they do run at a lower hot leg temperature
13 compared to some plants, I think we do have confidence
14 they'll be able to execute an operating cycle, and do
15 it safely.

16 CHAIR HALNON: Okay, so if I could just
17 kind of repeat back the work they've done to this
18 point, the work that's planned, sludge lancing, and
19 other cleaning processes, and the regime going forward
20 of inspection will make sure, give you the confidence
21 that we're operating at a level of adequate safety for
22 the steam generators?

23 MR. KLEIN: That's correct. And the
24 operational assessment process is very mature, so the
25 tube integrity engineers that look at this will need

1 to account for these inspection results, and then
2 understand what might be missed, and then account for
3 that moving forward when they're trying to determine
4 the next inspection.

5 CHAIR HALNON: Okay. You mentioned that
6 Beaver Valley 2 also has the same material in their
7 steam generators, is there communication -- and you
8 may not know this, between those two plants for the
9 lessons learned, so that Palisades is learning from
10 operational history at Beaver Valley? Because it's
11 still in operation at this point.

12 MR. KLEIN: I think that would have to be
13 addressed by Holtec, but they are aware that Beaver
14 Valley has Alley 600 high temperature mill annealed --

15 CHAIR HALNON: Okay, and I know that the
16 generator engineers talk to each other quite often.

17 MR. KLEIN: Yes. Beaver Valley has also
18 installed sleeves, although different from these
19 designs.

20 CHAIR HALNON: Okay, we may have finished
21 your presentation for you, but continue on please.

22 DR. BALLINGER: So, back again, sorry, Ron
23 Ballinger again.

24 CHAIR HALNON: Go ahead.

25 DR. BALLINGER: I guess I'm encouraged to

1 hear that you say that you're anticipating that they
2 can operate for one cycle. So, you are being a bit
3 conservative, because once this damage starts, the
4 rate continues to usually increase, and so you're
5 anticipating that they're going to find additional
6 cracks that are going to need to be addressed after
7 one cycle?

8 MR. KLEIN: Yeah, thank you for that
9 question, because I didn't mean to imply that they
10 were going to operate for one cycle. So, we are
11 waiting for a copy of the condition monitoring and
12 operational assessment report so we can review it. At
13 this point we're uncertain in terms of how long the
14 plant will be proposing to operate until the next
15 inspection.

16 DR. BALLINGER: Thank you.

17 MEMBER ROBERTS: This is Tom Roberts,
18 while we're talking about background, I understand
19 they plan to unplug some tubes that were plugged in
20 1990 or so, can you speak to that? I understand why
21 they're doing it, because they're plugging so many
22 tubes they need to get the heat transfer back, why
23 were they plugged 30 some odd years ago, and what's
24 the consequence of unplugging them?

25 MR. KLEIN: So, yes, you are correct,

1 there were I think about 600 tubes were plugged prior
2 to operation, they tended to be above the -- in the CE
3 design it has a central stay cylinder design, and
4 higher up above that tends to be an area that can be
5 susceptible to more aggressive tube wear at the
6 support plates.

7 And so, during this prolonged outage, they
8 did deplug those tubes, they performed eddy current
9 inspection to determine the condition of the tubes,
10 and some population of those tubes were unplugged, and
11 remain in service. Other ones were inspected,
12 determined that they had enough wear that they
13 shouldn't remain in service, and they were plugged
14 again.

15 DR. BALLINGER: So, is this a margin
16 issue?

17 MR. KLEIN: I think they were -- I
18 shouldn't speak to their motives, but I know they were
19 interested in recovering tubes because they had a
20 number of tubes that were being plugged this outage,
21 but I think it also recognized that maybe the number
22 of tubes that were prior in service might have been a
23 conservative number.

24 When we talked to the Framatome people
25 that did the inspection last week, they indicated that

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1 above the central stay cylinder there is some zones of
2 more aggressive wear, but then you transition away
3 from that to very little wear, and those were the
4 tubes that were put back in service, and there is no
5 question involving tube integrity during the next
6 operating cycle.

7 CHAIR HALNON: Walt, you had a question?

8 MEMBER KIRCHNER: Yes, this is Walt
9 Kirchner. So, looking ahead to the inspections that
10 are coming, could you cover that, or is that going to
11 be covered in further slides? And in particular with
12 regard to these tubes that are being unplugged, is
13 there going to be as part of the startup testing, some
14 testing of flow induced vibrations, et cetera, that
15 might be of concern with generating excess wear on the
16 tubes?

17 MR. KLEIN: I'm not aware of any vibration
18 analysis, but I think the advantage of eddy current
19 inspection of tubes with wear is that it's a
20 relatively easy degradation mechanism to detect, and
21 it also has a very small sizing error compared to size
22 in stress corrosion cracks for example. So, I'm not
23 concerned that they might have miss-sized, and put
24 tubes back into service that really had too much wear,
25 and shouldn't have been put back into service.

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1 MEMBER KIRCHNER: My issue -- not issue,
2 I don't have any issues, but my concern would be that
3 these tubes, once they're unplugged, could potentially
4 vibrate, or other once they have flow in them, then
5 the concern would be does the wear increase, the rate
6 of wear at the tube sheets, and other locations?

7 MR. KLEIN: There may be change and wear
8 with the tubes in service, but I would not expect it
9 to be so dramatic that it would be something that was
10 not able to be modeled appropriately.

11 DR. BALLINGER: So, in the end they'll
12 come up with all these inspections and everything,
13 they will come up with an estimate of the amount of
14 margin that they have, is that true? They'll have to
15 supply you folks with an estimate of the amount of
16 margin, in other words, number of tubes that could be
17 plugged going forward before their margin gets
18 removed?

19 MR. KLEIN: Yes, that's correct. We do
20 have the numbers for the percentage of tubes that are
21 plugged at this point, and we can provide that to you.

22 MEMBER MARTIN: That would be my question,
23 typically in safety -- this is Bob Martin --

24 DR. BALLINGER: Yeah, that's what I'm
25 talking about.

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1 MEMBER MARTIN: We look at about five
2 percent just as a conservative number regardless of
3 the status of the plant to cover such things, and
4 getting close to that number, not to say there's not
5 margin beyond five percent typically, but.

6 MR. KLEIN: I'm going to ask Andrew to
7 double check my numbers here, but it looks like in
8 terms of as of last week, the total tubes plugged in
9 Steam Generator A is about 8.9 percent, and in Steam
10 Generator B is 5.3 percent, and I believe that the
11 plugging design margin is 15 percent. So, there is
12 some degree of margin.

13 MEMBER MARTIN: I think they would be --
14 in the last FSAR, the assumption was 15 percent.

15 MR. KLEIN: Yes, so I think that provides
16 some degree of margin.

17 DR. BALLINGER: and that includes the
18 effect of sleeves?

19 MR. KLEIN: I think the sleeves may not be
20 included in that. So, with the sleeves you could
21 probably take the total number of tubes that are
22 sleeved, and ten sleeves approximately a week, a one
23 plug two.

24 MEMBER HARRINGTON: This is Craig
25 Harrington. Your comment, condition monitoring,

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1 condition assessment is a very mature process, I think
2 that's true across the industry. Your general sense
3 I take it is that they're effectively implementing
4 that process in thoughtful, logical, responsible way
5 from what you can tell in your inspections?

6 I don't want to put words in your mouth,
7 but is that -- that's kind of the sense that I am
8 getting.

9 MR. KLEIN: I would characterize that as
10 you did, yes.

11 CHAIR HALNON: Seems like we're worn out,
12 go ahead with your case.

13 MR. KLEIN: Slide two. So, the licensee
14 submitted an LAR in February of '25, requested an
15 approval for us of Framatome Alloy 690 leak limiting
16 sleeve to repair hot leg support plate ODSCC
17 locations, so this amendment is limited to the hot
18 leg. And the reason for that is you need to still do
19 tube inspections, so you can reach above the sleeves
20 from the cold leg plenum.

21 And then in the hot leg you can go up to
22 the highest sleeve location, and inspect down with a
23 rotating probe. The Framatome -- I actually have a
24 mock up here that I can pass around if the committee
25 is interested. But the Framatome sleeve design is

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1 called an H8, so it has four hydraulic expansions that
2 occur above the center portion, and then four that are
3 below the center portion.

4 And so, the center portion would sit over
5 top the support plate location, and the sleeve then
6 will be the pressure boundary where you have an
7 existing flaw, and the sleeve tube assembly would be
8 the pressure boundary outside of that center portion.
9 So, in support of our review, the NRC technical staff
10 performed an audit at Framatome in May of '25 to
11 better understand the sleeve design, the installation
12 process, and the eddy current qualification work that
13 was done in order to be able to inspect the sleeve
14 tube assembly after installation.

15 So, in terms of the audit, NRC staff
16 viewed that as very valuable, because it allowed us to
17 see a sleeve installed in a mock up, interact with the
18 Framatome technical team after the point where we had
19 the benefit of reviewing the LAR, and all of the
20 associated technical reference that were submitted as
21 part of that LAR, or that were put on a portal for us
22 to review.

23 And so, I think we gained a lot of
24 knowledge at the audit, and in particular the ability
25 to not only see eddy current print outs of the work

1 that they did, but actually be able to step through
2 the eddy current data with them, and with our
3 consultant from Argonne National Lab who is an eddy
4 current expert, that really gave us confidence in the
5 qualification work that was just completed at that
6 point in time.

7 So, the sleeve installation, I think we
8 touched on this last bullet already, but the sleeve
9 installation in lieu of plugging would maintain the
10 heat transfer capability, and we talked about where
11 they are currently with plugging margins. In terms of
12 transparency, I should mention that the sleeves have
13 been installed at this point, even though this LAR is
14 still under review.

15 The sleeving work as I understand it is
16 done, and they have installed a total 2971 sleeves in
17 the Palisades steam generator, and it is probably
18 worth taking a moment to speak about the sleeving
19 strategy that they employed at the plant. So, in
20 terms of sleeving of those 2971, 906 of them were what
21 they termed corrective sleeves.

22 So, those were sleeves that were actually
23 installed over ODSCC cracks. The other 2065 sleeves
24 are preventative sleeves. And so, once you install a
25 sleeve inside a steam generator tube, you don't have

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1 the ability to go back at any future time and install
2 another sleeve at a higher elevation. So, when the
3 plant had a tube that needed to be sleeved, they
4 tended to sleeve from either the fifth support plate
5 down to the first support plate, or from the fourth
6 support plate down to the first support plate
7 depending on the tube location and the tube model.

8 And the idea was that let's say you had
9 for example a crack at your highest temperature
10 location, which would be the first hot leg support,
11 they would then install sleeves at at least three or
12 four more elevations above that even if there were no
13 indication present, so that if something were to crack
14 at one of those locations in the future, it would
15 already have been sleeved.

16 And that portion of the parent tube then
17 would have been taken out of service, and would no
18 longer be a pressure boundary.

19 MEMBER MARTIN: Has Framatome stated to
20 you what the limit might be on sleeving? We talked
21 about limits on plugging, I'm not familiar, but you
22 would expect heat transfer to degrade when you have
23 this sleeve in there, more material, you have gaps and
24 stuff like that, there has got to be a limit, what
25 have they told you all?

1 MR. KLEIN: So, there is two limits, I
2 think there is a thermal hydraulic limit as we
3 mentioned, which was about the ten to one ratio
4 roughly for ball park. And then I think there is also
5 a main steam line break accident induced leakage
6 limit. So, part of the qualification testing involves
7 this is a leak limiting design, it's not a leak proof
8 design.

9 So, it's not a welded sleeve, you have a
10 series of hydraulic expansions, and so during an
11 accident you can get leakage past the sleeve into the
12 secondary system. And so, that's really, I think the
13 controlling thing in terms of the number of sleeves
14 that can be installed. But I will mention that the
15 leakage rates past this design are very, very low.

16 So, they have many more thousands of
17 sleeves I believe that could be installed before they
18 would be limited by that condition.

19 MEMBER MARTIN: Wait to see analyses I
20 guess.

21 MEMBER HARRINGTON: And this is Craig, the
22 sleeving strategy you were just talking about, is that
23 what they have implemented, or preventative, or
24 anticipatory sleeving above a location that they can't
25 inspect later, is that what they've done at Palisades?

1 MR. KLEIN: They have done that at
2 Palisades, that's correct, and they can be inspected.
3 So, the limitation at a higher elevation is
4 installation of a sleeve, because if you have a sleeve
5 already inside at a lower elevation, you just can't
6 get one past it. But they do have a technique to
7 inspect the sleeve assemblies once they are in
8 service.

9 And that's something that the staff really
10 focused on as part of our review, because we wanted to
11 be sure that they would have a qualified technique
12 that was capable of detecting cracking in the parent
13 tube if that were to occur in the future.

14 CHAIR HALNON: Walt, you've got a
15 question, go ahead.

16 MEMBER KIRCHNER: Yes, this is Walt
17 Kirchner. If you, subsequent to the chemical cleaning
18 and what other measures are made to bring the steam
19 generators back into service, if you do an inspection
20 after that, if you encounter stress corrosion cracking
21 at the tube sheet, at the entrance, is sleeving an
22 option for dealing with that particular set of
23 challenges?

24 MR. KLEIN: I would say yes. There are
25 tube feed sleeve designs that are currently available,

1 although I'll note that the number of cracks at the
2 support plates is much, much greater than the number
3 of cracks at the top of the tube sheet. I think when
4 you just look at the numbers, focusing on the tube
5 support plate sleeve, it would be kind of a much
6 greater benefit than a tube sheet sleeve.

7 MEMBER KIRCHNER: Okay, so the bulk of the
8 inspection results to date show that the area of
9 concern is mainly the support plate areas, not the
10 inlet tube sheet connection?

11 MR. KLEIN: That's correct. If you look
12 at the eddy current indications of stress corrosion
13 cracking at the top of the tube sheet, in the 1R28
14 inspection, it's a total of 210. So, that's a much
15 lower number than the approximately 1400 at the
16 support plates.

17 DR. BALLINGER: This is Ron Ballinger
18 again, has there been any free span cracking in the
19 steam generators?

20 MR. KLEIN: The answer to that is yes,
21 they had a total of four -- let me get the numbers
22 correct. They said they had a total of three free span
23 crack indications during this past inspection.

24 DR. BALLINGER: Because the sleeve
25 basically gets you out of a bad chemistry area for the

1 support plate region, but it transfers the stress
2 concentrator outside of that into the free span.

3 MR. KLEIN: That's correct, and so that's
4 one of the reasons we focused so hard on the eddy
5 current qualification technique, and its ability to
6 not only find indications within the tube sleeve
7 assembly, but also in the parent tube between adjacent
8 sleeves for example.

9 And so during the review, we requested a
10 couple additional sets of information from the
11 licensee, and those tended to be targeted towards
12 demonstrating that the probe that was focused at a
13 lower frequency in order to be able to inspect the
14 tube sleeve assembly would also have adequate
15 sensitivity in that parent tube in the free span
16 between adjacent sleeves.

17 And then also we asked for a set of data
18 to look at the existing cracks at the support plates
19 but after sleeve installation, so we could have an
20 understanding of how well that same sleeve probe would
21 see cracks once they were behind a sleeve.

22 DR. BALLINGER: Thank you.

23 MEMBER HARRINGTON: This is Craig. And
24 so, that ability to see not just in the local expanded
25 areas, but in the places where there is a little bit

1 of a gap, is that what I'm hearing?

2 MR. KLEIN: I'm not sure if I understand
3 your question.

4 MEMBER HARRINGTON: From the inspection
5 you got it's four hydraulically expanded zones top and
6 bottom, and I can more easily see how the inspection
7 could be productive in those four specific locations
8 top and bottom. But between them, and in the center
9 portion where there is a little bit of a gap between
10 the sleeve and the wall, it seems like that would be
11 harder.

12 MR. KLEIN: I would really characterize it
13 as there is more attenuation of the signal in That
14 center portion where there's a gap as you describe,
15 however the parent tube at that location is also not
16 a pressure boundary. But yes, the eddy current
17 qualification that was done included putting flaws in
18 all portions of this sleeve tube assembly.

19 Whether it be the transition zone between
20 the expanded and unexpanded, in the flat zone where it
21 rests against the parent tube, and where the gap
22 occurs. So, it was a lot of work that was done to
23 demonstrate that you could detect flaws in all
24 locations.

25 MEMBER HARRINGTON: Okay, very good, thank

1 you.

2 CHAIR HALNON: Other questions? Paul,
3 thank you very much. Obviously the steam generators
4 being a reactor current pressure boundary is one of
5 the more important concerns that we came into this
6 meeting with to try and work through, and it sounds
7 like you have some really good data there, and good
8 assessment, so I appreciate that. One last chance for
9 Paul before he takes a deep breath.

10 MEMBER KIRCHNER: Yes, a couple things,
11 Paul, thank you, this is Walt Kirchner again. Just
12 for your future presentations, I think a picture would
13 be worth a thousand words to illustrate where in the
14 steam generators your inspections and repairs are
15 being made. My question is what are the next steps in
16 terms of the inspection program for the steam
17 generators?

18 Could you just kind of walk us through
19 what comes next? We heard about chemical cleaning and
20 so on, as you go up to hydro, the primary system at
21 some point, so could you just go through what other
22 steps are necessary to quote unquote qualify the steam
23 generators for a return to service?

24 MR. KLEIN: Are you going to address any
25 of that, April, in your --

1 MS. NGUYEN: Yes.

2 MR. KLEIN: April will speak to that in
3 her slides later on.

4 MEMBER KIRCHNER: Okay, thank you.

5 CHAIR HALNON: Okay, let's go ahead and
6 move on. Jeff, I guess you're up next.

7 MR. KLEIN: So, let me introduce Jeff as
8 our next speaker.

9 CHAIR HALNON: You're going to have to
10 move that real close to you there.

11 MR. HERRERA: All right, can you hear me?

12 CHAIR HALNON: All right.

13 MR. HERRERA: So, my name is Jeff Herrera,
14 and just a brief background, I'm currently a senior
15 emergency preparedness specialist, I have a bachelor's
16 degree in chemical engineering. I've been in the
17 industry for roughly about a little over 20 years,
18 starting off as a resident inspector. I was over at
19 Oyster Creek, then I was also with on the private side
20 in the industry performing oversight.

21 And as part of the corrective action
22 program, I was also a headquarters operations officer
23 seeking inbound emergency calls for the NRC, and
24 currently I'm in licensing amendment review, or
25 licensing review for emergency preparedness. So, that

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1 just gives a sort of high level overview. If you
2 could go to the next slide?

3 So, what I would like to do is just
4 basically give an opportunity to give a high level
5 overview of the time line that led up to the license
6 amendment review for emergency preparedness. So,
7 Palisades officially shut down in May of 2022, and
8 certified by letter that they had permanently ceased
9 operations in June of 2022.

10 And then subsequently in December of 2023
11 the NRC approved their decommissioning emergency plan.
12 Roughly about five months later in May, Palisades
13 submitted a license amendment to restore the operating
14 emergency plan, and that amendment request was
15 approved with a licensing condition in July of 2025.

16 And during the same month an emergency
17 exercise was conducted with the offsite participation
18 where NRC inspected the onsite, and the licensee
19 performance, and FEMA correspondingly evaluated the
20 offsite response organization. Next slide, please.

21 So, Holtec, in order to change their
22 emergency plan from a permanently defueled emergency
23 plan back to an operating emergency plan, the plans
24 that were submitted requested to restore both the
25 emergency plan that they had in place prior to

1 shutdown, which in that case was Revision 32, and
2 submitted in accordance with NUREG-0654 Guidance
3 Document Revision 2.

4 And then also restore their emergency
5 action level scheme that was in place prior to
6 shutdown, and using the guidance with NEI 99-01
7 Revision 5. The request that they submitted was in
8 May of 2024, and their request again, was to have
9 completion of that license amendment review prior to
10 fuel loading, which is roughly the fourth quarter of
11 2025.

12 Next slide please. So, on a high level
13 basis there are several requirements that are needed
14 in order to restore, as Marlayna mentioned earlier,
15 the desire was to go back to an operating license.
16 So, the requirements for an operating license for
17 Palisades is the same as pretty much all other
18 operating plants currently, which are basically 10 CFR
19 50.47, which are the 16 planning that exist there, and
20 also the requirements that are located in Appendix E.

21 So, they would have to have their
22 emergency plan meet those requirements. And then in
23 addition, as I mentioned before, the guidance that was
24 used would be for that review was Revision 2 for the
25 emergency plan itself, and obviously 99-01 Revision 5.

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1 In addition, Holtec submitted an updated annual
2 population estimate, which was reviewed by the staff.

3 And then for the offsite portion, the
4 state and local emergency plans are reviewed by FEMA,
5 and that's under 44 CFR 350, and FEMA will be
6 providing the results of their review after the
7 emergency exercise, which we haven't received as of
8 yet, but will be coming hopefully soon. And then also
9 FEMA also reviews the alert notification system design
10 report, and then they submit those results to the NRC
11 for review.

12 Next slide please. So, the reactor
13 licensing branch conducted a review of the onsite
14 emergency plan in two parts. The review of their
15 submitted plan in comparison with the guidance, which
16 was the operating plant that they had in Revision 2,
17 their submittal, and of course against the guidance in
18 NUREG-0654, and the same method was really used for
19 the emergency action levels.

20 It was a review of their emergency action
21 levels compared to what they had previously, and then
22 also in comparison to the guidance that was submitted,
23 that they submitted under. For the offsite and local
24 emergency plans, FEMA did provide an interim finding
25 to the NRC of reasonable assurance that was done on

1 June 27th, 2025.

2 And that allowed the NRC to be able to
3 submit the license amendment with the license
4 condition pending a FEMA file review of reasonable
5 assurance.

6 CHAIR HALNON: Jeff, this is Greg. In
7 light of our discussion we just had with the steam
8 generators, and that emergency planning is kind of the
9 last line of defense in depth, were there any changes
10 to the steam generator EALs, or any offsite release
11 criteria based on the fact that we may have an
12 increased risk of steam generator tube rupture given
13 the condition?

14 MR. HERRERA: Yeah, that's a good
15 question. On one of my other slides I do go over what
16 the deviations are, but direct answer to your question
17 is there were no changes to the emergency action
18 levels, those are still valid for the conditions.

19 CHAIR HALNON: That assessment was made,
20 and you made the decision not to change anything at
21 that point. I get it that there was no change, I
22 wanted to make sure it was a deliberate decision, and
23 not a --

24 MR. HERRERA: Yeah, the thresholds for the
25 declaration for the emergency, and emergency action

1 levels remain the same.

2 CHAIR HALNON: Okay.

3 MR. HERRERA: Could we go to the next
4 slide? There we go. All right, so for the most part
5 Holtec submitted an emergency plan that really did
6 reflect the same plan that they had when they were in
7 operation. So, as you can see, there are very few
8 deviations from the guidance that were noted as a
9 result of review.

10 So, I'm going to just kind of go over high
11 level for the emergency action levels as an example.
12 One emergency action level was added to address the
13 lessons learned from Fukushima. At the point where
14 they submitted their license amendment request, Holtec
15 had completed all of their associated actions to
16 address the lessons learned from Fukushima prior to
17 shutdown.

18 However, at Palisades the emergency action
19 levels had not transitioned at that point between
20 Revision 5 and Revision 6 of NEI 99-01, which is where
21 the emergency action levels were added after as a
22 result of the lessons learned from Fukushima. So,
23 they added those EALs from Revision 6 into their
24 current emergency plan emergency action level scheme.

25 And then in addition they also modified

1 the emergency action level associated with their
2 independent spent fuel storage installation, and that
3 was to reflect the language in the draft NEI 99-01
4 Revision 7. The change there was to provide a much
5 simpler method of detecting potential cask radiation
6 leakage, and subsequent emergency classification.

7 Versus having, which they currently had in
8 emergency action levels, was individual casks and dose
9 rates associated with that, which they would then
10 declare those emergencies based on individual values.
11 So, the change provided a simpler method to measure
12 the dose rates at the perimeter while reducing the
13 human factors associated with potential errors by
14 having the fact that they had different cask
15 certifications stored on the pad.

16 And then from the emergency plan
17 perspective, there were three deviations from the
18 guidance in 0654 Revision 2. Holtec requested two
19 emergency response organizations functions to be
20 staffed by individuals remotely. The two functions
21 there are engineering functions and the dose assessor
22 functions.

23 They also evaluated their digital assets
24 as part of implementation of the cyber security role.
25 Holtec planned, their plan currently lies on existing

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1 24/7 IT support versus in that case assigning an IT
2 technician to respond to the technical support center
3 of the emergency response facility. Lastly, tech
4 support center dose assessor function was removed in
5 their emergency plan.

6 And the basis for that was that they staff
7 both their technical support center and their
8 emergency operations facility, and activate those
9 centers at the alert declaration. So, the transfer
10 from the tech support center from the dose assessor to
11 the EOF was no longer critical, and required, so they
12 could reduce that duplicate function.

13 So, the control room would directly
14 transfer to the EOF for the dose assessment function.
15 Next slide.

16 MEMBER HARRINGTON: This is Craig. That
17 function had the same response time?

18 MR. HERRERA: Yeah, per the guidance the
19 EOF would staff at the site area emergency in 60
20 minutes. But what they do is they staff at the alert
21 level, which is sooner. But yes, the TSC and the EOF
22 would both activate at this alert level.

23 CHAIR HALNON: And have the same response
24 time?

25 MR. HERRERA: They have the same response

1 time, that's correct.

2 MEMBER HARRINGTON: This is Craig. The
3 remote staffing, is that nominally done now in this
4 new age of remote work and things? My experience in
5 this role was before all that.

6 MR. HERRERA: Yeah, that's correct, this
7 is relatively new. I mean, there are very few
8 positions that would really qualify for that to be
9 able to have that kind of function. So, I don't want
10 to speak in advance of the -- but there is a white
11 paper on that that we'll be working on that getting
12 that through the file process.

13 But essentially for the engineering
14 functions, they function mostly out of the tech
15 support center, so current capabilities, and what we
16 reviewed is do they still have those capabilities,
17 accessing plant diagrams, plant procedures,
18 engineering procedures remotely? And then in addition
19 you have to consider do they still have the same
20 communication capabilities, and then backups?

21 So, backups essentially would be if their
22 phones don't work, then possibly either contact a
23 different engineer or go to the site, those kinds of
24 scenarios. So, currently tech support center is where
25 they are, but they have that capability to function

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1 remotely based on the types of actions that they would
2 be expected to perform in an emergency.

3 MEMBER HARRINGTON: Okay, so they would be
4 likely in the TSC, just not the EOF, but they could be
5 in both?

6 MR. HERRERA: Yes, it's more of a
7 capability in this particular case, and the example is
8 really during the emergency they have -- well, during
9 the week when they have normal engineering staff that
10 is part of the ERO for the emergency response
11 organization onsite, it doesn't make sense for them to
12 go drive home, they would just report to the tech
13 support center.

14 But off hours, and scenarios where they
15 are not present onsite, they have that capability to
16 be remote.

17 MEMBER HARRINGTON: Okay, thank you.

18 CHAIR HALNON: Just a little more. Is the
19 fitness for duty requirement the same for the motel
20 site --

21 MR. HERRERA: Yes, it is, yes.

22 CHAIR HALNON: And then the second
23 question is from a cyber security perspective, is that
24 those requirements translate to these folks' homes on
25 their computer, and how do you control that? I mean,

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1 because I know that these merging facilities do have
2 cyber requirements.

3 MR. HERRERA: Yeah, I can't really speak
4 --

5 CHAIR HALNON: That's part of the white
6 paper that's generically being written at this point?

7 MR. HERRERA: Yeah. I mean, I know the
8 cyber security plans, or Holtec's plans, and so I
9 can't speak to the specifics on the requirements for
10 connections, or remotely accessing information, but --

11 CHAIR HALNON: But we're not exempting
12 them from whatever requirements are there?

13 MR. HERRERA: Yeah, no, that's not part of
14 our review.

15 CHAIR HALNON: We don't need to go into
16 the specifics if it's probably getting into sensitive
17 areas, but they're not being exempted by what you're
18 doing here?

19 MR. HERRERA: That's correct.

20 CHAIR HALNON: Okay.

21 MR. HERRERA: Okay, next slide. So, I
22 wanted to talk just a little bit more just about
23 evacuation time estimates. Holtec submitted an
24 updated evacuation time estimate on September 7th at
25 2022 that was using the 2020 census data, and a

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1 completeness review of the evacuation time estimate
2 study was done on February 2023.

3 So, in addition, in August of 2024, Holtec
4 did complete an updated population analysis, which
5 concluded that the population has not really grown
6 enough to trigger another full evacuation time
7 estimate update. So, their requirements were
8 basically as I mentioned, to comply with the
9 regulatory requirements.

10 So, we're expecting of course within 365
11 days for there to be another update to that population
12 analysis. That should be coming somewhat soon.

13 CHAIR HALNON: But wasn't that time
14 estimate done based on shutdown requirements as
15 opposed to operational EALs?

16 MR. HERRERA: Yes, so the population
17 update is a calculated update, so as they've brought
18 the folks back onsite, you would expect for there to
19 be an increase in the population as a result of that.

20 CHAIR HALNON: No, not the population, I'm
21 talking about the 2022 time estimate that was based on
22 the shutdown EALs, was it not? Or it switched over to
23 decommissioning, decommissioning EALs. So, the
24 transport offsite from a release perspective would be
25 much smaller and lower, I mean slower than an

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1 operational.

2 PARTICIPANT: Jeff, wasn't 2022 they still
3 had their operational emergency plan in place, it
4 wasn't until '23 --

5 CHAIR HALNON: So, maybe the better
6 question is, is that time estimate indicative of an
7 operational plan? And if it is, then it's a moot
8 question, but yeah.

9 MR. HERRERA: Yeah, it was at the time
10 when it was performed, yes.

11 CHAIR HALNON: Okay, so they used the as
12 if the plant was in operation?

13 MR. HERRERA: I'll take a look and get
14 back with you on that one.

15 CHAIR HALNON: Yeah, I'd like to get an
16 answer, because that's pretty crucial. I think you're
17 trying to break in, are you?

18 MR. HERRERA: No, I believe that's Keith
19 Miller, he actually looked at the evacuation time
20 estimates. Keith, if that was you, go ahead.

21 MR. MILLER: Yes, sir. My name is Keith
22 Miller, I'm an emergency preparedness specialist
23 working with Jeff on the evaluation of the Palisades
24 emergency preparedness plan. As Jeff also alluded to,
25 I was the project manager for the evacuation time

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1 estimate reviews that occurred based on the 2020
2 census data.

3 The evacuation time estimates meet
4 requirements as per Appendix E, and as mentioned
5 earlier, there was not an exemption in place for them
6 to not submit the evacuation time estimate for the
7 2020 census data. So, they submitted a full
8 evacuation time estimate, which meets the Appendix E,
9 and also the NUREG-7002 Revision 1 requirements.

10 A completeness review was conducted on
11 that, and that review is actually not dependent upon
12 operational or decommissioning at the time, it is
13 actually just analysis of populations, and also the
14 roads, and highways around the plant. And since they
15 were not exempted, they did submit it, the evaluation
16 was conducted.

17 We completed the completeness review based
18 on the NUREG-7002 Revision 1 requirements, and as such
19 did not find anything. And also as Jeff mentioned,
20 they have also submitted the last, the 2023 and 2024
21 population estimate updates in accordance with
22 Appendix E to Part 50.

23 CHAIR HALNON: Okay, and that time
24 estimate bounds those new population estimates?

25 MR. MILLER: 100 percent, sir. If you

1 look at the left hand side of the screen under Section
2 M3, which is their sensitivity analysis, which is
3 where they conduct the review to determine at what
4 population growth we would exceed either a 25 percent
5 change, or 30 minutes, whichever is less in accordance
6 with Appendix E to Part 50 Section 4.

7 MEMBER KIRCHNER: This is Walt, I think
8 we've lost the sound.

9 MR. MILLER: Sorry, can you guys still
10 hear me? Can you guys still hear me?

11 DR. BLEY: I can hear you online.

12 CHAIR HALNON: Yeah, we should be fine, go
13 ahead.

14 MR. MILLER: Okay, so yeah, that Section
15 M is the sensitivity study, so that is done at what
16 point they would need to conduct an updated ETE
17 analysis, we call it an updated ETE analysis, because
18 it's between the ten year decennial census data. And
19 what they determined is they would need a 107 percent
20 change in the 2 mile EPZ permanent population, that
21 would cause a 30 minute change in their evacuation
22 time estimates.

23 So, I believe looking at the 2024
24 population estimate updates, there was an increase in
25 one percent, if I remember correctly, so we are well

1 short of that 107 percent change.

2 MEMBER MARTIN: This is Bob Martin, this
3 is a relatively simple analysis I'm going to guess,
4 right? They did some conservative analysis with the
5 population estimate, and they're just checking to see
6 if population is approaching the assumptions in their
7 analysis?

8 MR. MILLER: Okay, you're talking about
9 the annual updates to the population estimates, sir?

10 MEMBER MARTIN: Yes. I mean, and going
11 back to 2020, the 2020 data.

12 MR. MILLER: Correct. I mean, so the
13 requirements are they update their ETes, evacuation
14 time estimates, based on the census data, which
15 provides them a strong understanding of the population
16 surrounding the plants, and the EPZs, and everything
17 like that. These estimates are based on population
18 changes as per the Census Bureau's website, but also
19 talking with locals, and counties around the plants to
20 see how has population changed.

