Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
Power Uprates Subcommittee: Open Session

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Friday, July 26, 2013

Work Order No.: NRC-100 Pages 1-78

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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

5 (ACRS)

6 + + + + +

7 POWER UPRATES SUBCOMMITTEE

8 OPEN SESSION

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10 FRIDAY

11 JULY 26, 2013

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13 ROCKVILLE, MARYLAND

14 + + + + +

15 The Subcommittee met at the Nuclear

16 Regulatory Commission, Two White Flint North, Room T2B3,

17 11545 Rockville Pike, at 8:00 a.m., Joy Rempe, Chairman,

18 presiding.

19 SUBCOMMITTEE MEMBERS:

20 JOY REMPE, Chairman

21 J. SAM ARMIJO, Member

22 SANJOY BANERJEE, Member

23 CHARLES H. BROWN, JR. Member

24 MICHAEL CORRADINI, Member

25 HAROLD B. RAY, Member

1 STEPHEN P. SCHULTZ, Member
2 WILLIAM J. SHACK, Member
3 GORDON R. SKILLMAN, Member
4
5 ACRS CONSULTANTS PRESENT:
6 KORD SMITH
7
8 NRC STAFF PRESENT:
9 PETER WEN, Designated Federal Official
10 JOHN AVERY, NRR/DE
11 CHAKRAPANI BASAVARAJU, NRR/DE/EMCB
12 TERRY BELTZ, NRR/DORL
13 MARIOLY DIAZ COLON, NRR/DE
14 WILLIAM JESSUP, NRR/DE
15 KAMAL MANOLY, SLA
16 MATTHEW McCONNELL, NRR
17 JOHN MONNINGER, NRR/DORL
18 ALOYSIUS OBODOAKO, NRR/DE
19 SWAGATA SOM, NRR
20 ALEXANDER TSIRIGOTIS, NRR/DE/EMCB
21 YUKEN WONG, NRO/DE
22 MATT YODER, NRR/DE
23
24
25

1 ALSO PRESENT:

2 KENNETH AINGER, Exelon

3 WILLIAM M. BENTLEY, TVA/Browns Ferry

4 JOHN BJORSETH, NSPM

5 RAYMOND DENNIS, Westinghouse

6 GENE ECKHOLT, NSPM

7 JOHN FIELDS, NSPM

8 DAVID FORSYTE, Westinghouse

9 STEPHEN A. HAMBRIC, Penn State University

10 (consultant to NRC)

11 STEVE HAMMER, NSPM

12 NATHAN L. HASKELL, NSPM

13 LARRY KING, GE-Hitachi

14 GIANLUCA LONGONI, Westinghouse

15 JOHN OSBORNE, TVA/Browns Ferry

16 HAROLD PAUSTIAN, NSPM

17 JOHN ROMMEL, Exelon

18 ANNMARIE ROWLAND, Westinghouse

19 MARK SCHIMMEL, NSPM

20 VIKRAM N. SHAH, ANL (consultant to NRC)

21 RICK STADTLANDER, NSPM

22 DAVID SUDDABY, Westinghouse

23

24

25

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3 P R O C E E D I N G S
4 7:59 a.m.
5 CHAIR REMPE: Okay. We're going to go back
6 on the record and continue our meeting on the Monticello
7 EPU application. And we're going to start off with
8 Terry speaking, right?
9 MR. BELTZ: Yes.
10 CHAIR REMPE: Okay.
11 MR. BELTZ: Good morning. My name is Terry
12 Beltz. I'm senior project manager in the Division of
13 Operating Reactor Licensing and the project manager for
14 Monticello and Point Beach. Again, appreciate the
15 opportunity to address the ACRS members today.
16 What I'm going to do is I'm just going to
17 be here just briefly go over the agenda items for today.
18 Both XcelEnergy and the NRC staff are going
19 to be giving presentations on materials and in
20 mechanical and civil engineering.
21 XcelEnergy is going to give a presentation
22 on the steam dryer overview followed by the staff going
23 over their steam dryer review and the current status
24 of that review.
25 The steam dryer review and status, that will

be a closed session. And then following in the afternoon, then, we'll have both XcelEnergy again and the NRC staff giving presentations on electrical engineering.

I'm going to turn the presentation over to XcelEnergy. They do have some follow-up items that they want to discuss prior to their materials presentation.

They also have some follow-up items that are proprietary. Now, it's GE proprietary. So, they want to try to do that maybe before the closed session.

CHAIR REMPE: It will have to be part of the closed session if it's proprietary, right?

MR. BELTZ: Well, the problem with that is that's a Westinghouse proprietary. We'll have Westinghouse in the room also. So, we have to somehow coordinate that.

CHAIR REMPE: We'll switch things and have a different type of closed session. But just because of the phone line possibly and things, let's try and do it together.

MEMBER CORRADINI: Well, and the transcription, yes.

CHAIR REMPE: Yes, sir.

MEMBER CORRADINI: It's kind of a sparse crowd. So, maybe closing it now might be more possible.

1 I mean, I'm looking out at the -

2 MR. BELTZ: The masses.

3 MEMBER CORRADINI: The masses don't look as

4 massive as yesterday.

5 MEMBER ARMIJO: Well, are the GE people here

6 ready to go?

7 MR. FIELDS: We have the actual information.

8 MEMBER ARMIJO: You have the information

9 that you need.

10 MR. FIELDS: Yes, but it is GE proprietary.

11 MEMBER ARMIJO: Okay. Well, you might want

12 to just do it now and get it out of the way.

13 MEMBER BANERJEE: We close sessions

14 selectively.

15 CHAIR REMPE: Okay, we can do it. It's up

16 to you. We'll have to make sure the recorder is aware

17 of it.

18 So, do you want to - they can just start

19 their follow-up actions and then we'll stop for a minute

20 and close it and do some phone line things and back open

21 again?

22 MR. BELTZ: Sure.

23 CHAIR REMPE: Okay.

24 MR. BELTZ: Thank you.

25 (Off-the-record comments.)

1 (Pause in the proceedings.)

2 MEMBER ARMIJO: Are we in closed session now?

3 CHAIR REMPE: No, I think we're going to

4 start off open, right? And then you'll tell us when

5 --

6 MR. BELTZ: When to close.

7 CHAIR REMPE: - we magically need to change

8 then.

9 MEMBER ARMIJO: Okay, great.

10 MR. HAMMER: We'll start off with river water

11 temps.

12 MR. BELTZ: Sure.

13 (Discussion off the record.)

14 MR. HAMMER: This was prettier on my computer

15 at home, but it didn't quite copy over here to the

16 presentation quite as nicely.

17 There was a question yesterday about the

18 river response at Monticello. And so, you can see here

19 quite a number of years from 1987 up through 2006 where

20 we've plotted the range of river temperatures by month

21 here.

22 As it turns out, you know, our design river

23 - servicewater temperature is 90 degrees Fahrenheit.

24 So, you can see, you know, how we typically range there.

25 It's pretty unusual for us to get up above

80, basically, a lot of times. But if you look at the exceedance probability, there is another slide then on the -

MR. FIELDS: Which tab is that data?

MR. HAMMER: No, that was in the PowerPoint. Sorry.

MR. FIELDS: Oh.

MR. HAMMER: Not the - go down one more. Yes, so this slide shows the exceedance probability. It's a pretty easy number to remember. Basically, about if the river temperature is 50 degrees Fahrenheit, that's about the median. So, half the data is above it, half the data is below it.

So, the river temperature is probably the single thing that drives containment response the most, you know. So, it's the use of 90 degrees Fahrenheit for us in Minnesota, that's being a pretty conservative value.

MEMBER CORRADINI: Six significant figures. Pretty conservative?

MR. HAMMER: Well, yes.

MEMBER CORRADINI: Don't overstate it.

(Laughter.)

MR. HAMMER: Sorry.

MEMBER BANERJEE: Well, there's global

warming.

MEMBER CORRADINI: Up there, they could use it.

(Discussion off the record.)

MR. HAMMER: We're looking at global warming as being an advantage in Minnesota.

(Laughter.)

MR. HAMMER: Anyhow, any questions on river temperature?

MEMBER BANERJEE: It will increase the number of blackflies, though.

(Laughter.)

(Discussion off the record.)

MR. HAMMER: Go to the first slide, I think.

(Discussion off the record.)

MR. HAMMER: Yes, there was a question yesterday on the peak power density for a transient event and it turns out this was provided by GE yesterday that the loss of feedwater heater event had a power density of 13.76 kilowatts per foot.

MEMBER ARMIJO: It's really - not really power density, but it's peak LHGR.

CHAIR REMPE: Right.

MR. HAMMER: Yes.

MEMBER ARMIJO: But that's pretty low.

1 MR. HAMMER: And after that, I think it gets
2 proprietary.
3 MEMBER ARMIJO: Okay.
4 MR. FIELDS: Want me to do tech specs?
5 MR. HAMMER: Yes, go ahead and do tech specs.
6 MR. FIELDS: John Fields for Northern States
7 Power -
8 CHAIR REMPE: That's not proprietary, the
9 tech specs?
10 MR. FIELDS: This is not.
11 CHAIR REMPE: Okay, let's do that.
12 MR. FIELDS: There was a question yesterday
13 concerning our tech spec changes for EPU. Basically,
14 if I could summarize them, they're pretty much all just
15 based on changing power level. So, percents of things
16 that are changing.
17 There was a couple other ones. We talked
18 about the ADS, having to have three valves for ADS
19 already.
20 The other one that we had was the MSIV choke
21 flow. That was as a result of a GE R21 notification
22 on their conversion between delta pressure and the
23 percent flow and how that was calculated. So, that was
24 just a response to an industry OE item that we had.
25 That's all the tech spec changes that we

1 had proposed.

2 MEMBER SCHULTZ: Okay. So, the 380 S valves

3 is proposed, it's not something you applied to in

4 advance.

5 MR. FIELDS: That's correct. It is proposed

6 under EPU.

7 MEMBER SCHULTZ: Thank you.

8 MR. HAMMER: Yes, and I think after that we

9 have one other question, but that one is proprietary.

10 There was a question on the - all of the

11 uncertainties applied to the NPSH calcs.

12 (Discussion off the record.)

13 CHAIR REMPE: Is there anyone in the room

14 who needs to be -

15 MR. HAMMER: I don't think so. I think we've

16 got a few guys that were on the Committee. So, I think

17 we're all right.

18 CHAIR REMPE: Just give us a minute, please.

19 (Discussion off the record.)

20 DR. SMITH: Steve, even though you had very

21 nice data with no points over 90 degrees, the

22 mathematicians never like to see the zero in your 90.

23 MR. HAMMER: Yes, yes.

24 CHAIR REMPE: Lots of significant digits.

25 (Discussion off the record.)

1 DR. SMITH: Yes, we love that kind of stuff.
2 MR. HAMMER: Are we ready?
3 CHAIR REMPE: No, wait until Peter gets back,
4 please.
5 (Whereupon, the proceedings went off the
6 record at 8:07 a.m. for a closed session and went back
7 on the record at 8:20 a.m.)
8 CHAIR REMPE: So, we should go back on. Open
9 session, okay.
10 (Discussion off the record.)
11 MEMBER BANERJEE: And there was also that
12 piece of the 15 cases that contain --
13 (Simultaneous speaking.)
14 CHAIR REMPE: We want to know the different
15 cases.
16 MEMBER BANERJEE: Whatever that is. Send
17 it to Peter, and then he can send it to me.
18 MR. HAMMER: I'll tell you where it is.
19 MEMBER BANERJEE: So, Bill has this machine
20 he can find instantly where everything is.
21 MEMBER CORRADINI: He's retired. Leave him
22 alone.
23 MEMBER SHACK: Actually, I don't have that.
24 MEMBER BANERJEE: That's amazing.
25 MEMBER SHACK: We didn't get the reference.