21 So, they try to use real data when
22 possible, but at the same time they do an estimate
23 based on population growth percentages going forward,
24 and that's contained within those reports that the
25 inspectors typically see.

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1 CHAIR HALNON: So, it's not just
2 population though, I mean isn't it capability of the
3 locals, and the ability to move populations, potential
4 posturing, that sort of stuff?

5 MR. MILLER: Yes, sir. So, the evacuation
6 time estimate study itself factors in the different
7 populations, special populations, and special
8 facilities that may require additional assistance.
9 And this is help provided as a tool to the offsite
10 response organizations to help with discussion of
11 evacuation times, and what they may decide as a
12 protective action decision.

13 During the estimates, as per the
14 requirements in Appendix E to Part 50, it really is
15 just a permanent population change. It does not go
16 into factors of changes in ability based on that
17 snapshot in time that is conducted as part of the ETE
18 study.

19 CHAIR HALNON: And we're getting into the
20 theme of world of the offsite plans, and that's --
21 they work with the locals to make sure that those
22 plans are appropriate, and through the state and other
23 agencies I assume.

24 MR. MILLER: Correct, sir. Yeah, the
25 interim finding that Jeff had mentioned earlier, that

1 is based on FEMA's review of the offsite plans. The
2 final finding we are waiting on is FEMA's actual
3 analysis of the implementation of these final plans,
4 and I would defer to FEMA for the majority of that
5 discussion, sir.

6 CHAIR HALNON: Right, so their process of
7 the annexes, and their emergency plan for the offsite,
8 this is where it all comes together with what you're
9 saying here then.

10 MR. MILLER: Correct, sir, yes. We are
11 responsible for evaluating the evacuation time
12 estimates, and we do that completeness review, and we
13 also inform our partners, FEMA, we send letters saying
14 hey, we've completed these reviews there. But then
15 this is just a tool for those offsite response
16 organizations to use in coming up with plans and
17 decisions if they want to put in at this point.

18 But again, they could also be used during
19 an incident based on different weathers and scenarios
20 that may not have been covered.

21 CHAIR HALNON: Very good, thank you.

22 MR. HERRERA: All right, this is Jeff
23 Herrera again, so can we go to the next slide? So,
24 the last thing is the conduct of the emergency
25 preparedness exercise. So, the exercise was conducted

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1 on July 29th of 2025, where the inspection was led by
2 Region III with support from two headquarters Reactor
3 Licensing Branch members.

4 FEMA conducted the evaluation of the
5 offsite response capabilities as part of their final
6 finding of reasonable assurance. And FEMA also
7 conducted a public meeting after the exercise, and
8 there were no issues that rose to the level of the
9 FEMA finding. And with that, unless there is any
10 questions --

11 CHAIR HALNON: Was that a limited NRC
12 participation, or was it a full EE plan of activation
13 within Region III, do you know?

14 MR. KOZAL: This is Jason Kozal, there was
15 no participation from Region III, it was a licensee
16 evaluated exercise only.

17 CHAIR HALNON: Okay, did you just not see
18 a need for it, or because of the recent -- I mean
19 normally you do one every six years or something.

20 MR. KOZAL: Yeah, it just wasn't on the
21 schedule, our resources for response exercises are
22 relatively limited. Additionally, but we were --
23 April and I were both out there as well, not doing
24 evaluation, but observation.

25 CHAIR HALNON: Okay, so you didn't see

1 anything out of the normal?

2 MR. KOZAL: No, it went --

3 CHAIR HALNON: Holtec is a new licensee,
4 I mean this is their only nuclear plant that they're
5 operating, so --

6 MR. KOZAL: The people doing the exercise
7 were not new to doing --

8 (Simultaneous speaking.)

9 CHAIR HALNON: -- with Palisades.

10 MR. KOZAL: Yeah, or industry folks.

11 CHAIR HALNON: Okay, thank you.

12 MR. HERRERA: All right, that's all I
13 have, and I guess I'll turn it back to Jason.

14 CHAIR HALNON: Before we go, let's take a
15 15-minute break at this point, it seems like a good
16 place.

17 April, you can get a drink of water, and
18 get ready for -- we probably won't have any questions.
19 So, right now it's about three minutes after, so let's
20 come back at 20 after 10:00 Eastern Time. Thank you.

21 (Whereupon, the above-entitled matter went
22 off the record at 10:03 a.m. and resumed at 10:20
23 a.m.)

24 CHAIR HALNON: Thank you. Okay. The
25 meeting is back in session. I'll turn it over to

1 Jason Kozol for this portion of the presentation.

2 MR. KOZAL: I'll let the slides catch up
3 here. All right. Actually, we're going to deviate a
4 little bit from this slide. We did realize that we
5 failed to add a slide for the ROP transition, ROP
6 transition plan.

7 So as we've heard on Monday, Palisades is
8 transitioning not only into their operator license,
9 but into the ROP, the Reactor Oversight Process, and
10 we'll start to be evaluated under that process and
11 our inspections will fall under that. So what I'm
12 going to do right now is turn it over to Phil to
13 discuss a little bit of that and how that process
14 worked and what it's going to look like going forward.

15 MR. MCKENNA: Thank you, Jason. I'm Phil
16 McKenna. So since we didn't do a slide, I'm going to
17 read out a couple ML numbers I discuss here so people
18 have the information to refer to. But as we talked
19 about in the last meeting, we developed an inspection
20 manual chapter to govern the process for the restart
21 of a reactor that went into the decommissioning status
22 and returned to an operational status. That is
23 Inspection Manual Chapter 25.62. It's available on
24 the ROP side of the public website. And in that
25 inspection manual chapter, it talks about that the

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1 licensee could potentially send us a readiness letter
2 saying that they're ready to transition from a
3 decommissioned state to an operational state, which
4 would help inform us of when we were ready to issue
5 the licensing actions for that.

6 So we did receive a letter from Palisades
7 dated 1 July, 2025, and here comes the first ML
8 number: ML25182A066. And in that letter, Holtec
9 described that they were ready to transition. And it
10 was a fairly lengthy letter, so we used that to inform
11 the next letter that we sent was actually a memo which
12 was a transition to operational status to the Reactor
13 Oversight Process for Palisades.

14 And I'm going to read another ML number,
15 ML25147A274. And that contains the transition plan
16 for Palisades to transition into the ROP. It also was
17 the vehicle that we used to inform NRC senior-level
18 leadership that we were going to issue the licensing
19 bundle on July 25th. I think that's -- 24th. Sorry.
20 July 24th. So we used that vehicle to do that.

21 In that transition plan, it does talk
22 about how the licensee Palisades will transition for
23 performance indicators, and it breaks down in an
24 appendix each individual performance indicator and
25 when they become effective. For instance, the reactor

1 scram PI, there would need to be four quarters worth
2 of operational actually operating the plant before
3 that PI would become in effect. Some PIs go into
4 effect right away.

5 So I'll stop there for any questions
6 before I transition back to Jason.

7 CHAIR HALNON: This is Greg. In the
8 transition plan, is there any extrapolation? In other
9 words, if it looks like the scrams are happening too
10 much, I assume that would just spark a special
11 inspection or some other type of --

12 MR. MCKENNA: Yes. That's a good
13 question. So what I meant to say actually was we
14 based the transition plan for PIs based on other
15 projects. So it looks exactly like the transition we
16 use for Vogtle 3 and 4, and it looks like the
17 transition we use for Watts Bar 2, which were the
18 other two major projects recently that had the
19 transition as to the ROP.

20 So in the ROP, you know, the PIs inform
21 what supplemental inspection we need to do. So if
22 they trip a white threshold into PI, potentially we
23 would do a 95001 supplemental inspection. We always
24 have in the ROP the authority to do a deviation if we
25 think that's not the right level of response for the

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1 agency. So if they would have, you know, a multitude
2 of reactor trips and we understand those reactor
3 trips, then we wouldn't necessarily need to do a 95001
4 supplemental inspection.

5 CHAIR HALNON: Okay. And your
6 end-of-cycle assessments will look backwards and
7 determine that. I mean, that's a pretty detailed
8 discussion in the region.

9 MR. KOZAL: This is Jason Kozal. Yes,
10 those discussions are ongoing, right. So plant
11 performance and assessment is an ongoing thing. So if
12 we see performance, regardless of the PIs, right,
13 there's a performance issue that we think we need to
14 evaluate under our reactive inspection program, we do
15 that. We do that quite a bit now.

16 So we're not relying on PI indicators
17 necessarily to tip us off to do extra inspection in an
18 area or a reactive inspection. We do that as an
19 ongoing basis. So regardless of the PI status, we're
20 not just waiting around to see what happens. We're
21 also evaluating those issues as they come up.

22 CHAIR HALNON: Right. And you know what
23 nominal plant performance looks like. I mean, because
24 you've got plenty of other ones, so you'll know if
25 it's out of normal.

1 CHAIR HARRINGTON: This is Craig. I guess
2 what you're saying is the transition to the ROP is
3 less about the unit as a plant coming out of
4 decommissioning and going back to operation than it is
5 just a plant that's not under the ROP becoming a plant
6 under the ROP.

7 MR. MCKENNA: Absolutely. This is Phil
8 McKenna. So we've had plants in long-term, long
9 shutdowns that remained in the ROP. This is a
10 different case where they went out of the ROP, so we
11 need to bring them back in.

12 CHAIR HALNON: Phil, could you move that
13 mic so it's pointing straight at you?

14 MR. MCKENNA: And that's a good
15 transition. You know, one of the biggest changes, in
16 my view, for the Palisades is, as of Monday, the tech
17 specs apply at the site. So the operator license is
18 restored. They have to comply with their technical
19 specifications for whatever is prescribed in those
20 modes. And that's been the plan all along.

21 There is still quite a bit of work on the
22 site that needs to be completed. We talked about
23 steam generators, but there's other types of work that
24 they're doing, upgrades, refurbishments on equipment,
25 that are tech spec-related that needs to be completed.

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1 And the plan all along was, once they were able to
2 transition, the tech specs would control effectively.
3 the condition of the plant as they move forward
4 towards fuel load and initial criticality.

5 So for the inspection area and on-site,
6 our biggest two focus areas are system return to
7 service. All right. They have 75 or 76 systems
8 they've determined need return-to-service activities.
9 We're obviously most concerned with the safety-related
10 ones of those and then tech spec compliance as they
11 move through the modes. As of Monday, they'll be in
12 a no-mode situation, but their requirements for
13 handling fuel will change. On Sunday, they can handle
14 fuel with this set of requirements because they're
15 decommissioning. On Monday, they have a new set of
16 requirements.

17 So things like that are a big focus of our
18 team. So with that, I'll turn it over for April.
19 She's going to walk us through our slides on the
20 inspection portion.

21 MS. NGUYEN: All right. Good morning,
22 everyone, again. So, refreshing, my name is April
23 Nguyen, and I am the lead for the restart efforts in
24 Region 3, so we have the primary oversight
25 responsibilities for Palisades, including all of the

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1 infield inspection activities.

2 So a little background on myself, I've
3 been with the agency for 17 years. Eleven of those
4 years I spent as a resident inspector, and, of those
5 eleven years, I spent seven years at Palisades as the
6 resident inspector and senior resident inspector there
7 between 2011 and 2018. So I do have history with the
8 site. I do understand, you know, the operational
9 issues that they had previously and the equipment
10 reliability issues, the material condition of the
11 plant, and some of the unique design aspects
12 associated with it.

13 I have a large team in Region 3 that
14 supports all of the inspection-related efforts. One
15 of those individuals is here. Julie Winslow is our
16 senior project engineer, and she's the main project
17 manager in Region 3 for this activity. She's also a
18 qualified inspector and does inspections at the site,
19 as well; but we have a number of technical experts who
20 help us out in the region. We have resident
21 inspectors who are onsite, they've been onsite since
22 December of 2024, and a large number of staff from
23 other regional offices and headquarters who have
24 supported those inspection activities.

25 So we've spent almost 3,500 inspection

1 hours on activities right now. So you saw the chart
2 in the outreach slide that Marlayna presented. You
3 know, we're up to about 50 percent of the effort for
4 the project on inspection-related activities, and that
5 number is still going to go up as we continue on
6 through the rest of the activities I'm going to speak
7 to today. So large effort here, and it's an
8 agency-wide effort, and I just want to acknowledge
9 that because there are a lot of folks that are doing
10 a lot of really good work to support this activity.

11 So of the items that I'm going to talk
12 about, we will go over some of those inspections that
13 we have completed and the ones that are in progress
14 and still looking towards. We'll talk about the site
15 staffing and where they are with that, walk through
16 what the overall startup sequence is going to look
17 like, and then we do have some technical topics of
18 interest where we're going to hit on some of those
19 items that were requested of us to speak to.

20 Next slide. So for inspection activities
21 ongoing, again, as you heard, there are a lot of
22 things that are in progress. We have completed some
23 of them, and they are documented in inspection reports
24 that are publicly available on our web page. So we
25 did look at the reconstitution of the control room

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1 simulator. That was especially important for training
2 those operators and getting those individuals licensed
3 and qualified. We did complete a biannual problem
4 identification and resolution inspection. So this
5 included looking at the site safety conscious work
6 environment and safety culture. And as Jeff
7 mentioned, they did complete the emergency
8 preparedness exercise, and we did do the inspection of
9 that activity along with having, I'll say, local
10 participation with the residents being onsite and
11 participating as they would in an emergency scenario.

12 Many things are still in progress, so
13 there is a large amount of work that's still going on
14 to restore systems back to service, you know, pump and
15 valve maintenance and testing and system flushes and
16 ensuring, you know, electrical continuity and
17 reliability for those components. So a lot of that
18 we'll dive into in just a second in another slide.
19 But we're also looking at any modifications that the
20 site did to either enter decommissioning that now need
21 to be reversed, essentially, or any new modifications
22 that they are installing as part of, you know, system
23 restoration efforts.

24 We have a large in-service inspection set
25 of activities that have been ongoing for quite some

1 time now. This started really with the steam
2 generator inspections last year and have continued on
3 to look at those activities as they move through the
4 inspection and repair process but also, you know,
5 looking at things like the reactor vessel, the reactor
6 vessel head. The site is doing a large number of
7 Alloy 600 mitigation activities and really focusing in
8 on those activities, and I'll have some technical
9 slides later on to discuss those in more detail.

10 And then we are in process on looking at
11 physical security restoration. So as the site went
12 into a decommissioning status, right, the physical
13 security plan does change. So these inspection
14 activities have focused on returning that back to its
15 operational physical security plan, including
16 observing a force-on-force, licensee-led force-on-
17 force drill, which they did just complete a couple of
18 weeks ago.

19 And then we still have a couple
20 inspections that have not been either completed or
21 have not been started yet. So we are looking at
22 cybersecurity implementation. Again, that was a
23 program that changed when they went into
24 decommissioning. That needs to be reconstituted and
25 reimplemented with some reviews of what they had

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1 previously and then making sure that they meet the new
2 requirements for those.

3 The same goes along with the fire
4 protection inspections. So as you saw in a previous
5 slide, the site is still in a transition period to
6 NFPA-805. So the licensing basis reflects this, but
7 there are still in-plant modifications that are
8 ongoing to support those activities.

9 And then we're looking at license renewal
10 and kind of a modified version, I'll say, where when
11 the plants initially went through the license renewal
12 stages, they were one of the earlier plans to do it.
13 They didn't go through all the phases of inspection
14 for that first license renewal, specifically Phase IV.
15 So we're using the guidance in that license renewal
16 inspection procedure and looking at activities that
17 they're doing now as part of the restart. And then we
18 will also look at things like their aging management
19 program re-implementation to ensure that those
20 requirements are recaptured and implemented
21 appropriately.

22 And then I just wanted to highlight on
23 here, too, that we have been using a lot of baseline
24 inspection procedures, guidance documents to do these
25 inspection activities. Kind of like what the line of

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1 questioning was earlier, the intent of all of these
2 inspections is to make sure they're ready to operate
3 the plant like a normal operating reactor, right. So
4 we are using our normal operating reactor procedures,
5 portions of those, to make sure that everything is in
6 the right shape that it needs to be in to proceed
7 forward.

8 Some exceptions are a newly created
9 procedure, for example, that we're using for
10 cybersecurity. Just based on the way that program is
11 structured, there wasn't a good set of inspection
12 procedures implementing guidance to transition from a
13 decommissioning state to an operating state. So this
14 was one area that we felt we needed to create a new
15 inspection procedure related to that.

16 And then we did use some inspection
17 procedures that are used for, like, new reactors. So
18 especially in the security world where you're looking
19 at, again, kind of re-implementing the operating
20 program, we used a lot of those procedures as our
21 guidance documents to go through those inspections.

22 CHAIR HALNON: April, do you have a
23 thought where the PRA, the kind of shape it's in?

24 MS. NGUYEN: Yes. So they have
25 reconstituted a lot of the PRA. We do have a senior

1 reactor analyst who is part of the team that we're
2 using who is looking at that reconstitution and some
3 updates that they're doing related specifically to,
4 like, fire protection as they're working on that 805
5 implementation. So that is part of the process.

6 CHAIR HALNON: Do you know what their
7 highest risk area is? Is it fire?

8 MS. NGUYEN: Oh, for fire particularly?

9 CHAIR HALNON: In the holds for CDF, the
10 highest area of risk.

11 MS. NGUYEN: Yes. So Palisades is an
12 older design plant, so the areas of highest risk
13 significance are areas where they don't have that
14 separation built in. So they do have areas where, you
15 know, cable trays contain cables that have, you know,
16 one division stacked on top of another division as an
17 example.

18 CHAIR HALNON: Are fires their predominant
19 risk.

20 MS. NGUYEN: Yes, that's correct. And
21 that was part of the thought process to transition to
22 805, you know, when they initially did that.

23 CHAIR HALNON: Okay. Thanks. And could
24 you give us a sense of, when you say you completed
25 your simulator inspections, what that inspection

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1 looked like? Was it a series of runs? Did you just
2 look at what -- was it a paper review or did you
3 actually get into the physical simulator and look at
4 it?

5 MS. NGUYEN: Yes. So our inspectors
6 actually went to the physical simulator. The site had
7 to do, again, some reconstitution with the simulator.
8 Some pieces and parts had been taken out, so they did
9 have to repurchase some of those items. They also are
10 actively working through some modifications, so some
11 digital control mechanisms they're working on.

12 So we looked at any modifications they did
13 compared to what the simulator was previously. And
14 then they ran through a large number of their set
15 scenarios, and our individuals made sure that the
16 plant responded appropriately from the simulation
17 standpoint and then also verified that the procedures
18 they were using were correct for those particular
19 circumstances.

20 And we have observed the simulator in use
21 for the relicensing of operators. So we did do the
22 operator licensing examination inspections, so we are
23 able to check that fidelity and continuity as they
24 continue through the process.

25 CHAIR HALNON: Do you know offhand, given

1 that the plugging and the tube sheet sleeving in the
2 generators, if there was any need modeling difference
3 in the simulator based on flow or thermohydraulic
4 conditions? You might not be the right person to ask
5 that.

6 MS. NGUYEN: Yes. So they do have some
7 modifications that they're still working on
8 implementing, I will say, for the simulator. I would
9 have to verify if that is included in the
10 calculations, the revisions that they're looking at.
11 But the way that the individuals were licensed is on
12 the simulator design as it was when the plant shut
13 down, with the exception of the few modifications that
14 they've already put in.

15 CHAIR HALNON: Okay. Thanks.

16 MS. NGUYEN: Any other questions? All
17 right. Next slide, please. So one of the major
18 inspection focus areas, like Jason mentioned, is our
19 system return-to-service reviews. So there is a large
20 number of inspectors who have been working very hard
21 to look at the plans for returning all of the systems
22 and some programs back to service. So we have
23 completed a large chunk of the initial reviews of
24 those system return-to-service plans. I will say
25 those are living documents. So the site is

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1 continuously updating those with discovery-related
2 items as they go into inspections and repairs of
3 certain components and systems. And the intent of
4 these reviews is really to understand what code
5 requirements there might be, what regulatory
6 requirements, industry operating experiences out there
7 that could help these systems and components get
8 restored back to where we would expect them to be from
9 a normal operating status.

10 These plans also take into account things
11 that were present prior to the shutdown. So things
12 that were open in work order space, corrective action
13 program space. And we're ensuring that those items of
14 critical safety significance are being addressed prior
15 to those systems being restored.

16 They also contain the startup testing
17 plans. So things like surveillance testing
18 requirements, but also maybe code related pump tests
19 for IST sort of activities.

20 So we are looking at these in a phased
21 approach way. So we are doing some risk informing as
22 we take a look at the items here. And we're also
23 basing it on the schedule of when systems and
24 components will be restored back to service for plant
25 operation. So things of immediate needs, such as the

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1 control room HVAC system as you start handling fuel,
2 for example, is an item where we would look at that
3 sooner than something you might need for like a Mode
4 2 type of requirement. These plans then help our
5 infield inspectors, you know, risk-based and informed,
6 where they're going to go do their inspection
7 observations and activities.

8 So the resident inspectors, along with the
9 individuals who are helping them, will take a look at
10 the schedule for the week, go through the systems that
11 they understand are of the higher importance at that
12 point in time, and then prioritize their work based
13 off of that information. Also, capturing the items
14 from the plan that we know are of significance to make
15 sure that those systems and components go back to that
16 operational state. And I have an example of this on
17 the next slide, please.

18 MEMBER DIMITRIJEVIC: I have a question.
19 This is Vesna Dimitrijevic. So when you say that
20 you're basing this on significance, for example, of
21 the system, so you are using the PRA, existing PRA, or
22 you're using some qualitative, you know, methods to
23 determine the significance of or the risk importance
24 of the actions and systems?

25 MS. NGUYEN: Yes. So we do have access to

1 the prior PRA model and the prior PRA documents that
2 is helping us to risk-inform the activities that we're
3 doing. So looking not just at systems and components,
4 right, but looking at functions that are required in
5 certain states and ensuring that any sort of system,
6 you know, inter-reliability concerns are being
7 addressed, as well.

8 MEMBER DIMITRIJEVIC: My other question
9 also, did the plan have existing risk-informed
10 programs, like risk-informed in-service inspection in
11 the place, you know, before being shut down? And are
12 those risk-informed programs going to be reinstated?

13 MS. NGUYEN: Prior to shutdown, they did
14 have like a risk-informed surveillance frequency
15 control program and like risk-informed
16 maintenance-related programs. They do not have
17 risk-informed technical specifications, and it is not
18 part of the current licensing actions to look at that,
19 you know. An option in the future if they decide to
20 go that way. But, right now, they would just be going
21 back to the same risk-informed programs they had
22 previously.

23 MEMBER DIMITRIJEVIC: So did they have a
24 risk-informed in-service inspection?

25 MS. NGUYEN: So they had, I'll say, a

1 modified version of a risk-informed in-service
2 inspection previously.

3 MEMBER DIMITRIJEVIC: It applied to all
4 classes, not just to Class 1, or are you familiar with
5 that, you know, because my concern is that in the
6 beginning of, you know, this presentation today,
7 somebody says that part of service water piping was
8 removed from the plant.

9 MS. NGUYEN: Yes. So they did have
10 risk-informed in-service inspection, particularly for
11 Class 1 systems and components, I will say a portion
12 of Class II-related items; and then, from there, it
13 wasn't used. But that does help, like you mentioned,
14 to look at the things that they are restoring back to
15 service. They do know the areas, for example, with
16 the service water piping, where they need to go do
17 inspections, they need to understand what the material
18 condition of that is, before they would, you know,
19 affect any repairs and move forward with that.

20 So it's a tool that they're using in the
21 toolbox and that we're using in our toolbox, but it's
22 not the overarching driver for a lot of the
23 activities.

24 MEMBER DIMITRIJEVIC: Okay. Thank you.

25 MEMBER PALMTAG: Hi, April. This is Scott

1 Palmtag. I had a question about the foreign material
2 exclusion programs. I don't know how it was, but,
3 when they shut down the plant, was there any issues
4 with maybe not the foreign material exclusion or
5 debris maybe not being looked at very closely in the
6 primary system? If so, is there any additional
7 inspections to look for debris in the primary system?

8 MS. NGUYEN: Yes. So one of the major
9 activities that Holtec did last summer prior to
10 starting, you know, even the steam generator
11 inspections, was they did a decontamination and flush
12 of the primary system. So that helped to inform, you
13 know, what kind of material was in the system at the
14 time and what activities they would need to do to
15 ensure that it was at the right level of cleanliness
16 prior to folks even starting doing the work
17 activities, you know; and part of that is based on
18 radiation risk, as well as the actual physical
19 condition of the material that's in the system.

20 And then, since then, as they've been
21 working through different systems and different
22 components, they've identified other areas where they
23 will do kind of final system flushes, I'll call them,
24 prior to putting the system back into service. They
25 do have a foreign material exclusion program in place

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1 right now. That is something that we are reviewing as
2 we look at work activities in the field. So on those
3 daily walk downs, you know, ensuring that the covers
4 are on the systems and components that are open to the
5 air and the atmosphere right now or open to other work
6 activities that are going on. And this is also an
7 area that, when INPO came in, you know, that was an
8 area of focus for them that they did provide some
9 observations to the site on.

10 MEMBER PALMTAG: Okay. Thank you. That's
11 good to hear.

12 CHAIR HARRINGTON: This is Craig. The
13 startup for the system return-to-service plans include
14 -- are they doing startup testing activities on old
15 systems, a complete process just like a new plant
16 would go through? Are they doing functional testing,
17 physical testing of the systems?

18 MS. NGUYEN: Yes. So most of the startup
19 testing sequence would look like you would expect a
20 plant coming out of a refueling outage, right, so
21 doing the surveillances, doing some of the startup
22 checks and the, like, hot start tests and those types
23 of things. They're basing a lot of that off of where
24 they would need to be, you know, for Mode 6, Mode 5,
25 as they increase in the modes and start to bring

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1 everything back into the operating state.

2 So not quite at the level of detail that
3 you would have for a new reactor, but they are using
4 some of those aspects for specific systems or
5 components that they know they've done, like, major
6 work activities on, for example, if they have to re-
7 baseline a pump, right, or something along those
8 lines.

9 CHAIR HARRINGTON: Yes. So the plan goes
10 through that decision process to determine. How
11 extensive the testing?

12 CHAIR HALNON: Sorry. This is Greg. Some
13 of the testing assumes that the equipment was laid up
14 properly, maintain an oil reservoir, and maybe it was
15 even rotated once in a while, which probably didn't
16 occur during the timeframe that they thought it was
17 going to go. I don't know -- we've got a couple of
18 slides in a few minutes about mechanical reliability.
19 Is that going to be addressed, on their relative how
20 do you know the bearings are still good, even though
21 they may be operating now well within limits, but they
22 may be degraded. Was there visuals done on those and
23 some of them replaced, or how is that determined?

24 MS. NGUYEN: Yes. So a lot of that is
25 captured in the inspection portion, I'll call it, of

1 the work activities that they're doing. So they have
2 done a significant number of inspections on systems
3 and components that you might not normally do in,
4 like, a refueling outage, right, to address where
5 you're going with your question of, based on how the
6 system was laid up, whether it was wet or dry, whether
7 it was drained, you know. A positive out of that is,
8 if you drain an oil tank, now you can actually go into
9 it, take a look at it, make sure the material
10 condition is proper before you put the oil back in,
11 right.

12 So a lot of that is on the front end in
13 the discovery phase of doing those inspections,
14 visuals, you know, borescopes for certain piping,
15 those types of things, and then adjusting the
16 maintenance related and testing activities after that
17 based on what they see in those initial inspections.

18 CHAIR HALNON: Okay. Thanks.

19 MS. NGUYEN: All right. So just an
20 example of a system return-to-service that we are
21 actively looking at right now actually is the
22 emergency diesel generators, so a very important piece
23 of equipment. There are two of them onsite at
24 Palisades. You know, we looked through the plan,
25 right, to identify what the critical preventative

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1 maintenance activities were. So a lot of that comes
2 out of what you would expect from PMs on a diesel for
3 the two-year requirements, the ten-year requirements,
4 the quarterly requirements even.

5 We also then reviewed those plans in the
6 work order system to ensure that any prior were
7 identified in the system return-to-service plan, as
8 well as being executed in the field, so taking a look
9 at that T-0 schedule and understanding what exactly
10 they're doing in the maintenance window. We had
11 inspectors in the field observing those activities,
12 right, talking to the individuals who are doing the
13 work and verifying that the system material condition
14 was what they anticipated it was going to be.

15 They also did a number of corrective
16 maintenance items to address discovery issues. So
17 there were some things that were not anticipated, and
18 they were properly addressed as we looked at those
19 activities. And then, subsequent to that, they did do
20 a couple of test starts to ensure that you're meeting
21 the requirements of the tech specs, but they also did
22 the 24-hour endurance run as a post-maintenance test
23 for that, so then kind of adding in some of the normal
24 surveillances and requirements you would see along
25 with some of the ones that they wouldn't normally do

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1 as often.

2 And then there are still some items that
3 are outstanding that you would expect after you go
4 through a maintenance window. They're still going to
5 look at the outside fuel oil tank as an example. They
6 still have to evaluate a couple of issues that were
7 found during the maintenance to make sure that there
8 is no impact to operability, you know, ensuring that
9 they have the right dedication for all the parts, and
10 then doing system walk-downs at the end of all of this
11 to make sure that it's in the right configuration
12 prior to saying that it's operable. And the operators
13 themselves onsite, along with the inspectors, have a
14 plan for how to go through those walk downs.

15 MEMBER DIMITRIJEVIC: This is Vesna
16 Dimitrijevic again. Does this return to service also
17 include supporting system to this? Because I just
18 mention this because we just talked about the service
19 water was out of the question, which is supporting
20 system for diesel generator operations. So, I mean,
21 you know, so I assume they call it service water cool.

22 So the question is do those inspections
23 include the supporting systems for the system?

24 MS. NGUYEN: Yes. So each system onsite
25 has a system return to service plan. And to answer

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1 the question directly about the center, the system
2 interconnectivity there, that's really captured in
3 like the startup testing plans, right, so ensuring
4 that when you get to Mode, you know, 4, you have all
5 the systems that you need for operability in Mode 4
6 but also, as required by the tech specs, right, you're
7 looking at those supporting systems and their
8 functionality and operability, as well.

9 So that's captured in the operations
10 department where they ensure, right, from the licensed
11 individuals that all of those connections are complete
12 prior to making those declarations of operability.

13 CHAIR HARRINGTON: One more thing. This
14 is Craig. Since service water has come up a couple of
15 times now and obviously an important system, can I
16 have you speak a little bit about the condition of
17 that system and how it was left? Because that's one
18 that, just random layup, would be a pretty likely
19 condition in that system if they shut down the plant.

20 MS. NGUYEN: Yes. So for Palisades, they
21 have kind of a unique service water system design.
22 They have the critical part of the system, the
23 non-critical part of the system. So some of that
24 system was in service even after a shutdown, right,
25 for things like spent fuel pool cooling and those

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1 types of activities. So there were parts of the
2 system that were still in operation. They're looking
3 at those, but they're also looking at the parts that
4 were not in operation at the time.

5 So, for example, the piping, and I have a
6 little slide about buried piping here, but they're
7 actually digging up where the buried piping locations
8 are to do the borescope or the inspections that they
9 need to do to ensure that the integrity of that piping
10 is still intact. They're doing inspections of the
11 intake basin, right, so the normal inspections you
12 would take a look at for where the water comes from
13 but also any sort of cleaning and maintenance related
14 activities they would have to do there and then
15 related systems, right, so any service water-related
16 heat exchangers for the diesels is a good example
17 where they take that apart. They do the normal heat
18 exchanger inspections, the eddy currents, the
19 cleaning, the testing that they would normally do for
20 those to ensure they understand the condition.

21 Just generally speaking, they haven't
22 identified anything noteworthy where the layup
23 conditions were not, I will say, were not inducive of
24 reusing those components.

25 CHAIR HARRINGTON: And they reconstituted

1 a buried pipe program and all that.

2 MS. NGUYEN: That is correct.

3 CHAIR HARRINGTON: Thanks.

4 MS. NGUYEN: All right. We'll go to the
5 next slide. So going to some of the questions already
6 received, we do focus on things that the site is
7 doing, as well, that would look at longer-term
8 reliability of systems and components. So, yes, the
9 component systems programs need to be in place for
10 immediate operation, but you also want to ensure that
11 a week into operation that something doesn't fail, at
12 least that can be anticipated at this point in time.
13 So some of the projects that are being undertaken and
14 are identified in those system return-to-service plans
15 look at that longer-term reliability.

16 So a couple of examples that are on the
17 slide here but of pretty significant importance is
18 power systems. So looking at operating experience
19 from the industry, as well as operating experience
20 onsite, they went and they replaced all of the station
21 batteries. They did replace the generator output
22 breaker. So, again, looking at the reliability of
23 that power system. And then addressing some prior
24 known issues that they have with the coordination of
25 their DC system and the breakers in that system.

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1 So these are things that we were aware of
2 previously, things that we flagged in those system
3 return-to-service plans, and want to make sure that we
4 inspect those activities as they move along because
5 they are of important significance and do ensure that
6 longer-term reliability.

7 Also looking at a lot of modifications for
8 digital-related components or more specifically for
9 them is looking at obsolescence issues. So because it
10 is an older plant that has older components in it,
11 they are using this opportunity to address some of
12 those issues and move a little bit more into the more
13 digital age for some of these systems. So, for
14 example, the auxiliary feedwater actuation system, the
15 controls for that are being upgraded. And then,
16 again, from industry OE, looking at things like
17 Rosemount transmitters and replacements of those
18 components.

19 All right. Next slide, please.

20 CHAIR HALNON: Hey, April. You told us
21 when you were here last year that they still had yet
22 to accomplish the loss-of-phase detection. It's not
23 on your slides. Have they done that?

24 MS. NGUYEN: So that is something that
25 they are still working on at this point in time. We

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1 do have the temporary instruction. We actually had
2 them reopen that procedure so that we can use it to do
3 the follow-up inspection when the site has completed
4 those activities. Those activities are not complete
5 at this time.

6 CHAIR HALNON: Okay. Thanks. Will they
7 be done before they start the record?

8 MS. NGUYEN: Yes. So based on
9 understanding what the plant configuration was prior
10 to shutdown and the risk associated with what the
11 current configuration is, they have elected to push
12 those into the operating cycle to institute those.
13 They do have part of it in place already, and then the
14 rest of it will be implemented, I believe, prior to
15 the next refueling outage. The end of the next
16 refueling outage; let me clarify that.

17 CHAIR HALNON: Okay. Thank you.

18 MS. NGUYEN: So, again, more focus on
19 reliability of components. Going back to the service
20 water-related questions, we do have the bullet here
21 about looking at the heat exchangers, right, and
22 ensuring that those are the proper level of
23 cleanliness, that they were inspected appropriately
24 with any current testing technology that's available
25 now, and then are in the correct operating state prior

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1 to restarting those systems. All of that is in
2 progress at this point in time.

3 Also, looking at buried piping, you know,
4 buried piping of particular significance, areas where
5 they know that there might be some susceptibility to
6 material condition issues, looking at the service
7 water system, looking at the condensate storage tank,
8 so that is an outside tank where the piping goes
9 underground into the plant. So they have some known
10 areas where, based on their prior monitoring programs,
11 they believe that there were areas that would be more
12 susceptible to potential structural integrity issues.
13 So they are actively replacing some portions of that
14 piping and the same with the red waste piping. So
15 that again goes to external holdup tanks, and they
16 know areas where there's some susceptibility and are
17 doing active replacements on those piping.

18 And then another area of note is the
19 containment building itself, so, looking at the
20 structural integrity of the containment building
21 specifically, they've completed inspections of
22 attendance already. So we had an individual actually
23 from NRR who's an expert in structural integrity and
24 concrete systems and structures who helped us look at
25 those inspections of the attendance, as well as the

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1 inspections of the containment building itself. There
2 were no major issues that were identified coming out
3 of those inspection activities but did take a very
4 thorough look at what the current status of that is.

5 And then, also, you know, from an internal
6 component standpoint, looking at things like snubbers
7 and ensuring that that program is reimplemented
8 appropriately and that those were appropriately
9 inspected and repaired or replaced as necessary.

10 MEMBER BIER: Quick question. This is
11 Vicki Bier. This is kind of an overview with respect
12 to the safety culture issues. It sounds like you feel
13 like the plant is being sort of proactive about
14 looking where there might be problems rather than just
15 going through the motions of inspection; is that
16 accurate?

17 MS. NGUYEN: Yes. So the intent of the
18 system return-to-service plans is to capture items
19 that are of immediate concern and also looking at
20 longer-term reliability issues. So, you know, from
21 our review of that information to this point, it seems
22 like they've been utilizing their operating experience
23 program. You know, they've been utilizing prior
24 equipment reliability data that they have on the site,
25 as well as from sister sites, to understand what could

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1 be potential issues that could pop up and trying to
2 address those issues proactively.

3 You know, a lot of the work is still
4 ongoing at this point in time and decisions will be
5 made moving forward as to exactly what activities are
6 still going to be completed.

7 MEMBER BIER: Okay. Thank you.

8 MS. NGUYEN: All right. So that's kind of
9 a good segue here into also looking at program
10 reimplementation. So, you know, the equipment at the
11 site is important. Obviously, that needs to function
12 appropriately. But we also want to ensure that the
13 programs are set up to make sure that those systems
14 and components are going to operate correctly.

15 So we have reviewed a number of the system
16 return-to-service plans that also look at the
17 programs. So that's, you know, reconstituting some
18 programs, that's just brushing off some of the old
19 ones that they had previously, but ensuring that those
20 programs are reimplemented at the level we would
21 expect for a normal operating reactor. So making sure
22 that all of the code requirements are there, that all
23 of the regulatory requirements are there, but also
24 looking at, you know, current industry standards and
25 guidance and information that's available to make sure

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1 that it was captured appropriately if it applies to
2 the plant.

3 So just a couple of examples of things
4 that we've already looked at and we've discussed is
5 the corrective action program, the fire protection
6 program, and the cybersecurity program, which is an
7 ongoing inspection right now.

8 Next slide. So another topic that we were
9 asked to address is looking at the staffing of the
10 site. So as I mentioned before, we have done a pretty
11 extensive look at the licensed operator program,
12 starting with the simulator restoration back in
13 February of last year where they restored that back to
14 a plant reference simulator but also looking at the
15 program as it's going back through the full
16 accreditation process. So the site did receive full
17 accreditation for their licensed operator training
18 program in March of this year, and then we did our
19 inspections where we actually looked at the licensing
20 and examination of those individuals. And we have
21 gone out and done some requalification inspections, as
22 well, to ensure that that program is back and
23 functioning at the level we would expect.

24 So you can see at the bottom here the
25 number of licensed operators that they have onsite

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1 currently. So the first box is individuals who were
2 prior licensed operators at the site who did stick
3 around as either certified fuel handlers or
4 non-certified fuel handlers and went through the
5 relicensing process. And then they had a subsequent
6 class of individuals who went through an initial
7 licensing class, so folks who did not stay at the site
8 during that shutdown timeframe but some of whom did
9 work at the site prior to that and maybe went
10 somewhere else and then came back. And so, you know,
11 currently the site has enough staff to meet the
12 requirements they would need for a normal operating
13 plant, especially looking at tech spec requirements.

14 Next slide.

15 CHAIR HALNON: April, this is Greg. Do
16 they have additional classes ongoing now?

17 MS. NGUYEN: They do. So they have
18 another class that's ongoing that they expect to
19 examine next year about mid-year timeframe.

20 And then looking at the other groups
21 onsite, you know, they are reviewed as part of the
22 license transfer application that was already
23 discussed from the folks in NRR. So, currently, the
24 site has about 600 permanent individuals that are
25 staffed onsite. Because of the workload that they

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1 have currently, there are a number of contractors and
2 supplemental individuals who are onsite. That's over
3 a thousand people at this point that are helping that
4 process.

5 They did have full accreditation of the
6 maintenance and technical training program, as well;
7 so that was in May of this year. So, you know,
8 looking at, again, the training and qualification of
9 those individuals as part of our inspection
10 activities, we do look at certain groups, for example,
11 radiation protection technicians. You know, our
12 inspectors are aware of what the qualification and
13 training requirements are for those.

14 And then looking at the emergency response
15 organization, just touching on the staffing there,
16 they do have the teams fully staffed. Three out of
17 their five teams are currently qualified, which meets
18 the requirements for the license transition operations
19 at this point. And then the other two will be
20 qualified shortly in about the fourth part of this
21 year.

22 So, as mentioned earlier, you know,
23 working through the process of the startup, now that
24 the licensing actions are out and the operating
25 license will take effect on Monday, you know, we're

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1 relying on those requirements that are in the
2 licensing basis to move forward in this process. So,
3 from an inspection standpoint, you know, looking at
4 things like the FSAR, the technical specifications,
5 their ODCM, you know, their TRM, those types of
6 documents, as we work through those inspection
7 activities. But, also, those are the guardrails to
8 ensure that the plant doesn't move too quickly through
9 this process.

10 So, you know, looking at the requirements
11 for transitioning into Mode 6, for example, our
12 inspectors are focusing on what systems are needed for
13 those, what are the work activities associated with
14 those, like we mentioned in system return-to-service,
15 and then verifying that as they work through those
16 modes and that startup sequence and, also,
17 highlighting the fact that there are licensed
18 operators there who are individually responsible,
19 right, for ensuring that those requirements are met,
20 as well.

21 Next slide, please. So this is just
22 walking through kind of a flow chart sequence of how
23 the startup will work but, as mentioned, as soon as
24 they transition to the ROP on Monday, all of those
25 requirements go into effect. That will lead then

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1 through the process of trying to get fuel onto the
2 site.

3 So there is a time line and a sequence for
4 receiving the new fuel and then ensuring that is
5 appropriately loaded into the four and then looking at
6 closing up that primary system, going through the
7 system testing and flushes, and working the way over
8 towards the secondary side, as well, system flushes,
9 system testing, to support eventually getting to the
10 point of actually turning on the reactor, so to speak,
11 and working towards criticality and then a long
12 sequence of power ascension testing and activities as
13 they work their way to full power.

14 CHAIR HARRINGTON: This is Craig. I
15 assume that there's some general time line for these?
16 Like, when do they expect new fuel? Is it this year,
17 is it next year that they're going to find the right
18 fuels. I don't know. I don't have a good sense here.

19 MS. NGUYEN: Yes. So I will say what is
20 advertised right now is that, in the fourth quarter of
21 2025 this year, most of this sequence will be worked
22 through.

23 CHAIR HARRINGTON: Fair enough. Thanks.

24 MS. NGUYEN: Any other questions? All
25 right. Next slide. So, here, I'll transition over to

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1 some topics of interest that we were asked to speak to
2 in front of the group. So I know there's been a
3 lengthy conversation about steam generators already,
4 and Paul did a fantastic job of going through a lot of
5 the technical details there. So just high level, from
6 an inspection standpoint -- and we actually have a
7 nice picture of one of our inspectors. This is our
8 ISI inspector who's actually in the containment
9 building looking at data as inspections are going on.

10 So they have completed all of the eddy
11 current testing, right; the visual examinations; went
12 through an initial set of cleaning activities, I'll
13 say, as far as sludge lancing was concerned; did do
14 some FOSAR, so that's for an object search and
15 retrieval; and then working through the process in the
16 steam generator tubes of doing the in situ pressure
17 testing and then the sleeving activities. And as Paul
18 mentioned, the sleeves are all installed in both steam
19 generators that they plan to install at this point.

20 The post leaving eddy current testing has
21 been completed, as well. That data is still under
22 review at this time, but that's leading them now
23 really to the point where they're working on the
24 secondary side of those steam generators. So there
25 are some repairs that will need to be made and then

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1 working through the cleaning and flushes, which, as
2 mentioned, is a really critical part to ensure that
3 they address those causes that were identified,
4 leading to some of the system issues and conditions
5 that were found from the initial inspections.

6 It's a very extensive, I'll say, cleaning
7 process that they're going to be using. It's multiple
8 weeks of work of cleaning, flushing, using chemical
9 treatment, those types of things.

10 Okay. Well, I think Walt had raised his
11 hand.

12 MEMBER KIRCHNER: Yes. Could you just
13 briefly tell us what repairs are going to be made on
14 the secondary side?

15 MS. NGUYEN: Yes. So most of those
16 repairs, I'll call them, are smaller repairs. So
17 looking at things, like, maybe some boost bolting or
18 some items that had come free during the shutdown
19 period, items that they found in the search and
20 retrieval process that would need to be addressed, but
21 nothing that was a major repair.

22 Okay. Moving on to the next. So another
23 area of interest is the reactor pressure vessel and
24 the reactor pressure vessel head. So a lot of work
25 has been completed in this area, too; and, again, I'll

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1 highlight my fantastic in-service inspectors who have
2 been working really hard on a lot of the activities
3 going on at the site.

4 Visual examinations have been done of all
5 the interior surfaces, supports, the core shroud
6 plates, the core support plate, the fuel alignment
7 plate, so internal components have been visually
8 inspected. As items were identified, again, minor
9 maintenance or related type activities, you know,
10 things are either being addressed with those repairs
11 or being evaluated.

12 They did look at also the core shroud
13 bolts, so this is like the Westinghouse equivalent in
14 CE space of the bolts. There was an extensive
15 analysis that has been completed on those that is
16 actively under review, as well, to ensure that those
17 bolts are appropriately identified and evaluated for
18 system operating conditions moving forward.

19 And then also looking at things like welds
20 that are attached to the system, right, so your vessel
21 welds, your vessel and nozzle welds, and your nozzle
22 and piping welds for those systems. And all of this
23 was done under the guidance in the ASME code and MRP-
24 227 processes.

25 So still in progress is work on the

1 reactor vessel head. So, for Palisades, as kind of
2 mentioned earlier, they have Alloy 600 as the material
3 that's still in the plant. This was part of the
4 nozzle welds for the control rod drive mechanisms that
5 are in the head. So this is being repaired by
6 basically doing a half-nozzle weld repair where
7 they're using Alloy 690 instead of the 600 material.
8 This also helps to support some of the active
9 licensing actions that are still in progress,
10 specifically the leak-before-break analysis that's
11 being reviewed.

12 CHAIR HALNON: And from a reactor vessel
13 fluence perspective, are we still within the limits or
14 within the acceptable area of the fluence charts?

15 MS. NGUYEN: So, Anye, is he on or someone
16 from --

17 DR. BALLINGER: I think this is the only
18 plant where they did a 50.69 probabilistic fracture
19 mechanics analysis for the vessel and they gained an
20 awful lot of margin.

21 CHAIR HALNON: Okay.

22 DR. BALLINGER: This vessel, before they
23 did that, was literally slated to go to exceed the
24 criteria, but then they went and did this analysis.
25 And I think they're okay.

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1 CHAIR HALNON: Have you looked at that
2 analysis?

3 DR. BALLINGER: Yes.

4 CHAIR HALNON: Okay. That answers the
5 question. Thank you.

6 MS. NGUYEN: Okay. Yes, I know they did
7 the analysis. I haven't specifically looked at the
8 analysis, but we have had support from NRR,
9 specifically the Reactor Vessel Internals Branch, who
10 has been reviewing some of the evaluations that have
11 taken place with respect to, like, the cladding and
12 the corrosion analysis that's going on for the reactor
13 vessel.

14 DR. BALLINGER: I was talking about the
15 screening criteria, embrittled.

16 MS. NGUYEN: Yes. All right. Next slide,
17 please. So, again, a related portion to all of that
18 is the primary coolant system. And the main focus
19 here has been the Alloy 600 mitigation activities. So
20 a lot of work has been done to do weld overlays of the
21 identified areas where they were dissimilar metal
22 structural welds. That's very hard to say.

23 For connections, such as the safety
24 injection system, they have branch connections that
25 needed to be addressed and then also things like the

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1 shutdown cooling system piping connections. Those are
2 still underway, at this point, but they have made it
3 through a large number of those activities. And these
4 are all full weld overlays, so there is NDE subsequent
5 to ensure that they have the right level of coverage
6 and the repair addresses the issues that were
7 previously identified.

8 And then another item of interest for the
9 primary coolant system, as we touched on earlier, too,
10 is the cleanliness of that system, right. So I
11 mentioned the primary system decontamination flush
12 that they did prior to starting the work activities
13 last year; the foreign material exclusion program,
14 which we are looking at as we go out and take a look
15 at all of the activities they're working on; and then,
16 finally, there will be primary side system flushes and
17 chemical control type activities that will be
18 completed after they get it all buttoned up. So in
19 that flow chart sequence, right, of ensuring that it's
20 clean radiologically and physically and ready to go
21 prior to restarting the reactor.

22 Then another item that we were asked to
23 talk to was the reactor fuel. So there is going to be
24 a mix of used and new fuel that's going to be loaded
25 into the reactor core. There is the use fuel that's

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1 still in the spent fuel pool that they plan on putting
2 back into the core. The rest of that used fuel has
3 been put into dry fuel storage containers at this
4 point. They have maintained the spent fuel pool
5 during their shutdown activities, so, you know,
6 following the normal protocols that you would have for
7 the cleanliness of the spent fuel pool, as well as
8 maintaining the spent fuel pool cooling system. And
9 then they did inspect all of that used fuel. So they
10 went through a pretty extensive inspection campaign,
11 as well as ultrasonic cleaning that was done on that
12 fuel, prior to them putting it back.

13 The new fuel has been ordered and is being
14 manufactured, and, like we mentioned previously, on
15 target to be back at the site on the fourth quarter of
16 this year. And the core configuration, so nothing of
17 substantial change as far as the fuel or the core
18 configuration is concerned.

19 CHAIR HALNON: Scott, go ahead.

20 MEMBER PALMTAG: Hey, this is Scott
21 Palmtag. I had a question. A lot of the fuel has
22 been put into spent fuel storage. Is there enough,
23 was there -- I assume there was enough fuel in the
24 spent fuel pool to reload this?

25 MS. NGUYEN: Yes. So they would use the

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1 normal process you would use to reload the core,
2 right, so the once burned, the twice burned, figuring
3 out which fuel bundles and configurations you need to
4 go along with the new fuel that they're loading.

5 MEMBER PALMTAG: So when they did the
6 inspections, was there any damage found to any of the
7 fuel assemblies?

8 MS. NGUYEN: There was nothing of note
9 when they did the inspections. As mentioned
10 previously, right, ensuring that there's no foreign
11 materials or debris was a key focus area to make sure
12 that you're not putting that back into the reactor.

13 MEMBER PALMTAG: Okay. And then did they
14 also inspect the control blades? The control blades
15 are kind of unique for this plant. Were those all
16 inspected?

17 MS. NGUYEN: Yes, those were also
18 inspected, and they are unique. It's a one of a kind
19 at Palisades to use a cruciform control blade
20 configuration, yes.

21 MEMBER PALMTAG: And there was no damage
22 found in any control blades?

23 MS. NGUYEN: There were no issues
24 identified from those inspections.

25 MEMBER PALMTAG: Okay. Thank you.

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1 MS. NGUYEN: All right. Next slide,
2 please. So, finally, we also wanted to touch on
3 safety culture, which was asked about already. As
4 part of the problem identification and resolution
5 inspection, we did have agency experts in the area of
6 safety culture who were part of that team and did a
7 pretty extensive review of the reconstitution of those
8 programs, so things like the Employee Concerns
9 Program. They do have an individual onsite as part of
10 the ECP looking at the management oversight process,
11 so their Nuclear Safety Culture Monitoring Panel, and
12 actually listening in to the meetings that those
13 individuals have, as well as reviewing condition
14 reports and data that supports the training and
15 analysis for those items.

16 The resident inspectors being there
17 continuously supports this program as well, so they
18 have firsthand data of what the safety culture is like
19 on a daily basis, looking at everything from the Work
20 Control Program to the Corrective Action Program, but
21 also looking at a safety-conscious work environment
22 and ensuring that individuals are raising concerns as
23 issues do come up. And what we identified from our
24 inspection activities is that there was a healthy
25 safety-conscious work environment and a healthy safety

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1 culture there. The individuals who are part of
2 plan-of-the-day meetings, who are part of these
3 Corrective Action Program meetings, emphasize the need
4 to ensure that individuals are using all the correct
5 tools from their human performance standpoint, as well
6 as ensuring that management oversight is available and
7 in the field to make sure that those are being
8 implemented appropriately and, if it's not, that it's
9 being addressed at the right level.

10 So, you know, it does seem like there is
11 a trust that has permeated throughout the environment
12 of the work area there, starting with the top-level
13 leaders and going all the way down to the infield
14 workers. And we did a pretty extensive review with
15 focus groups and interviews of personnel from all
16 divisions, including contractors and supplemental
17 employees, to ensure that we had the right
18 cross-sectional view there.

19 CHAIR HARRINGTON: This is Craig. You
20 sort of alluded to it, but that's the workforce. I
21 gather from this whole process, you know, I don't want
22 to put words in anybody's mouth, but have you felt
23 that management and financial management has
24 adequately supported this whole effort throughout
25 without pushing back too hard. Obviously, there's a

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1 given page on what do you pay for now, what do you --
2 but do you have a good comfort level about how all
3 that's gone throughout the process?

4 MS. NGUYEN: Well, I'll address that
5 question from the worker-level component, and I'll
6 probably turn it to Jason for the higher level. But
7 from the folks that we talked to, there wasn't a
8 schedule pressure, right. So that's always something
9 that we take a look at of ensuring that individuals
10 feel free to ask those questions, to stop the work,
11 whether they don't have the right pieces and parts
12 associated with it or there's not the right level of
13 support needed from, you know, other groups of
14 individuals, right. So, from that perspective, the
15 folks we talked to said, yes, we would all stop work,
16 we would make sure we had the things we needed to do
17 to do the work we were told to do.

18 There is some flux, I will say, as far as
19 their work management process is concerned. You know,
20 depending on where they are with financial
21 capabilities, those drive some of the activities that
22 they are doing. But things that need to be addressed,
23 critical items, you know, we haven't seen those things
24 go away at this point.

25 MR. KOZAL: I'd say, from their management

1 level and their executive level, it's been very
2 consistent from the beginning, their messaging around
3 a need to be done on time but also be done the right
4 way. And that's not changed really the entire time.
5 And I spend extra time onsite, I don't go to any other
6 site more than I go to Palisades on a monthly basis,
7 which is pretty high for us. And that's part of what,
8 you know, I engage on, and I would say that now, you
9 know, it'd be interesting to see, as they get closer
10 to when they want to start the plant up, there's still
11 a lot of work to do on the site. But I believe, you
12 know, based on our interactions and what our safety
13 culture assessors identified, which was very high
14 marks from a safety culture perspective, that, you
15 know, we don't have any concerns in that area right
16 now.

17 CHAIR HARRINGTON: Thank you.

18 CHAIR HALNON: You're done.

19 MS. NGUYEN: I was just going to do a
20 quick wrap up. I didn't know if you had a question or
21 not.

22 CHAIR HALNON: I do, but it escaped me.
23 So rather than field it right now, go ahead and do
24 your --

25 MS. NGUYEN: All right. So going back to

1 what we said previously, right, is there's still a lot
2 of work going on. So we've been careful to emphasize
3 with the site that, you know, this is where we are at
4 a snapshot point in time, right. But having the
5 correct implementation of these programs, right,
6 ensuring that the individuals onsite have the right
7 standards and level of engagement as you continue
8 through the process is key. And, you know, that's a
9 big focus area for our resident inspectors is making
10 sure that those behaviors and those practices still
11 continue as the process moves forward and ensuring
12 that those external pressures aren't felt at the level
13 where it starts to hinder the work activities going
14 on.

15 So we do have a large number of inspection
16 activities we're currently working on. As you saw on
17 the chart, there's a number of group-related
18 activities, as well as the resident activities, that
19 are still going on. You know, and we continue to have
20 the right level of support and resources available to
21 do those activities.

22 So, with that, that completes my portion.
23 So I'll turn it over to James.

24 CHAIR HALNON: I did have one question.
25 You said it , and it kind of re-sparked me. What's

1 your resident inspector staff going to look like? Is
2 it any extra for a while or are you going to just
3 maintain the N+1?

4 MS. NGUYEN: So we have two assigned
5 resident inspectors there, but, throughout the year of
6 2025 so far, we have had a third person as a
7 rotational opportunity. So we have had a third person
8 onsite to basically be a third inspector that's there,
9 and we plan to continue doing that, along with
10 supplementing them as needed with other individuals
11 who might have a particular area of expertise.

12 CHAIR HALNON: And those same individuals
13 will be there through the startup. There's no
14 rotation on the permanent staff there?

15 MS. NGUYEN: The permanent staff will
16 stay, yes.

17 CHAIR HALNON: Excellent.

18 MEMBER MARTIN: Can I ask a question?
19 This might reflect my ignorance. The frequency of
20 in-service inspection gets captured in the tech spec,
21 right?

22 MS. NGUYEN: Yes.

23 MEMBER MARTIN: And, of course, the
24 applicant or the owner, Holtec, has given you what
25 they want, which probably goes back to the previous

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1 OL. You do have influence on maybe adjusting the
2 frequency of certain inspections, thinking, again,
3 about the steam generator in particular. I know
4 there's some precedent, you know, it was, I guess,
5 Paul mentioned the Beaver Valley experience; and I was
6 digging around and I saw that they had like a five-
7 cycle condition on the sleeves and inspection of that.
8 Do you expect this to evolve? Are you looking first
9 to validate, I don't know if we'll call it a proposal
10 but what they've requested, or do you believe this
11 will evolve over the next couple of years here, a
12 year, whatever the schedule is?

13 MS. NGUYEN: Yes. So I think all the
14 information that they're gathering now is a good
15 starting point, data, right, to inform what that looks
16 like moving forward. And I can't say that we have a
17 clear picture of what that is yet. But like Paul
18 mentioned, for the steam generators, right, that's
19 still something that's being figured out as far as how
20 often are they going to do those inspections, that
21 there's still data analysis going on that is going to
22 support that. And it looks like Paul wants to jump in
23 here.

24 MR. KLEIN: Thanks, April. I did want to
25 add, so the tech specs for steam generators set a

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1 maximum interval, if you will, for inspection, so you
2 can't exceed that limit. However, it's really the
3 operational assessment that's the technical basis for
4 how long you can safely operate until the next
5 inspection. We anticipate receiving that operational
6 assessment no later than September 23rd, and we're
7 quite interested in taking a look at it and having any
8 needed discussions with them at that point.

9 MS. NGUYEN: But for other activities, not
10 just the steam generators, right. You know, for
11 example, looking at safety culture and problem
12 identification and resolution. So we've already
13 talked about, you know, this would be a good thing to
14 go do a check in on, right. So it may not be a full
15 PNR team inspection, but maybe like a smaller group of
16 individuals who have a particular focus in looking at
17 safety culture, but also maybe looking at
18 implementation of the Corrective Action Program from
19 like a smaller sample size. We might do that mid-year
20 next year then as a check, right. Is the program
21 being implemented as we expect it to based on what we
22 looked at previously and making sure that it's healthy
23 and moving along in that way. And we would use that
24 same sort of check and adjust on whatever other
25 programs we decide, you know, would fall into that

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1 category.

2 MEMBER MARTIN: Okay. Thank you.

3 CHAIR HALNON: Are there any other
4 questions from either members in the room, online,
5 consultants?

6 MR. MCKENNA: I'll just do a quick close,
7 and then we'll open it up to further questions.

8 CHAIR HALNON: Okay. Go ahead, Phil.

9 MR. MCKENNA: All right. So, today, the
10 staff has presented an overview of the status of the
11 staff's licensing and oversight actions to date of the
12 Palisades Restart Project, went over in detail the
13 steam generator repair technique, emergency
14 preparedness, and inspection activities.

15 I want to thank the ACRS, the committee,
16 for all your detailed questions, and, especially, I
17 want to thank Paul, Jeff, and April for our detailed
18 answers that we provided. Hopefully, this gives
19 confidence to the committee of the staff's actions to
20 date.

21 CHAIR HALNON: Okay. Now I'll ask members
22 again or consultants any further questions? Okay.

23 The only last question I have is the next
24 significant licensing activity is going to be
25 subsequent license renewal that committed to send in

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1 an application relatively near term. Is there any
2 concern that's going to carry forward that you all are
3 going to look at? I mean, I realize that the aging
4 management programs and whatnot are going to be key in
5 all that. Is that where your mind is at, that we're
6 going to have to take a really hard look at the aging
7 management programs for this next application coming
8 in?

9 MS. NGUYEN: So this is April Nguyen.
10 I'll start, at least for the answer there. So right
11 now we're focused on the opportunity that's presented
12 to do a pretty in-depth look at these systems and
13 components and programs, right, that a lot of sites
14 moving through that process don't get the opportunity
15 to do. So, you know, as opportunities come up to look
16 at systems, components that are influenced with the
17 aging management program, we're looking at those right
18 now. That will help inform then the inspection
19 activities for subsequent license renewal.

20 So we have those individuals in the region
21 who will kind of continue that process as it moves
22 along and having that knowledge and background to then
23 further inform how they would look at it after the
24 fact.

25 MR. KLEIN: And I would say, additionally,

1 going and doing this Phase IV license renewal
2 inspection that we talked about is also a big piece of
3 understanding where their programs are and what
4 actions they've taken towards that. It does go a long
5 way that Phase IV helps inform subsequent license
6 renewal actions. So I think, between that and how
7 we're looking at aging management, I think we've got
8 that pretty well covered.

9 CHAIR HALNON: Okay. Very good. You all
10 did a great job following the outline that we're
11 providing with all the areas we wanted to go, so thank
12 you very much for a comprehensive evaluation and
13 presentation.

14 I'm going to go into the public comment
15 period, and this is how it's going to work. The
16 public will be asked to raise your hand on Teams,
17 which we've already got a couple. You will be taken
18 in the order that you come. You'll be given two
19 minutes, and then I'll cut you off. And if you're
20 still talking, we'll mute you. So try to stay within
21 the two minutes.

22 I do have a special request for a few more
23 minutes, and I'm going to wait until at the end. Mr.
24 Gundersen will be provided five minutes. We
25 negotiated that, and he'll be at the end, and that'll

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1 be the last public comment we take.

2 So, at this point, I want the public to
3 raise their hand, get in the queue. I'll take you in
4 the order that you come. And, again, reminding you
5 that the comment will be the comment. It'll go into
6 the record, we'll consider it in our deliberations,
7 but we will not respond to questions and your comments
8 at this time. But they will be in the record.

9 So, at this time, opening it up, Alan
10 Blind, I believe you're first. You have two minutes.

11 MR. BLIND: Yes. Do you hear me okay?

12 CHAIR HALNON: Yes, you're fine.

13 MR. BLIND: I have a comment similar to
14 Mr. Gundersen. Could I request five minutes, please?

15 CHAIR HALNON: No.

16 MR. BLIND: Okay. The two ACRS questions
17 were based on the steam generators. One asked about
18 some operating experience based on a previous plant
19 that had a failure, and that was me. I was the vice
20 president of nuclear power for Indian Point in year
21 2000 when we had that steam generator tube failure,
22 and I'd like to go directly -- there was a document,
23 a lessons learned document, that the NRC prepared and
24 I'd like to read from the executive summary.

25 It said the task group concluded that

1 communicating the safety significance of the IP2 event
2 was challenging. They said that the staff found that
3 the degraded steam generator tube conditions was risk
4 significant because of the loss of margin. They also
5 said that IP2 was designed to mitigate the effects of
6 a tube rupture. Palisades is not by its design basis.
7 They rely on the atmospheric dump valves. And I don't
8 have time to explain that to you, but I'd like to if
9 I can come back.

10 CHAIR HALNON: Alan, if there's time at
11 the end before noon, I'll let you come back if you'd
12 like.

13 MR. BLIND: Okay. Thank you. Let me just
14 make one more sentence from that operating experience.
15 And this is very important because there's technical
16 similarities between Indian Point and Palisades,
17 particularly with the age and the INCONEL 600 tubes.
18 The NRC said in that report, and I quote now: because
19 steam generator tube failures and ruptures have
20 occurred in the past and are likely to occur again.

21 Okay. So I'll yield my time. I hope I
22 can come back and explain to you the connection
23 between the design basis, the atmospheric dump valves,
24 and the emergency plan. Thank you.

25 CHAIR HALNON: Thank you, Alan. Like I

1 said, if there's time at the end, I'll recall. Go
2 ahead and raise your hand again just so I can make
3 sure.

4 MR. BLIND: Thank you.

5 CHAIR HALNON: Okay. Kraig Schultz, you
6 have two minutes.

7 MR. SCHULTZ: Can you hear me?

8 CHAIR HALNON: Yes.

9 MR. SCHULTZ: My name is Kraig Schultz.
10 I'm an environmental health advocate with Michigan
11 Safe Energy Future. I live 50 miles from Palisades
12 Nuclear Power Plant and have received electricity from
13 it for its entire 50 years of operation. Mr. Halnon,
14 members of the subcommittee, thank you for hearing me.

15 The hazard here is not only Palisades, it
16 is the precedent. Restarting a decommissioned plant
17 under new ownership and an inexperienced operator
18 discards decades of operational knowledge about
19 degradation that creates systemic risk for the entire
20 fleet. At Palisades, the issues are clear: overdue
21 fire safety upgrades, degraded steam generators,
22 embrittlement, an inexperienced operator, and depleted
23 trust funds.

24 But the deeper hazard is what this
25 precedent means. If the NRC allows plants in

1 decommissioning to return to service, then no operator
2 can assume early closure exempts them from upgrades.
3 Every facility must be maintained as if it will run
4 indefinitely. This is a seismic shift in the
5 regulatory landscape.

6 I also notice that this meeting ends
7 today, August 21st, and the staff has indicated
8 license changes are set for August 25th, leaving in
9 reality just one business day. That makes it
10 essential for this committee to recommend that the
11 August 25th date be suspended so that hazards and
12 inadequacies identified here can be fully reviewed and
13 addressed before any final action.

14 History will not remember how quickly
15 Palisades reopened. It will remember the long-term
16 impact of this precedent on nuclear safety and public
17 trust. It will remember your names for whether you
18 identified the hazards, flagged the inadequacy of
19 current standards, and recommended the safe, credible
20 path forward.

21 We have written recommendations for this
22 committee that cover these points in greater detail.
23 I need to know where to send these recommendations,
24 given the urgency of having only one day to make them
25 known and acted upon.

1 CHAIR HALNON: Alan -- I mean Mr. Schultz.
2 First, thank you. Your comments are in the record.
3 Send your written comments to Quynh Nguyen, the
4 Designated Federal Officer. His email address is on
5 the agenda.