1 MEMBER BANERJEE: The first time the machine
2 has been defeated.
3 MEMBER SHACK: We have the accession number.
4 MEMBER BANERJEE: Well, in that case if Bill
5 doesn't have it, I'm sure nobody has it.
6 MEMBER SHACK: Reference 54 in the SE.
7 (Pause in the proceedings.)
8 MR. BJORSETH: Are we ready to proceed?
9 CHAIR REMPE: We are.
10 MR. BJORSETH: Okay. My name is John
11 Bjorseth and I am the director of the EPU Project and
12 I'll be discussing today the materials and
13 mechanical/civil engineering aspects of our EPU
14 Project. And that includes both flow-induced
15 vibration, as well as reactor vessel structural topics.
16 First of all, flow-induced vibration, I'm
17 up to Page 102, this does include - the scoping of this
18 does include the main steam, feedwater and reactor
19 cooling system piping and supports.
20 The limits for the vibration are
21 established in the ASME ONM Part 3 and it provides
22 criterion on these limits.
23 Just a little background. At CLTP, what
24 we've got is a baseline here at full power as 14 percent
25 of that criterion is what we're seeing for our feedwater

1 system inside containment. And on our main steam inside
2 containment we're at 32 percent of those values.
3 Now, as we move outside containment, our
4 feedwater system maximum is 43 percent. And our main
5 steam outside containment is 34 percent. So, as you
6 can see, we're still - we've got a significant margin
7 to those established ASV criteria.
8 From other power uprates, they've seen
9 increases in vibration of up to 50 percent for a 20
10 percent increase.
11 So, what we've set as a threshold if we've
12 got accelerometers, we've established inside
13 containment and are in inaccessible portions outside
14 containment, then we'll also do hand-held readings on
15 the accessible parts, but we've established a criteria
16 of anything above 50 percent of the ASV criteria we will
17 stop and do the analysis.
18 One other aspect of this is we did review
19 the thermalwells on main steam and feedwater system.
20 We did identify one on main steam that becomes sensitive
21 with the natural harmonic. And we did remove that this
22 last outage. We found no thermalwells on the feedwater
23 system. They had natural harmonics.
24 On the next page for flow-induced
25 vibration, we have performed an analysis on the RPV

1 internals with regard to flow-induced vibration.

2 Our maximum core flow does stay the same.

3 Our 105 percent of rated core flow goes up

4 correspondingly with the EPU. And our corresponding

5 feedwater and steam flows do increase.

6 But as a result of all of that analysis,

7 we did conclude that we meet the acceptance criteria

8 of 10 ksi peak stress intensity, and that is less than

9 the code. So, we did confirm the structural integrity

10 of reactor vessel internals.

11 CHAIR REMPE: When you were going through

12 life extension, I guess there was a lot of discussion

13 about this current state of the internals. And there

14 were a lot of additional inspections. And the

15 inspections are confirming that everything is in a good

16 state at this time?

17 MR. BJORSETH: Actually, the internals of

18 Monticello reactor are in very good condition. We

19 continue to comply with the BWR - or the BWRVIP program

20 and do those inspections.

21 MR. SCHIMMEL: Well, we send in - the results

22 of those inspections in as a result of the end of this

23 last outage.

24 CHAIR REMPE: Okay.

25 MR. BJORSETH: Moving on to reactor vessel

1 structural topics, again this is fairly benign as we
2 go through this process because of the zero power change
3 EPU.
4 Design conditions really have not changed.
5 The main issue is steam dryer, which we will discuss
6 separately later.
7 And we've had very small changes in both
8 the normal and upset conditions for coolant and flow.
9 And we have evaluated the stresses on emergency and
10 faulted conditions.
11 Reactor internal pressure differentials
12 are very slightly changed, again, and they were all
13 within the DPs that are within the bounding analysis.
14 So, bottom line is our stress analysis of
15 reactor vessel structural is very little affect and well
16 within the allowables.
17 The next page we get into the fatigue usage
18 factors. And there you see the CLTP cumulative usage
19 factors, as well as the EPU and the various increases.
20 They're all within the acceptable range of one.
21 You do see that the feedwater nozzle has
22 increased more than the others. The main factor driving
23 net increase is the increase in feedwater flow.
24 As we have the turbulence coming out of the
25 sparger coming through the nozzles, we do have

1 alternating stresses that do increase as part of that
2 increase in feedwater flow. And that drives that usage
3 factor up.
4 That was all as a result of back in the early
5 `80s some of you may remember NUREG-0619 and the cracking
6 on the surface of the nozzles. And that now just shows
7 that we're good there.
8 Monticello has historically been good. We
9 do have loaded in thermal sleeves. So, we don't have
10 that bypass that can give our spargers -
11 MEMBER BANERJEE: The spargers have jets
12 which are horizontal, or they point downwards?
13 MR. BJORSETH: They're horizontal. What it
14 is, is a box where it comes in with the thermal sleeve.
15 MEMBER BANERJEE: Yes.
16 MR. BJORSETH: Then the sparger runs along
17 the inside of the vessel with the holes on the sparger
18 pointing out.
19 MEMBER BANERJEE: Yes.
20 MR. BJORSETH: But you still get the
21 turbulence with the recirc flow coming down. So, you
22 get that alternating temperature right at the surface
23 of that nozzle.
24 MEMBER BANERJEE: So, it doesn't point down.
25 It points horizontally into the -

1 MR. BJORSETH: To the downcomer.

2 MEMBER BANERJEE: Okay. And do you do any

3 hydrogen addition or -

4 MR. BJORSETH: Yes, we do.

5 MEMBER BANERJEE: Okay. Where is that done?

6 MR. BJORSETH: That's done prior to the feed

7 pumps. So, it gets mixed up going through the feedwater

8 system and injected in the -

9 MEMBER BANERJEE: With the feedwater. So,

10 you don't count on those jets to do the mixing.

11 MR. BJORSETH: No.

12 MEMBER ARMIJO: No.

13 MEMBER BANERJEE: Okay.

14 MEMBER ARMIJO: You are adjusting your

15 hydrogen input to compensate for the increased

16 radiolysis at EPU?

17 MR. BJORSETH: Yes. Actually, what we've

18 done is as power comes up, the hydrogen level comes up,

19 but then we've also got noble metals that will be

20 starting here three months after startup. So, it would

21 be in October time frame.

22 Once we get a surface oxide on the fuel and

23 the new components, we'll be starting with noble metals,

24 which will allow us to decrease our hydrogen injections

25 to maintain structural coverage.

1 MEMBER SKILLMAN: John, I understand the
2 increases in the CUF for the bellows and for the closure
3 studs.
4 MR. BJORSETH: Yes.
5 MEMBER SKILLMAN: Why with your revised
6 calculation of methodology - I got that backwards. I
7 understand the increase for the feedwater nozzle and
8 the inlet nozzle. Why did the other two decrease?
9 MR. BJORSETH: The other two -
10 MEMBER SKILLMAN: It seems as though you've
11 done a calculational swap here.
12 MR. BJORSETH: Yes, what we've done on both
13 the refueling bellows and the main closure region studs,
14 we got a new analysis technique used. And so, that
15 maintained - it's actually a much more accurate
16 analysis. So, we were able to maintain that number the
17 same.
18 MEMBER SHACK: But these are all code-type
19 calculations. You haven't resorted to finite element
20 things to further reduce stresses.
21 MR. BJORSETH: Correct.
22 CHAIR REMPE: Why didn't you do that, then,
23 for the feedwater nozzle and some of the other
24 components?
25 MR. BJORSETH: We do have that - some of the

later analysis - in fact, Larry, I don't know if you want to talk about the later analysis techniques that are available.

(Speaking off mic.)

MR. BJORSETH: Okay. You want to talk about that why any and other analysis techniques that we've got for the feedwater nozzle and reactor recirc nozzles?

MR. KING: This is Larry King with GE-Hitachi. Feedwater nozzles, we have done some reduction with what's called the - I've got to get the right terminology. It's the rapid cycling. We've got more data on the corrosion effects and we've been able to reduce some of the effects of rapid cycling on the nozzles.

That's really the only technique change or changes that we have in the programs for evaluating these other than going into finite element analysis. And we usually don't do that unless we get to a case where it looks like it's going to exceed limits.

CHAIR REMPE: So, could I restate this that probably these other techniques were modified because you had more data and you didn't have more data at the time to improve the other components analysis?

Is that why, I mean, some of these you were at 0.861 and you revised the analysis technique so that

1 it actually decreased in your revised analysis.

2 Well, why didn't you do it for the feedwater

3 nozzle which went up to 0.9138? And what I'm hearing

4 is, well, we have some more data now, so we possibly

5 could do it and have a lower number. Is that what I'm

6 hearing?

7 MR. BJORSETH: Was it data, or was it

8 analysis -

9 MEMBER SCHULTZ: It sounds like - it looks

10 like lower input than analysis.

11 MR. BJORSETH: Yes, that's correct.

12 MEMBER SCHULTZ: You changed the duty cycle

13 both most likely with respect to what it's experienced

14 and what it will experience.

15 MR. BJORSETH: And each one of these areas

16 is very specific on what it's seeing in the EPU, because,

17 for instance, we've talked about the feedwater nozzle

18 and the variation of temperatures. That is a very

19 unique case in these four applications.

20 Recirc, main closure region studs and

21 refueling bellows each has their own separate analysis

22 has to be done. So, you can't just apply one methodology

23 to all four and say it works.

24 As you get improved methodology for a

25 specific application, you can apply it. And those two

1 both had improved methodologies.

2 CHAIR REMPE: Okay.

3 MEMBER SHACK: I mean, historically - do you

4 still have an augmented inspection on the feedwater

5 nozzle?

6 MR. BJORSETH: Absolutely.

7 MEMBER SHACK: That's all required since the

8 1980 time frame.

9 MR. BJORSETH: Yes.

10 MEMBER SKILLMAN: How do you know that the

11 cycles that you began your calculation with are

12 accurate?

13 MR. BJORSETH: Want to talk about the cycle?

14 MR. HASKELL: Yes. We actually have a

15 cyclic fatigue monitoring program at Monticello. And

16 it meets the requirements of our tech spec Section 5.5.4.

17 And it includes the components listed in our USAR

18 Section 421, as well as other components.

19 And the component list was established in

20 accordance with NUREG-6260, which is the application

21 of interim fatigue curves to selected nuclear power

22 plant components published in March of 1995.

23 The component list includes the components

24 associated with the vessel, which are the nozzles, the

25 head studs and the things that are listed here.

1 And components not associated with the
2 vessel also are in the monitoring program. And those
3 include reactor water cleanup, non-regenerative heat
4 exchangers.
5 The periodic performance of cycle counting
6 is documented in our plant procedure. It's 1475 is our
7 procedure number.
8 The most recent performance of cycle
9 counting considered the effects of
10 environmentally-assisted fatigue. And it's
11 accomplished by considering the number of cycles allowed
12 for the component and comparing those values against
13 experienced transients that we've had.
14 We went back and reviewed plant records
15 against the criteria that constitute a cycle in the
16 design of the component. And the results of that
17 accounting were validated against the allowable number
18 of cycles to ensure the component usage factor remains
19 less than one.
20 So, we do that evaluation on a cycle basis.
21 So, coming out of this refueling outage we will also
22 do an update to the cumulative usage factors and keep
23 those current. So, that's how we do that.
24 MEMBER SKILLMAN: Do you have confidence
25 that your data from 1970 to 1990 is accurate?

1 MR. HASKELL: We did a pretty good scrub and
2 search of our records to make sure that we have good
3 data there. So, yes, we're pretty confident.
4 MEMBER SKILLMAN: Thank you.
5 MR. HASKELL: Yes.
6 MEMBER ARMIJO: Just going back a little bit
7 to the vessel internals, you've - could you just fill
8 me in on the status of your top guide core plate and
9 then the shroud, the extent of any kind of cracking that
10 you may have found during inspection?
11 (Discussion off the record.)
12 MR. BJORSETH: That will have to be a
13 bringback, because I don't have that data. I can tell
14 you we did the inspection. We did, you know, we continue
15 to monitor that in accordance with the BWRVIP program
16 and do those inspections.
17 MEMBER ARMIJO: Have you found any cracking
18 in the top guide? I know it's difficult to do. And,
19 also, do you have any cracks in your shroud?
20 You're not clamping your shroud, are you?
21 MR. BJORSETH: No. No, we have not had the
22 serious indications that some of the other plants have
23 had to take corrective actions for in clamping and things
24 like that.
25 MEMBER ARMIJO: Okay. So, your shroud is

1 okay. But as far as the inspection results on the top
2 guide, you don't have that available?
3 MR. BJORSETH: We can get that information
4 for you.
5 MEMBER ARMIJO: Sure. Maybe later today.
6 MR. BJORSETH: We can take that action and
7 provide it.
8 MEMBER ARMIJO: Thank you.
9 MR. BJORSETH: Okay. The next one, we'll
10 move on to fracture toughness and materials. And,
11 again, we used the 10 CFR 50 Appendix G requirements.
12 And because the fluence values increase for
13 EPU conditions and those materials did not change, we've
14 reanalyzed that through the BWRVIP program.
15 We did see slight changes to temperature
16 and flow as we've discussed previously. And water
17 chemistry conditions maintained constant within the
18 EPRI guidelines.
19 But the bottom line is on the reactor
20 pressure vessel we have not seen any issues and we're
21 still within acceptable limitations of guidelines
22 there.
23 MEMBER SKILLMAN: John, let me ask a
24 question.
25 MR. BJORSETH: Go ahead.

1 MEMBER SKILLMAN: In your material, you've
2 taken part of your specimens and put them in Prairie
3 Island as part of your surveillance program.
4 I understand the concept, but I'm baffled
5 by how one can make the jump between the geometry and
6 the neutron energies in a B and accepting those specimens
7 in a very different environment at least as I see it
8 in a P, in a pressurized water reactor.
9 Could someone please explain that to me?
10 (Discussion off the record.)
11 MR. SCHIMMEL: I'm going to have to make that
12 a bringback.
13 MEMBER SKILLMAN: Clearly, you're counting
14 on fluence values for your extended -
15 MR. SCHIMMEL: Do you understand his
16 question?
17 MEMBER SKILLMAN: - exposure for the
18 specimens that you put in Prairie Island to be -
19 MR. SCHIMMEL: Rate of exposure of the -
20 MEMBER SKILLMAN: - your lead indicator for
21 this reactor vessel. So, I'm curious -
22 MR. SCHIMMEL: How we correlate the two.
23 MEMBER SKILLMAN: - how those become
24 correlated.
25 MR. SCHIMMEL: Okay.

1 MEMBER SKILLMAN: Thank you.

2 MR. BJORSETH: Okay. And for IGSCC and
3 IASCC, again, no reactor internal changes. Slight
4 changes to temperature, pressure and flow, but the peak
5 fluence is very negligible on the irradiation-assisted
6 stress corrosion cracking.

7 Will be managed by maintaining the hydrogen
8 water chemistry conditions and maintaining the
9 chemistry guidelines within the EPRI limitations. And
10 then we augmented them in the very near future with our
11 noble metals.

12 For the overpressure protection, this is
13 a consistent set of numbers that we've been discussing
14 over the last day.

15 And that does includes our MSIV failure to
16 scram on limit switch pressure, the ATWS peak pressure.
17 And from an overpressure protection, we are still
18 satisfying the criteria.

19 Annulus protection, we are bounded by our
20 OLTP Loads. And we did evaluations of the off-rated
21 conditions at - we did evaluate the bio-shield design
22 limitations on our missile protection. And all of those
23 are essentially unchanged from CLTP conditions.

24 And that does conclude the mechanical and
25 civil engineering discussion. Any questions overall?

1 CHAIR REMPE: We have a presentation from
2 the staff.
3 (Pause in the proceedings.)
4 (Discussion off the record.)
5 MR. TSIRIGOTIS: Good morning. My name is
6 Alexander Tsirigotis and I -
7 CHAIR REMPE: We need to wait just a minute
8 for the computer to switch over. You may be able to
9 see the slides, but we can't. So, you might introduce
10 yourself, but don't go into too much discussion, okay?
11 MR. TSIRIGOTIS: My name is Alexander
12 Tsirigotis. I'm an engineer in the Mechanical and Civil
13 Engineering Branch of the Division of Engineering.
14 And I reviewed the licensee's evaluations
15 for the structural integrity of systems, structure,
16 components that we evaluated for the power uprate.
17 Did the slides come up yet?
18 CHAIR REMPE: Peter's working with them to
19 try and get that changed, but just be patient for a
20 minute.
21 (Discussion off the record.)
22 (Pause in the proceedings.)
23 CHAIR REMPE: Here we go. Okay.
24 MR. TSIRIGOTIS: As you've probably seen
25 from previous presentations, the original licensed

1 thermal power for Monticello was 1,670 megawatts
2 thermal.
3 The current licensed thermal power, which
4 includes this power uprate in 1998 for 6.3 percent, is
5 1,775 megawatts thermal.
6 The proposed EPU will increase the power
7 20 percent above the original licensed thermal power
8 and approximately 13 percent above the current licensed
9 thermal power and will be 2,004 megawatts thermal.
10 The Monticello EPU is a constant pressure
11 power uprate. In other words, there's no change to the
12 maximum reactor dome pressure.
13 The Monticello EPU follows the guidance
14 which is provided in the NRC-approved GEH licensing
15 topical report referred to as the CLTR.
16 That's this slide, yes. The NRC-approved
17 CLTR is for a constant power uprate with a power increase
18 of 20 percent for the plants' percent original thermal
19 power. There was a maximum steam and feedwater flow
20 increase up to 24 percent. Those are the requirements
21 of the CLTR.
22 The Monticello EPU does not change the
23 current plant maximum normal operating reactor dome
24 pressure and it increases the original thermal power
25 by 20 percent with a maximum steam and feedwater flow

1 increases of near 24 percent. Therefore, it meets the
2 mentioned CLTR requirements.
3 The Monticello also uses guidance provided
4 in the staff-approved GEH, two topical reports referred
5 to as the ELTR1 and the ELTR2. These are also generally
6 followed for constant pressure power uprate
7 evaluations.
8 The CLTR, ELTR1 and ELTR2 along with the
9 NRC ACRS have been applied to all extended power uprate
10 submittals since their NRC approval.
11 Next slide. Review scope. The impact of
12 the EPU on the structural integrity of systems,
13 structures and components was reviewed for the
14 pressure-retaining components and supports which
15 include the reactor coolant pressure boundary piping,
16 balance of plant piping, reactor pressure vessel,
17 control rod drive mechanisms, recirculation pumps.
18 And the reactor pressure vessel internals
19 and core supports were also reviewed, as well as the
20 seismic and dynamic qualification of mechanical and
21 electrical equipment.
22 In addition to the main steam, the only
23 other piping inside containment for which the piping
24 loads are not bounded in the existing design basis
25 analysis is the core spray system piping.

1 Due to the core spray piping analysis
2 temperature increase at EPU by a percentage - I don't
3 know if that percentage is proprietary information or
4 not. It's not, right?
5 It increase by a percentage of
6 approximately 17 to 18 percent from the original
7 licensed thermal power, and seven to eight percent from
8 the current licensed thermal power.
9 Much of applied stresses support load
10 summaries for the core spray line show that the
11 calculated stresses and loads meet code allowables at
12 EPU conditions.
13 The main steam piping was reanalyzed to
14 incorporate a load case to the turbine stop valve fast
15 closure transient.
16 Monticello provided maximum pipe stress
17 summaries and it included evaluation result summaries
18 for pipe support loads and loads of the SRV inlet and
19 outlet flanges, the reactor pressure vessel nozzle loads
20 and containment penetration fluid and core loads.
21 The analysis summaries so that the
22 evaluations for the main steam inside containment meet
23 all ASME code of record and design base-established
24 allowables.
25 For the feedwater inside containment from

1 the outward isolation valve to the reactor pressure
2 vessel, the design basis loads used in the current CLTP
3 analysis bound the piping loads at the EPU conditions.
4 The forward section of feedwater piping is not affected
5 by the EPU.
6 For outside containment, for piping outside
7 containment, the feedwater and condensate pump and
8 heater replacement modifications along with related
9 piping modifications were required for the EPU.
10 There were pipe changes in the
11 configuration. And, therefore, the analysis of the
12 feedwater piping and the condensate piping were required
13 to be analyzed.
14 Piping systems outside containment for
15 which pipe loads due to EPU conditions of temperature,
16 pressure and flow are not bounded in the existing design
17 basis structure analysis are the main steam, extraction
18 steam, feedwater, condensate, torus piping,
19 servicewater, emergency servicewater, heater drains,
20 cross-around piping, cross-around relief valve piping
21 and moisture separator drain lines.
22 Piping and pipe supports of these systems
23 were evaluated in accordance with the current design
24 basis codes and code year additions and addendums on
25 the existing record.

1 And as they were referenced in the
2 appropriate calculations with the code allowable values
3 and analytical techniques that were used without
4 introducing any new assumptions.
5 Evaluation summary results were provided
6 and the presented pipe stresses and pipe support load
7 summaries. So, the pipe stresses and pipe support loads
8 are within the design basis and code of record allowable
9 values.
10 The flow-induced vibration of piping, as
11 the licensee mentioned, they use the guidance of the
12 ASME OM-S/G Part 3, which is also the recommended
13 guidance by the SRP 3.9.2, dynamic testing analysis of
14 systems, structures and components.
15 The main steam and the feedwater piping,
16 the flow rates increased and the flow velocities to
17 accommodate the power uprate.
18 The licensee evaluated the flow-induced
19 vibration levels associated with the main steam and the
20 feedwater systems. And they projected - that were
21 projected to increase for EPU.
22 Review of the flow-induced vibration and
23 the power ascension testing programs are also contained
24 in different sections of the staff's SER in Section
25 2.2.6, which is the dryer section, and 2.12, which is

1 the power ascension section.

2 As the licensee mentioned, they also

3 evaluated the main steam flow restrictors and they also

4 evaluated the main steam and feedwater thermal wells

5 and the feedwater sample approach.

6 One of the thermalwells the licensee had

7 to remove and kept the connection, because that

8 thermalwell was coming close to the frequency of the

9 natural frequencies of the instrument. And, therefore,

10 they needed to remove it so that it will not go into

11 resonance.

12 For the internals, for the non-flow-induced

13 vibration part of the internals, the licensee evaluated

14 the structural effects.

15 They reconciled the evaluations for

16 stresses and they were performed consistent with the

17 current design basis analysis. The EPU loads were also

18 compared to the existing design basis analysis.

19 The summaries show that the allowable

20 stress limits meet the allowables - I'm sorry. The

21 calculated stresses limit - stresses meet the ASME code

22 allowable values for stresses and for fatigue usage

23 factors. For fatigue usage factors, they were below

24 one.