6 MR. SCHULTZ: Thank you.

7 CHAIR HALNON: Okay. Let's see. Next is
8 -- I'm going to probably mess up your name, Jan. Jan
9 Boudart. Jan?

10 MS. BOUDART: Okay. You can hear me, and
11 I don't think I'm going to take two minutes. I have
12 just a really long worry about the fact that the NRC
13 does not take into consideration climate change. And
14 the point there is that what is considered is how much
15 the plant affects the environment. But with climate
16 change, the environment is having a tremendous effect
17 on plants. And Palisades is so on the beach that it's
18 almost in the lake and, of course, I live on Lake
19 Michigan, and what happens at Palisades really affects
20 me. And that's my first part about climate change.

21 Also, there have been major, major changes
22 to FEMA. And you've been discussing using FEMA, but
23 have you considered how you're going to use FEMA with
24 the extensive changes that have taken place in FEMA?

25 So those are two questions. It's not a

1 discussion. And that's what I wanted to talk about or
2 it was one of the things. I have many, but, you know,
3 I can't go into all the stuff that bothers me. So,
4 anyway, those two things: climate change effect on the
5 plant and what are you going to do about the huge
6 changes to FEMA that have occurred in the last six
7 months? Thank you.

8 CHAIR HALNON: Thank you, Jan. Mr.
9 Michael Keegan. Oh, I'm sorry. Wait a second. I'm
10 sorry, Mike. Hold on. 517-677-8312, whoever you are,
11 please identify yourself, affiliation, if appropriate,
12 and make your comment.

13 MS. BARNES: Yes. This is Kathryn Barnes,
14 and I'm with Don't Waste Michigan. I live about 60
15 miles downwind from Palisades, and it's always been a
16 concern to me. I think you are addressing a lot of
17 the issues, and you're leaving them open with a risk
18 factor. Your speaker, I believe her name is April,
19 said that you would be restarting and moving towards
20 criticality. What does that mean? That you're
21 expecting problems? You're expecting critical
22 problems? Maybe you're expecting a meltdown, you're
23 risking a meltdown. You're talking about thousands of
24 cracks in connector plates that connect tubing which
25 has hundreds of potential cracks in its sleeving. I'm

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1 wondering about that, what happens when a connector
2 plate cracks.

3 I'm also wondering about the tubing, what
4 if a tube cracks and the liquids or whatever you're
5 putting through the tubing has an action on other
6 tubes, so it would have like a chain reaction where
7 other tubes would become degraded and potentially not
8 inspected. You're talking about levels of tubing,
9 which I'm assuming that, with gravity, there would be
10 leakage onto other levels.

11 So you've got a plethora of risks there.
12 One of the main risks also is the degradation of the
13 plant itself, the embrittlement. How are you going to
14 know when you know it's embrittled to the point where
15 it's going to have a meltdown.

16 Also, your population. You say it has not
17 increased by more than one percent, and you're not
18 including migrant workers, you're not including
19 tourists, you're not including part-time residents
20 like all those people that own the homes around there
21 that might be, you know, the Census might have them in
22 Florida or in Chicago as listed and not there.

23 So what are you considering? Are you
24 considering a 10-mile radius which would include the
25 small town of Covert with permanent residents? You

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1 know, yes, maybe they have not increased their
2 population by one percent, more than one percent. But
3 what about all of the outlying communities that would
4 be affected and all of the tourists if there was an
5 accident this summer that might be affected and all
6 the migrant workers, the blueberry farms, and all the
7 people in outlying districts, including myself, which
8 would be downwind that would be affected. Certainly,
9 Kalamazoo's population has increased more than one
10 percent in the Kalamazoo school program.

11 CHAIR HALNON: Kathryn, you need to wrap
12 it up. You're well over two minutes.

13 MS. BARNES: Okay. Thank you. I will.
14 I'm just concerned that you're not, that you are
15 willing to take a risk and, like the other people have
16 said, extend it. Do not just start it up in a day
17 without, you know -- the 25th of August is too soon.
18 You have not resolved issues. You haven't looked into
19 all of them thoroughly enough.

20 And thank you for letting me speak.
21 Please take my concerns seriously.

22 CHAIR HALNON: Thank you, Kathryn. Okay.
23 Now Michael Keegan.

24 MR. KEEGAN: Hello, can you hear me?

25 CHAIR HALNON: Yes, we can.

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1 MR. KEEGAN: Yes. Michael Keegan with
2 Don't Waste Michigan, and I, too, I want to echo and
3 reinforce Kraig Schultz's request that the ACRS put
4 the brakes on the loading of fuel set for Monday.
5 It's my understanding that question did get ducked
6 earlier by April on specifically when would the fuel
7 be loaded.

8 I attended the ACRS back in July of 2006
9 and heard about how Generic Issue 191 was going to be
10 resolved. It was a matter of the strainers were too
11 small, 50 total square feet. The utility acknowledged
12 that they needed to be between 3,000 and 5,000 square
13 feet; but, because the proceeding before the ACRS was
14 license transfer, not relicensing, that issue was not
15 going to get addressed. But we were certain it would
16 be resolved. It was never resolved, and now they've
17 kicked that issue into the second refueling outage
18 after restart.

19 As they approached shutdown in about 2005,
20 I'm sorry, 2015, Entergy started getting exemptions to
21 defer inspections until the next ten-year cycle, the
22 sixth cycle, which would begin at restart.

23 So many issues not looked at for
24 potentially 20 years. We were promised on August 1st
25 of 2024 that the control rod drive mechanisms were all

1 being changed out. Now we see a relief request to
2 allow them under hardship to continue with what they
3 have. They botched the patch job in September of
4 2020, forced them into the early shutdown of May 20th,
5 '22 because of leaking.

6 There are so many unresolved problems, and
7 the political economy is obvious. You are in a very
8 deep predicament, and you're at risk of blowing the
9 entire nuclear renaissance by rushing this plant into
10 operation.

11 Those are my comments. Thank you very
12 much for listening to me. And please put the brakes
13 on. Do not allow fuel loading. And what is Mode
14 Zero? I've not been able to find Mode Zero anywhere.
15 Thank you.

16 CHAIR HALNON: Thank you, Michael. If
17 those who have already commented could lower their
18 hands, please. The only one that should be up there
19 is Mr. Blind. Arnie Gundersen, are you online?

20 MR. GUNDERSEN: Hello. Arnie Gundersen.

21 CHAIR HALNON: Yes. You have five
22 minutes, Arnie.

23 MR. GUNDERSEN: Okay. Thank you. I began
24 my first nuclear engineering job in June of 1971.
25 Palisades started six months later. Palisades and I

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1 have grown old together. You have my CV, so I'll
2 spare you the details over those 54 years. Yet, never
3 in those 54 years have I been more concerned about the
4 safety of a nuclear plant than I am about the planned
5 resurrection of Palisades.

6 Because I only have five minutes, I'll
7 talk fast, and I'll limit my remarks to what I believe
8 is the single biggest safety concern, the condition of
9 the steam generators. Palisades steam generators were
10 first replaced in 1991, and they haven't been replaced
11 since. This 34-year span is extraordinarily long for
12 600 tubes, Alloy 600 tubes. Palisades' previous
13 owners were conscientious in maintaining excellent
14 water chemistry and rigorous inspection routine, which
15 contributed to this longevity. Palisades was sold to
16 Holtec, a demolition contractor with no nuclear
17 operating experience, to be decommissioned. That was
18 in June of 2022.

19 On July 2022, only two weeks after the
20 sale, Holtec requested funding from the Department of
21 Energy to resurrect Palisades. Holtec acknowledged
22 that the steam generators were degraded and requested
23 a half a billion dollars, quote, to replace old
24 worn-out hardware such as the steam generators.
25 Unlike the previous owner, Entergy, Holtec renounced

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1 the tech spec license requirements for its need to
2 maintain excellent water quality and to perform
3 frequent steam generator inspections. Both Holtec and
4 the NRC have acknowledged that proper EPRI guideline
5 layup and associated records were not maintained for
6 two years. Without adequate control of water
7 chemistry, through the addition of oxygen scavengers
8 and the proper pH control, Palisades steam generator
9 tubes rapidly deteriorated.

10 Finally, two years after acquiring
11 Palisades, Holtec belatedly performed tube
12 inspections. That new inspection showed that stress
13 corrosion cracking was extensive. Only one tube was
14 found damaged in 2020 by Entergy, yet 700 flaws were
15 identified by Holtec in 2024. While Holtec has
16 acknowledged in 2022 that the steam generators were
17 worn out, in 2025 they asked the NRC for permission to
18 place Alloy 690 sleeves into alloy 600 tubes instead
19 of replacing the steam generators.

20 My 45-page expert report has been provided
21 to the NRC and to you that details my serious concerns
22 about the overall safety of the Palisades steam
23 generators if it's allowed to go forward. As an
24 expert, I believe that caustic chemicals will hide out
25 in the steam generator crevices, causing rapid steam

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1 generator damage if the plant restarts. However, the
2 Office of General Counsel has stated that my concerns
3 are irrelevant to sleeving.

4 Because the NRC has apparently ignored my
5 concerns, I asked two AI programs to analyze Palisades
6 steam generators. Here's what Grok said: hundreds of
7 more indications, possibly 10 to 20 percent additional
8 plugging, will be needed within one or two years,
9 risking a loss of coolant accident if unchecked.

10 Here's what ChatGPT said: Historical data,
11 little or no tube damage for 30 years, no longer
12 applies. The current condition suggests a non-trivial
13 likelihood of tube leakage or even rupture if
14 Palisades restarts without a steam generator
15 replacement. Until new steam generators are
16 installed, Palisades will be running closer to the
17 edge of tube integrity than it ever did before,
18 implying a higher probability of failure.

19 I end this presentation with one simple
20 question: What's the rush? Why is there such a rush
21 to resurrect Palisades? There's no power shortage in
22 Michigan since Palisades is closed. There's no AI
23 data centers in Michigan clamoring for the power.
24 And, indeed, when Palisades starts up, its power will
25 be more expensive than other sources that Michigan

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1 already relies on.

2 My analysis, supported by Holtec in 2022,
3 and two AI programs show that Palisades will not be
4 reliable, nor will it be safe. The Palisades steam
5 generator should be replaced before the reactor is
6 restarted. Thank you.

7 CHAIR HALNON: Thank you, Alan. And your
8 comments were written into the record, as well. Thank
9 you.

10 MR. GUNDERSEN: Thank you.

11 CHAIR HALNON: William Tilson, you're up
12 next. Two minutes.

13 MR. TILSON: Thank you. This is Dr. Deric
14 Tilson from the Breakthrough Institute. We are an
15 environmental nonprofit that is independent. We don't
16 receive any industry funds.

17 I have been participating and listening in
18 to Palisades meetings for some time now and countless,
19 countless NRC meetings, and I have been encouraged by
20 the process throughout. So far, this restart, during
21 which you've had a lot of public engagement, a lot of
22 the public to ask questions, it's in line of the
23 principles of good regulation, of NRC's principles of
24 good regulation. And hearing the thoroughness and the
25 due diligence of the NRC inspections and results

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1 throughout today's meeting also furthers my belief
2 that you're doing a wonderful job.

3 All this aligns with the new mission
4 statement and helps support nuclear's benefit to
5 society as a whole. We are wholly supporting the
6 return of the operating or the reset of the operating
7 license in the coming week and look forward to the
8 further restarts. Thank you so much.

9 CHAIR HALNON: Thank you, Dr. Tilson.
10 Next up is Bette Pierman. Pierman, unmute and find
11 your comment.

12 MS. PIERMAN: There, I think I am now.
13 Can you hear me?

14 CHAIR HALNON: Yes, just fine. Thank you.

15 MS. PIERMAN: Thank you. My name is Bette
16 Pierman, and I live in Benton Harbor, about 13 miles
17 south of the plant on the lake shore. I listened with
18 great interest this morning, and I heard discussions
19 of how the equipment was being flushed and cleaned,
20 and I believe that toxic chemicals are being used to
21 do that. And so my concern is where are those
22 chemicals going after they've been used to flush and
23 clean the equipment? If they discussed that, I missed
24 it. I want to know how they're being disposed. Are
25 they being hauled off site to a licensed toxic waste

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1 disposal site, or are they being put into the ground
2 and the lake, further endangering our environment and
3 the people who live around there?

4 So those are my comments. If you said
5 where you're putting those chemicals after they've
6 been used to flush and clean the equipment, I'm sorry,
7 I missed it. But I didn't see it in any of the
8 documents or on any of the slides, and I certainly
9 didn't hear you talk about it. And my concern is the
10 environment. My concern is how safe this lake is
11 going to be after you continue running this plant.
12 And it's a serious concern if you are flushing toxic
13 chemicals in some place other than a licensed disposal
14 waste site. Thank you.

15 CHAIR HALNON: Thank you. Okay. There's
16 a phone number 240-462. Unmute yourself and provide
17 your name and affiliation, if appropriate, in your
18 comment.

19 MR. KAMPS: Hello, can you hear me?

20 CHAIR HALNON: Yes.

21 MR. KAMPS: Hello. My name is Kevin Kamps
22 with Beyond Nuclear and Don't Waste Michigan. I'm
23 speaking to you from Kalamazoo, about 35 miles
24 downwind of Palisades, my hometown.

25 And I would like to first agree with

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1 something that Kathy Barnes brought up about emergency
2 preparedness. I think your figures for populations
3 are way off because I heard no consideration of
4 tourists. So I looked up the Blueberry Festival that
5 was held in South Haven from August 8th to 11th this
6 year, considered one of the biggest in the world,
7 attendance 50,000 people. Of course, some of those
8 50,000 could be from South Haven, which is population
9 just under 4,000, I believe, or from Covert,
10 population around 2,500. But, of course, most of the
11 50,000 people will be coming in from elsewhere, or a
12 lot of them anyway. I don't think the emergency
13 preparedness has considered such a scenario at all, it
14 seems to me.

15 And I'd just like to add to the list that
16 Michael Keegan brought up. Embrittlement of the
17 reactor pressure vessel was discussed briefly. The
18 Associated Press in 2012 cited it as a top example of
19 NRC regulatory retreat. So you found a computer
20 methodology that says everything's okay, and it
21 reminds me of an ACRS meeting a decade or longer ago
22 where a member of ACRS asked an NRC staffer
23 specializing in reactor pressure vessel embrittlement,
24 what is so special about Palisades? It was a generic
25 embrittlement discussion, and he was continually

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1 bringing up Palisades because it's the worst
2 embrittled reactor pressure vessel in the country,
3 with a close second being Point Beach Unit 2 on
4 Wisconsin's Lake Michigan shoreline.

5 So Lake Michigan is wedged between the two
6 most embrittled reactor pressure vessels in the
7 country. And this is a problem, it's a meltdown risk,
8 as is the sumps and strainers, as Michael Keegan
9 brought up, as is the lack of fire protection, decades
10 overdue. And Holtec is asking for a further extension
11 before compliance.

12 The control rod drive mechanisms are the
13 worst operating experience in industry. We're seeing
14 no change to that. The list goes on and on. I am one
15 of millions of guinea pigs, downwind, downstream, of
16 this very high-risk nuclear experiment that Holtec,
17 with complicity from NRC, is conducting in Covert
18 Township. And we object, we protest, we've taken part
19 in every possible intervention opportunity. Those
20 countless public meetings --

21 CHAIR HALNON: You need to wrap up your
22 comments.

23 MR. KAMPS: We have attended every second
24 of those countless meetings. It's pearls before the
25 swine at the NRC obviously; the writing's on the

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1 walls. If the worst happens, as a commenter said, we
2 know who's responsible.

3 And my final point is that the Japanese
4 Parliament concluded that Fukushima Daiichi, the root
5 cause, was collusion between the regulatory agency,
6 the company, and government officials. And we have
7 such dangerous collusion in spades at Palisades.
8 Thank you.

9 CHAIR HALNON: Thank you, Kevin. Okay.
10 We're going to take two more comments. I'm going to
11 ask Ace Hoffman to go first, and then I'm going to
12 give two minutes back to Mr. Blind. He's been very
13 patient with us.

14 So, Ace, why don't you go ahead?

15 MR. HOFFMAN: Okay. Can you hear me okay?

16 CHAIR HALNON: Yes, we can. Thank you.

17 MR. HOFFMAN: Okay. Great. I live in
18 California, so when San Onofre had a steam generator
19 problem I was paying quite a bit of attention to it.
20 And I know a lot of other people here, Tom Palmisano,
21 of course, Arnie Gundersen, were also paying
22 attention.

23 It seems to me that, in this case, there's
24 no intention to run the plant with these steam
25 generators for very long, and part of the reason is

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1 because they're really not in very good shape. And
2 unplugging several hundred tubes, those tubes were
3 undoubtedly plugged because that area was vibrating.
4 And I don't see that as being a safe way to get a
5 license going on a plant that obviously is either
6 going to get new steam generators, or they're trying
7 to keep the license going so they can put in SMRs
8 later. Either way, it seems like an enormous risk for
9 no gain and an enormous amount of money being spent.

10 And that's all I have to say, other than
11 that, I think the people who did the research that we
12 were listening to at the beginning seemed very honest
13 and did a good job, and I was quite impressed. Thank
14 you.

15 CHAIR HALNON: Thank you, Mr. Hoffman.
16 Alan, you've been very patient, as I mentioned. I'm
17 going to give you two more minutes, and then we'll
18 wrap up. So please go ahead.

19 MR. BLIND: Okay. Thank you. Let me give
20 you the ML number of the lessons learned. It's
21 ML003759165. And there's been a lot of discussion
22 here about what's been done to restart Palisades.
23 It's a lot of good work, and a lot of hard work by
24 everybody. But the punctuation point on all this will
25 be the steam generators. That's what we'll remember

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1 last.

2 The lessons learned document, that's the
3 NRC's document, they identified mistakes not only the
4 licensee, that was me, but also their own mistakes
5 that they made, you know, kind of like, hey, if we had
6 to do this all over again, we would do it differently.
7 And that's what I'm concerned about is I don't see the
8 approach by the licensee or NRC considering those
9 lessons learned.

10 Okay. IP2 was designed to mitigate the
11 effects of the failure or a rupture. There was no
12 radiological release at Indian Point. We were able to
13 contain it because we had like 80-percent steam dump
14 capacity to the condensers. Palisades, by design,
15 does not have that capacity. They must rely on the
16 atmospheric dump valves, and what's important is
17 that's irregardless of whether they have offsite power
18 or not. The first method for rapid depressurization
19 will be the atmospheric dump valves.

20 Now, by Holtec's own calculations for that
21 -- and, again, this assumes that you're at the tech
22 spec limit for fuel condition -- they calculated at
23 the exclusion barrier boundary, this is their number,
24 that they'll have 1.17 rem TEDE. The emergency action
25 level guideline for general emergency entry and making

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1 a recommendation to the governor for evacuation is 1
2 rem. So the design basis for a steam generator tube
3 rupture, which the NRC is saying it's just a matter of
4 time, it's another one that's going to happen,
5 especially with these INCONEL 600 tubes, the way the
6 public safety is ensured is by ordering an evacuation,
7 not by the design of the plant.

8 So my plea is that the ACRS make the
9 recommendation that, when the NRC does get the
10 operational assessment, that all of these factors that
11 we've been discussing, you know, they're all
12 probabilities, that they're all stacked up together,
13 the chemistry, the age, the material, and the list
14 goes on. But they also have to consider that the
15 probability is high of there being an actual event,
16 and there is no conventional means for rapid
17 depressurization, that that all has to be factored
18 into the operational assessment. And I know Kevin
19 said or Mr. Klein said we haven't got that yet, but,
20 when we do get that, I also hope that the ACRS can
21 recommend to the Commission that they must review and
22 approve that operational assessment before entry into
23 Mode 4. Thank you.

24 CHAIR HALNON: Thank you, Alan. I would
25 recommend that all public comments, if you want to

1 make sure that you have all your points covered,
2 because I know that we are time limited, please submit
3 your comments in writing to Quynh, the Designated
4 Federal Officer. And that also goes for those of you
5 that may want to comment but have not had the
6 opportunity. Unfortunately, we've reached the end of
7 our meeting, and if you have comments and you still
8 want to put them in the record, please write them down
9 in an email, letter, whatever it takes to get it to
10 Quynh Nguyen. And we will provide those into the
11 record for our consideration.

12 I want to thank the members of the public
13 for your comments. I apologize for having to be
14 regimented, but we are up to a hard stop that we have
15 to end the meeting. I want to thank the NRC staff.
16 Excellent job for covering very comprehensively what
17 you've done.

18 The steps going forward is the committee
19 will consider all that we've heard, including the
20 comments, including the presentation, in addition to
21 what we've heard in the past at our previous meetings,
22 and we will, at the full committee meeting in
23 September, take a further discussion and we'll decide
24 if we will be writing a letter, which we probably will
25 be, to the commissioners to provide to them what we

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1 think our end product is, which is going to be a
2 letter that provides our opinions on the process and
3 the ratings. That will be a public session, as well.
4 And if there's anybody that has a concern or questions
5 about what we're going to be doing, just to listen in
6 to that session during the full committee meeting in
7 September. And that will be noticed in the coming
8 week probably; I'm looking over at my executive
9 director and she nodded in the coming week that will
10 be noticed.

11 Last chance for members and consultants,
12 if there's anything you want to wrap up with. Okay.
13 I want to thank everybody for your attendance, and I'm
14 going to adjourn the meeting at this time. Thank you
15 again.

16 (Whereupon, the above-entitled matter went
17 off the record at 12:08 p.m.)
18
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**BEFORE THE UNITED STATES
NUCLEAR REGULATORY COMMISSION**

IN THE MATTER OF)	
)	Docket No. 50-255-LA-4
HOLTEC PALISADES LLC)	
)	
(Steam Generator License Amendment))	

**DECLARATION OF ARNOLD GUNDERSEN
IN SUPPORT OF PETITION TO INTERVENE
AND REQUEST FOR ADJUDICATORY HEARING
OPPOSING STEAM GENERATOR RESTORATION
BY MICHIGAN SAFE ENERGY FUTURE, DON'T WASTE
MICHIGAN, NUCLEAR ENERGY INFORMATION SERVICE,
THREE MILE ISLAND ALERT, AND BEYOND NUCLEAR**

Under penalty of perjury, I, Arnold Gundersen, declare as follows:

1. I have previously provided three declarations in this matter. My CV is attached.
2. I am submitting this Declaration to supplement my previous testimony in this proceeding, which is incorporated herein by reference.
3. **My Previous Steam Generator Experience**
 - 3.1. My *curriculum vitae*, which is attached, details my 50+ years of experience in the nuclear industry, However, expanding upon my CV is essential by focusing on my experience and expertise with nuclear steam generators.
 - 3.2. When I was an engineer with Northeast Utilities (NU), corporate management was concerned that metallic debris in the condensate and feedwater systems might contaminate the new, unused steam generators at Millstone Point Unit 2. In 1974, Northeast Utilities' management appointed me as the lead engineer responsible for devising the chemical cleaning process for the condensate and feedwater systems before water entered the steam generator while Unit 2 was undergoing startup testing.

- 3.3. At that time, Bechtel was the construction engineer modifying the system piping connections, and NU hired Haliburton to provide the boilers, chemicals, and pumps to complete the process. Together with my team of Bechtel and Halliburton, our analysis determined that the chemical cleaning process successfully removed 5,000 pounds of metallic contaminants that otherwise would have entered and contaminated Millstone's steam generators had the chemical cleaning not occurred.
- 3.4. Later in my career, during the 1970s, I was the lead nuclear engineer at New York State Electric & Gas (NYSE&G) and was responsible for acquiring what turned out to be the last significant atomic power plant purchased in the United States until the Vogtle 3 and 4 units. The plant was slated for construction near the Nine Mile Point nuclear reactors in upstate New York. It was a Combustion Engineering System 80 design, which is still operating about 50 miles west of Phoenix, Arizona, at Palo Verde Units 1, 2, and 3.
 - 3.4.1. The steam generator tube analysis was a critical part of the acquisition process in my procurement decision for NYSE&G. Therefore, I spent weeks in the labs and manufacturing facilities of Combustion Engineering, Babcock and Wilcox, and Westinghouse, where I analyzed each vendor's unique approach to engineering and manufacturing of their specific steam-generator designs. *The hideout of chemicals at the junction between the tube and its tube sheet was of particular concern to each vendor.*
 - 3.4.2. What is a *hideout*? According to an abstract in *ScienceDirect* of the article entitled, *10 - Hideout, Hideout Return and Crevice Chemistry in Nuclear Steam Generators*¹,

"Localized corrosion originating on the outside surface of the steam generator (SG) tubes has been a major cause of SG incapability in the commercial nuclear power industry, with the predominant modes of attack being either stress corrosion cracking or intergranular attack caused by the accumulation of highly concentrated solutions. The solutions accumulate in flow-restricted regions on the secondary side of the SG, **such as**

¹ *Hideout, hideout return and crevice chemistry in nuclear steam generators*,
<https://www.sciencedirect.com/science/article/abs/pii/B9780081008942000121>

crevices formed at the intersections between the SG tubes and the tube sheet, the tube-support structure and deposits that have accumulated on the tube surface and the tube sheet. (Emphasis Added)

- 3.5. During the 1980s, when I was the Vice President of Engineering at Nuclear Energy Services (NES) in Danbury, Connecticut, my utility clients consistently informed me of their difficulty in installing internal structures used to prevent water from entering the channel head at the bottom of steam generators when clients performed steam generator tube inspections. I convened my design engineering staff to think outside the box, which led to the invention of the modern steam generator nozzle dam, allowing freedom of movement inside the steam generator channel head while the refueling process was underway.
- 3.6. In 2012, Friends of the Earth (FOE) retained me to evaluate the cause of steam generator failures at San Onofre Units 2 and 3. I met with Senator Barbara Boxer and her staff with the help of concerned whistleblowers from within San Diego Gas and Electric (SDG&E) and within the NRC itself. I published five expert reports² on behalf of Friends of the Earth (FOE) that determined that the San Onofre steam generators had catastrophic tube failures because SDG&E failed to implement the legal provisions of 10 CFR 50.59 (like-for-like) in its design of replacement steam generators.
- 3.7. Following my five reports, I was also the FOE expert on a Section 2.206 petition and presentation to the NRC. The FOE 2.206 petition and presentation to the NRC was about the materially false statements made to the NRC by its federally regulated utility, San Diego Gas and Electric (SDG&E), regarding the new and uncertified design of the Replacement Steam Generator (RSG). The NRC 2.206 Petition Review Board analyzed the materially false statements about the condition of the steam generators for more than two years. Then, it declared the petition moot because San Onofre was permanently

² <https://www.fairewinds.org/san-onofre>

closed. The NRC made this decision even though the license was still in effect and San Onofre and its attorneys still employed the personnel I had identified in my report.

3.8. In my expert work for FOE, I developed several videos describing the failure mechanism at San Onofre³. The new *allegedly improved steam generators* failed in only 11 months, although designed using modern computer analysis to last at least 60 years. San Onofre was permanently closed in 2013 with a financial loss exceeding \$4 Billion.

3.9. In addition to the above mentioned steam generator experiences, I am familiar with the “hideout” phenomena from corrosive chemicals in nuclear heat exchangers. Specifically, I was one of the principal investigators of the Millstone Unit 1 Chloride Intrusion Incident. During the incident, corrosive chemicals found in salt water entered the nuclear steam supply system leading to a reactor scram and numerous stress corrosion failures. Damage to safety related components from stress corrosion cracking while the reactor was hot occurred in fifteen seconds. While the Unit was shut down to repair the stress corrosion damage, Northeast Utilities repeatedly tried for nine months to eliminate all traces of the chemical contaminants from the NSSS, but was unable to ever completely eradicate contamination within the plant’s Isolation Condenser, a safety related heat exchanger. This continuing contamination of this safety related heat exchanger led to frequent tube failures after the reactor was restarted.

4. **Introduction: The History of Steam Generator Damage at the Holtec Palisades Nuclear Reactor**

4.1. My analysis of the condition of the Palisades steam generators has been limited by Holtec’s lack of transparency on tube inspection data. Specifically, filing of steam generator inspections at Palisades are required by Technical Specification 5.6.8. This tech spec requires reports to be submitted within 180 days. My review of the ADAMS database indicates that no tube inspection reports have been filed for Palisades since 2020, yet I am aware of at least one Holtec Steam Generator inspection that occurred in

³ <https://www.fairewinds.org/nuclear-energy-education/san-onofre-bad-vibrations>

August 2024. I reserve the right to amend this report if and when Holtec ultimately files this information as required by its technical specifications

- 4.2. The Achilles heel of all Pressurized Water Nuclear Reactor (PWR) designs, like the Palisades reactor, has always been the integrity of Steam Generators (SG) and their uncontrolled releases of radioactivity due to Steam Generator tube failures. Indeed, the initial SGs at Palisades were replaced in 1990 after only 19 years of operation. Palisades employees inspected them frequently and accurately maintained the specific RSG water chemistry with ultra-pure water⁴ to reduce metal corrosion. Presumably, the two prior owners of Palisades (Consumers Energy and Entergy) recognized that the 1990 Replacement Steam Generators (RSGs) would fail unless they were maintained by the specific RSG water chemistry and by using ultra-pure water to reduce metal corrosion.⁵
- 4.3. However, when Holtec International⁶ bought Palisade and assumed responsibility for the reactor in late June of 2022, it simply ignored the significant safety precautions required to prolong the life of its RSGs. In 2022, before Entergy turned ownership of the plant over to Holtec, it terminated the technical specifications (tech specs) that would have required continuous maintenance and inspection of the steam generators.⁷ NRC staff admitted at a January 14, 2025 public meeting that the steam generators were not put into layup status until May 2024.⁸ And until Holtec's filing of its 2025 License

⁴ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML23075A112>

⁵ Response for Palisades to Generic Letter 2004-01, Requirements for Steam Generator Tube Inspections, dated October 24, 2004

⁶ Holtec International and its numerous subsidiaries are referred to as "Holtec" throughout this document.

⁷ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML22039A198>

⁸ NRC staffer Andrew Johnson, in response to a question from Sierra Club Michigan Chapter member Ed McArdle, about exactly when chemically-preservative wet layup was implemented in the steam generators (SGs) to prevent accelerated corrosion of exceedingly thin-walled (merely 0.042 inches thick) heat-transfer tubes — stated: "I believe it was in the previous inspection outage call that we had back in September, in the notes, we documented that *they had placed the generators in wet layup in May of '24. There was about a two year period where they were not in a wet layup, with controlled water chemistry.* That was the latest information that we had." [Holtec neglected Palisades' steam generator tubes for two years! - Beyond Nuclear](#) Also, see audio recording of the meeting: [Jan 14 2025-NRC Holtec Steam Gen LBB Sleeve.m4a - Google Drive](#), from 1:26:18 mark to 1:26:50 mark.

Amendment Request (LAR) regarding the steam generators, there was no attempt to change the tech specs to preserve the generators from deterioration and corrosion.

- 4.4. Expressly, in May 2023, Holtec renounced Entergy's previously endorsed license requirements necessary to prolong the useful life of the Palisades RSGs in its proposed license change to the Nuclear Regulatory Commission (NRC) for Palisades. Based on this May 20, 2023, submittal to the NRC, Holtec determined there was no reason to maintain the Palisades RSGs with proper chemical controls against corrosion. Moreover, when Holtec acquired Palisades on June 28, 2022, it never stated its intention to restart the shuttered reactor. Governor Whitmer first floated the trial balloon to continue to operate Palisades instead of shutting it down for good on April 20, 2022, as regulations and its sale had specified.⁹ After Entergy closed the Palisades reactor on May 20, 2022, and Holtec took over on June 28, 2022, the possibility of restarting Palisades lingered in rumors. On September 9, 2022, Governor Whitmer and Holtec went public, and it became clear that Holtec, albeit completely inexperienced, would attempt to resurrect the Palisades Nuclear Power Plant.¹⁰ Before March 2023, Holtec had proposed a restart scheme to the NRC.¹¹ The NRC held the first public regulatory pathway to restart meeting between the NRC and Holtec on March 20, 2023.¹²
- 4.5. When Entergy permanently closed Palisades on May 20, 2022, it had no financial incentive to place the steam generators in a wet layup. Moreover, during the January 14, 2025, public meeting, an NRC staffer acknowledged that Holtec did not set the steam generators in proper wet layup until May 2024. More disturbingly, although it had acquired Palisades and was aware of the possibility of restarting it, Holtec made no effort to protect its vital systems from corrosive chemical attacks for two more years. In

⁹ *Whitmer Calls for Federal Investment to Protect Jobs and Shore up Energy Needs*, <https://www.michigan.gov/whitmer/news/press-releases/2022/04/20/whitmer-calls-for-federal-investment-to-protect-jobs-and-shore-up-energy-needs>

¹⁰ <https://www.detroitnews.com/story/news/local/michigan/2022/09/09/palisades-owner-seeks-federal-grant-keep-michigan-nuclear-plant-open/8036078001/>

¹¹ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML23032A399>

¹² <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML23075A112>

early 2025, Holtec came before the NRC seeking approval and forgiveness for the damage its safety lapses inflicted on the Palisades Steam Generators. Make no mistake: these safety flaws, along with many others done to additional equipment, were caused by Holtec's gaffes and management blunders beginning in 2022 and continuing through 2024.

- 4.6. Considering Holtec's gaffes and management blunders beginning in 2022 and continuing, the surrounding communities and the NRC should reflect upon, scrutinize, and analyze the extent of damage caused to Palisades' Steam Generators. If Holtec were an engineering firm experienced in designing, engineering, and operating nuclear power plants, as it should be, it would have had the knowledge to put critical operating components in the unique layup condition mandatory to protect Palisades' major steel and other essential equipment placed in hiatus for an extended period. However, Holtec allowed the damage and deterioration to crucial operating systems, and only belatedly identified the poor condition of its equipment in 2024. Now, in 2025, it desires permission from the NRC to make ill-defined and flawed repairs.
- 4.7. The extensive SG tube failures identified by Holtec in September 2024 were caused entirely by Holtec and were foreseeable and foreseen.¹³ Yet Holtec seeks permission from the Nuclear Regulatory Commission (NRC) to move forward unequivocally without replacing the severely damaged Palisades SGs. Due to its lack of nuclear operating experience, Holtec damaged the Steam Generators (SGs) and may have completely bungled Palisades' restart.
- 4.8. As detailed below, it is probable that no nuclear power plant operator in the U.S. has proposed the magnitude of repairs to its deteriorated SGs as Holtec did in September 2024. Moreover, none of the other U.S. nuclear power plants have implemented the

¹³ NRC (Nuclear Regulatory Commission) Information Notice No.85-56: *Inadequate Environment Control For Components And Systems In Extended Storage Or Layup* (ML031180196)

sheer number of repairs proposed by Holtec to alleviate the extensive new damage it created from its lack of prudent maintenance practices. Due to Holtec's lack of prudence, the NRC should reject Holtec's repair requests. In light of the extreme risk of radioactive releases at Palisades from its existing steam generators, the NRC should instead require the installation of new Replacement Steam Generators (RSGs) at Palisades.

- 4.9. The enormous increase in the number of damaged tubes uncovered in 2024 implies Palisades' unsafe and unreliable operation under any circumstances in an area of the country that is highly populated and part of the U.S. breadbasket due to its proximity to the Great Lakes and their agricultural water supply and its direct use of Lake Michigan itself. Finally, the NRC created regulations that elucidate that it should never allow Holtec Palisades and Holtec International to implement its poorly proposed Band-Aid fixes.
- 4.10. I note that Holtec has never operated a nuclear power facility. Consequently, the lax conditions that Holtec has created have damaged the Palisades Steam Generators (SGs). Holtec's lack of nuclear or atomic operating experience created significant damage that could be considered a rookie blunder. Disastrously, any rookie blunders made at a nuclear power plant, especially those damaging such vital safety-significant systems, structures, or components (SSCs) as already previously degraded SG tubes, might have serious public health consequences, *including a nuclear meltdown*.

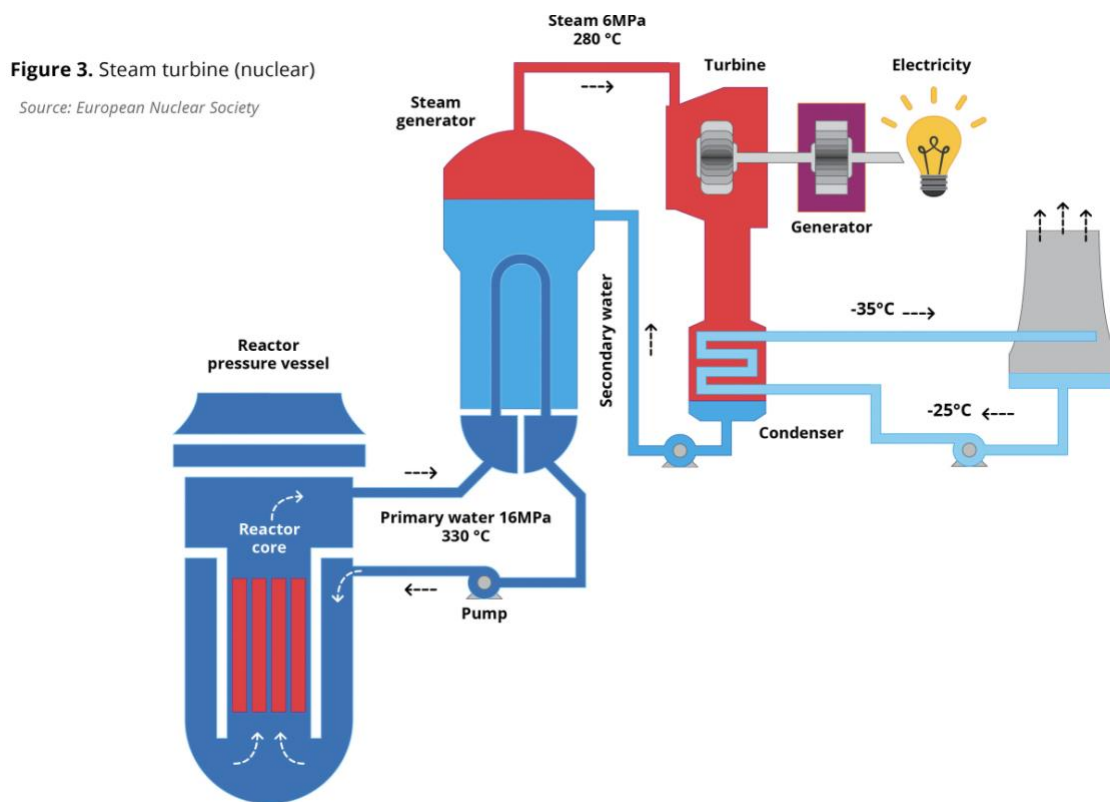
5. **What Does A Steam Generator Do and What Does It Look Like?**

- 5.1. Nuclear Steam Generators¹⁴ are massive steel tanks that are part of the reactor coolant pressure boundary and are designed to keep the hot radioactive water from inside the nuclear core separate from the non-radioactive steam that spins the turbine as it

¹⁴ <https://www.mackinac.org/S2020-03#simple-cycle-combustion-turbine>

generates electricity. Radioactive water flows through the inside of thousands of U-shaped tubes within the steam generators. This radioactive water within the tubes is separated from the non-radioactive water by the tubes and tubesheet. The non-radioactive water is above the tube sheet and outside the steam generator tubes. If the Steam Generator tubes or tubesheet develop cracks, radioactive water can leak into non-radioactive steam and thereby release that radioactive steam into the environment. If cracking is severe, the reactor coolant pressure boundary is breached and a nuclear meltdown can ensue.

5.2. A schematic drawing of a typical steam generator (not Palisades) is below.



6. Palisades Steam Generators Before the Holtec Acquisition

6.1. Consumers Energy and Entergy were the two previous owner-operators of the Palisades Nuclear Reactor. Both corporations were experienced nuclear power plant operators.

They submitted to and were bound by the conditions of Palisades' license extension to operate the outdated reactor from 2011 until 2031 according to the Summary Report of License Renewal Review Questions for: AMP* Audit (*Note – The AMP (Aging Management Plan) is necessary for all older nuclear power plants as equipment, pipes, rubber, and many other items age and simply rust or wear out.)

- 6.2. As such, Palisades' former owners recognized that "...good chemistry control and 100% tube inspections are some of the ways that the existing steam generators are managed to maximize their life."¹⁵
- 6.3. The owners were also aware that at least since 1990 that 308 tubes in steam generator "A" and 309 tubes in steam generator "B" were plugged before the SG was placed in service as a preventative measure, as damage and leakage from these tubes was anticipated after the manufacturing was complete but before the SGs were put in service.¹⁶
- 6.4. Therefore, the NRC renewed the Palisades 2011 license, requiring that more than 600 tubes remained prophylactically plugged as a safety measure to prevent tube wear and failure, which could release radioactivity into the environment, or even ultimately lead to a reactor core meltdown. **Any attempt by Holtec to remove these prophylactically plugged tubes would be a change to the 2011 Palisades license conditions, requiring new public hearings.**
- 6.5. As indicated in 2005 correspondence with the NRC (cited and extracted below), Consumers Energy and later Entergy acknowledged keeping the Palisades Steam Generators safe by consistently implementing good water chemistry and extensive inspections. As detailed later in this expert declaration, Holtec violated previous license conditions by allowing improper steam generator water chemistry after it acquired the

¹⁵ ML052720250 Summary Report of License Renewal Review Questions for: AMP Audit

¹⁶ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML18066A306>

Palisades plant, thus causing extensive damage to its Palisades Steam Generators. NRC approved Entergy's changes to not provide SG proper layup conditions since Palisades' operation was terminated. Why would you? But Holtec changed the game to Restart and did not perform wet layup until May 2024.¹⁷

7. ***Please Note:*** *In the single-spaced paragraphs indented below, I cited and extracted from materials submitted to the Nuclear Regulatory Commission (NRC) or from the NRC in its responses to Holtec (the owner/licensee)—this is done in legal format for citations for court and docket submittal and are direct quotes. As such, the [Emphasis Added] in bold shows areas where we clarify the material for you, the reader, by emphasizing a direct quote or defining an acronym. Thus, we have not changed any misspellings or inaccuracies written or defined by either the NRC or Holtec, as these materials are direct quotes submitted in the Federal Docket between the Federal Regulator NRC and Holtec, the owner of the Palisades Nuclear Power Plant.*

7.1. **From Page 105:**

Summary Report of License Renewal Review Questions for: AMP¹⁸ Audit¹⁹

Provide examples of trending results of inspections are documented (evaluation, and comparison with previous inspection results).

Question B2.1.18-009

NRC Follow-up Response is acceptable

- 7.2. The best source for information regarding the Palisades Steam generators is in the following correspondence with the NRC: Letters to the NRC dated April 22, 2003 (ML031190626), April 13, 2004 (ML041100667), June 28, 2004 (ML04890415), and December 1, 2004 (ML043430446) discussed the 2003 steam generator inspection results. Also, NMC [Nuclear Management Company, operator of Palisades during later years of Consumers Energy's ownership] Response for Palisades to Generic Letter 2004-

¹⁷ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML22039A198>, p. 103/111 of pdf (deleting requirement of steam generation tube inspections and report).

¹⁸ AMP on the NRC reports stands for Aging Management Plan, a program installed at the older nuclear power plants with physical material wearing out due to the reactor's age. Material includes metal, rubber, piping, electrical wires, and various other types of equipment.

¹⁹ "Summary Report of License Renewal Review Questions for: AMP Audit" (9/27/05), p. 105, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML052720250>

01, *Requirements for Steam Generator Tube Inspections*, dated October 24, 2004, related the following about the history and design of the steam generators:

The Generic Letter response provided a Safety Assessment that provided a good summary and trend for the replacement steam generators and results found to date. During the 2004 refueling outage inspection all tubes in both steam generators were inspected. Since we have data on all tubes and tubes with degradation are inspected each outage, trending is a natural aspect of the steam generator inspection program.

Good chemistry control and 100% tube inspection are some of the ways that the existing steam generators are managed to maximize their life. We have full confidence that the existing steam generators can be effectively managed to provide full power through the end of the extended period of operation.²⁰

Question B2.1.18-010 NRC Follow-up Response is acceptable

Update: We have experienced all of the traditional Alloy 600 degradation mechanisms in our replaced steam generators, which have ALLOY 600 tubes. Our replacement steam generators were built a number of years prior to their replacement in 1990. That is why they have the Alloy 600 tubes. Some advantages in design were achieved with the replacement steam generators, but not with the tube material. 6/22/05 2100.

The steam generators at Palisades are Combustion Engineering [CE] model 2530. The replacement steam generators were installed in the fall of 1990. The tube material is mill annealed ALLOY600 with a 0.75-inch outside diameter and a 0.042-inch wall thickness. Each steam generator has 8219 tubes. The tubes were expanded through the full depth of the tube sheet using an explosive process. The tube bundle is supported by stainless steel egg crate lattice type supports comprised of horizontal egg crate supports, vertical straps and diagonal straps. Tube rows 1-18 are u-bends and rows 19-165 are square bends.

Prior to the installation of the SGs, CE advised Consumers Energy that the area around the center stay cylinder region

²⁰ Summary Report of License Renewal Review Questions for: AMP Audit 9/27/2005, p. 106 of 139 of pdf (ML052720250),
<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML052720250>.

was potentially susceptible to fretting wear at the bat wing locations. As a result, 308 tubes in steam generator “A” and 309 tubes in steam generator “B” were plugged as a preventative measure. After initial service, steam generator A was designated “Steam Generator E-50A” and steam generator B was designated “Steam Generator E-50B”. **[Emphasis Added]**

After nine cycles of operation, 72 additional tubes in steam generator E-50A have been plugged for a total of 380 tubes plugged. After nine cycles of operation, 54 additional tubes in steam generator E-50B have been plugged, for a total of 363 tubes plugged. Steam Generator E-50A has 7839 active tubes with 4.62% of the tubes plugged. Steam Generator E-50B has 7856 active tubes with 4.42% of the tubes plugged.

The Generic Letter response identified active degradation mechanisms as (1) structural wear in SG **[Steam Generator]** E-50 B, and **Axial ODSCC [Crack on the Outside of the tube Diameter Stress Corrosion Cracking]** in SG E-50A&B. Potential degradation mechanisms have been identified as **Axial PWSCC [Axial means the cracks are going up the tube with Primary Water Stress Corrosion Cracking], Circumferential [cracking going around the circumference around the tube] ODSCC [Cracking Outside the Tube], Circumferential PWSCC [Corrosive Chemicals are within the reactor water and attacking the tubes from the reactor side], Axial PWSCC [cracks going up and down the tube on the inside in the primary water system], tube wear, Pitting and Oblique [holes in tubes and angled cracks] PWSCC [tubes in the Primary Water [are inside the reactor] are showing signs of Stress Corrosion Cracking. [Emphasis Added]**

6/30/05, Status: Closed - Accepted by Auditor Potential Docketed Response Source: AMP Audit, Information Request: 9/27/2005 Page 106 of 139 **[Emphasis Added]** and **[Definitions Added for Acronyms that name these systems]**

8. Palisades Steam Generators After Holtec Acquisition

- 8.1. Palisades was acquired by Holtec on June 28, 2022, with the apparent expectation that the facility would be dismantled and destroyed. Holtec did not maintain the required and safe water chemistry concentrations in the steam generators—which is part of the wet

layup process.²¹ Ignoring all industry experience for restart and operation, Holtec allowed the corrosive chemicals to attack the steam generators' internal structures. Regulators and the local community never expected Holtec to maintain the operational status of Palisades equipment, given that Holtec was allowed to purchase the aged and defunct reactor for its shutdown and decommissioning. Since neither the NRC, the local community, nor Palisades' former employees anticipated a restart, allowing steam generator degradation was deemed reasonable, given the planned decommissioning and subsequent dismantlement of the Palisades Reactor with the proposed sale of outmoded equipment for scrap, or disposal as radioactive waste. However, it became a costly wrong decision when the plan changed to resurrect the reactor carcass.

- 8.2. Although records indicate that Holtec sought Department of Energy funding to *resurrect* Palisades on or about July 5, 2022, Holtec International formally unveiled its attempt to restart the Palisades Nuclear Power Plant on September 22, 2022.²² Thereafter, Holtec submitted its application to the NRC for a *Regulatory Path to Reauthorize Power Operations at the Palisades Nuclear Plant*²³ on March 13, 2023.
- 8.3. Yet even as it pursued NRC approval for the restart in 2023, Holtec revealed its lack of nuclear experience by submitting its Final Safety Analysis Report Update Revision 36 to the NRC on March 31, 2023 with the explanation that "Revision 36 includes changing the FSAR title to Defueled Safety Analysis Report (DSAR) reflecting the transition of PNP to a permanently defueled facility."²⁴ Holtec further represented that "the Steam Generator Tube Integrity Program no longer applies to a plant system, structure, or

²¹ NRC gave permission to Entergy to cease maintenance of the steam generators as operating components as part of plant shutdown, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML22039A198> see page 103/111 of pdf.

²² <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML22292A261>

²³ *Regulatory Path to Reauthorize Power Operations at the Palisades Nuclear Plant*, ML23072A404, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML23072A404>

²⁴ Final Safety Analysis Report Update Revision 36, ML23107A064, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML23107A064>, p. 1/300 of pdf.

component that is within the 10 CFR 54.4 Scope for License Renewal and may be eliminated.”²⁵

8.4. **Steam Generator Tube Integrity Program No Longer Applies... and May Be Eliminated**²⁶

Section	Title	Change	Description of Change
1.9.1.18	Steam Generator Tube Integrity Program	Delete	<p>This section is proposed to be deleted in its entirety.</p> <p>Amendment 272 removed TS 5.5.8, "Steam Generator (SG) Program," which ensures that SG tube integrity is maintained, and the license will no longer contain requirements for tube integrity. After implementation of Amendment 272, the only remaining accidents are the FHA, cask drop, and the potential release of gaseous wastes or radioactive liquids, which do not credit SG tube integrity.</p> <p>Consequently, the Steam Generator Tube Integrity Program no longer applies to a plant system, structure, or component that is within the 10 CFR 54.4 Scope for License Renewal and may be eliminated.</p>

8.5. **Steam Generator Tube Degradation Is No Longer Relevant**²⁷

4.3.4.1	Steam Generator Tube Degradation	Delete	<p>This section deleted in its entirety.</p> <p>Amendment 272 deleted TS Section 3.4, Primary Coolant System, and TS 5.5.8, Steam Generator Program, reflecting the permanent cessation of operations at PNP and permanent removal of fuel from the PNP reactor vessel. Certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel were submitted to the NRC in accordance with 10 CFR 50.82(a)(1)(i) and (ii) and are docketed for PNP, therefore the 10 CFR Part 50 license no longer permits operation of the reactor or placement of fuel in the reactor vessel in accordance with 10 CFR 50.82(a)(2). As a result, the SG will no longer perform a function in the permanently shut down and defueled facility. Therefore, SG tube degradation is no longer relevant.</p>
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8.6. In effect, Holtec, in the midst of preparations for restart, decided that the degradation of the steam generator tubes was irrelevant by canceling the methods by which tube deterioration might have been identified.

9. **Holtec-Induced Steam Generator Damage**

9.1. During routine steam generator inspections required for the continued operation of a nuclear power plant, a small amount of tube degradation is usually due to tube vibration.

²⁵*Id.* at p. 33/300 of pdf

²⁶ *Id.*

²⁷ *Id.*, p. 59/300 of pdf.

Following more than two years of ownership of the Palisades reactor and given its request to change its operational status, a Holtec assessment of the condition and degradation of the Palisades Steam Generators began in August of 2024 and problematic results were announced in September 2024.²⁸

- 9.2. Because Holtec failed to institute a wet layup in 2022 and 2023, the operational condition within the steam generators and other critical mechanicals was unprotected from years of corrosive chemical attack from cold water due to the lack of chemical water treatment to the steam generator water internal structures.
- 9.3. More alarmingly, during its September 2024 inspection, Holtec uncovered ***at least 700 additional tubes that were newly damaged and must be plugged*** due to metal corrosion owing to its lack of preventive maintenance.²⁹ Amazingly, Holtec uncovered more new tube failures in 2024 (1.163)³⁰ than the 88 total SG tube failures at Palisades documented across 35 years of combined operation by Consumers Energy and Entergy.
- 9.4. Disturbingly and according to the NRC, the Stress Corrosion Cracking (SCC) on the Palisades SGs, while managed by Holtec, “far exceeded” any SCC that occurred before Holtec acquired the Palisades Nuclear Power Plant.³¹
- 9.5. Because Holtec did not place the system in a proper wet layup, extensive corrosion exists from cold water on the outside diameter of the steam generator tubes and between the tubes and tube sheet. Avoiding Stress Corrosion Cracking is critical to preventing a

²⁸ *Preliminary Notification of Event or Unusual Occurrence - PNO-III-24-002*, [main.jsp](#) (ML24262A) (September 18, 2024) (“During Holtec’s analysis of the inspection data, preliminary results identified a large number of SG tubes with indications that require further analysis and/or repair.”). For details of the tube damage and deterioration, see *Summary of Conference Call Regarding Steam Generator Tube Inspection (EPID L-2024-NFO-0008)*, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML24267A296> (October 1, 2024).

²⁹ *Id.*, Summary of Conference Call immediately above, p. 5/8 of pdf.

³⁰ [Corrosion cracking at Palisades nuclear plant exceeds previous estimates, NRC says](#), <https://www.power-eng.com/nuclear/corrosion-cracking-at-palisades-nuclear-plant-exceeds-previous-estimates-nrc-says/>

³¹ *Id.*

meltdown at Holtec Palisades. *Furthermore, the NRC staff notes that stress corrosion crack indications also adversely affect the tube sheet and must be appropriately addressed to maintain the generator's pressure boundary.*³² In a *Reuters News* article³³ published on October 2, 2024, Holtec Palisades admitted that it had expected damage to the Palisades reactor's steam generators from the chemical attack Holtec created from its improper layup between 2022 and 2024.

“Patrick O’Brien, a company spokesperson, said the results of the inspections “were not entirely unpredicted” as the standard system “layup process”, or procedure for maintaining the units, was not followed when the plant went into shutdown.”

- 9.6. The *Reuters News* article also identified that Holtec Palisades was willing to ignore the safety implications of stress corrosion cracking and focus instead on unplugging 600 tubes that were prophylactically plugged thirty-four years earlier for safety reasons.

Reuters News stated:

“But he said the return of Palisades is still on schedule and that Holtec wants to fix, and not replace, the steam generators, which he said would last for 30 years after repairs. **“We expect the repair strategy will be to ‘unplug’ approximately 300 tubes per steam generator that were plugged at original installation,** and then address the tubes found during the inspections by plugging approximately 20% of the tubes that cannot be repaired easily and repairing the remaining 80% with sleeving, which is a common and proven repair strategy,” O’Brien said. (Emphasis Added)

- 9.7. Other Combustion Engineering (CE) steam generators, including St. Lucie 2, San Onofre 2 and San Onofre 3 experienced substantial internal vibrations in the center of the tube bundle. Those vibrations occurred during their operational years while the

³² Subject: Palisades Nuclear Plant - Summary of Conference Call Regarding Steam Generator Tube Inspections ADAMS Accession No.: ML24267A296.

<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML24267A296>

³³ *Corrosion exceeds estimates at Michigan nuclear plant US wants to restart, regulator says,* <https://www.reuters.com/business/energy/us-report-says-corrosion-michigan-nuclear-plant-above-estimates-2024-10-02/>

steam generators were hot. The Palisades SG tubes were prophylactically plugged in 1990 before this problem occurred.

- 9.8. Now, Holtec Palisades has decided that the quick solution to its technical safety-related dilemma is to unplug the tubes that Consumers Energy preemptively plugged three decades ago. Since the Holtec Palisades tubes are also experiencing Stress Corrosion Cracking (SCC), unplugging extra tubes will create more unforeseen engineering and safety predicaments.
- 9.9. For example, Holtec suggests that *the damaged tubes should be sleeved rather than plugged*. However, one must remember that the tube damage is due to stress corrosion cracking from chemical deposition in cold water, and *sleeving increases stress in the tube*. According to the Electric Power Research Institute's Steam Generator Slewing Review Committee:

The process of forming a sleeve joint places an additional stress on both the sleeve and the parent tube materials. The additional stress in the joint area increases the parent tube susceptibility to environmentally induced cracking.³⁴
[Emphasis Added]

- 9.10. Holtec's sleeving solution for the Palisades Steam Generator Stress Corrosion Cracking (SCC) damage will increase the stress on the tubes and tube sheet. Increasing the stress on the tubes and tube sheet by sleeving is counterintuitive and counterproductive in eliminating a problem created by Stress Corrosion Cracking (SCC).
- 9.11. As the *Electric Power Research Institute's Steam Generator Slewing Review Committee* noted in the quote above, further complications arise from the chemical-induced corrosion on both the primary side of the reactor itself as well as in the secondary system of the steam generators that also has been contaminated by chemically corrosive water

³⁴ <https://www.neimagazine.com/advanced-reactorsfusion/sg-repair-has-something-up-its-sleeve/?cf-view>

permeating the reactor water (primary system) and the steam generator (secondary system).

10. The Fix Proposed by Holtec Does Not Address the Underlying Stress Corrosion Cracking (SCC) Problem

- 10.1. Aging steam generators at nuclear facilities expect to slowly develop damage to their tubes over prolonged periods. Yet, the suddenness and extent of new damage to the Palisades steam generators under Holtec's management and ownership is astounding. At least 700 tubes developed significant defects in only 26 short months from chemical attack in cold water. The only recorded sudden incidence of gross tube failures of which I am aware occurred at the San Onofre Units 2 and 3 in California in 2012 and is similar to the number of defects at Palisades. The gross tube failures at San Onofre were induced by tube vibration while the SGs were hot, and resulted in the permanent closure of both reactors at a cost to ratepayers of \$4 billion.^{35 36}
- 10.2. Nevertheless, the tube damage at Palisades is more critical to reactor safety than the steam generator defects uncovered at San Onofre. The damaged tubes at the Combustion Engineering (CE) reactors at San Onofre were due to tube vibration in the center of the tube bundles. Palisades, also a CE design, already prophylactically plugged more than 600 tubes to avoid this problem. Holtec now proposes to unplug all the prophylactically plugged tubes in the Palisades Steam Generators identified in 1990—some 35 years ago—to be a real danger to the safe operation of Palisades.
- 10.3. The San Onofre tube failures were caused by vibration while the facility operated. Unlike San Onofre, Palisades experienced stress corrosion cracking from chemicals in cold water while it was shut down for two years. Stress Corrosion Cracking (SCC) is a

³⁵ [Bad Vibrations: San Onofre steam generators cannot safely be repaired – new Fairewinds video and report | San Onofre Safety](https://sanonofresafety.org/2012/05/15/bad-vibrations-san-onofre-steam-generators-cannot-safely-be-repaired-new-fairewinds-video-and-report/), <https://sanonofresafety.org/2012/05/15/bad-vibrations-san-onofre-steam-generators-cannot-safely-be-repaired-new-fairewinds-video-and-report/>

³⁶ [Dismantling California nuke plant will cost \\$4.4B | AP News](https://apnews.com/general-news-f710f0e64d8747adb2c022b67ab59185), <https://apnews.com/general-news-f710f0e64d8747adb2c022b67ab59185>

chemical attack on the steam generator tubes and tubesheets that is so much worse for reactor safety than what occurred at San Onofre. Why? Holtec never contemplated the restart of the defunct Palisades reactor and completely ignored the steam generator water chemistry inside the shuttered facility between 2022 and 2024.

- 10.4. First, these harmful chemicals are concentrated deep in small crevasses next to the tubes and are impossible to eradicate. Second, if Holtec Palisades restarts, the chemical stress corrosion cracking will continue because additional heated steam in the steam generator will accelerate any interior chemical reactions. Additional tubes are in jeopardy of destruction and failure, and the stainless-steel tube sheet inside the steam generator is also subject to cracking.

11. Analysis Of Holtec’s January 14, 2025, Presentation to The Nuclear Regulatory Commission (NRC) – Precedent for Sleeving at Palisades

- 11.1. Holtec has acknowledged that it anticipated its actions would cause extensive damage to the Palisades Steam Generators.³⁷ It claims that inserting sleeves into the hundreds of damaged Palisades Steam Generator tubes will mitigate that damage and allow the generators to operate safely for thirty additional years.

“A spokesperson from the company explained that the NRC’s findings weren’t [sic] unexpected as proper maintenance was not carried out when the facility shutdown... They confirmed that Holtec will swiftly [sic] implement a repairs[sic], which it expects to last 30 years, and remain on schedule to reopen the facility next year.”³⁸

³⁷ *Corrosion exceeds estimates at Michigan nuclear plant US wants to restart, regulator says*, <https://www.reuters.com/business/energy/us-report-says-corrosion-michigan-nuclear-plant-above-estimates-2024-10-02/> (Patrick O'Brien, a company spokesperson, said the results of the inspections "were not entirely unpredicted" as the standard system "layup process", or procedure for maintaining the units, was not followed when the plant went into shutdown. But he said the return of Palisades is still on schedule and that Holtec wants to fix, and not replace, the steam generators, which he said would last for 30 years after repairs.)

³⁸ <https://www.power-technology.com/news/palisades-steam-generators-require-repair-before-restart-nuclear-authority-says/>

11.2. Even as recently as April 2024, Holtec still clung to its unfounded belief that sleeving some of the damaged tubes will allow Palisades SG to continue to operate for thirty additional years. This claim by Holtec is unfounded in the literature of Alloy 600 Steam Generators, and in fact flies in the face of all historical data. The current Alloy 600 Palisades SG is already 34 years old, yet Holtec's lack of nuclear operating experience leads it to conclude that it can survive twice as long. Holtec states:

Another major restart project is the refurbishment of the two Steam Generators whose tubes exhibiting localized indications will be "sleeved" using a proven method based on industry experience. This, along with other proactive measures, is projected to extend the equipment's service life by up to 30 years. The Steam Generator refurbishment schedule supports a restart in the fourth quarter of 2025.³⁹

11.3. Holtec claims safe historical precedent to support their proposal for extensive sleeving of the damaged Palisades Steam Generator tubes in the experience of finally opening the Watts Bar, Unit 2 nuclear reactor in Tennessee.⁴⁰ Slide 34 of the Holtec 1/14/25 presentation to the Nuclear Regulatory Commission states that the previous sleeving of the Watts Bar 2 steam Generators in 2020 establishes historical precedent that sleeving can be accomplished at Palisades. Quote from Slides:

- Precedent
- Most recent sleeving amendment was for Watts Bar Nuclear Plant, Unit 2. NRC issued the Safety Evaluation on August 10, 2020 (ADAMS Accession No. ML20156A018)
- Information submitted to obtain the Watts Bar Unit 2 approval used as guidance in the development of the Palisades request⁴¹

³⁹ Holtec Highlights, HH #40.08 (April 7, 2025), <https://holtecinternational.com/wp-content/uploads/2025/04/HH-40.08.pdf>

⁴⁰ Holtec License Amendment Request, 2/11/2025, Enclosure 1, p. 31/126 of pdf, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25043A348>

⁴¹ *Palisades Nuclear Plant Pre-Submittal Meeting (Open Portion) License Amendment Request to Support Repairing of Steam Generator (SG) Tubes by Sleeving*, Slideshow, p. 34/55 of pdf, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25006A181>

- 11.4. Since Holtec has offered Watts Bar Unit 2 as its only example of historical precedent, it is illustrative to analyze the actual history of the Watts Bar Unit 2 steam generators. That history proves that Steam Generator sleeving at Watts Bar 2 is not indicative of the success of sleeving, but rather was a historical failure.
- 11.5. TVA started construction on the two-reactor Watts Bar nuclear plants in 1973. Watts Bar Unit 1 began generating electricity 23 years later in 1996, while Unit 2 was mothballed in the mid-1980s for several decades. TVA revived Watts Bar Unit 2 in 2007,⁴² and Unit 2 began producing electricity in 2016, four decades after it began construction.⁴³
- 11.6. The steam generators at Watts Bar Unit 1 and Unit 2 were not subject to any monitoring or corrosion preservation programs during the decades the reactors sat dry and unused. While they did not experience the wear and tear of stresses from hot flowing water during heat-ups and cooldowns that other steam generators typically experience, their condition was degraded due to different aging mechanisms throughout those decades. The NRC did not address the damaged condition of the steam generators when allowing both reactors to start in 1996 (Unit 1) and 2016 (Unit 2).
- 11.7. I have reviewed the non-proprietary portion of the 1/14/25 Holtec/Framatome presentation⁴⁴ as well as the February 2025 License Amendment Request.⁴⁵ Holtec's use of Watts Bar Unit 2 as its only historical precedent for plugging/sleeving in its presentation is flawed, as Palisades' Steam Generator damage is unique. Unlike Watts Bar Unit 2, whose steam generators were dry for 45 years, Palisades experienced extensive Stress Corrosion Cracking because water containing corrosive contaminants

⁴² <https://www.cleanenergy.org/blog/did-tva-stay-on-budget-with-the-new-tva-watts-bar-2-reactor/>

⁴³ <https://www.tva.com/newsroom/watts-bar-2-project/watts-bar-unit-2-timeline>

⁴⁴ *Palisades Nuclear Plant Pre-Submittal Meeting (Open Portion) License Amendment Request to Support Repairing of Steam Generator (SG) Tubes by Sleeving*, Slideshow, p. 34/55 of pdf, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25006A181>

⁴⁵ *License Amendment Request to Revise Selected Permanently Defueled Technical Specifications to Support Repairing of Steam Generator Tubes by Sleeving*, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25043A348>, p. 31/126 of pdf.

hid out in the tube-to-tube sheet junction once Palisades was permanently closed and scheduled to be dismantled. Every other plant (including Watts Bar 2) has experienced slower, monitored trends in degradation while operating HOT. Palisades experienced 50 times more SCC after two years of exposure to a toxic cold soup of corrosive chemicals during its pre-planned termination. *The SG phenomenon called hideout*, which was discussed previously, causes corrosive contamination to enter the gap between the tube and tube sheet. These chemicals are impossible to remove and continue their chemical attack on the tube and tube sheet. Framatome claims an extensive background in the sleeving of tubes,⁴⁶ but the situation differs from Palisades.

11.8. In its slide presentation, Holtec/Framatome said,

“Based on decades of experience with replacement SGs, Alloy 690 is virtually impervious to **PWSCC [Primary Water Stress Corrosion Cracking]** and has dramatically improved resistance to **ODSCC [Outside Diameter Stress Corrosion Cracking]**. In some SGs with Alloy 600 tubing, ODSCC has been found in tubesheet crevices, within lattice support plate locations, and at dents. Thus, Alloy 690 is the best alloy currently available for both primary and secondary side corrosion concerns.⁴⁷ (Emphasis added).