25 For the internals, it got to the

1 flow-induced vibration. The vibration levels for the
2 EPU were established by extrapolating vibration data
3 obtained during startup for Monticello and from an
4 instrumented prototype plant which is - or similar
5 plants and on the General Electric BWR operate and
6 experience.
7 The projected EPU vibration levels were
8 then compared with established vibration acceptance
9 limits.
10 The established vibration level acceptance
11 limits are based on the General Electric criterion which
12 limits flow-induced vibration alternating stress to
13 10,000 psi for austenitic stainless steel.
14 That is an acceptable criterion, because
15 this concern of when it's compared to the ASME Section
16 3 design fatigue endurance limit for austenitic
17 stainless steel material of 13,600 psi.
18 This limit is further reduced for steady
19 state vibration by a factor of 0.8 to 10,880 psi, which
20 follows guidance of the SVOM Section Part 3 code.
21 That's the Standards and Guides for the Operation and
22 Maintenance of Nuclear Power Plants.
23 So, do you have any questions?
24 CHAIR REMPE: Okay.
25 MR. TSIRIGOTIS: We do the thorough review

1 and we went back and forth with Monticello staff on
2 various occasions since 2009.
3 And it looks like all the structural
4 evaluations have been completed and they meet design
5 basis requirements and values that are in their FSARs.
6 MEMBER SCHULTZ: In this area, were there
7 any audit calculations performed by the staff?
8 MR. TSIRIGOTIS: Any what?
9 MEMBER SCHULTZ: Were there any audit
10 calculations -
11 MR. TSIRIGOTIS: Audit calculations.
12 MEMBER SCHULTZ: - performed by the staff?
13 MR. TSIRIGOTIS: No, we didn't audit any
14 calculations. We just asked for additional information
15 that was not included in the PUSAR. And we asked for
16 information such as not all of the piping summaries,
17 maximum stress summaries were included in the PUSAR that
18 were affected by the EPU.
19 The licensee provided those as they were
20 finishing their analysis. And I looked at the results
21 and they looked acceptable.
22 MEMBER SCHULTZ: Thank you.
23 MR. TSIRIGOTIS: Sure.
24 CHAIR REMPE: If there are no more questions
25 even though it's early to have a break, we're going to

1 go into closed session after the break.

2 So, why don't we all come back here about

3 9:15 and we'll be in closed session for the steam dryer.

4 And maybe we'll have a lunch at noon instead of 12:30

5 or something, which would be a little bit nicer, okay?

6 So, we're going to go off the record.

7 (Whereupon, the proceedings went off the

8 record at 8:55 a.m. for closed sessions and a lunch

9 recess and went back on the record at 1:03 p.m.)

10 A F T E R N O O N S E S S I O N

11 1:03 p.m.

12 CHAIR REMPE: Okay. Let's go back on the

13 record and restart.

14 MEMBER ARMIJO: Okay, electrical.

15 CHAIR REMPE: I think we're going to start

16 off with a report from Terry or John, right?

17 MR. BELTZ: Thank you for your patience.

18 We did have a caucus just before we started up here.

19 Just to give you a general idea of what our timeline

20 looks like. And I'll just give you a quick background.

21 There are 22 - there were actually 35 RAIs

22 that are still outstanding. We have 22 that have been

23 submitted and are on the docket. And there is 13 RAIs

24 that the staff have seen in draft form that the licensee

25 still needs to reply to.

1 There's also some, and we'll call them
2 clarifications, which essentially are going to be - will
3 be RAIs, but they're going to be rolled into the RAIs
4 that are still outstanding.
5 We've looked at timelines with Westinghouse
6 and with the licensee. It appears that Westinghouse
7 can get those RAI responses, they said, by the end of
8 next week. Conservatively I've got August 5th just in
9 case there's some slippage there. And the licensee can
10 get that to us by -
11 MR. FIELDS: Monday.
12 MR. BELTZ: Through their process again by
13 Monday early the first full week in August.
14 MEMBER SCHULTZ: That's August 5th.
15 MR. BELTZ: That would be August 5th-August
16 6th time frame. The first part of that week.
17 (Discussion off the record.)
18 MR. BELTZ: Okay. No later than August 5th.
19 That being said, and obviously we have to take time
20 to review those, may need to work up, develop their
21 completion of the SE that's already under development.
22 And the staff have given us a time frame, I believe
23 -
24 MR. MANOLY: The 9th. We're going to begin
25 the project on the 9th of August. That's Friday the

1 9th.

2 MR. BELTZ: So, if they can get it to us by

3 the 9th of August, I still need to do my review of it

4 and look at it, clean things up and make sure everything

5 is a good product to you. So, we're talking probably

6 sometime early to mid-week of the following week.

7 MR. MONNINGER: The 13th or 14th of August.

8 MEMBER ARMIJO: Yes. Well, we can take that

9 into consideration because it's a very limited amount

10 of material. So, because we've reviewed all the other

11 part of the SE.

12 MR. BELTZ: And I'll just put on the record

13 here, I mean, I appreciate meeting with you and giving

14 you the information that we have available now. And

15 that was the purpose of why we tried to get together

16 today to at least get what has been completed, the

17 background of what's been completed so you've seen it.

18 I would have liked to have given you

19 something without open items, obviously. But now that

20 there's an understanding of those open items if we can

21 get those resolved and get everything to you that we

22 prefer, you know, to get to you in sufficient time before

23 a full committee meeting of it occurs in September.

24 And that was the intent.

25 So, that's our timeline and obviously we

1 can give this further discussion, but, you know, any
2 feedback on the schedule as you look at what our timeline
3 is just, you know, let us know.
4 CHAIR REMPE: Now, there is the potential
5 when you get the information, you may have - not be happy
6 and want additional clarifications. And that -
7 MR. MANOLY: Well, we decided to discuss over
8 the phone with them and we there are things that we had
9 questions on. We're going to try to resolve them
10 quickly by phone communication.
11 CHAIR REMPE: So, we have a high confidence
12 that all issues will be resolved by August 13th.
13 MR. MANOLY: If issues arise, we will try
14 to nail them down, you know, by the phone.
15 MR. BJORSETH: And we've also committed that
16 we would not have an action to an action that all data
17 would be submitted with the RAI response.
18 MEMBER ARMIJO: Right, right. Not just a
19 promissory note, which is no good.
20 CHAIR REMPE: Okay. I guess we'll discuss
21 at the end of our subcommittee meeting and decide -
22 MEMBER ARMIJO: Yes.
23 CHAIR REMPE: - on what to do on this going
24 forward. Does that sound like a -
25 MEMBER ARMIJO: Do you have a date that you

1 feel - August - the week of August 12th?

2 MEMBER SHACK: They said the mid-week.

3 MEMBER ARMIJO: Mid-week August 12th.

4 MEMBER SHACK: 13th or the 14th.

5 MEMBER ARMIJO: Okay.

6 CHAIR REMPE: Just out of curiosity, are you

7 going to send everything to them on August 5th, or are

8 you going to keep sending it piecemeal so they could

9 start some of the review a little bit before? Is that

10 what's going to happen?

11 MR. BJORSETH: The drafts have all been

12 submitted. So, it's a matter of finalizing those drafts

13 both with Westinghouse through Xcel and to the staff.

14 MEMBER ARMIJO: But if the drafts are not

15 going to change, the technical content of the drafts

16 are not going to change, then, you know, that's -

17 MR. BJORSETH: That's correct. That's the

18 intent with them having the drafts is that they could

19 do the reviews and then do a final confirmation once

20 they get the final product.

21 MR. SCHIMMEL: Bu tin all fairness to them,

22 they have not made all the drafts yet.

23 MR. BJORSETH: No.

24 MR. SCHIMMEL: So, they have to finish

25 reading the drafts. They haven't had the opportunity

1 to read them all yet.

2 CHAIR REMPE: Right. So, there's a

3 potential for a down - not a successful path. I guess

4 that's what I ought to say.

5 MR. BJORSETH: And we did align in what the

6 critical aspects were of the submittals and what we could

7 get them first starting the reviews.

8 MEMBER SCHULTZ: Now, this also includes the

9 WCAP final documentation?

10 PARTICIPANT: We're going to review that

11 final part of it.

12 MR. BJORSETH: That was the action to do an

13 action and all be put into the responses.

14 MEMBER SCHULTZ: Okay.

15 MR. ECKHOLT: WCAP is still being revised

16 with what will be critical to getting the SE adopted.

17 MR. BELTZ: The RAI response will have the

18 information that will eventually be in the WCAP.

19 MEMBER SCHULTZ: Rather than reference WCAP.

20 MR. BELTZ: Correct.

21 CHAIR REMPE: So, by August 9th, somebody

22 could contact Peter and also let him know it's a thumbs

23 up or a thumbs down with respect to the review, right,

24 and he can let us know?

25 MR. BELTZ: Yes.

1 MR. MONNINGER: And our thought is prior to
2 your potential noticing of it in the Federal Register,
3 we would also provide affirmation to Peter and -
4 CHAIR REMPE: That's what I would really like
5 is an informed decision about going forward.
6 MR. MONNINGER: We had a very good
7 discussion. But with that, the notion was we got to
8 hammer through the schedule and discussions to, you
9 know, making sure we have alignment and agreement,
10 because, you know, we want to come to the ACRS with a
11 quality product and have a successful meeting.
12 And we definitely do not want to have the
13 meeting cancelled or we definitely do not want to have
14 unnecessary questions from the ACRS due to lack of
15 quality in our product.
16 CHAIR REMPE: This sounds like a good path
17 forward especially so we can have that notification.
18 MR. MONNINGER: So, we'll continue the
19 dialog.
20 CHAIR REMPE: Okay.
21 MEMBER ARMIJO: Yes.
22 CHAIR REMPE: And so, then I think the
23 licensee has some answers to some earlier questions
24 before we get into the electrical engineering
25 discussion.

1 MEMBER ARMIJO: Yes.

2 CHAIR REMPE: Are they questions that Dr.
3 Banerjee raised? So, this isn't the best time to bring
4 those in now that I think about it.

5 MEMBER ARMIJO: Fuel-related.

6 (Discussion off the record.)

7 CHAIR REMPE: If you're good, then go for
8 it.

9 MR. HASKELL: Okay. The first one has to
10 do with the sample that was placed in the Prairie Island
11 vessel.

12 Now, we did do that and actually installed
13 it in the Prairie Island reactor vessel for accelerated
14 radiation.

15 The sample was removed, tested and we did
16 get some reports generated on that. We submitted those
17 to the NRC because we were hopeful to use that as part
18 of our surveillance program information.

19 However, the staff determined that the lead
20 factor was too high. It was over ten. And so, they
21 were not considered applicable. So, we did not use
22 those as the basis for fluence in our program.

23 We did, however, were able to use those for
24 some chemistry factors, because they did produce some
25 copper and nickel content information. So, we did use

1 them for that.

2 And just as a data point in the mid-1990s,

3 we did submit some PT curves that included zero fluence

4 associated with the information obtained from Oak Ridge

5 National Labs archive on non-irradiated plate material.

6 So, that's currently where our program is on fluence.

7 MEMBER SKILLMAN: Thank you, Nate. That's

8 good. Thanks.

9 MEMBER SCHULTZ: Nate, what was the rough

10 time frame when they were withdrawn and tested?

11 MR. HASKELL: We installed them, it appears,

12 in 1981, I believe. And we removed them in the - doesn't

13 say here.

14 MEMBER SCHULTZ: But it was an accelerated

15 program.

16 MR. HASKELL: It was an accelerated program.

17 MEMBER SCHULTZ: In that decade.

18 MR. HASKELL: Yes.

19 MEMBER ARMIJO: What was the problem with

20 the lead factor being too high? First of all, I don't

21 know what a lead factor is.

22 MEMBER SHACK: Flux rate.

23 MR. HASKELL: The flux is too high and you

24 can only get within a certain limit. We were over the

25 limit of ten and they were rejected.

1 MR. SCHIMMEL: Was that not the basis for
2 your question then? How can you take it, stick it in
3 PWR and correlate to a boiler?
4 MEMBER SKILLMAN: Well, I think Nate has
5 communicated actually you can. It was dismissed, but
6 it was good for chemistry. And I'm good with that
7 answer.
8 Had you said, hey, we have this super
9 whamodyne exponential curve that we do a fit and we do
10 deviations and permutations, I would have said, time
11 out. I don't buy that.
12 MR. HASKELL: You would have been interested
13 in that. I got that.
14 MEMBER SKILLMAN: Thank you.
15 MR. HASKELL: Okay. We also had a question
16 relative to the top guide plate and the inspections that
17 we had done on the top guide plate.
18 We performed a VT1 examination of the liner
19 pins and the sockets at two locations. We did EVT1 and
20 VT3 visual inspections on eight cell locations, which
21 approximately accounts for seven percent of the top
22 guide cells.
23 We also performed a VT3 examination of
24 accessible areas of the top guide. And this was done
25 in 2011. And there were no relevant indications at that

time.

MEMBER SHACK: But VT3 is not going to see a whole lot.

MEMBER ARMIJO: Yes, the best you could do right now, I guess.

MR. HASKELL: Yes. Okay. I can't remember if there was a question on the core plate.

MEMBER ARMIJO: That was the same part.

MR. HASKELL: Okay. We did inspect those, the core plate, and we have not found any relevant indication on the core plate.

MEMBER ARMIJO: Okay, good. Thanks, Nate.

MR. HASKELL: Yes. That's all the questions I had answers to.

CHAIR REMPE: Great.

MEMBER ARMIJO: Let's move on.

(Pause in the proceedings.)

MR. STADTLANDER: All right. If there's no other questions on that, we'll proceed on to the electrical engineering side of it here.

Let's see. I'll be talking about just giving an overview of our electrical plant. Talk about our station blackout capability. And then the grid stability at Monticello and how we have improved that there.

1 We have done some substation modifications.
2 It wasn't completed related to EPU, but we did install
3 - or we did in 2011, we had one new 345 KV line that
4 we did install. That raises our 345 KV and our 115 KV
5 lines up to six.
6 So, Monticello was kind of like I said
7 yesterday, kind of uniquely positioned as far as most
8 nuclear power plants go where we do have a substantial
9 substation that's supporting us and we do seem to be
10 right kind of in the middle of the Xcel grid. So, we've
11 got a lot of support electrically to the nuclear plant.
12 So, with that, like I said, we've got three
13 345 KV lines and we've got three 115 KV lines. We've
14 also replaced the main transformer as part of EPU.
15 we also replaced two of our offsite
16 transformers; our 1R and 2R transformers. Those are
17 both able to - either one of those is able to completely
18 power the plant. Typically we run off of the 2R
19 transformer with the 1R as an in-service backup.
20 We did upgrade those and we'll go over the
21 ratings here in a moment, but we now have - previously
22 what we had is we had the input voltage coming in and
23 we had two 4 KV windings on that. Now, we have a 4 KV
24 winding and a 13.8 KV winding. And I'll get into that
25 a little bit more when we talk about the in-plant power

1 supplies.

2 A few other modifications that we did, we

3 did update the isophase or the isolated bus cooling

4 system for our generator. And we did do upgrades on

5 our protective relaying as well.

6 So, the offsite power systems has been

7 looked at. Does have sufficient capability to start

8 and operate a required safety-related AC loads within

9 all the design voltage ranges.

10 So, we also had a grid stability study done

11 by myself which indicated no compromise of the offsite

12 power source from the increased electrical output at

13 Monticello.

14 As you can see here we'll take a look at

15 the different readings that we had on our 2R and 1R

16 transformers.

17 As you can see in the CLTP rating we did

18 have - each one has a different input voltage. The 1R

19 having 115 KV volts coming into it. The 2R has 34.5

20 KV volts. That stayed consistent.

21 Looking at the EPU ratings, you can see that

22 we changed the output from two 4 KV windings to a 13.8

23 KV winding and a four KV winding.

24 What we ended up doing - and you can also

25 see the overall EPU ratings for 1R did rise significantly

1 essentially from 22.4 MVA to 40.5 MVA without any
2 cooling. And the 2R transformer did drop slightly, but
3 still well within the capabilities of what's required
4 to power up the plant.
5 We do have two ratings there under the EPU
6 rating. The 40.5 MVA rating is without any cooling.
7 The 54 MVA rating is with the forced air cooling. These
8 don't have any oil pumps on them. They do just have
9 forced air.
10 MEMBER SKILLMAN: How often do you use the
11 air?
12 MR. STADTLANDER: We're just getting into
13 this, but I know when we ran our - the expectation is
14 we're not going to have to use that at all. So, because
15 we have to get above the 40.5 MVA rating in order to
16 have to use the fans. And typically we're using on the
17 order of about 25 MVA typically to operate the plant.
18 So, the expectation is that we wouldn't have to.
19 MEMBER SKILLMAN: So, the hottest day of
20 August is not going to be a problem for you for your
21 aux transformers?
22 MR. STADTLANDER: No, that's correct.
23 MEMBER SKILLMAN: Okay. Thank you.
24 MR. STADTLANDER: Yes. All right. Under
25 onsite AC power as I talked about, we covered the changes

there a little bit - a little bit later here, but we've got no modifications to the emergency diesel generator system; our load shed schemes or the essential bus transfer changes for EPU.

All the changes that we made to our onsite AC power system were all to the nonessential loads. So, we didn't make any changes to the safety-related loads for this EPU.

We also didn't make any because of that as well, I didn't require any changes to our Class 1 uninterruptable power supply system for EPU.

So, as we talked about previously, we did add the 13.8 KV distribution system within the plant. We added that mainly for our feed pumps and our condensate pumps as we were upgrading the horsepower on those.

And the recirc pump motors or the reactor recirc pump motors stayed at consistent horsepower rating, but we did upgrade those to the new 13.8 KV system as well.

So, we've got all new switchgear, all new relay and associated with 13.8 KV system. And those are fed by our 1R and 2R transformers.

So, as we can see here with the ratings that we're looking at -

1 MEMBER BROWN: Could you go back? I've got,
2 I guess, an informational question. The boundary for
3 where you maintain control of your switchyard boundary.
4 And my question is, I guess the 1R and 2R
5 are - those come in from offsite and then they power
6 into the system.
7 MR. STADTLANDER: Correct.
8 MEMBER BROWN: Into the plant.
9 MR. STADTLANDER: Yes.
10 MEMBER BROWN: So, there should be a breaker
11 on the - referring to output on that one that feeds the
12 plant.
13 MR. STADTLANDER: Right.
14 MEMBER BROWN: That's under your all's
15 control, under the plant's control, or does the MISO
16 have control of that, both those particular breakers?
17 And the next question goes to the main
18 generator breaker.
19 MR. STADTLANDER: Okay. At Monticello, our
20 line of jurisdiction, I guess if you want, actually stop
21 before we get onto the subyard proper.
22 We do have a breaker and a half scheme
23 throughout both the 345 KV substation and the 115 KV
24 substation, which means we can isolate any line with,
25 you know, any two breakers. So, without disrupting

1 power to the rest of the substation.

2 So, the short answer to your question is

3 that the breakers at the subyard are under control of

4 the Xcel network and not the plant specifically.

5 MR. BJORSETH: So, we have control over the

6 1R and 2R transformers.

7 (Simultaneous speaking.)

8 MEMBER BROWN: If you're feeding - you're

9 feeding the grid.

10 MR. STADTLANDER: I'm feeding the grid from

11 the -

12 MEMBER BROWN: From the main generator.

13 MR. STADTLANDER: Yes, from the main

14 generator.

15 MEMBER BROWN: Okay. The other ones come

16 in. So, the breakers on the plant side are under Xcel

17 under the control of the offsite -

18 MR. STADTLANDER: Yes.

19 MEMBER BROWN: That's what I'm trying to ask.

20 MR. STADTLANDER: Okay. We've got as we top

21 off, and I wish I had a white board here or a picture

22 of the -

23 (Simultaneous speaking.)

24 MR. STADTLANDER: Okay. Apologize for

25 that. We'll take that as something to look at going

1 forward.

2 MR. BJORSETH: First breaker out.

3 MR. STADTLANDER: Yes.

4 MR. SCHIMMEL: This is Mark Schimmel. Just

5 tell them where we control and where -

6 MR. STADTLANDER: Right. So, we've got

7 control of everything just as it comes off of the

8 subyard. So, at the 345 KV line as it comes into the

9 plant or the ring bus as it comes to the plant, we've

10 got control just as it comes off there.

11 We've got control of a motor-operated

12 disconnect that would disconnect the - that's at 345

13 KV volts. So, 345,000 volts. We own that.

14 MEMBER BROWN: So, under your plant control,

15 the 345 KV line.

16 MR. STADTLANDER: Correct. We've got - yes,

17 that's a line. The way - I'll try to back this up here.

18 The way 2R works, for instance, is we take

19 power off of the 345 KV system. It actually comes

20 through another step-down transformer which steps it

21 down to 34.5 KV volts. And then from there it swings

22 into 2R, which from there it split up into the 4 KV and

23 the 13.8 KV windings.

24 So, on the high side of the 2RS transformer

25 is a 345 KV motor-operated disconnect.

1 MEMBER BROWN: And that's yours?

2 MR. STADTLANDER: And that's, yes, under our

3 - that's actually under dual jurisdiction between us

4 and the transmission system operator.

5 Oh, and then we've got a breaker in between

6 those two transformers which is under our jurisdiction

7 completely.

8 MEMBER BROWN: Also.

9 MR. STADTLANDER: Correct.

10 MEMBER BROWN: So, the other one is under

11 both jurisdictions.

12 MR. STADTLANDER: Yes, that's right on the

13 line of demarcation.

14 MEMBER BROWN: This may be a little bit too

15 deep. One of my concerns and I haven't looked at this

16 before. I'm just now starting to try to evaluate this,

17 is how susceptible are the feeds to the plant or inside

18 the plant, even, by outside operators how

19 they get their control signals in.

20 In other words, are they internet fed down

21 to now controllers which are connected so that they -

22 or do they have direct hard-wired type stuff where

23 they're back to their main control?

24 It's kind of - it's a control of access if

25 you want to look at it that way either preventing

1 malicious - it's still a control of access no matter
2 how you slice it.
3 MR. STADTLANDER: Right. And I'll address
4 that in two ways here. We've got the physical location
5 of the subyard is actually just south of the plant, but
6 it's still within our owner-controlled area.
7 So, that's controlled. We actually have
8 to get through, you know, our first security barrier
9 in order to get access physically into the subyard.
10 So, anybody going in and out of the physical subyard
11 we've got control of.
12 As far as controls from downtown, they do
13 have a direct hard wire link to the subyard at this point
14 to be able to operate the breakers within the subyard
15 proper.
16 MEMBER BROWN: Okay. So, they're not
17 software initiated.
18 MR. STADTLANDER: No.
19 MEMBER BROWN: But you say it's hard wired.
20 MR. STADTLANDER: Correct.
21 MEMBER BROWN: Okay. And is that consistent
22 with the other - is that all of those interfaces like
23 that, hard wired? Are there any other access for the
24 grid operators or downtown -
25 MR. STADTLANDER: No.