11.9. Framatome and Holtec rely upon the historical precedent of Watts Bar Unit 2 to claim that sleeving may prevent tube failure in the future. Watts Bar 2 was a failure, not a success. Additionally, by focusing on repairing the steam generator tubes, Holtec and Framatome ignore the more significant issue of *hideout* in the tube-to-tubesheet crevasses. Their assumption is flawed for three essential reasons.

⁴⁶ *License Amendment Request to Revise Selected Permanently Defueled Technical Specifications to Support Repairing of Steam Generator Tubes by Sleeving*, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25043A348>, p. 73/126 of pdf.

⁴⁷ *Palisades Nuclear Plant Pre-Submittal Meeting (Open Portion) License Amendment Request to Support Repairing of Steam Generator (SG) Tubes by Sleeving*, Slideshow, p. 48/55 of pdf, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25006A181>

- 11.9.1. Holtec has publicly claimed that the repaired Palisades steam generator will last for thirty more years,⁴⁸ while the Watts Bar Unit 2 steam generator was replaced 18 months after TVA sleeved the suspect tubes.
- 11.9.2. Sleeving will not prevent the continuation of the corrosive chemical reaction on the outside diameter of the tube due to the continuing hideout of chemicals in the junction between the tube and tubesheet.
- 11.9.3. While Watts Bar Unit 2 shows that sleeving is an 18-month Band-Aid fix for the affected tube, the tubesheet itself (not the tube) is also subject to the corrosive attack of chemicals hiding out in the tube-to-tubesheet junction. *Nothing* in Framatome’s experience or Holtec’s analysis of *tube repair* addresses the potential for a chemical attack on the tube sheet itself, which is part of the reactor coolant pressure boundary. The tubesheet itself will continue to be savaged by Stress Corrosion Cracking from chemicals hiding out in the tube to the tubesheet junction caused by Holtec’s negligence after the pre-planned termination of Palisades.
- 11.10. The TVA experience at Watts Bar Unit 2 also illustrates how little the industry experts understand localized crevasse chemistry and the speed at which tube degradation can occur. According to the 2020 Watts Bar Unit 2 Licensee Event Report:

“... **the growth rate identified was greater than projected**... localized crevice chemistry at the TSP [Tube Support Plate] creates an undesirable condition that leads to initiation and growth of ODSCC.”

“This [2020] inspection revealed **higher than projected degradation** from axial ODSCC of the SG tubing”.⁴⁹

⁴⁸ *Corrosion exceeds estimates at Michigan nuclear plant US wants to restart, regulator says*, <https://www.reuters.com/business/energy/us-report-says-corrosion-michigan-nuclear-plant-above-estimates-2024-10-02/> (“But [Patrick O’Brien, company spokesperson] said the return of Palisades is still on schedule and that Holtec wants to fix, and not replace, the steam generators, which he said would last for 30 years after repairs.”)

⁴⁹ *Licensee Event Report 391/2020-004-00, Steam Generators Degraded Due to Axial Outside Diameter Stress Corrosion Cracking*, <https://www.nrc.gov/docs/ML2100/ML21007A022.pdf>

11.11. Using Watts Bar Unit 2 as a precedent proves that the industry projections of steam generator crack propagation cannot be relied upon to indicate that the steam generators' vital safety functions can be monitored or maintained.

11.12. During the January 14, 2025, public hearing, the NRC indicated that it is evaluating no alternative other than sleeving the Palisades steam generators. According to *Inside NRC*,

Tom Flynn of Michigan Safe Energy Future, which opposes Palisades restart, asked during the question period why Holtec had chosen to repair steam generator tubes rather than replacing the generators entirely, noting that the Department of Energy had included \$500 million for the replacement in the \$1.52 billion loan guarantee it awarded Holtec to support the plant's restart.

An NRC staffer replied that **the issue was “outside of our scope of safety evaluations...”** The proposed revisions to the technical specifications, the company said, would “include a repaired tube (sleeve and tube) inspection interval that shall not exceed 24 effective full power months or one refueling outage (whichever is less), and specify the allowable SG tube repair methods with the establishment of a ten-year sleeve in service limit.”⁵⁰ **[Emphasis added]**

11.13. However, if Watts Bar Unit 2 is Holtec's only precedent for sleeving, the historical data argue against both Holtec and the NRC. In 2020, the basis for the NRC's acceptance of the continued operation of Watts Bar Unit 2 was the following commitment by TVA:

“The cause of the degradation in the SGs.... is axial outside diameter stress corrosion cracking (ODSCC) of the Alloy 600 mill annealed (MA) coincident with carbon steel tube support plate interactions. **Corrective actions to prevent reoccurrence include a planned mid-cycle SG inspection and steam generator replacement”...** “**As a result of the identified condition, a mid-cycle inspection of SG tubes will be preformed [sic] at WBN Unit 2. Actions are in progress to move up the planned replacement of the WBN Unit 2 steam generators”.**⁵¹ **[Emphasis Added]**

⁵⁰ *INSIDE NRC*, PLATTS/S&P GLOBAL, Commodity Insights, Volume 47 / Issue 2 / January 24, 2025

⁵¹ LER 2002-004, pp. 1 and 5, TVA Watts Bar 2, <https://www.nrc.gov/docs/ML2100/ML21007A022.pdf>

- 11.14. In the case of Watts Bar Unit 2, *the NRC allowed continued operation only if the reactor was shut down at its nine-month mid cycle for complete tube reinspection and that all the steam generators be wholly replaced in 18 months.* Yet for Holtec Palisades, the NRC claims that replacing the steam generators is “**outside of our scope of safety evaluations.**” (Emphasis added). While Holtec claims that Watts Bar Unit 2 is the precedent that Palisades will follow, in contradiction, Holtec also claims that Palisades will not be reinspected for two years and that the existing steam generators can be safely operated for thirty additional years. Holtec has taken the wrong lessons from the Watts Bar Unit 2 precedent.
- 11.15. Based on the Holtec January 2025 presentation to the NRC, I conclude that the Palisades SGs will leak and/or fail during the plant’s first cycle of operation.

12. Analysis Of Holtec’s Steam Generator License Amendment Request (LAR)

- 12.1. Holtec has stated that it plans to *resurrect* the Palisades reactor, with a restart scheduled in the fourth quarter of 2025. *Holtec has requested that the NRC support such a never-before-accomplished resurrection by expediting its safety reviews.* The lights have remained on in Michigan since Palisades was closed in 2022, and *there is no need for the excess power that Palisades might produce.* Indeed, Holtec and its power purchasers require massive taxpayer and ratepayer subsidies if they are to restart Palisades. *Why is Holtec requesting an expedited safety review for its Palisades resurrection?* Holtec seems to be placing expediency and profitability ahead of community health and safety. More importantly, *why is the NRC supporting this rapid resurrection?*
- 12.2. In a July 5, 2022, funding request to the Department of Energy, Holtec acknowledged that the Palisades steam generators had degraded and should be replaced as Holtec stated:

Designing the new equipment to **replace old worn-out hardware, such as the Steam Generators.**⁵² (Emphasis added).

⁵² *Holtec International Application for Federal and State Support to Enable the Resurrection of the Palisades Nuclear Generation Station*, submitted July 5, 2022, p. 4/42 of pdf.

- 12.3. Yet almost three years after the DOE funding request, Holtec’s License Amendment Request presents the Nuclear Regulatory Commission with a *flawed solution*, indeed with no alternative other than sleeving the Palisades steam generator tubes with a slightly different alloy (690 vs. 600).
- 12.4. Holtec filed its License Amendment Request (LAR) “*To Support Repairing of Steam Generator Tubes by Sleeving*” on February 11, 2025.⁵³ In the very first paragraph of the LAR, Holtec incorrectly frames the steam generator problems at Palisades as somehow created by an unknown mysterious cause, stating:

The LAR would revise the Permanently Defueled Technical Specifications (POTS) to allow Framatome Alloy 690 sleeves to **repair defective steam generator (SG) tubes** as an alternative to removing the tubes from service by plugging.⁵⁴ **[Emphasis Added]**

- 12.5. In 1991, Palisades installed its new Steam Generators, and while they were relatively old and worn out when Holtec took control of the Palisades reactor from Entergy in 2022, *the reactor did not have any leaking tubes*. As discussed in this expert report, *Holtec discovered hundreds of damaged tubes during an August 2024 inspection*.⁵⁵ Holtec states that these newly identified tubes were **defective, but the SGs had operated without failure for their final cycle under Entergy’s control (May 2022)**. Through the deliberate, premeditated actions of Holtec the tubes were *damaged* when Holtec knowingly allowed improper layup from June 2022 to May 2024.⁵⁶ Holtec’s blissfully ignorant actions created the need for sleeving as a dangerous solution.

<https://beyondnuclear.org/wp-content/uploads/2023/10/7-5-22-42-page-Holtec-application-to-DOE-for-CNC-funds-to-restart-Palisades.pdf>

⁵³ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25043A348>

⁵⁴ ML25043A348

⁵⁵ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML24267A296>

⁵⁶ *Corrosion exceeds estimates at Michigan nuclear plant US wants to restart, regulator says*, <https://www.reuters.com/business/energy/us-report-says-corrosion-michigan-nuclear-plant-above-estimates-2024-10-02/>

12.6. Holtec now seeks the NRC's rapid approval to perform its requested sleeving due to its unsafe actions. The extensive steam generator damage would not have been possible if Holtec had followed utility protocols by placing the Palisades Steam Generators in an industry-standard wet layup condition. Furthermore, if Holtec had prior operational nuclear power plant experience, it would have understood the absolute necessity of a proper wet layup.

12.7. At p. 8/126 of pdf in the February 2025 LAR,⁵⁷ Holtec perpetuates the myth that the tubes are "defective" rather than damaged by its own negligence stating:

The Palisades Nuclear Power Plant Tech Specifications (PNP TSs – Tech Specs), as detailed in the Reference 1 LAR, allow defective tubes to be removed from service by installing plugs at both ends of the tube. The installation of SG tube plugs removes the heat transfer surface of **the plugged tube from service and leads to a reduction in the primary coolant flow available for core cooling....**The LAR would also prevent unnecessary plugging of SG tubes, if appropriate, prior to the restart of the unit and subsequent refueling outages. (Emphasis added).

12.8. On page 5 of Enclosure 1, Holtec states,

"Sleeving is a method used to repair defective SG tubes and thus keep the tubes in service."⁵⁸

12.9. In making its sleeving claim, Holtec fails to acknowledge that all steam generators have excess steam generator tubes to allow for plugging as the steam generators age. Instead, Holtec *purposely misrepresents or technically misunderstands* the unique engineering specifications of plugging Steam Generator (SG) tubes. Rather than giving the correct technical specifications and engineering requirements, Holtec wrongly claims and misrepresents that it causes "a reduction of primary coolant flow available for core cooling" and is performed to "keep the tubes in service."

⁵⁷ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25043A348>

⁵⁸ *Id.*, p. 9/126.

12.10. Throughout its entire LAR, Holtec fails to acknowledge that there are alternatives other than sleeving the damaged tubes created by its negligence. Technically feasible alternatives include:

- 12.10.1. As at Watts Bar Unit 2, the severely damaged steam generators should be replaced. After all, the previous owners of Palisades installed these steam generators in 1991, and Holtec identified them as “worn out” in its 2022 funding request to the Department of Energy. And even as far back as 2006, Consumers Energy wanted to sell Palisades, because of the degraded condition of the steam generators, among other factors.
- 12.10.2. No LAR would be necessary if Holtec were to plug the tubes as PNP Tech Specs detail, rather than incur additional expense and technical risk to plant safety of sleeving the tubes. Plugging the tubes reduces the heat load transmitted by the affected tube into the tubesheet, and it decreases the possibility of increased Stress Corrosion Cracking from a hideout in the tubesheet near the plugged tube. Therefore, plugging is a safer alternative that is already foreseen and allowed by the existing plant specifications.
- 12.10.3. Throughout the LAR, Holtec fails to identify with specificity the number of tubes it might plug without any “*reduction of primary coolant flow available for core cooling.*” Holtec’s claim of flow reduction is wholly unproven and unprovable without the specificity of calculations and analytical detail.
- 12.10.4. Why is Holtec demanding that the NRC approve sleeving instead of plugging? It appears that Holtec is telling the NRC that sleeving will “*keep the tubes in service*” while simultaneously telling DOE that the steam generators are *old, worn-out hardware*. Holtec’s technical precedent at Watts Bar Unit 2 indicates that sleeving lasted only 18 months until new Replacement Steam Generators (RSGs) replaced the old defective steam generators. What is also clear is that Holtec has acknowledged that 10 to 12 sleeves have the same flow resistance as a single plug.

So if they want full reactor power, they are forced to use sleeves or else there may not be enough channels to force the water through. This Holtec claim is not supported by evidence or calculations.

- 12.11. As important as the content within Holtec's LAR (License Amendment Request) claim is, what Holtec does not say in that LAR is even more significant. As a nuclear engineer, an internationally recognized expert witness, an author of three peer reviewed international papers, and a best-selling technical book regarding the triple meltdowns at Fukushima Dai-Ichi, I am professionally astonished that the LAR has passed any NRC acceptance review⁵⁹ since it is lacking extensive critical information. It appears that the NRC focuses on meeting Holtec's financial scheduling rather than adequately assessing the LAR's impact on community health and safety and environmental protection near Palisades.
- 12.12. It is irresponsible for the NRC to claim it can thoroughly review Holtec's proposed *steam generator resurrection gambit* without further information in the following areas:
- 12.12.1. Holtec has previously stated that it intends to remove the plugs from 600 tubes that were prophylactically plugged in 1991 and to sleeve those previously closed tubes. Yet the LAR is silent on what tubes Holtec intends to sleeve. Should Holtec inspect and sleeve the previously plugged tubes, the inspection report identifying those activities might only become available to the public after Holtec's planned restart date. Yet, prior owners prophylactically plugged those tubes to avoid radiation releases.
- 12.12.2. The entire focus of the LAR is on the proposed sleeving operation on hundreds of tubes that Holtec previously damaged through its own negligence. For the record, I have no opinion on the acceptability of Alloy 690 compared to Alloy 600. Moreover, Holtec refuses to address the broader issue of ongoing damage to both

⁵⁹ Palisades Nuclear Plant - Audit Plan In Support Of Review Of License Amendment Request Regarding Steam Generator Repair By Sleeving (EPID L-2025-LLA-0036) [ML25070A153](#),

the sleeved and unsleeved tubes due to chemical hideout if it restarted the Palisades' steam generators.

12.12.3. The LAR is utterly silent on the anticipated chemical attack on the tubesheet (NOT the tubes) by chemicals deposited in the tube-to-tubesheet gap. *Failure or leakage of the tubesheet is a reactor coolant pressure boundary failure, which Holtec must evaluate before the NRC can consider any restart of Palisades.*

12.12.4. The LAR never discusses how Holtec knowingly damaged the steam generator tubes, but rather simply claims that the tubes are *defective*. These tubes were damaged by a chemical attack due to exposure of contaminated cold water while Holtec was preparing to dismantle the steam generators during the decommissioning of Palisades. Those intrusive chemicals remain in the tube to tubesheet junction due to the phenomenon called *hideout*.

12.12.5. *Heating the steam generators will exacerbate the chemical attack on all the steam generator tubes*, not just those that Holtec has already identified as needing repair. The LAR contains no discussion of the likelihood of continued chemical attack from hideout on the sleeved tube nor on those tubes that remain unsleeved.

12.12.6. Holtec has identified that the sleeving operations will degrade the performance of the steam generators during a Main Steam Line Break (MSLB).

Holtec stated,

After the leak and cyclic tests were complete, MSLB leak testing was performed to represent the maximum pressure expected from an MSLB accident. **The leak rates measured** during this testing, performed at room temperature, **were higher than those previously recorded during room temperature leak testing.** However, no joint failure was noted during testing.⁶⁰ (Emphasis added).

⁶⁰ *License Amendment Request to Revise Selected Permanently Defueled Technical Specifications to Support Repairing of Steam Generator Tubes by Sleeving*, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25043A348>, p. 21/126 of pdf.

- 12.12.7. Holtec identifies that in one statistically insignificant test of a few tubes in cold laboratory conditions, leak rates were measured to be higher than previously recorded. Yet it suggests that since there were no gross failures, sleeving remains adequate.
- 12.12.8. Yet Holtec's MSLB testing does not accurately model the actual conditions that now exist inside the damaged Palisades steam generators. Not only the tubes that Holtec proposes to sleeve, but all tubes inside the steam generators, will be under continuing chemical attack and will be further weakened if the NRC allows these old steam generators to be restarted. The MSLB tests performed by Holtec do not include any further degradation of all the tubes caused by hideout under hot operating conditions, but instead represents the cold-water condition of only the damaged tubes identified in the inspection report following the August 2024 tube inspection.⁶¹
- 12.12.9. *Likely this new MSLB damage assessment is why Holtec is proposing changing its license conditions on Leak Before Break considerations.* The radiation released from the new analysis of tube failures is already identified as beyond what was previously anticipated.
- 12.12.10. More importantly, Holtec has already identified hundreds of damaged tubes that will require sleeving, yet it is not specific as to where on the tubesheet those sleeved and plugged tubes are located. Even though a complete Steam Generator Inspection report is required by Palisades technical specifications to be filed in ADAMS within 6 months of the inspection, Palisades has apparently ignored this filing requirement. Additionally, Holtec assumes that the tube repairs will

⁶¹ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML24267A296>

occur in random locations, stating in its Flow Induced Vibration⁶² discussion (FIV) below,

The FIV analyses evaluated fluid-elastic stability margins (FSM) **and random turbulence vibration response** for TSP sleeves installed at the TSPs on the hot leg. The natural frequencies and mode shapes of the SG tube and sleeve combination were determined. The FIV tube model included the hot leg, U-bend, and cold leg tubing from tubesheet to tubesheet [sic]. The FIV analyses indicated that the sleeves are acceptable for installation based on FSM and **random turbulence vibration** considerations. (Emphasis added)

- 12.12.11. Holtec provides absolutely no specificity about its assumption that flow induced vibration will occur in random turbulence. Plugging and sleeving patterns likely will create turbulence vibration that is not located randomly. If the turbulence vibrations are not random, the tubes may interact with each other causing destruction similar to what occurred at San Onofre Units 2 and 3.

13. Ramifications of Hideout and Temperature on Stress Corrosion Cracking

The focus of Holtec is to repair the stress corrosion cracking caused by their own improper wet layup under cold conditions, *ie*, all the tube cracks that they now want to sleeve appeared in cold metal. Holtec LAR request has failed to acknowledge that chemical HIDEOUT exists in all the thousands of tube-to-tubesheet crevices. Holtec also fails to acknowledge that high temperatures when operating will not just exacerbate continued crack propagation in the already identified tubes that it plans to sleeve but also hideout will exacerbate in the tube sheet and as yet undetected tube flaws creating new flaws. Palisades is unique in that all the tube-to-tubesheet crevasses are contaminated but only a few hundred have already developed 40% flaws because the tubes were cold when the SCC occurred.

⁶² *License Amendment Request to Revise Selected Permanently Defueled Technical Specifications to Support Repairing of Steam Generator Tubes by Sleeving*, <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25043A348>, p. 99/126 of pdf.

The scientific literature is replete with references to SCC being exacerbated by high temperature:

Stress corrosion cracking (SCC) is a severe and insidious form of material degradation that occurs when susceptible metals are exposed to a corrosive environment under tensile stress. Elevated temperatures significantly exacerbate this process. Unlike uniform corrosion, which leads to a predictable material loss, SCC can cause sudden and often unexpected failure of critical infrastructure, sometimes without visible signs of deterioration.

The formation of microcracks, which are fine and often invisible at first, is a defining characteristic of SCC. **These microcracks propagate over time, potentially leading to catastrophic failure even if the material appears intact externally. High temperatures can accelerate the SCC process by increasing both the corrosion rate and the cracking mechanism, thereby enhancing the chemical reactions between the metal and its corrosive environment. This makes SCC particularly hazardous in high-temperature environments, where the risk of failure is significantly elevated.**⁶³

14. Analysis of Non-Confidential Framatome Report

Framatome Inc. Engineering Information Record
Document No.: 51-9385467-002
Steam Generator Mechanical TSP Sleeve Qualification Report for ¾" Tubes at Palisades Nuclear Power Plant
March 26, 2024

- 14.1. (Framatome quotations are in standard text while Gundersen comments are in bold, italicized text.)
- 14.2. Revision 2 was issued on March 26, 2024:

In July 2022, Holtec began its plan for securing funds from DOE to resurrect Palisades. As part of its request for funds, Holtec requested more than \$500M for the SG replacement, claiming condition of the Palisades SGs was beyond repair. But apparently in late 2023, Holtec commissioned Framatome to sleeve the SGs, claiming the SGs would last as long as 30 additional years after being sleeved. The Technical Specification submittals in the ADAMS database show that no eddy current tests were performed until September 2024, which implies that Holtec had no basis to change its DOE analysis that

⁶³ *Stress corrosion cracking (SCC): Causes and Prevention, Technical Causes of Stress Corrosion Cracking (SCC)*,
<https://inspenet.com/en/articulo/stress-corrosion-cracking-prevention/> (February 28, 2025).

the SGs were in poor condition. What prior knowledge did Holtec have that lead it to believe that sleeving was necessary and that Framatome should be retained?

Even in late 2023, there was time for Holtec to use the appropriated DOE funds to order new SGs to be completed and installed in late 2025. Instead of replacement, Holtec chose Framatome's sleeves instead of SG replacement. The goal of the Framatome report seems to be to revise the Tech Spec requirements on tube plugging by identifying sleeving as an acceptable alternative. Yet Holtec hired Framatome before the SG damage was identified and then waited more than half a year after the Framatome report was completed in March 2024 before asking for the LAR to change its technical specifications. I conclude that Holtec never planned to replace the SGs but applied for the DOE funds anyway.

- 14.3. Page 3, Record of Revision: Revision #002: Revised Section 7.7 and Deleted Section 11 "No Significant Hazards and Environmental Considerations".⁶⁴

There is no basis for Framatome's choice to exclude an analysis of significant hazards in Revision #002 that was already provided in Revision #001.

- 14.4. Page 8, Section 1.0, Executive Summary: "The analytical evaluations were originally completed to qualify the Framatome sleeves for use in Westinghouse steam generators. When necessary, the qualification has been extended by analysis to provide a qualified TSP sleeve at Palisades."⁶⁵

Apparently this report is limited to placing sleeves within tubes near tube support plates (TSP) and is an old analysis of sleeving for the Westinghouse design that was modified to address the Combustion Engineering design at Palisades. There are significant differences in the tube-to-tubesheet connection methods and the tube support plate designs used by CE and Westinghouse. The steam generator problems identified by Framatome's September 2024 inspection are unique and have never been previously encountered. Those newly identified problems from September 2024 could not be analyzed in the Framatome report which was written previously in March of 2024. There is no analysis in the Framatome report of sleeving at the tubesheet, nor is there any analysis of chemical hideout on the tube outside diameter.

- 14.5. Page 8, Section 1.0, Executive Summary: "The limiting case was the burst pressure criteria during normal operation for the joint region of the sleeve. This resulted in a calculated acceptable flaw depth of [] through wall.... The results of this evaluation

⁶⁴ 2/11/2025 LAR, p. 67/126 of pdf.

⁶⁵ 2/11/2025 LAR, p. 72/126 of pdf.

validate that flaws less than [] TW satisfy all performance criteria including NDE uncertainty and flaw growth.”⁶⁶

Due to Holtec’s negligence by not placing the Palisades in proper wet layup for two years, chemical contaminants now reside in the tube-to-tube sheet gaps. The Framatome report fails to address that these contaminants will continue to attack both the tubes and the tubesheet, and that chemical attack will be enhanced when the steam generator is at operating temperature. The chemical attack is not limited to tubes that have already been shown to be damaged, but will also include tubes that presently do not meet Palisades repair criteria.

- 14.6. Page 8, Section 1.0, Executive Summary: “... the Palisades Steam Generator Program currently requires plugging of crack-like indications on detection in the parent tubing, except in areas within the tube sheet covered by alternative repair criteria. This same plug-on-detection criteria applies to the parent tubing portion of the pressure boundary in the sleeve joint region. SG tube surveillance requirements continue to ensure that defective tubes will be repaired or removed from service upon detection.”⁶⁷

Framatome is basing its safety conclusions on the Palisades Technical Specifications that existed in March 2024. Those Technical Specifications required tube inspections at every refueling outage. Holtec is now requesting NRC approval to delay those tube inspections for two effective full power years refueling outages, which is not supported by the inspection assumptions made by Framatome.

- 14.7. Page 9, Section 2.1, Purpose: “This report contains sufficient information to support a technical specification change allowing installation of these sleeves and demonstrates that reactor operation with sleeves installed in the Palisades RSGs will not increase the probability or consequences of a postulated accident that has been previously evaluated. The sleeve installation will not create the possibility of a new or different kind of accident and will not reduce the existing margin of safety.... The sleeves are acceptable to be installed within any tube support plate except elevations that are geometrically limiting at Palisades Nuclear Power Plant.”

Framatome’s analysis is limited to the tube support plates and not the tubesheet. Apparently, Holtec commissioned this Framatome report KNOWING that it intended to change Technical Specifications to allow for sleeving of steam generator tubes instead of plugging them. At the time Framatome was retained, Holtec had not inspected the Steam Generators and claimed to have no knowledge of any SG degradation. Also, Framatome is basing its safety conclusions on the Palisades Technical Specifications that existed in

⁶⁶ *Id.*

⁶⁷ *Id.*

March 2024. Those Technical Specifications required tube inspections at every refueling outage (1.5 EFPY). Holtec is now requesting NRC approval to delay those tube inspections for two effective full power years, which is not supported by the inspection assumptions made by Framatome.

- 14.8. Page 34, Section 7.5, Sleeved Tube Seismic Considerations: “Ground accelerations for the operational basis earthquake used for containment design purposes and all seismic Class 1 structures are 0.10g applied horizontally and 0.07g applied vertically. In addition, ground acceleration of 0.2g horizontal and 0.13g vertical are used for the design basis earthquake.”

Framatome’s seismic analysis is based on the ground acceleration of the containment building and not the amplified response spectra acceleration that can be reasonably be expected to be significantly greater than the ground acceleration.

- 14.9. Page 36, Section 7.7, Design Analysis Conclusion: “Therefore, the sleeves are acceptable for installation at the Palisades Nuclear Plant... The current PNP Administrative Controls Technical Specification (TS) 5.5.8c, Steam Generator Program, limit of a depth equal to or exceeding 40% of the nominal tube wall thickness is conservative. A sleeved tube is plugged on detection of degradation in the sleeve/tube assembly.”

Framatome is basing its safety conclusions on the Palisades Technical Specifications that existed in March 2024. Those Technical Specifications required tube inspections at every refueling outage. Holtec is now requesting NRC approval to delay those tube inspections for two effective full power years, which is not supported by the inspection assumptions made by Framatome.

- 14.10. Page 57, Section 10.4, Eddy Current Restrictions on Sleeve Installations: “Installation of sleeves in both the hot and cold leg tube support locations of the same tube will impede the ability to efficiently inspect the un-sleeved section of the tube.

Framatome only intends to sleeve the hot leg side of damaged steam generator tubes. While this may have been reasonable based on what it knew in March 2024, the latest data from the September 2024 inspections indicated extensive damage throughout the thousands of tubes within the steam generators. This assumption is no longer valid for sleeving.

15. CONCLUSION

- 15.1. The only purpose of the entire Framatome report is to highlight the superiority of Alloy 690 sleeves placed in damaged Alloy 600 tubes at the tube support plates. However, the steam generator inspections of September 2024 indicate extensive damage well beyond that anticipated by Framatome in March 2024. Due to two years of Holtec’s

incompetence which allowed extensive chemical attacks of the tubes and tube sheet, it is clear that sleeving will not solve the ongoing degradation of the Palisades Steam Generators. Chemical contaminants cannot be dislodged in the tube-to-tubesheet crevasses and continuing damage to sleeved and unsleeved tubes is inevitable if the steam generators are allowed to restart. Failure of sleeved or unsleeved generator tubes is inevitable, as is the potential of tubesheet cracking and potential failure.

The Framatome report also based its safety conclusions for Alloy 690 sleeves on the Palisades Technical Specifications in place in March 2024 which required complete tube reinspection during every refueling outage, at 1.5 EFPY.(Effective Full Power Years). Holtec appears to be ignoring its own Tech Spec analysis and reporting requirements, requesting a re-inspection interval of 2.0 EFPY. Thus Holtec is ignoring the analysis of its own consultant while basing its proposed LAR changes on that same consultant's analysis.

The proposed revisions to the technical specifications, the company said, would “include a repaired tube (sleeve and tube) inspection interval that shall not exceed 24 effective full power months or one refueling outage (whichever is less), and specify the allowable SG tube repair methods with establishment of a ten-year sleeve in service limit.”⁶⁸

15.2. The Holtec LAR simply qualifies Alloy 690 sleeves at the tube support plates:

“By letter dated February 11, 2025 (Agencywide Documents Access and Management System Accession No. ML25042A692), Holtec Palisades, LLC requested U.S. Nuclear Regulatory Commission (NRC) review and approval of a license amendment request (LAR) to revise the Palisades Nuclear Plant (PNP) technical specifications to allow the use of Framatome Alloy 690 sleeves to repair defective steam generator (SG) tubes as an alternative to removing the tubes from service by plugging.”⁶⁹

15.3. There is an assumption that any defect below 40% will not grow to the breaking point in one refueling cycle

The applicable tube plugging criteria, specified in the TS, are that tubes found during in service inspection to contain flaws with a depth equal to or exceeding 40 percent of the nominal wall thickness shall be plugged, unless the tubes are permitted to remain in service through application of alternate repair criteria provided in the TS

15.4. The Framatome sleeve report only qualifies the sleeves for the tube support plates

15.5. The layup damage is at the tube sheet, not the tube support plates.

⁶⁸ Inside NRC, Platts/S&P Global, Commodity Insights, Volume 47 / Issue 2 / January 24, 2025.

⁶⁹ <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML25128A171>

- 15.6. The extensive damage identified in the September 2024 inspection is not within the realm of parameters analyzed by Framatome nor previous industry experience, and was caused when the unit was in cold shutdown condition.
- 15.7. Sleeving tubes that exceed 40% TW will not prevent tubes less than 40% from extensive rapid crack propagation once the SGs are heated and pressurized. THE DAMAGE HAS METASTASIZED although it does not yet meet 40% sleeving requirements. There is no historical precedent for the extensive spread of SCC at Palisades under cold conditions while the unit was not operating.(spacing should be 1.5?)
- 15.8. The Framatome report for Alloy 690 sleeves is clear that the analysis based on decades of its experience only applies to tube support plates. Yet the LAR suggests that sleeving will be used at the tube support plate and tube sheet. Holtec is using the Framatome report to support LAR changes that are not addressed in the Framatome report. And the NRC seems to be making no distinction, either. While this may have been reasonable based on what Framatome knew in March 2024, the latest data from the September 2024 inspections indicated extensive SCC damage throughout the thousands of tubes within the steam generators. Thus Framatome's assumption is no longer valid for sleeving.
- 15.9. After reviewing all the data provided by Holtec in the LAR (License Amendment Request), I opine that Palisades is NOT capable of extended operations. Furthermore, Palisades' degraded condition means that it *cannot be considered as a reliable power source on the electric grid for Michigan because of the inevitability of a steam generator failure which means therefore it cannot be critical for system reliability.*
16. From my review of the extensive documentation cited in my analysis I conclude that sleeving the tubes in the Palisades steam generator will reduce critical safety margins and increase the risk to public health and safety as well as the environment. In my research and assessment, it is not a question of whether the Palisades steam generators will leak. They will. Rather, it is a question of when the first leak will occur and how serious the radiation leak will be to the surrounding community and to Lake Michigan. Based on the Watts Bar Unit 2 precedent cited by Holtec, if the NRC allows Palisades to restart, at least one tube and likely more will fail and release radiation that moves beyond the plant boundary within one year of restart.
- 16.1. I conclude that Holtec has created this expedited LAR for its private commercial reasons.
It has set a Fall 2025 restart to assure its funding does not dry up. Why then is the NRC bowing to commercial pressures, rather than insisting that the "worn out" Palisades Steam Generators are replaced before the "resurrection" of Palisades is completed?

- 16.2. The already-suspect steam generators at Palisades became even less safe because Holtec did not adequately maintain them between 2022 and 2024. There is no methodology for safely repairing the safety-compromised steam generators within Palisades. Most importantly, the existing Palisades Steam Generators are so damaged from Stress Corrosion Cracking (SCC) of the tubesheet that they create a significant risk to public health and safety and must be replaced with new Steam Generators.
- 16.3. Furthermore, adding to the fact that there is no existing methodology for safely repairing the safety-compromised steam generators within Palisades, Holtec now arbitrarily proposes to sleeve 700 additional tubes and unplug the more than 600 tubes purposely plugged 35 years ago. The maneuver of *mass unplugging*, accompanied by plugging other existing tubes, is unprecedented anywhere in the industry. Moreover, such a *mass unplugging* violates the condition of the NRC's 2011 license extension that would have allowed Palisades nuclear power plant to continue operating until 2031.
- 16.4. Thus, Holtec must replace all steam generators at an additional cost of at least \$510 million,⁷⁰ and bear the delayed startup that will result. This is the only responsible interpretation of the applicable federal statutes and regulations. Complete replacement of Holtec's steam generators is the only reasonable means of protecting the health and safety of the people, communities, Lake Michigan and the unique lakeside ecology of Michigan and Wisconsin

Declaration Electronic Signature Page

I hereby declare under penalty of perjury that the testimony submitted in this proceeding is true and correct to the best of my knowledge. The facts presented in this expert report are true and accurate to the best of my knowledge, and the opinions expressed are based on my best professional judgment.