1 MEMBER BROWN: - to get into the plant -
2 MR. STADTLANDER: No.
3 MEMBER BROWN: - by any means for any other
4 switchgear, control switchgear or whatever? There are
5 none of those?
6 MR. STADTLANDER: No. We only control,
7 obviously, what's within our subyard.
8 MEMBER BROWN: I got that.
9 MR. STADTLANDER: Yes.
10 MEMBER BROWN: I just wanted to make sure
11 there wasn't some -
12 MR. SCHIMMEL: His concern, I think, is
13 somebody else can get out on with a laptop and control
14 the inputs to the plant and how is that controlled.
15 MEMBER BROWN: Well, they can trip it off.
16 MR. STADTLANDER: Right.
17 MEMBER BROWN: But if it's hard wired, it's
18 not. I just wondered what type of control was exercised
19 for this since it seems to be a fairly - you said it
20 was almost a main - not a main, but a somewhat centralized
21 larger switchyard than most plants have, which becomes
22 kind of a distribution center.
23 I think that was the way it's relative to
24 the volt-amp control situation or, you know, bar
25 controls yesterday.

1 MR. STADTLANDER: Yes, correct.

2 MEMBER BROWN: So, I was just curious as to

3 how that was operating at your all's facility. So, I

4 guess that's all I had.

5 MR. STADTLANDER: Okay.

6 MEMBER BROWN: Thank you.

7 MR. STADTLANDER: You bet. All right.

8 MEMBER BROWN: Did you follow what I was

9 talking about, Sam?

10 (Laughter.)

11 MEMBER BROWN: The point being if it's hard

12 wired -

13 MR. STADTLANDER: Right.

14 MEMBER BROWN: - people can't get -

15 MEMBER ARMIJO: Oh, I know that part.

16 MEMBER BROWN: The old-fashioned

17 analog-type wires.

18 MR. STADTLANDER: Correct.

19 MEMBER BROWN: You could ask. That's why

20 I - excuse me for interrupting again.

21 MR. STADTLANDER: No, no problem. I want

22 to make sure you get all your questions answered.

23 So, our current license or what we had prior

24 to going into the outage versus what we've got coming

25 out of this EPU outage.

1 So, our non-safety related switchgear buses
2 Number 11 and 12, those are the two that we upgraded
3 to our 13.8 KV buses. You can see the continuous
4 amperage is the same. It's the voltage that changed
5 on those.
6 The feedwater pumps went from 6,000
7 horsepower motors up to 8,000 horsepower motors. 11
8 and 12 condensate pumps went from 1750 horsepower up
9 to 2400 horsepower. So, and those two are, like I said,
10 kind of the main reason we ended up going to the 13.8
11 KV distribution system.
12 We also previously had our recirc MG set
13 drive motors on the same buses as the feed pump motors.
14 So, we ended up upgrading those to the 13.8 KV as well
15 even though the horsepower rating stayed the same.
16 The onsite DC power system, we didn't make
17 any significant changes to the DC system under EPU.
18 The DC loading and battery requirements were reviewed
19 for the design basis worst-case loading scenario. And
20 that ended up being the station blackout mitigation.
21 The EPU changes only resulted in changes
22 to the timing of certain loads. So, we didn't increase
23 the magnitude of those DC loads at all.
24 MEMBER BROWN: Yesterday you mentioned
25 something about coping times. You said they didn't

1 change.

2 MR. STADTLANDER: Correct.

3 MEMBER BROWN: Is that correct?

4 MR. STADTLANDER: Yes.

5 MEMBER BROWN: It's still four hours?

6 MR. STADTLANDER: Still four hours.

7 MEMBER BROWN: And none of the changes jacked

8 up the demands such that you decreased that.

9 MR. STADTLANDER: No, that's correct. We

10 were able to stay within the four hours. So, we do have

11 sufficient capacity on the DC system to start and operate

12 all connected DC loads.

13 The DC power systems meet all applicable

14 design criteria for battery capacity and DC equipment

15 operations with adequate margin under EPU conditions.

16 Some of the 250 volt DC battery loads due

17 to battery capacity margin - let's see. Sorry. Some

18 250 volt DC battery load changes, the rearrangement of

19 the loads and minor relay in changes, those changes due

20 to the battery capacity margin management modification

21 wasn't due specifically to the EPU.

22 So, I believe on the next slide we've got

23 - take a look at the margins that we've got. So, you

24 can see the 250 volt DC Division I stayed about the same.

25 The 250 volt DC Division II actually got quite a bit

1 better because of that redistribution of the loads that
2 we talked about.
3 The 125 volt DC Division I and II got a
4 little closer to the margin, but we still had quite a
5 bit of margin there yet to our four-hour coping time.
6 MEMBER BROWN: How often do you all do
7 battery capacity checks? It's probably in your tech
8 specs.
9 MR. STADTLANDER: Yes.
10 MEMBER BROWN: I just don't know the answer.
11 So, I thought I'd ask.
12 MR. STADTLANDER: I'm trying to think if we
13 - now, you're testing me on my tech specs. Well, you're
14 talking a full-blown capacity test.
15 MEMBER BROWN: I'm talking about a
16 full-blown -
17 MR. STADTLANDER: Discharge test.
18 MEMBER BROWN: So, you do a discharge test
19 that confirms you actually have -
20 MR. STADTLANDER: Right.
21 MEMBER BROWN: - the margin that -
22 MR. STADTLANDER: That should be once per
23 cycle. Every outage we go through them. Every two
24 years, yes.
25 MEMBER BROWN: Okay.

1 MR. STADTLANDER: Correct. Yes, we do our
2 standard weekly surveillances, monthly, quarterly
3 surveillances, you know, to go through and look at the
4 specific gravities and various other items within
5 batteries themselves, but the actual discharge test that
6 you're talking about would be during the refueling
7 outages.
8 MEMBER BROWN: Thank you.
9 MR. STADTLANDER: Yes. All right. Briefly
10 here about station blackout capabilities, we talked a
11 little bit previously about the plant responses. Those
12 were discussed, like I said, previously under a
13 different part of the presentation here.
14 We haven't had any changes to our station
15 blackout mitigation equipment. We did have a new model
16 here that more accurately includes our SCT-torus HPCI
17 suction transfers.
18 Like we talked about already, our coping
19 times are unchanged. We still meet the four-hour
20 expectations there. And the existing DC load profile
21 bounds are EPU.
22 So, based on that, we do have acceptable
23 battery capacity. Our CST capacity and our HPCI net
24 positive suction head and equipment temperatures are
25 all within the expected limits.

1 And talk briefly about the electrical grid
2 reliability. Like we talked about, we did add an
3 additional 345 KV line into the Monticello substation.
4 Increased the number of credited transmission lines
5 from five to six.
6 We upgraded the 345 KV bus from a ring bus
7 to a breaker-and-a-half scheme. So, I'll talk about
8 that a little bit, but what that means overall is that
9 we can go ahead and isolate any particular line without
10 having to disrupt power to the rest of the 345 KV subyard.
11 So, I can isolate an incoming line if I need
12 to for the transmission system operator without
13 impacting the feed to our 2R or 1R transformer.
14 Grid reliability study was performed in two
15 separate studies, actually. Initially we requested the
16 13 megawatts electric in 2009 and 60.8 uprate in
17 megawatts electric in 2011. So, that was reanalyzed
18 and approved to upgrade all the output at one time so
19 that we could take credit for that here in 2013.
20 The interconnection study included
21 analysis for regional single line ground fault with the
22 breaker failure and a three-phase fault without a
23 breaker failure.
24 So, looking at that, our short circuit
25 analysis calculated the fault currents available with

1 the increased generation. Verified the fault currents
2 are within the interrupting capability of the substation
3 breakers that we got.
4 MEMBER BROWN: But you would expect that,
5 right?
6 MR. STADTLANDER: Exactly.
7 MEMBER BROWN: You wouldn't say, gee, we did
8 this and did it without breaker failure. You're not
9 supposed to fail an interrupted fault.
10 MR. STADTLANDER: They're not supposed to,
11 correct. That's why we do the studies, though, to make
12 sure they don't.
13 The conclusion here is the EPU does not
14 adversely impact the stability of the MISO transmission
15 grid in our local area.
16 So, that's really all I have for the
17 electrical engineering presentation unless there's
18 other questions.
19 CHAIR REMPE: Okay. I think it's time for
20 the staff.
21 (Discussion off the record.)
22 (Pause in the proceedings.)
23 CHAIR REMPE: So, let's talk about
24 electrical engineering.
25 MS. SOM: Let's go to the first slide. I'm

1 Swagata Som from NRR and Matt and I had to give this
2 one.
3 The first slide just contains the
4 regulations that we followed for our review of extended
5 power uprate and its impact on electrical power system
6 and equipment.
7 The first one is 10 CFR 50.49 for rules
8 related to environmental qualification of electrical
9 equipment involved in fuel safety.
10 The second is 10 CFR 50.63 and rules related
11 to station blackout due to the complete loss of AC
12 electrical power to the essential as well non-essential
13 power distribution buses in the plant.
14 The third rule is 10 CFR Part 50 Appendix
15 A General Design Criteria GDC-17 of the Electrical Power
16 System; onsite and offsite power systems. I provide
17 the requirements for capacity and capability to function
18 as well minimizing the probability for losing power
19 supplies.
20 Second slide. The second slide is summary
21 of evaluation and findings. We reviewed the existing
22 environmental qualification and if the equipment which
23 need to remain qualified for EPU operation is bounding.
24 So, we reviewed the environmental
25 parameters and bounding profiles such as radiation,

1 temperature, pressure, submargins in accordance with
2 the Item E of 10 CFR 50.49 inside and outside the
3 containment and location of the reactor building. So,
4 these parameters must be established for normal and most
5 severe design basis accident.
6 And we determine that the effects of the
7 EPU did not adversely impact the qualification of the
8 electrical equipment important to safety and this
9 provides bounding.
10 Next, we reviewed the onsite and offsite
11 power system modifications and we determined that the
12 loading on safety-related equipment remains bounding
13 as licensee explained for AC system and DC power system.
14 The offsite power system needed
15 modification in main equipment like generator, isophase
16 bus, main steam valve transformer, station service
17 transformer and other equipment which are on the
18 non-essential side. And also some modifications in the
19 switchyard like transmission line increase and all.
20 The licensee provided a grid reliability
21 study and we determined that if you condition with
22 additional power output and increased plant loading does
23 not adversely affect the onsite and offsite power
24 systems.
25 The third slide is the summary of our

1 acceptance of the EPU. We reviewed the EPU impact on
2 the environmental qualification of the electrical
3 equipment onsite and offsite power distribution
4 systems, capability and capacity and the station
5 blackout.
6 And as the licensee mentioned, the plant
7 is a four-hour coping duration plant that remained
8 unchanged.
9 We determined that the systems that we
10 discussed are acceptable for operation at EPU
11 conditions.
12 We conclude our - with that, any questions?
13 MEMBER ARMIJO: Pretty definitive.
14 CHAIR REMPE: Looks like you're going to get
15 off scot-free. Thank you very much.
16 (Discussion off the record.)
17 CHAIR REMPE: So, if I were to follow the
18 agenda, we'd have a break, but we've not been in session
19 that long. So, I would propose that we go directly to
20 public comments and finish up.
21 Does that sound okay?
22 MEMBER ARMIJO: Sounds good to me.
23 CHAIR REMPE: So, if there are any members
24 of the public left - looks like there aren't any that
25 might have comments here.

1 What about the phone lines? Can you - it's
2 open. Is anyone out there? Just say it so we know it's
3 open. Say you are here.
4 PARTICIPANT: Yes.
5 CHAIR REMPE: Does anyone out there have
6 any comments they want to share?
7 (No response.)
8 CHAIR REMPE: Okay. So, at that point,
9 let's go around the table for final comments. And when
10 you're making your comments, it would be good to just
11 have a sense if you're okay with what the staff has
12 proposed for the path forward too.
13 And since you missed yesterday, I'm going
14 to start with you, Kord.
15 DR. SMITH: Okay. Well, first of all, I
16 would like to thank everybody who indulged me since this
17 is my first time being a consultant here.
18 I think I learned more than I offered to
19 the Committee here. So, I was very impressed with what
20 was presented. I think it's a solid path forward. I
21 didn't see any outstanding problems.
22 Unfortunately, the area I know a lot about
23 was not taxed at all because of low power density of
24 the Monticello core. So, hopefully we'll come back
25 sometime for a very taxed power density core which will

1 be much more interesting.

2 CHAIR REMPE: Okay, thank you. Sanjoy.

3 MEMBER BANERJEE: Well, I spoke yesterday.

4 So, today I should only speak about the steam dryer.

5 I think that the staff actually is pursuing

6 important sort of due diligence of this which needs to

7 be done and has my full support in the methodology and

8 the way they're proceeding.

9 I want that sort of recorded, because there

10 was confusion before this. I think they are doing their

11 job, they're doing a first-rate job and I don't think

12 we should give mixed messages about that. That's my

13 contribution.

14 CHAIR REMPE: Are you -

15 MEMBER BANERJEE: I like the way they are

16 proceeding. I think they are going systematically and

17 that's what they should do and we should support them

18 until they finish the job. Of course when they do,

19 that's fine.

20 CHAIR REMPE: But if we hear from the staff

21 through Ed and Peter that they are -

22 MEMBER ARMIJO: That's fine.

23 CHAIR REMPE: It's an agreement to go

24 forward. I think that doesn't interfere with their

25 ability to do due diligence.

1 MEMBER ARMIJO: But if they need more time,
2 let them take more time. That's fine.
3 CHAIR REMPE: Okay. Steve.
4 MEMBER SCHULTZ: I would agree with Sanjoy's
5 last comment. I think that's appropriate. I am pleased
6 to know that a schedule has been arrived and it ought
7 to be a firm one that is met by both the applicant and
8 by the staff and look forward to the findings that emerge
9 from that.
10 Again, I commented yesterday. I certainly
11 would like to thank the applicant and the staff one more
12 time for the work that was presented today, as well as
13 yesterday.
14 Upon reflection, it was a very thorough
15 discussion of the key items that the Subcommittee was
16 interested in hearing and the full committee would be
17 interested as well.
18 I would like to comment related to the full
19 committee meeting. I think what the rest of the
20 committee would like to hear specifically is the summary
21 of those changes that are being made associated with
22 obviously the elements associated with achieving the
23 uprate, but also those improvements that are being done
24 as a result of the opportunity for plant improvement
25 where safety margin improvement is a result.

1 So, I would recommend that at the full
2 committee meeting a summary be provided in all of the
3 areas focusing on that in particular.
4 But, again, I'd like to thank the staff and
5 the - for their detailed evaluations that have been done,
6 very thorough work and presentations and also the
7 applicant's responsiveness to all the questions that
8 we have had today and yesterday.
9 CHAIR REMPE: Okay. Dick.
10 MEMBER SKILLMAN: I echo both Steve and
11 Sanjoy's comments. Compliments to both the staff and
12 the Monticello team. Their presentations have been
13 comprehensive and thorough. They've really, in my
14 view, addressed the key items that need to be addressed.
15 The BOP changes are solid and sound. In
16 my view, will protect this plant with margin for the
17 power uprate. The nuclear analysis is solid.
18 I was skeptical on CAP. They have
19 convinced me that they have properly applied CAP to this
20 application.
21 And we still need to get the steam dryer
22 information, but it sounds like they've got a path
23 forward. So, I give both teams high marks. Thank you.
24 CHAIR REMPE: Yes. Sam.
25 MEMBER ARMIJO: Yes, I think, first of all,

1 the presentations were very good, very well prepared,
2 good discussion.
3 There's nothing wrong with starting out
4 with a low-core power density plant. Life can be a lot
5 better than - and I share Kord's view on that from the
6 core and fuel.
7 The - as far as CAP, I think the licensee
8 did a very good job of applying the guidance from the
9 Commission on the application of CAP. For this plant,
10 I think it's perfectly acceptable.
11 The steam dryer, I'm probably in the - take
12 a view that I've yet to see that we've got a safety
13 problem here. Certainly there are some technical
14 issues and some observations that need to be pursued,
15 but I don't see anything of - I would be very surprised
16 if the staff came back to us and said we recommend you
17 cancel that meeting because we've got a serious steam
18 dryer problem.
19 That would really surprise me. So, I think
20 the path forward is clear and I just urge everybody to
21 get their job done so that we can hold this meeting in
22 September. That's all I have.
23 CHAIR REMPE: Okay. Bill.
24 MEMBER SHACK: I appreciate the discussion
25 of the steam dryer today. I thought the licensee and

1 their supporters made a very good presentation.

2 We did get some new information from the

3 staff. And so, I think I have to agree with Sanjoy that

4 we really do have to let them complete their work. There

5 are some items that need to be addressed.

6 I'm just hopeful that we can move forward

7 and get this done in September.

8 CHAIR REMPE: Charlie.

9 MEMBER BROWN: I'm still writing.

10 (Laughter.)

11 MEMBER BROWN: I guess one of the

12 observations I've made is that I appreciated from the

13 presentations was the effort that the licensee has made

14 in not just doing EPU-related modifications to the

15 plant. That they took the opportunity as they went over

16 these last couple of years as moving forward on that

17 to bring other parts of the plant up to a higher - I

18 don't want to say a higher standard, but a more robust

19 set of systems and components to stand in for the

20 remaining life of the operations. So, that part of it,

21 it was nice to see that particular thing.

22 I'm not going to wax eloquent on the steam

23 dryer. I am still listening. Although, I don't - I've

24 heard the stuff about adding more requirements, or are

25 we raising the bar, lowering the bar or what have you.

1 And, obviously, the staff has to complete their work
2 and I guess there's a path forward to getting that done
3 and we'll see what the results are.
4 I do compliment them on having an analog
5 set of controls for their electric plants, because it
6 certainly removes concerns that I have with software
7 these days controlling major interfaces in the
8 electrical plants' power systems.
9 So, other than that I thought they did a
10 good job and presented - I learned a lot, as well as
11 Kord did. So, on stuff that I know nothing about for
12 the most part.
13 CHAIR REMPE: I don't have any great words
14 of wisdom. Again, I also, though, appreciate the staff
15 and the licensee's efforts.
16 And, again, I note that I think I've seen
17 some opinions changing about the approach to CAP because
18 of the way that you did go through it very carefully
19 with us and you did evaluate other options and why you
20 went with the approach you did and the analysis that
21 you performed.
22 We will only have a couple of - oh, and I
23 also do want to mention, too, that the staff does have
24 the right to do due diligence on the analysis and I would
25 heavily encourage everybody to get this going to make

1 sure that we go forward by the 9th that we have at least
2 an idea if we're going to go forward.
3 But if we go forward with the full committee
4 meeting in September, you'll only probably have at most
5 a couple of hours. And I, again, as you work with the
6 staff on what to present, definitely the CAP is - this
7 is the first time that this approach has been followed
8 since it was approved by the Commission.
9 So, you'll want to discuss that, because
10 the colleagues who aren't here will be very interested
11 in that and the steam dryers the first time that this
12 has gone through. And that would be something to
13 highlight, but you'll have to pick your time and your
14 slides well to get through it all.
15 And unless there's any other questions or
16 comments, should we close the meeting?
17 MEMBER BROWN: You're in charge.
18 CHAIR REMPE: Okay. It's over.
19 (Whereupon, at 1:48 o'clock p.m. the
20 meeting was adjourned.)
21
22
23
24
25

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

ACRS Subcommittee on Power Uprates

NRC Staff Review

Monticello Nuclear Generating Plant Extended Power Uprate

July 26, 2013

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Topics for July 26th

- Materials and Mechanical / Civil Engineering
- Steam Dryer Overview
- Steam Dryer Review and Status
- Electrical Engineering

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Monticello Nuclear Generating Plant Extended Power Uprate ACRS Subcommittee Meeting

Mechanical and Civil Engineering Review

Alexander Tsirigotis

Mechanical & Civil Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Background

- Original licensed thermal power (OLTP): 1,670 MWt (1971)
- Current licensed thermal power (CLTP): 1,775 MWt (1998)
- EPU: 2,004 MWt (20% above OLTP)
- MNGP EPU is a constant pressure power uprate (CPPU) - No change to the maximum reactor dome pressure

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Background (cont'd)

- EPU consistent with the staff approved guidance in GEH topical reports (TRs):
  - NEDC-33004 (CLTR)
  - NEDC-32424 (ELTR-1) and
  - NEDC-32523 (ELTR-2)

- CLTR, ELTR1 and ELTR2 have been employed to all BWR extended power uprate submittals since their NRC approval

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Protecting People and the Environment

Review Scope

EPU impact on structural integrity of systems, structures, and components (SSCs):

- **Pressure-retaining components and supports**
  - **Reactor coolant pressure boundary piping**
  - **Balance of plant piping**
  - **Reactor pressure vessel**
  - **Control rod drive mechanisms**
  - **Recirculation pumps**

Review Scope (cont'd)

- RPV internals and core supports (except dryer)
- Seismic and dynamic qualification of mechanical and electrical equipment

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Review Results

- The piping systems mainly affected from the EPU are the condensate, feedwater and steam systems
- Evaluation for FIV levels of piping is in accordance with the ASME OM –S/G Part 3
- FW and condensate pump and heater replacement modifications along with related piping modifications were required for EPU

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Review Results (cont'd)

- **Structural evaluations of SSCs at EPU conditions employed current plant design basis methodology and acceptance criteria**
- **All structural evaluations met design basis code allowable values**

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Conclusion

Reasonable assurance that plant SSCs important to safety are structurally adequate to perform intended design functions under EPU conditions

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Questions

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Monticello Nuclear Generating Plant Extended Power Uprate ACRS Subcommittee Meeting

Steam Dryer Review

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Mr. Kamal Manoly, SLA

Mechanical & Civil Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

MNGP EPU - Steam Dryer NRC Review Team

NRC - NRR/DE/EMCB

- Dr. Chakrapani Basavaraju
- Mr. Anthony McMurtray (Branch Chief)

Argonne National Laboratory

- Dr. Vikram N. Shah, ANL
- Dr. Stephen A. Hambric, Senior Scientist
  Applied Research Laboratory, Penn State University
- Dr. Samir Ziada, Professor, Mechanical Engineering
  Department, McMaster University

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Questions

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ACRONYMS

ACM - Acoustic Circuit Model

ASME – American Society of Mechanical Engineers

CLTP - Current Licensed Thermal Power

FEA - Finite Element Analysis

MNGP- Monticello Nuclear Generating Plant

OLTP - Original Licensed Thermal Power

QC2 - Quad Cities, Unit 2

RRP- Reactor Recirculation Pump

SG - Strain Gages

SPM - Skirt Protection Model

VPF-Vane Passing Frequency

WEC – Westinghouse Electric Corp.