⁷⁰Holtec International Application for Federal and State Support to Enable the Resurrection of the Palisades Nuclear Generation Station, submitted July 5, 2022, p. 9/42 of pdf, <https://beyondnuclear.org/wp-content/uploads/2023/10/7-5-22-42-page-Holtec-application-to-DOE-for-CNC-funds-to-restart-Palisades.pdf>

Executed in accordance with 10 CFR 2.304 (d) and 2.326 (b).

/S/ Arnold Gundersen
Arnold Gundersen, MENE, RO
Fairewinds Associates, Inc

Dated: June 16, 2025

Palisades Nuclear ACRS Presentation
Arnold Gundersen
August 21, 2025

Fresh out of college, my first engineering job in the nuclear industry was in June of 1971. The Palisades nuclear plant began operation in December of that same year. Both Palisades and I have grown old together. As my CV has already been provided, I will spare you with the details of my training and experience over those 54 years. Yet never in those 54 years have I been more concerned about the safety of a nuclear plant than I am about the planned “resurrection” of Palisades. Because I only have five minutes, I will limit my remarks to what I believe is the single biggest safety concern, the condition of Palisades Steam Generators.

Palisades Steam Generators were first replaced in 1991, and have not been replaced since then. This 34 year life span is extraordinarily long for Alloy 600 tubes. Its previous owners were conscientious in maintaining excellent water chemistry and a rigorous inspection routine which contributed to this longevity.

In June 2022, Palisades was sold to Holtec, a demolition contractor with no nuclear operating experience, to be decommissioned. Yet two weeks later on July 5, 2022 Holtec requested funding from the Department of Energy, to “resurrect” Palisades. Holtec acknowledged to DOE that the steam generators were degraded and requested half a billion dollars of DOE funds “to replace **old worn-out hardware such as the Steam Generators**¹”.

Unlike the previous owner Entergy, Holtec renounced the need to maintain excellent water quality and perform frequent SG inspections. Both Holtec and the NRC have acknowledged that proper “wet layup” water chemistry and associated records were NOT maintained for about two years. Without adequate control of water chemistry through the addition of oxygen scavengers and proper pH control, Palisades steam generator tubes rapidly deteriorated. Finally, two years after acquiring Palisades, Holtec performed a tube inspection. That new inspection showed that

¹ Page 2, HOLTEC INTERNATIONAL APPLICATION FOR FEDERAL AND STATE SUPPORT TO ENABLE THE RESURRECTION OF THE PALISADES NUCLEAR GENERATION STATION SUBMITTED JULY 5, 2022 (**Emphasis added**)

stress corrosion cracking was extensive. Only one tube was found damaged in the 2020 Entergy inspection while more than 700 tubes were found to be damaged under Holtec in 2024.

Even though Holtec has acknowledged in 2022 that the steam generators were “worn out”, in 2025 it asked the NRC for permission to place alloy 690 sleeves into the Alloy 600 tubes rather than replace the steam generators. I have provided a 45 page technical expert report to the NRC and to this ACRS detailing my serious concerns about the overall safety of the SGs if Palisades is allowed to be resurrected. As an expert, I believe that caustic chemicals will “hide out” in the steam generator crevasses causing rapid steam generator damage if the plant restarts. However, the Office of General Council has stated that my concerns are irrelevant to sleeving of the SGs. Because the NRC has apparently ignored my concerns, I asked two Artificial Intelligence programs to analyze the Palisades Steam Generators. (The complete AI reports have been provided to the ACRS.)

Here is what GROK said:

Hundreds more indications, possibly 10-20% additional plugging needed within 1-2 years, risking loss-of-coolant accidents if unchecked.

Here is what Chat GTP said:

...historical data (little to no tube leakage in 30 years) no longer applies directly – the current condition suggests a non-trivial likelihood of tube leakage or even rupture if Palisades restarts without SG replacement.... until new SGs are installed, Palisades will be running closer to the edge of tube integrity than it ever did before, implying a higher probability of failure relative to its past operation

I end this presentation with the simple question: Why is there such a rush to resurrect Palisades? The lights have not gone out in Michigan since Palisades has closed, there are no AI data centers in Michigan clamoring for the power, and indeed the power that Palisades plans on providing will need to be subsidized to be competitive with renewable energy sources. My analysis along with Grok and Chat GTP show that Palisades will not be reliable nor will it be safe. The Palisades Steam Generators should be replaced before the reactor is restarted.

***We Asked AI Five Questions About the Safety of Holtec Palisades
AI's Answers Were a Cause of Great Concern***

The Nuclear Regulatory Commission (NRC) has refused to consider any of the technical concerns filed in Expert Reports by knowledgeable nuclear experts about the degraded condition of the Steam Generators at the Palisades nuclear plant. Were the public's experts wrong? Did they miss anything that the US nuclear regulator must have known proving that Palisades Steam Generators were safe after all?

To see if the NRC was correct that Palisades Steam Generators were indeed safe, we asked two powerful Artificial Intelligence (AI) computer systems, Grok and Chat GTP, to each perform their own unbiased, independent technical analysis of the condition of Palisades Steam Generators.

GROK and CHAT GPT EACH INDEPENDANTLY PROVED THE PUBLIC'S EXPERTS WERE RIGHT! The AI reports are lengthy and complex but both strongly support Expert Reports that identify that Palisades Steam Generators are severely degraded and will be prone to failure in the near future. In the spirit of full disclosure, here are the links to the complete extensive Grok and Chat GTP analyses:

Grok: https://grok.com/share/bGVnYWN5_9b37de42-74b5-4285-8102-5dce097b24eb

Chat GTP: <https://chatgpt.com/share/688f9f88-36a4-8005-8419-0eb8664e2b78>

NOTE: AI frequently uses the term "SCC" which means Stress Corrosion Cracking. Stress corrosion cracking (SCC) is a type of material failure where cracks form in a metal due to a corrosive environment. It's a form of environmentally induced cracking,

Below are a few of the key takeaways from both AI's analysis. (**emphasis added**)

QUESTION 1: HAVE THE PALISADES STEAM GENERATORS BECOME DAMAGED SINCE THE PLANT WAS SOLD TO HOLTEC IN 2022 AND TO WHAT EXTENT?

GROK RESPONSE: A. Tube damage from 1992-2022 was progressive but manageable, with ~4-5% plugging and low leakage, focused on operational SCC and wear. From July 2022-August 2025, **damage surged dramatically**, with 1,032 newly affected tubes and 1,417 indications, requiring extensive repairs—**far exceeding prior estimates and representing rapid degradation during shutdown.**

CHAT GPT RESPONSE: **This number of tube failures in one go is astounding** – Holtec found *more new tube failures in 2024 than the total number of tube failures that had occurred over the plant's prior ~35 years of operation.* Figure 1 in §1B (Table 1) highlights this leap (only 1 tube plug in 2020 versus ~700 in 2024).

QUESTION 2. WHAT CAUSED THE DAMAGE AFTER 2022?

GROK RESPONSE: Under Holtec's ownership since June 2022, the plant entered decommissioning initially, with SGs placed in layup. No major changes to operational water chemistry occurred due to shutdown, but layup practices shifted. **Holtec reportedly did not implement proper wet layup in 2022-2023, allowing exposure to aerated conditions and inadequate pH/oxygen control...** In May 2023, Holtec renounced prior Entergy-endorsed license requirements for SG maintenance (e.g., prolonging useful life). **SGs and tubes underwent inspections in August 2024, revealing extensive new damage;**... Pre-2022 focused on operational hideout and chemistry excursions; post-2022 emphasized shutdown layup failures (aeration, no scavengers), leading to ambient-temperature corrosion not seen before.

CHAT GPT RESPONSE: Holtec International assumed ownership of Palisades in late June 2022, with the initial intent to decommission the permanently shut-down plant. This change in mission had immediate consequences for how the plant's secondary water systems were maintained. **Critically, Holtec did *not* maintain the wet lay-up chemistry for the idle steam generators after shutdown...** Holtec, focusing on dismantlement, **allowed the SGs to sit with stagnant water and without proper chemical controls for approximately 22 months** (from May/June 2022 until May 2024). This was a major change from the vigilant chemistry management during operations.

QUESTION 3. WHAT IS THE TYPE AND EXTENT OF DAMAGE THAT HAS BEEN IDENTIFIED AT PALISADES?

GROK RESPONSE: **Significant additional damage was detected in 2024 inspections:** 1,417 indications across 1,032 tubes (701 in SG A, 248 in SG B). Types: Primarily axial ODSCC (1,163 at TSPs), with axial PWSCC, circumferential ODSCC/PWSCC, volumetric, and wear >40% TW. Locations: Hot-leg TTS, TSPs, freespan. Extent: Indications up to 91% TW depth (e.g., 4.29V axial ODSCC at TTS), with 949 tubes candidates for plugging/repair. **This was ~250 times more TSP ODSCC than in 2020** [ie. Tube Support Plate Outside Diameter Stress Corrosion Cracking]

CHAT GPT RESPONSE: Widespread Stress Corrosion Cracking: The dormant period introduced aggressive corrosion that led to **hundreds of new SCC indications** on the tube outer surfaces. Notably, the 2024 inspection identified SCC in **1,163 tubes** (out of ~16,000 total) – **a shocking number compared to prior inspections**. For context, before shutdown, only a few tens of tubes showed any cracking indications. This implies that dormant corrosion initiated SCC in many previously unflawed tubes. Most of these indications are ODSCC on the external tube surface, consistent with corrosive impurities

attacking the tubes from the secondary side during layup. The damage was concentrated at known vulnerable spots: **tube support plate crevices and the top-of-tubesheet region...** In effect, what Palisades avoided for 30 years by diligent chemistry management was unleashed in less than 2 years due to this lapse. The events at Palisades serve as a case study affirming the importance of adhering to EPRI's chemistry and lay-up recommendations: *Wet lay-up with chemically treated water is not just optional, it is essential to preserve SG integrity during shutdown*

QUESTION 4: CAN PALISADES BE SAFELY OPERATED WITH THE DAMAGED STEAM GENERATORS?

GROK RESPONSE: Residual chemical deposition and hideout in tube support plate (TSP) crevices could concentrate upon restart, as boiling (from 80°F to ~600°F) drives superheating and impurity buildup (e.g., NaOH, chlorides), lowering local pH and raising ECP. This exacerbates SCC in Alloy 600, especially with increased pressure (2000 psi) and flow (millions gph), **promoting crevice corrosion and crack propagation**. Per EPRI, improper layup leaves deposits that return during heatup, accelerating damage... If SG temperature exceeds 500°F in 2025-2026 (e.g., during restart/operation), anticipated damage includes accelerated axial/circumferential SCC at TSPs/TTS (up to 85-90% TW growth per year, based on historical 0.3% TW/EFPY wear but higher for SCC), pitting, and **potential multiple tube ruptures if hideout returns**. **Extent: Hundreds more indications, possibly 10-20% additional plugging needed within 1-2 years, risking loss-of-coolant accidents if unchecked.**

CHAT GPT RESPONSE: In summary, **the 1992–2022 period saw controlled, limited tube degradation, whereas the 2022–2025 period saw widespread, severe tube degradation....** in 2022–2024, there was a prolonged period of **chemistry neglect** – no active control of pH or oxygen.... In practical terms: Before 2022, Palisades could run with essentially all tubes intact (over 99% in service); after 2024, it has to operate with perhaps ~10% of its tubes plugged or sleeved. The difference is akin to night and day in the context of SG health.... **If Palisades were to restart in the current state, a major concern is the residual chemical deposits and concentrated impurities** that remain lodged in crevices at the tube support plates. These tube support plate (TSP) crevices (small gaps where tubes pass through support structures) are known traps for corrosive species ("hideout"). Restarting the plant would subject these areas to **high-temperature (up to ~600 °F) water, high pressure (~2000 psi increase), and high flow rates** on the secondary side. This change in conditions could **exacerbate tube damage in several ways...** In other words, the residual deposits virtually guarantee that SCC will continue and likely accelerate in those areas as soon as hot operation resumes. **Tubes that might currently have subcritical cracks could crack further and faster.... It's not far-fetched to think of a worst-case where a tube could leak or rupture soon after restart** if a particularly bad crevice environment causes a crack to go critical.... We can

expect continued and likely accelerated SCC in those locations once the SGs return to high temperature operation. Tubes that might currently be intact could rapidly develop cracks due to these aggressive crevice chemistries. The combination of concentrated corrosives and renewed stress could result in **further tube failures (leaks or required plug/sleeve) in a very short time after restart....** At Palisades, the likelihood of a tube leak is certainly higher post-restart than it was historically (because of the sheer number of cracked tubes). We could anticipate one or more **tube leak events in 2025–2026** if the plant runs without replacing SGs. In the worst case, a **tube rupture** could happen. A tube rupture is a sudden break that can release a large amount of primary coolant quickly... Nevertheless, the **likelihood of a serious tube event is undoubtedly higher now** than it was historically.

QUESTION 5: SHOULD PALISADES STEAM GENERATORS BE REPLACED?

GROK RESPONSE: D. Yes, historical data (e.g., 2024 surge in damage post-layup) indicates increased likelihood of tube failure upon restart, as repairs (sleeving) add stress, and residuals could propagate cracks under operational loads. **Probability rises from low (pre-2022) to moderate-high, potentially requiring SG replacement within years.**

CHAT GPT RESPONSE: In summary, **historical data (little to no tube leakage in 30 years) no longer applies directly – the current condition suggests a non-trivial likelihood of tube leakage or even rupture if Palisades restarts without SG replacement.** This is precisely why the plan is to sleeve and plug so many tubes; it's an attempt to drive that likelihood back down. **Nonetheless, until new SGs are installed, Palisades will be running closer to the edge of tube integrity than it ever did before, implying a higher probability of failure relative to its past operation**

Public Comment for ACRS Hearing on Palisades Restart – August 21, 2025

Good afternoon, members of the Committee. My name is Alan Blind.

I want to bring to your attention an important fact that is absent from the NRC Staff's presentation today. Nowhere in the slides does the Staff discuss how it has considered the Advisory Committee's own past cautions about the Systematic Evaluation Program, or SEP. The SEP, conducted in the early 1980s, was a one-time effort to benchmark older plants like Palisades against then-current safety standards using bounding analyses rather than full compliance with the General Design Criteria.

Yet on July 25, 2025, the NRC approved the Palisades Final Safety Analysis Report, including Chapter Four, which continues to use to a great extent those same SEP evaluations—the very evaluations your Committee, in NUREG-0820 Appendix H, explicitly warned about.

Let me remind you, today's ACRS of those warnings from the 1982 ACRS:

- **Dr. D. M. Okrent** stated: *“The SEP report should not be misinterpreted in the future as demonstrating conformance*

to current regulations. It was not designed for that purpose and cannot substitute for compliance determinations.”

- **Dr. S. A. Abrahams** cautioned: *“Because many of the evaluations used bounding assumptions, they must not be relied upon for future plant-specific operational decisions. Their use should remain limited to the context of the SEP review.”*
- **Dr. M. Pouring** advised: *“The staff must ensure that the limitations of the SEP analyses are clearly documented so that later users will not apply the results in ways never intended.”*
- **Dr. W. Kerr** warned: *“One danger lies in selectively citing SEP conclusions without the balancing assumptions and constraints. Such selective use in licensing could lead to unsafe or misleading conclusions.”*

These cautions from your predecessors—now overlooked by NRC staff—go directly to whether Palisades’ restart can rest on SEP analyses alone. By approving the 1982 SEP in the current FSAR, the NRC has left Palisades distinct from plants licensed to full General Design Criteria. I urge the Committee to recommend that this distinction be formally recognized and that NRC oversight reflect the added risk. One of the most significant

examples is the Steam Generator Tube Rupture analysis, which relies only on the atmospheric dump valves—bypassing both the reactor coolant pressure boundary and containment, two of the three fundamental safety barriers

I respectfully ask the current ACRS to **review Appendix H of NUREG-0820** as part of your deliberations and to explicitly incorporate those cautions into your recommendations. Without doing so, the NRC risks repeating the very misuse of SEP that this Committee foresaw more than forty years ago.

Thank you.

Written Comment for ACRS Meeting Record, August 21, 2025,

Palisades Restart

**Steam Generator Tube Rupture at Palisades: Lessons from Indian
Point 2 and the Case for Integrated Uncertainty and Emergency
Planning”**

Alan Blind - Baroda, Michigan, Retired

Former Vice President, Nuclear, Consolidated Edison of New York

Former Engineering Director, Palisades Nuclear Plant

Qualified Emergency Plan Director

My remarks follow directly from two questions raised by ACRS members during this meeting.

The first was posed to NRC steam generator expert Paul Kline:

Was he aware of a previous undetected steam generator tube rupture?

That question was about me. I was the Vice President of Nuclear at Consolidated Edison of New York in 2000, when Indian Point Unit 2

experienced a steam generator tube rupture that went initially undetected. This event led to the NRC's *Lessons Learned Report on the Indian Point 2 Steam Generator Tube Failure* (TAC No. MA9163), Final Report, October 23, 2000 (ML003759165).

The Executive Summary of that report stated:

*“The Task Group concluded that communicating the safety significance of the IP2 event is challenging. During the NRC’s significance determination process for the Cycle 14 tube failure, **the staff found that the degraded SG tube condition was risk significant because of the loss of safety margin.***

*However, despite this margin degradation, **IP2 was designed to mitigate the effects of a tube failure or rupture**, the plant shut down safely, and there were no adverse consequences to public health and safety. This important distinction may not be clear to all stakeholders.*

Because SG tube failures and ruptures have occurred in the past and are likely to occur again, the Task Group recommends that the NRC incorporate the experience from the IP2 event and

the SDP process into ongoing initiatives for risk communication and public outreach.”

Emergency Plan

The second ACRS question was:

Had the Emergency Action Level (EAL) for a steam generator tube rupture been revised to reflect the current condition of the Palisades steam generators?

This goes directly to my design basis concern for Steam Generator Rapid Depressurization. Palisades’ design basis relies on the atmospheric dump valves (ADV) as the first option for rapid depressurization. In the event of a significant SG tube rupture, Holtec’s own FSAR accident analyses acknowledge that this pathway will result in site boundary exposures exceeding 1.0 REM Total Effective Dose Equivalent (TEDE). Since the General Emergency threshold and the basis for recommending public evacuation is 1.0 REM, Palisades’ design raises the real prospect that any SGTR would soon, trigger a General Emergency declaration.

Importantly, the NRC’s 2000 Lessons Learned report on the Indian Point 2 rupture stated that “***because SG tube failures and ruptures have***

occurred in the past and are likely to occur again,” this is not a remote-probability event like a design-basis loss-of-coolant accident, but rather an event with demonstrated recurrence in operating history. The ACRS should recommend to the NRC staff that this design outcome be explicitly incorporated into their evaluation of Holtec’s Operational Assessment when determining the appropriate inspection interval for the steam generator tubes.

Operation Assessment

Taken together, these issues show why reliance on operational assessments—already weakened by missing condition monitoring and uncertain inputs such as tube age, Alloy 600 material susceptibility, chemistry history, and accelerated cracking rates—creates an unacceptable stack of uncertainties. I note that there were many excellent ACRS questions raised on these individual uncertainty issues, and the NRC expert responded to each one separately. But the industry guidance for operational assessments, specifically NEI 97-06 and the EPRI Steam Generator Integrity Assessment Guidelines, requires that **all statistical uncertainties be summed and considered collectively**, not addressed in isolation. The NRC expert did not discuss this integrated treatment of

uncertainties. When combined with a design-basis reliance on ADVs for rapid depressurization, the safety margin is slim to nonexistent.

I respectfully ask the Committee to recommend that NRC explicitly consider the Indian Point 2 lessons learned and require that the Palisades SGTR EAL and emergency plan be reevaluated in light of the plant's current degraded steam generator condition, and that any operational assessment incorporate the required cumulative treatment of uncertainties.

ACRS Requests

Therefore, I respectfully request that the ACRS recommend to the NRC staff that:

1. The NRC staff's review of Palisades be explicitly informed by, and incorporate, the findings of the NRC's 2000 *Indian Point 2 Steam Generator Tube Failure Lessons Learned Report* (ML003759165), including its conclusion that SGTRs have occurred in the past and are likely to occur again.
2. This design outcome of reliance on Atmospheric Dump Valves, be explicitly incorporated into their evaluation of Holtec's Operational

Assessment when determining the appropriate inspection interval for the steam generator tubes.

3. The Palisades Emergency Action Levels be reevaluated to reflect the current degraded condition of the steam generators and the realistic potential for exceeding the 1.0 REM TEDE threshold.
4. All uncertainties in the operational assessment—tube age, Alloy 600 susceptibility, chemistry history, growth rate variability, and detection reliability—be summed and treated collectively, consistent with NEI 97-06 and EPRI guidelines, rather than addressed individually.

Alan Blind

Comment for ACRS Palisades Restart Consideration, Steam Generator Integrity Oversight: Bridging ACRS Testimony and Indian Point Lessons Learned

Alan Blind

Former VP, Nuclear – Consolidated Edison of New York

Former Engineering Director – Palisades Nuclear Plant

Qualified Emergency Plan Director

Introduction

On August 21, 2025, the Advisory Committee on Reactor Safeguards (ACRS) held a hearing on the proposed restart of the Palisades Nuclear Plant, during which NRC technical staff responded to member questions regarding the condition and management of the plant's steam generators. I have compared that testimony with the NRC's 2000 *Indian Point 2 Steam Generator Tube Failure Lessons-Learned Report*.

This comparison is not focused on the technical details of tube degradation mechanisms, but rather on the **programmatic lessons** the NRC itself identified following Indian Point 2. Those lessons went beyond metallurgy and inspection results; they addressed the adequacy of regulatory processes, industry practices, inspection guidance, licensee oversight of vendors, communication of safety significance, and the dangers of overconfidence in inspection programs.

The Indian Point 2 report stressed that steam generator tube failures are not rare, that industry and NRC programs had weaknesses in detecting and evaluating degradation, and that both regulators and licensees needed to strengthen their frameworks for ensuring tube integrity. In reviewing the ACRS testimony from August 2025, it is evident that many of the same programmatic issues identified 25 years earlier remain relevant today.

This comparison highlights how the ACRS questions to NRC staff and the corresponding responses at Palisades closely mirror the concerns and deficiencies flagged in the Indian Point 2 lessons learned report. In doing so, it underscores that the Palisades restart is not merely a technical matter of sleeving or chemical cleaning, but a test of whether the NRC and industry have truly absorbed the **programmatic lessons** of past failures.

Comparison

1. Layup & Chemistry

- **ACRS Q:** Were Palisades SGs in wet or dry layup? How confident are you uncontrolled chemistry didn't leave hidden damage?

- **NRC A:** Wet layup, uncontrolled chemistry, only 3 samples in 2 years; cause analysis cites deposits + chemistry; chemical cleaning scheduled.
- **Indian Point Lessons Learned:** IP2 review emphasized **importance of water chemistry control** and that inspection intervals should consider layup conditions when granting extensions. The IP2 tube failure occurred after ConEd deferred proper evaluation of a **new degradation mechanism** despite chemistry controls.
- **Comparison:** Both emphasize chemistry's role, but IP2 showed even with "good" layup, cracks developed when inspection and evaluation were inadequate. Palisades' uncontrolled chemistry increases concern, echoing IP2 lessons that **licensees must rigorously evaluate layup impacts**.

2. Industry Context & Replacement

- **ACRS Q:** Why hasn't replacement been discussed?
- **NRC A:** Only Palisades and Beaver Valley 2 still have Alloy 600 MA; most others replaced with Alloy 690. No comment on Holtec's plans.

- **Indian Point Lessons Learned:** IP2's SGs were replaced outright after the rupture. NRC highlighted that **industry-wide vulnerabilities** require decisive action, not just patchwork.
- **Comparison:** Palisades is essentially repeating the IP2 situation — last plants with Alloy 600 MA still in service. The IP2 report shows **replacement is the durable fix**, while Palisades is pursuing sleeving/cleaning.

3. In-Situ Testing & Tube Integrity

- **ACRS Q:** What does “passed” mean? How were tubes selected?
- **NRC A:** In-situ pressure testing for leakage and burst; all tubes passed. Selection based on eddy-current limits.
- **Indian Point Lessons Learned:** IP2 report criticized **licensee reliance on unqualified sizing techniques**, poor eddy-current data quality (“noise”), and failure to pursue new degradation (PWSCC). Recommended more conservative screening for in-situ testing.

- **Comparison:** Palisades NRC response is procedural (they passed tests). IP2 lessons warn that “**passing**” can mask underlying risk if data quality or tube selection is flawed — the exact concern ACRS raised in questioning.

4. Degradation Mechanisms

- **ACRS Q:** Are all damage mechanisms fully understood?
- **NRC A:** Main contributors: uncontrolled chemistry + deposits; mitigations = sleeving, cleaning, inspections.
- **Indian Point Lessons Learned:** NRC faulted ConEd for not **evaluating susceptibility of similar tubes** once degradation was found, and for ignoring new types of degradation (denting, PWSCC).
- **Comparison:** IP2 shows that **identifying mechanisms is not enough** — licensees must rigorously evaluate implications and adjust programs.

Palisades NRC answer doesn’t reflect this deeper caution.

5. Tube Plugging & Unplugging

- **ACRS Q:** Why unplug tubes from 1990? Margin issue?
- **NRC A:** Yes, about 600 were conservatively plugged at startup; some de-plugged and reinspected to regain margin.
- **Indian Point Lessons Learned:** Report highlighted risks of relying on **conservative assumptions without re-evaluation**. Licensees must reassess when new degradation appears.
- **Comparison:** Palisades' re-use of tubes raises the same concern IP2 flagged: **past decisions may underestimate risk** when conditions change.

6. Flow-Induced Vibration

- **ACRS Q:** Concern about vibration in re-activated tubes?
- **NRC A:** Wear is easily detected; not a major concern.
- **Indian Point Lessons Learned:** Report noted **noise in eddy-current data** masked defects, and that vendor/technique limitations were not properly evaluated.

- **Comparison:** IP2 shows confidence in inspection techniques can be misplaced. Palisades NRC answer is reassuring, but IP2 experience urges skepticism.

7. Sleeving

- **ACRS Q:** What are limits? How is inspection assured with sleeves?
- **NRC A:** Limits = thermal-hydraulic + accident leakage; qualification confirmed flaw detection between sleeves.
- **Indian Point Lessons Learned:** Warned against reliance on **unqualified or inadequately demonstrated inspection methods**, and urged licensees to ensure **plant-specific qualification** of eddy-current.
- **Comparison:** NRC's Palisades response mirrors IP2 lessons (qualification required), but IP2 shows how easily **qualification gaps** can undermine confidence.

8. Free-Span & Tube Sheet Cracking

- **ACRS Q:** Is cracking mostly at support plates? Any free-span cracks? Can tube sheet cracks be sleeved?
- **NRC A:** Yes, mostly at support plates (~1,400), fewer at tube sheet (~210); 3 free-span cracks found; sleeving possible but less beneficial at tube sheet.
- **Indian Point Lessons Learned:** Criticized ConEd for not following up on **new types of degradation** when first observed.
- **Comparison:** NRC acknowledges locations at Palisades, but IP2 reminds that **new mechanisms often appear in overlooked areas** — vigilance is required.

9. Next Steps

- **ACRS Q:** What's next before restart?
- **NRC A:** Chemical cleaning, hydrotesting, review of operational assessment.
- **Indian Point Lessons Learned:** Stressed that **inspection intervals, scope, and evaluation of new degradation** are central, and that relying on past assumptions (like ConEd did) invites failure.

- **Comparison:** NRC’s Palisades roadmap is procedural. IP2’s lessons add the caution: **don’t just clean and restart—interrogate whether the program truly bounds future degradation.**

Overall Comparison

- **ACRS Questions** at Palisades mirror the **same vulnerabilities exposed at IP2:** chemistry control, adequacy of inspections, reliance on sleeving, understanding degradation, and overconfidence in “passed” tests.
- **NRC Responses** at Palisades are procedural and reassuring.
- **IP2 Lessons Learned** are cautionary: failures came **not from lack of process, but from overconfidence in inspection scope, qualification, and industry guidance.**
- **Key Point:** Palisades today is facing the *exact conditions* IP2 warned about — Alloy 600 MA tubing, deposit-driven ODSCC, deferred cleaning, reliance on sleeving, and industry guidance vulnerabilities.

Via Email, 8/21/25, 12:27PM:

Dear Advisory Committee on Reactor Safeguards,

Thank you for the opportunity to provide public comment during the Plant Operations Subcommittee meeting regarding the proposed restart of the Palisades Nuclear Plant. As I said orally, I am submitting written recommendations for the Committee's consideration.

These comments focus on your statutory role under Sections 29 and 182b of the Atomic Energy Act to advise the Commission on hazards of proposed or existing reactor facilities and the adequacy of proposed safety standards, as well as your charge under Executive Order 14300 to focus on issues that are unique, novel, and noteworthy. In addition to outlining hazards and inadequacies, I have also included proposed record language that can be directly adapted into your formal letter report if you find it useful.

The central point is this: the restart of a permanently closed reactor under new ownership and with new staff represents a novel and systemic hazard, and NRC's current regulatory framework is inadequate to address it. This precedent is more than site-specific. It sets a seismic shift in the regulatory landscape, one that could undermine safety discipline across the entire U.S. nuclear fleet.

I also note for the record that this meeting was held on August 21, while staff have announced their intent to issue license changes on August 25. That compressed schedule leaves less than one business day for this Committee's advice to be meaningfully considered. It risks reducing ACRS to a procedural formality, when in fact your statutory duty is to provide substantive, independent review of hazards and adequacy of standards.

Expanded Public Comment on Palisades Restart

Statutory Framing

Under the Atomic Energy Act (§29, §182b), the Advisory Committee on Reactor Safeguards is charged with advising the Commission on hazards of proposed or existing reactor facilities and on the adequacy of proposed safety standards.

Executive Order 14300 further limits ACRS review to what is *unique, novel, and noteworthy*. A restart after permanent closure is exactly that: it is novel, untested, and inadequately addressed by current regulations.

Hazards Identified

1. Loss of Continuity from Closure + New Ownership (Hazard & Adequacy)
Restarting a plant in decommissioning under new ownership, with management and staff turnover, discards decades of institutional knowledge of degradation pathways. This loss of continuity creates a novel and systemic hazard for the entire fleet.
 - *Proposed Record Language: "The Committee identifies as a hazard the loss of operational continuity when reactors in decommissioning are sold and restarted under new ownership. Such actions discard critical institutional knowledge of degradation*

pathways and constitute a novel and untested practice. The Committee finds that restarting under these conditions creates systemic hazard to the fleet."

2. Fire Safety Upgrades (Hazard)

Critical fire safety upgrades are years behind schedule. Allowing restart before completion would expose the plant to an immediate hazard.

- *Proposed Record Language: "The Committee finds that the deferral of overdue fire protection upgrades constitutes a hazard. Completion prior to restart is necessary to ensure adequate defense-in-depth."*

3. Steam Generator Integrity (Hazard)

Degraded steam generators pose rupture and fatigue risks that demand independent review.

- *Proposed Record Language: "The Committee identifies degraded steam generator condition as a hazard and recommends an independent technical review to determine whether continued operation is safe or replacement is required."*

4. Reactor Vessel Embrittlement (Hazard)

Unresolved embrittlement margins raise the risk of fracture under accident conditions.

- *Proposed Record Language: "The Committee finds unresolved reactor vessel embrittlement margins to be a hazard. A transparent assessment of fracture risk is required before restart."*

5. Operator Competence (Hazard)

A new operator without prior experience managing a nuclear facility increases human-factor hazards.

- *Proposed Record Language: "The Committee finds that assignment of an inexperienced operator constitutes a hazard. Adequate standards require demonstration of experienced nuclear operations capability."*

6. Decommissioning Trust Funds (Hazard)

Decommissioning trust funds have been significantly drawn down during closure. Restart without replenishment creates long-term financial and safety hazards for decommissioning.

- *Proposed Record Language: "The Committee finds current standards inadequate with respect to decommissioning trust funds. Restart should not proceed unless funds are fully replenished and independently verified to ensure protection of the public."*

Inadequacy of Current Safety Standards

7. Funding Transparency (Adequacy)

Public funds are not tied to specific safety deliverables, creating accountability gaps.

- *Proposed Record Language: "The Committee finds current standards inadequate because public funds are not tied to safety deliverables. Adequate standards require transparent reporting linking public investment to safety upgrades."*

8. Restart Licensing Pathway (Adequacy)

There is no regulatory pathway for restarting closed plants. Treating restart as reactivation assumes continuity that no longer exists.

- *Proposed Record Language: “The Committee finds current safety standards inadequate because the NRC does not maintain a regulatory pathway specific to the restart of closed facilities. Treating restart as license reactivation assumes operational continuity that no longer exists. The only adequate pathway is a full license review equivalent to a new application.”*

Conclusion

Maintaining the nuclear fleet safely is one thing. Restarting a decommissioned plant under new ownership and without continuity of knowledge is something else entirely. It creates hazards, undermines public confidence, and sets a precedent that could weaken safety discipline across the fleet.

These eight points fall squarely within ACRS’s statutory duty to identify hazards and test the adequacy of standards. Even if the Commission overrules, history will not remember how quickly Palisades was reopened. It will remember whether this Committee recognized the precedent for what it is: a novel hazard to nuclear safety and public trust, and whether you recommended the credible, conservative path forward.

Respectfully,

Kraig Schultz

Environmental Health Advocate
Michigan Safe Energy Future

Via Email, 8/21/25, 12:59PM:

“My name is Kraig Schultz. I am an **Environmental Health Advocate with Michigan Safe Energy Future**. I live 50 miles from the Palisades Nuclear Plant and have received electricity from it for its entire 50 years of operation.

Mr. Halnon, members of the Subcommittee—thank you for hearing me.

The hazard here is not only Palisades—it is the precedent. Restarting a decommissioned plant under new ownership and an inexperienced operator discards decades of operational knowledge about degradation. That creates systemic risk for the entire fleet.

At Palisades the issues are clear: overdue fire safety upgrades, degraded steam generators, embrittlement, an inexperienced operator, and depleted trust funds. But the deeper hazard is what this precedent means: if NRC allows plants in decommissioning to return to service, then no operator can assume early closure exempts them from upgrades. Every facility must be maintained as if it will run indefinitely. This is a **seismic shift in the regulatory landscape**.

I also notice that this meeting ends today, August 21, and the staff has indicated license changes are set for August 25—leaving, in reality, just one business day. That makes it essential for ACRS to recommend that the August 25 date be suspended, so that hazards and inadequacies identified here can be fully reviewed and addressed before any final action.

History will not remember how quickly Palisades reopened. It will remember the long-term impact of this precedent on nuclear safety and public trust. It will remember your names for whether you identified the hazards, flagged the inadequacy of current standards, and recommended the safe, credible path forward.

We have written recommendations for this Committee that cover these points in greater detail. I need to know where to send these recommendations given the urgency of having only one day to make them known and acted upon."

Thank you,
Kraig Schultz

Advisory Committee on Reactor Safeguards Full Committee Meeting

Palisades Restart Informational Briefing

August 21, 2025



Agenda



- Restart Evaluation Process
- Update on Licensing Actions
- Emergency Preparedness
- Status of Inspection Activities
- Palisades Restart Activities
- Update on Inspection and Technical Topics of Interest

Licensing Basis and Actions Palisades Restart

Marlayna Doell, Project Manager
Palisades Restart
NRR/DORL

Evaluation Criteria for Restart



- Leveraged existing operating license to make changes under normal NRC processes (i.e., amendments and exemptions)
- General approach was to review requested changes for consistency with previous licensing basis and focus on any areas of change from previous approaches or analyses
- Focus on meeting the same safety, security, and environmental requirements that were applicable to the previously operating plant, with changes as needed

Licensing Actions Completed



- July 24, 2025 – Issued the licensing “bundle” to restore the operational licensing basis at Palisades
 - License transfer, exemption, four license amendments
- August 25 – Planned implementation date for the bundle
 - Will serve as the official transition date from decommissioning to operations for licensing, inspections to the ROP, fee billing, etc.
- Post-August 25 – Palisades will continue restart activities under the operational TS requirements

Licensing Actions Bundle



<u>Submittal</u>	<u>Licensing Action</u>	<u>Implementation</u>
Sept. 28, 2023	Exemption from 10 CFR 50.82(a)(2)	Aug. 25, 2025
Dec. 6, 2023	License Transfer	Jul. 24, 2025
Dec. 14, 2023	Operating License Technical Specifications	Aug. 25, 2025
Feb. 9, 2024	Operating License Administrative Technical Specifications	Aug. 25, 2025
May 1, 2024	Emergency Plan	Aug. 25, 2025
May 23, 2024	Quality Assurance Plan (supplement to license transfer)	Aug. 25, 2025
May 24, 2024	Update to MSLB Analysis Methodology	Aug. 25, 2025

Licensing Actions in Progress

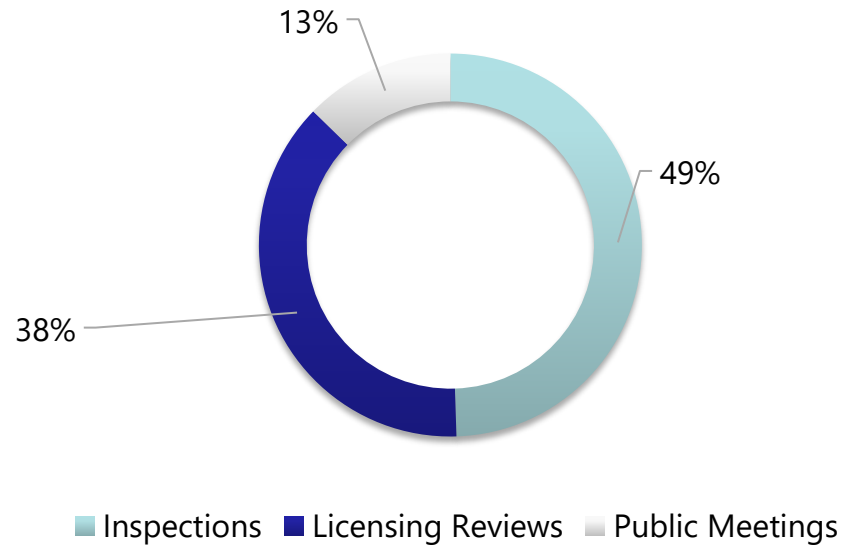


- Leak Before Break Methodology
- Steam Generator Repairs
- Fire Protection NFPA-805 Implementation
- Relief Requests for Certain ISI Activities

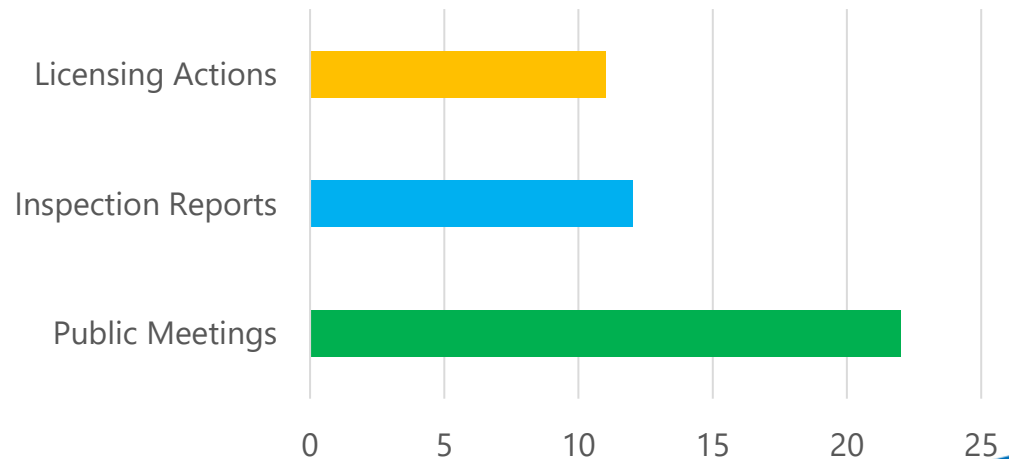
Public Outreach



The NRC conducted numerous public meetings throughout the potential restart project, allowing the opportunity to speak directly to NRC inspectors and technical staff. Additional meetings are still underway for the items still under review.



NRC Actions Since 2023



The NRC dedicates **over 35 direct staff hours** to each public meeting

Steam Generators Palisades Restart

Paul Klein, Senior Materials Engineer
Corrosion and Steam Generator Branch
NRR/DNRL

Special Technical Topic - Steam Generators



- Combustion Engineering Model 2530 Steam Generators (SGs)
 - 8219 tubes per SG, installed in 1990
 - Alloy 600 mill annealed tubing
 - Nominal 0.75 inch diameter, 0.042 inch wall thickness
 - Rows 1-18 U-bend, Rows 19-138 square bend design
 - Horizontal stainless steel lattice type "eggcrate" support plates
- September 3, 2024 phone call between NRC Staff and Holtec to discuss ongoing SG inspections (ML24267A296). Palisades experienced significant increase in axial outside diameter stress corrosion cracking indications (ODSCC) at the eggcrate supports.
- The NRC released a Preliminary Notification on September 18, 2024 (ML24262A092)
- During 2025, in-situ pressure testing (ISPT) of 17 tubes in SG A and 5 tubes in SG B was performed to confirm tube integrity as part of condition monitoring.
All tubes passed ISPT.

Special Technical Topic - Steam Generators

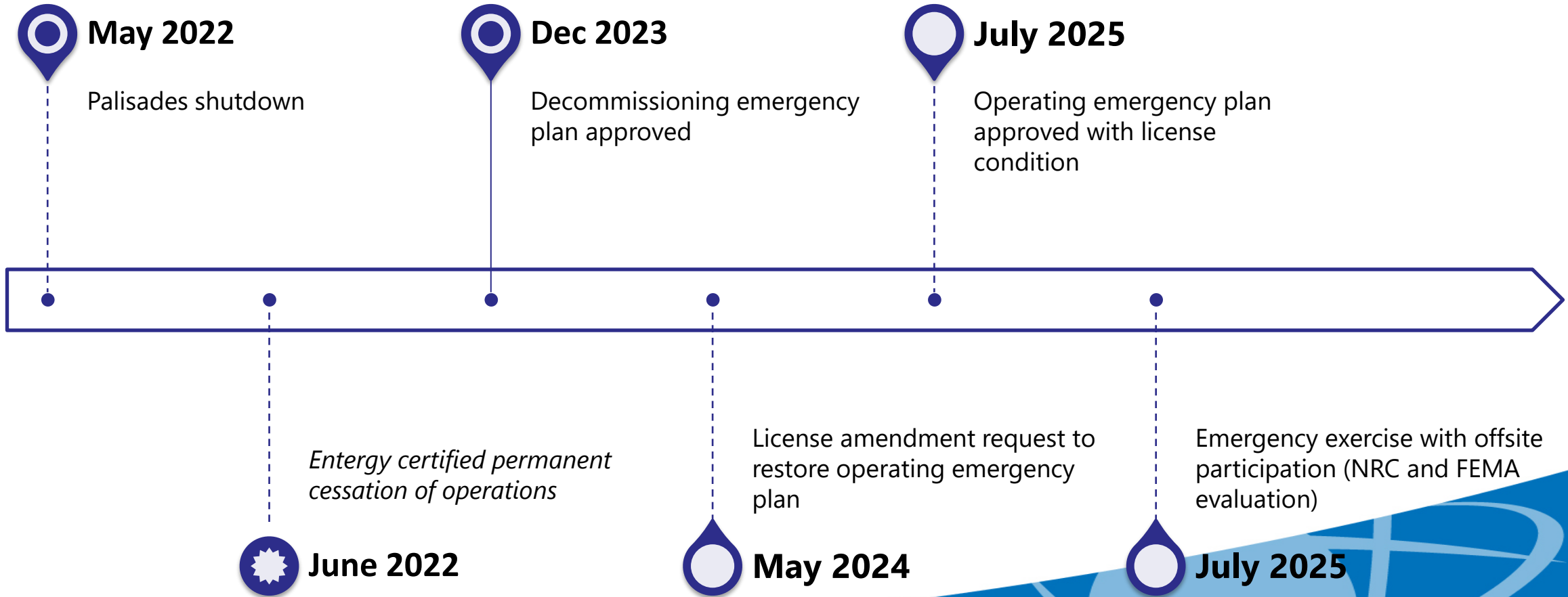


- The licensee submitted an LAR in Feb. 2025 requesting approval for use of a Framatome Alloy 690 leak limiting sleeve to repair hot leg support plate ODS/CC locations. This LAR is under review, RAI responses (ML25211A324, public)
- NRC technical staff performed an audit at Framatome in May 2025 to better understand the sleeve design, installation process, and eddy current qualification work
- Sleeve installation (in lieu of tube plugging) would maintain the SGs heat transfer capability to operate Palisades at full power

Emergency Preparedness Palisades Restart

Jeffrey Herrera, Senior EP Specialist
Reactor Licensing Branch
NSIR/DPR

Emergency Preparedness Timeline



Holtec Emergency Plan Request



- License amendment request
 - Restore operating emergency plan prior to shutdown revision 32 (using NUREG-0654, Rev. 2)
 - Restore emergency action level scheme prior to shutdown (using NEI 99-01, rev. 5)
- Requested timeline
 - May 1, 2024 – license amendment request submitted.
 - Holtec requested completion prior to fuel load (4th Quarter 2025)

Emergency Plan Requirements



License Amendment

- NRC Regulatory requirements
 - 10 CFR 50.47 and Appendix E
 - 16 planning standards
 - Applicable sections of Appendix E
- Guidance Documents:
 - NUREG-0654/FEMA REP-1 Revision 2 "Criteria for Preparation and Evaluation of Radiological Emergency response Plans and Preparedness in Support of Nuclear Power Plants" (ML19347D139)
 - NEI 99-01 "Development of Emergency Action Levels for Non-Passive Reactors" Revision 5 and 6 (one EAL) [ML080450149 and ML12326A805 respectively]
- Additional regulatory requirements
 - Submit updated annual population estimate (Part 50 Appendix E.IV.5)
- FEMA evaluation of state and local emergency plans
 - FEMA requirements under 44 CFR 350
 - FEMA to review offsite emergency plans and evaluate offsite actions during exercise
 - FEMA reviews the alert and notification system design report and submits results to the NRC

Emergency Plan Review



- Reactor Licensing Branch (RLB) staff reviewed Holtec's emergency plan in two parts:
 - Review of the emergency plan
 - Review of the emergency action levels (EALs)
- Emergency Plan Review
 - Review of submitted emergency plan using guidance. Previous emergency plan (Rev. 32) was compared to ensure there were no additional changes.
 - NUREG-0654/FEMA REP-1 Revision 2
- EALs
 - Reviewed submitted emergency action levels using NEI Guidance document 99-01, Revision 5
- FEMA Interim finding
 - FEMA provided an interim finding to the NRC on June 27, 2025, which allowed the NRC to issue the license amendment with a license condition pending a FEMA final finding of reasonable assurance

Emergency Plan Deviations



- Emergency Action Levels (EALs)
 - Added EALs to address lessons learned from Fukushima added to NEI 99-01, Revision 6
 - Modified EAL associated with Independent spent fuel storage installation (based on draft NEI 99-01, Revision 7)
- Emergency Plan
 - Three deviations from NUREG-0654 Revision 2
 - Remote staffing of augmenting engineers (Rx, Mechanical, Electrical) as well as EOF Dose Assessor
 - Information Technology services not necessarily being in the emergency response facilities
 - No TSC dose assessor due to EOF dose assessor staffing at same time

Evacuation Time Estimates (ETE)



- Palisades submitted an updated ETE on September 7, 2022, using the 2020 Census data in accordance with Appendix E to Part 50 Section IV
 - Section 1.4 – Permanent resident population decreased by 4.5% (2010 to 2020 Census Data)
 - Section M.3 – 107% change in permanent resident population within the 2-mile region would require an updated ETE study
- Completeness review of ETE study completed in February 2023
 - Reviewed in accordance with NUREG/CR-7002 "*Criteria for Development of Evacuation Time Estimate Studies*" Revision 1 (ML21013A504)
 - Reviewed and found to be generally consistent with the guidance in NUREG/CR-7002 Revision 1 and, as such, found to be complete
- Holtec completed an annual population estimate in August 2024

Emergency Exercise



- Palisades conducted an emergency preparedness exercise on July 29, 2025
 - This exercise was led by Region III Emergency Preparedness inspectors
 - Two Reactor Licensing Branch Members (Emergency Preparedness Specialist and Branch Chief) supported the exercise evaluation at the TSC and EOF
- FEMA conducted the evaluation of the offsite response capabilities as part of their ability to issue a final finding
 - FEMA conducted a public meeting after the exercise and there were no issues that rose to the level of a FEMA finding

Inspection and Site Activities

Palisades Restart

Jason Kozal, Division Director

April Nguyen, Team Lead

Region III/DORS

Palisades Site Activities Update



- Inspection Activities
- Staffing
- Overview of Startup Sequence
- Technical Topics of Interest

Inspection Activities

Completed	In Progress	Planned
Simulator	System Return to Service	Cybersecurity (Pre-Fuel Load & Post-Fuel Load)
Biennial Problem Identification and Resolution	Plant Modifications	Fire Protection Team Inspection
Emergency Preparedness Exercise	In-service Inspection Repair Activities	License Renewal Phase IV
	Physical Security	

Inspections are being conducted using mostly baseline procedures to ensure programs, procedures, and SSCs meet regulatory requirements and industry standards for normal plant operations. Some reactor startup procedures are being utilized, as well as newly created procedures for Cyber Security.

Inspection Focus Item – System Return to Service Reviews



SRTS Plans

- Completed initial reviews of 70% of the 75 System Return to Service (SRTS) plans
- Plans document activities performed to verify configuration & condition of systems, structures, & components (SSCs)
- Plans identify required maintenance and testing, including modifications
- Plans prioritize repairs, open corrective action items, & system enhancements

Inspection

- Phased approach for review of plans and associated activities
- Risk-informed in-field walkdowns and observations of maintenance and testing
- Inspection based on licensee schedule & when systems needed for plant operations
- Verification of operability/functionality by reviewing work orders, technical specifications, and code requirements

Examples of SRTS Inspection Activities



Emergency Diesel Generators

- Review of plan identified critical preventive maintenance activities and prior deficiencies that needed to be addressed
- In-field inspection observed maintenance activities and verified system material condition
- Work also included corrective maintenance to address discovery items
- Test starts and 24-hour endurance run for post-maintenance testing

Additional Follow-Up

- Inspection and cleaning of safety-related Fuel Oil Tank
- Evaluation of any issues identified during maintenance that may impact operability
- Dedication of safety-related parts
- Operators and Inspectors conduct system walkdowns/alignment prior to transitioning to Mode of Applicability for EDGs

Inspection Focus Items – Modifications for Longer-Term Reliability



- On-Site and Off-site Power maintenance
 - Replace Station Batteries
 - Replace Generator Output Breaker
 - Address prior issue with coordination of DC Breakers
- Implementation of modifications for Digital I&C and to address obsolescence issues
 - Auxiliary Feedwater Actuation System
 - Replacement of Rosemont Transmitters
 - Core Monitoring System Upgrade



Inspection Focus Items – Inspection & Verification of Mechanical Reliability



- Inspection, cleaning, and NDE of critical heat exchangers per Generic Letter 89-13 program
- Inspect and repair known susceptible areas of buried piping
 - Service Water System, Condensate Storage Tank outlet piping, Radwaste piping to external hold tanks
- Verification of Containment Structural Integrity
 - Inspection, testing, and cleaning of containment tendons
 - Containment penetration maintenance and verification
 - Internal containment concrete structural inspections and repairs



Inspection Focus Item – Program Re-implementation



- Inspectors have reviewed plans for re-implementation of required programs
- Focus on verifying guidance documents and implementing procedures are revised for normal plant operations and meets regulatory requirements and current industry standards

Examples include the Corrective Action Program, Fire Protection Program, and Cyber Security Program



Staffing – Licensed Operators

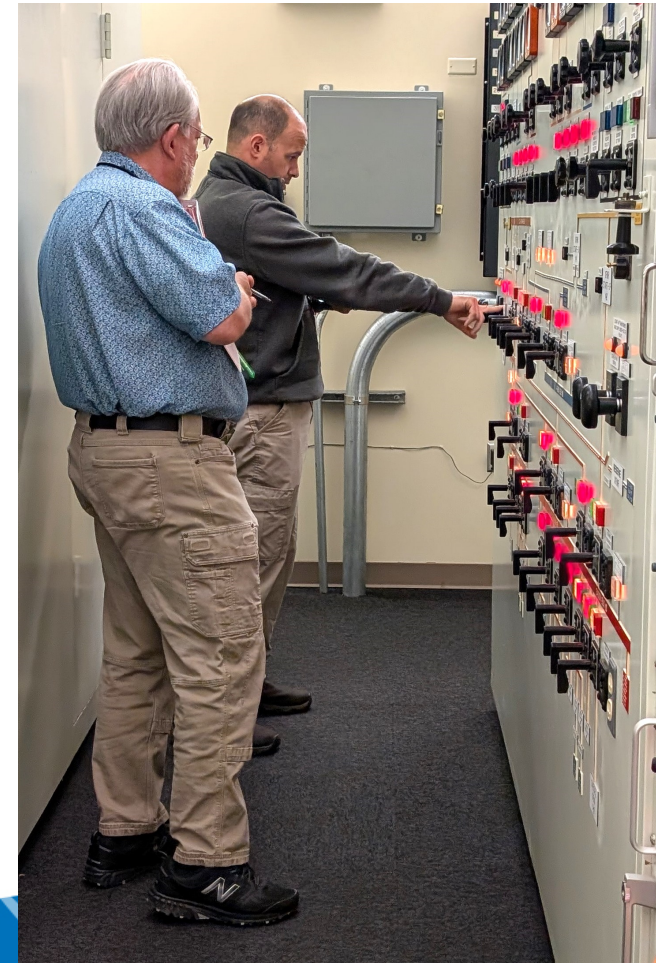
- Simulator restored as a plant-reference simulator in February 2024
- Full accreditation of Licensed Operator Training in March 2025
- NRC inspection of licensed operator training found that training has shown to be effective

Re-licensed Operators

- 16 SROs
- 7 ROs

2025 Initial Licensed Operator Class

- 2 SROs
- 8 ROs



Staffing – Other Site Groups

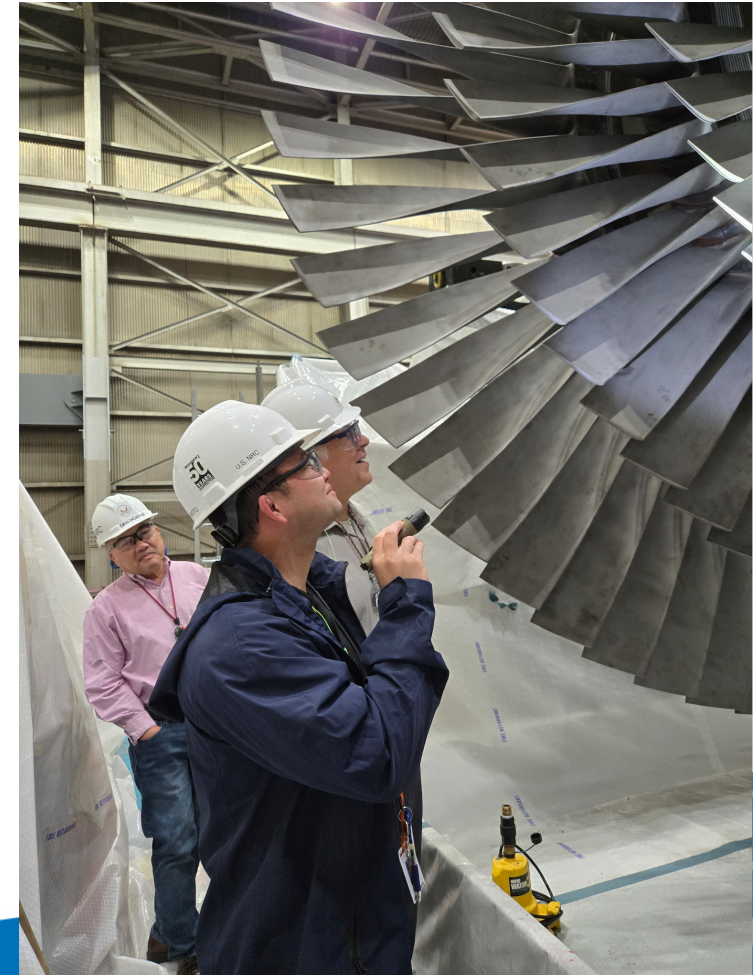


- The site's organizational structure, functions and responsibilities were reviewed as part of the license transfer application using applicable guidance in NUREG-0800
- Total permanent site staff 600 individuals across all departments. Open positions are supplemented by contractors.
- Full accreditation of Maintenance and Technical Training in May 2025
- Emergency Response Organization teams are fully staffed and qualified to meet the requirements for license transition to operations

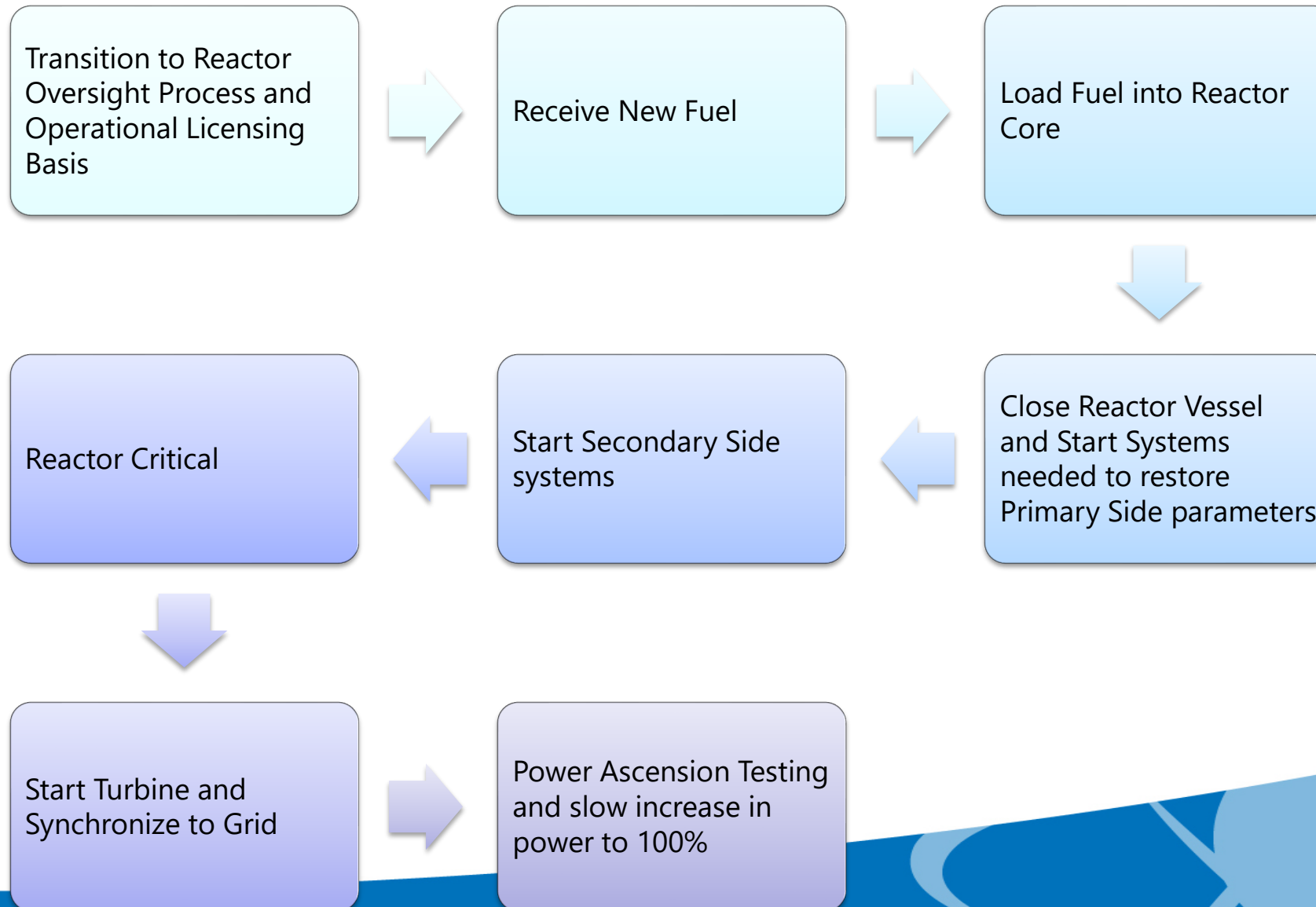
Process for Startup



- Once Holtec implements their licensing bundle and other licensing actions, they are required to follow the operating license to meet NRC's safety requirements
- Implementation of actions will allow Holtec to commence moving through the startup process
- Holtec's Licensed Operators are licensed by the NRC and are personally responsible for safe operation of the nuclear reactor
- NRC inspectors are onsite to observe how they meet the requirements



Overview of Startup Sequence



Inspection Topics of Interest – Steam Generators

What has been completed?

- Initial Eddy Current Testing (ECT) of all tubes
- Visual examinations of the secondary side
- FOSAR and sludge lancing
- SG Tube In-Situ pressure testing for selected tubes in both generators
- Sleeving of SG tubes to repair identified indications
- Post-sleeving ECT

Additional Activities

- Secondary side repairs
- Secondary side cleaning and flushes



Inspection Topics of Interest – Reactor Pressure Vessel and Head



What has been completed?

- Visual examination of RPV interior surface, supports, core shroud plates, core support plate, and fuel alignment plate
- NDE and evaluation of Core Shroud Bolts and Clevis Bolts
- NDE of RPV Head Vent Line
- NDE of vessel welds, vessel-to-nozzle welds, and nozzle-to-pipe welds

*Inspections completed per ASME Code and MRP-227

Activities in Progress

- RPV Head CRDM Half Nozzle repairs to address Alloy 600 weld issue
- Reactor Vessel evaluations for power operations
- Currently, no issues of safety significance have been identified from these activities.

Inspection Topics of Interest – Primary Coolant System



Alloy 600 Mitigation Activities

- NDE of weld overlay locations completed
- Full dissimilar metal structural weld overlays completed for specific areas such as Safety Injection piping, branch connections, and Shutdown Cooling system connections
- Continue full weld overlays

System Cleanliness

- Completed an initial PCS decontamination system flush in July 2024
- Foreign Material Exclusion program is continuously observed by site personnel and inspectors to ensure proper controls are in place for work activities
- Will conduct PCS flushes with chemical treatment after work completed and prior to restarting reactor

Inspection Topics of Interest – Reactor Fuel



- Reactor will be loaded with a mix of new and used fuel
- Used fuel maintained since shutdown in the spent fuel pool
- Used fuel is inspected and cleaned prior to core load
- The core configuration will not change
- New fuel has been ordered and is being manufactured

Safety Culture



- The site has re-established its nuclear safety culture monitoring program, Employee Concerns Program, and management oversight board
- As part of the Problem Identification and Resolution inspection, safety culture inspectors determined that the licensee has maintained a SCWE where personnel feel free to raise safety concerns
 - Trust seems to permeate the work environment from the top down
 - Assessors conducted focus groups and interviews of over 90 personnel

For More Information:



- For additional information about the Palisades Potential Restart Project, please visit:

<https://www.nrc.gov/info-finder/reactors/pali.html>

- Contact us at:

PalisadesRestartProject@nrc.gov



1. Summary

Meeting title: Palisades Restart Activities

Attended participants: 87

Start time: 8/21/25, 5:44:43 AM

End time: 8/21/25, 2:27:42 PM

Meeting duration: 8h 42m 58s

Average attendance time: 2h 43m 18s

2. Participants

Name

Quynh Nguyen

Thomas Dashiell

Julie Winslow

Gregory Halnon

Marlayna Doell

Sandra Walker

Shandeth Walton

Alan Blind

Charles Moulton

Ivy Fowler

Andrea Russell

Derek Widmayer

Jay Robinson

16462584095 (Unverified)

Dennis Bley

News Channel 3 (Unverified)

Allegra Chilstrom

Keith Miller

Oren Egnal (Unverified)

Kraig Schultz - Michigan Safe Energy Future (Unverified)

Vicki Bier

Walt Kirchner

Tammy Skov

17035177420 (Unverified)

Steven Bloom

Mike Gallagher (Unverified)

Jean Fleming

Stewart Bailey

Clint Ashley

Jan O'Connell (Unverified)

William Deric Tilson

Weidong Wang

Khatchadourian, Vicken

Robert Martin

Michael J. Keegan (Unverified)

Tom Palmisano

Marissa Bailey

Ace Hoffman (Unverified)

Prema Chandrathil

Manna Jo Greene (Unverified)
Daryl Davis (Unverified)
Arnold Gundersen
Vesna Dimitrijevic
Scott Palmtag
15176778312 (Unverified)
Matthew Domke
Laura Willingham
Joon Park
Paul Roth
Brenna Ruff
Jan Boudart
Steve Smith-DSS
Edwin Lyman
Eric Magnuson
Hossein Nourbakhsh
12404623216 (Unverified)
Ron Ballinger
Jack Giessner
King, Alexandra
Christina Antonescu
18607296981 (Unverified)
Scott Palmtag
Bette Pierman
Atif Shaikh
Marlena Tatkowski
Viktoria Mitlyng
Edward Robinson
Lovett, Alan
Diane D'Arrigo
Gurjendra Bedi
Rob Krsek
Takuma Okamoto
Rodney Clagg
Christopher Brown
jan Boudart (Unverified)
James Drabble
Dillon Reed (Unverified)
On Yee
Steven Pope
John Wise
Connie Kline (Unverified)
Kevin Bernstein
Anita Ghosh Naber
Denise J (Unverified)
Denise Jakobsberg
Pam McFarland
Terry Lodge (Unverified)

3. In-Meeting Activities

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