ACE - Enhanced ACM

B&Us - Bias errors & Uncertainties

BUF - Bumpup Factor

EPU - Extended Power Uprate

fps - feet/second

MSL - Main Steam Line

PATP - Power Ascension Test Plan

RSD - Replacement Steam Dryer

SCF - Stress Concentration factor

SMT-Scale Model Tests

SRV-Safety Relief Valve

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Monticello Nuclear Generating Plant Extended Power Uprate ACRS Subcommittee Meeting

Electrical Engineering Review

Matthew McConnell
Swagata Som

Electrical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

Electrical Systems Regulations

- 10 CFR 50.49
  Environmental Qualification
- 10 CFR 50.63
  Station Blackout
- 10 CFR Part 50, Appendix A, GDC-17
  Electrical Power Systems

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Electrical Systems Evaluation

- Existing environmental qualification of electrical equipment remains valid
- Loading on safety equipment remains bounding
- Safe operation under increased electrical output and increased plant load
  - Grid stability study

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Summary

- The Electrical Engineering Branch staff found the following areas acceptable for operation at uprated conditions:
  - Environmental Qualification of Electrical Equipment
  - Offsite Power Systems
  - Onsite Power Systems
  - Station Blackout

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Questions

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Public Comments

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Committee Comments

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Adjourn

Materials and Mechanical/Civil Engineering

Flow-Induced Vibration

Reactor Vessel Structural Topics

Flow Induced Vibration

Flow Induced Vibration - Piping

- FIV evaluation based on CLTR
- FIV effects on piping components in the RCS, MS, and FW systems were evaluated and found to be acceptable for EPU
- Piping vibration startup test program for FW and MS will be performed during EPU power ascension
- Effects of FIV induced stresses at EPU conditions evaluated on safety-related thermowells in MS and FW systems
  - MS thermowell removed to remove vortex shedding frequency concerns
  - FW thermowells remain acceptable at EPU conditions

EPU Flow Induced Vibration – RPV Internals

- Maximum core flow (60.5 Mlbs/hr) not changed by EPU
- Evaluation used bounding reactor power of 2004 MWt and 105% of rated core flow
- Feedwater and Steam Flows increase ~15%
- Analysis results concluded FIV loads at EPU meet acceptance criterion of 10 ksi peak stress intensity (less than ASME Code criteria of 13.6 ksi)
- Structural Integrity of Reactor Internal components confirmed

Reactor Vessel Structural Topics

EPU Structural Effects – RPV Internals

- Design conditions not changed by EPU
- Installation of Replacement Steam Dryer will not affect structural integrity
- Normal and Upset Conditions only slightly changed by reactor coolant temperature and flow conditions
- Stresses due to emergency and faulted conditions are based on loads such as peak dome pressure limit which did not change for EPU
- Change in RIPDs accounted for in Normal, Upset, Emergency and Faulted analyses
- Stress analysis demonstrates EPU stresses still meet ASME Section III requirements

RPV Structural Evaluation

The fatigue usage factors meet the ASME code requirements for the 20 year license with EPU. RPV components having a CUF > 0.33 that experience an increase in flow, temperature, RIPDs, or other mechanical loads were evaluated for fatigue as follows:

Component	CLTP CUF	EPU CUF	Allowable
Refueling Bellows	0.861	0.833*	1.0
FW Nozzle	0.621	0.9138	1.0
Main Closure Regions Studs	0.573	0.534*	1.0
Reactor Recirculation Inlet Nozzle	0.226	0.556	1.0

** EPU CUF value was re-evaluated considering a more representative and less conservative treatment of the duty cycle.*

RPV Fracture Toughness and Materials

- RPV meets 10 CFR 50 Appendix G requirements
- No material changes, except for the steam dryer
- Fluence values calculated for EPU conditions
- Inspection requirements based on BWRVIP program (BWRVIP-25, 26 and 47)
- Slight changes to temperature and flow for RCPB materials
- RPV water chemistry conditions maintained consistent with EPRI and established industry guidelines
- Current inspection strategy for RCPB is acceptable

EPU IGSCC & IASCC – RPV Internals & Core Support Structure

- EPU will result in no Reactor internals material changes, except for the steam dryer
- EPU causes slight changes to temperature, pressure, and flow for reactor coolant pressure boundary materials; negligible effect on tensile stresses. No affect on other IGSCC susceptibility factors.
- The peak fluence increase results in a negligible impact on IASCC potential. The current inspection strategy is adequate to manage any potential effects of EPU.
- The potential for IGSCC and IASCC will be managed by maintaining RPV hydrogen water chemistry conditions consistent with established industry and EPRI guidelines. MNGP recently installed capability of using noble metal chemistry.

Overpressure Protection

- **Limiting Events are MSIV closure with failure of position scram (MSIVF) and ATWS**

- **MSIVF Peak Dome Pressure: 1317 psig**
  - Tech Spec Limit: 1332 psig
  - CLTP Value: 1277 psig

- **ATWS Peak Dome Pressure: 1489 psig**
  - ASME Limit: 1500 psig
  - CLTP Value: 1385 psig

- **No setpoint changes necessary**

Annulus Pressurization

AP Load Evaluation

- EPU loads bounded by OLTP loads
- Evaluated at off-rated conditions
- Includes SC 12-08, Impact of Plant Changes on Bio-Shield Wall Doors

Mechanical/Civil Engineering - NRR Session

Steam Dryer Overview – Closed Session Proprietary Information

Steam Dryer

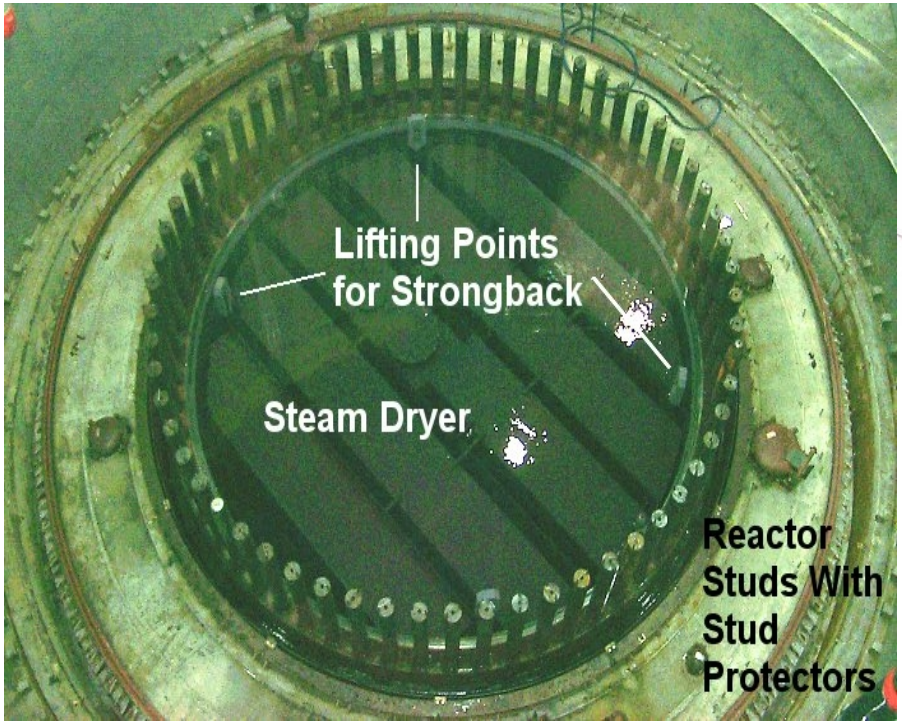
Steam Dryer Introduction

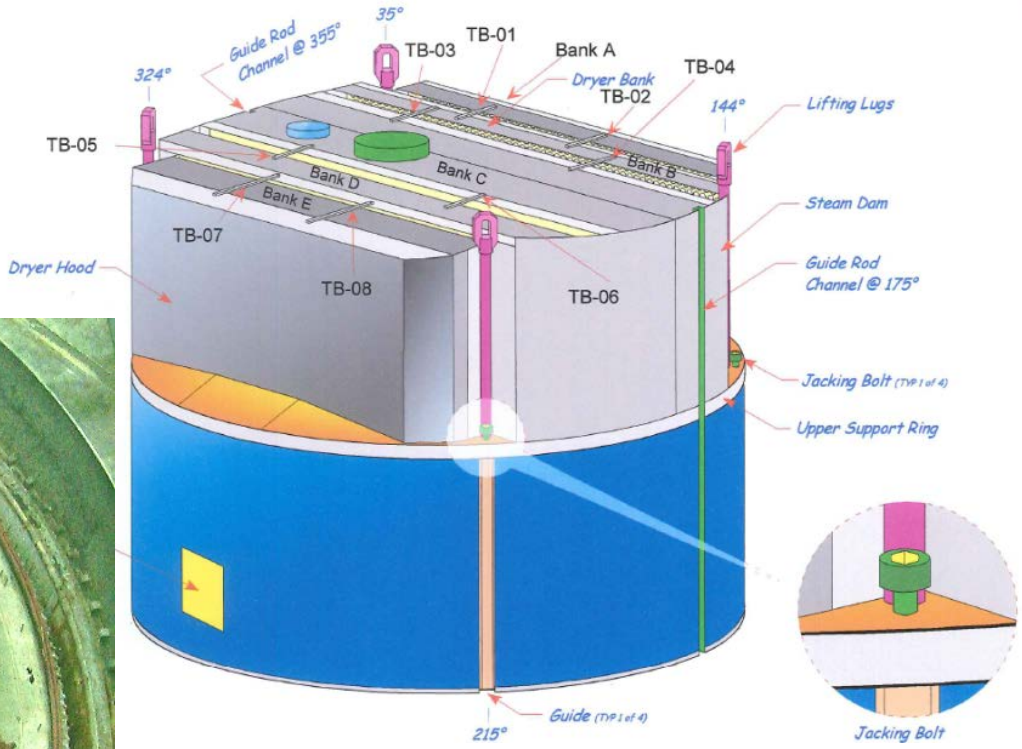
Steam Dryer Analysis

Power Ascension Test Plan

Original Steam Dryer

Square Hood Design Steam Dryer





Steam Dryer Review Status – NRR Session

Electrical Engineering

Electric Plant Overview

Station Blackout Capability

Grid Stability

Offsite Power

- Substation modifications:
  - New 345 KV line (not EPU related) – 6 transmission lines in substation
  - Main Transformer replaced for EPU
  - 1R and 2R Transformers replaced – upgraded and serves new 13.8 KV in plant system
- In Plant modifications:
  - Generator isolated phase bus upgraded
  - Generator protective relaying upgraded
- Offsite Power system has sufficient capacity to start and operate required safety-related AC loads within design voltage ranges
- MISO grid stability study indicated no compromise of off-site power sources from increased electrical output at MNGP

Offsite Power

Equipment	CLTP Rating	EPU Rating
1R Transformer	22.400/29.867/37.333 MVA OA/FA/FA @ 65C Rise 115kV-4.16kV-4.16kV	40.5/54 MVA ONAN/ONAF @ 65C Rise 115kV-13.8kV-4.16kV
2R Transformer	56 MVA FOA @ 65C Rise 34.5kV-4.16kV-4.16kV	40.5/54 MVA ONAN/ONAF @ 65C Rise 34.5kV-13.8kV-4.16kV

Onsite AC Power

- No modifications necessary to EDG system, load shed schemes or essential bus transfer changes for EPU
- No new safety-related loads required for EPU
- No changes required to Class 1E UPS system for EPU
- Added new 13.8 KV system:
  - Feeds FW pump, Condensate pump and RRP motors
  - Fed by new 1R and 2R transformers

Onsite AC Power

Equipment	CLTP Rating	EPU Rating
Non-Safety Related Switchgear #11	2000 A Continuous 4.76 KV	2000 A Continuous 15 KV
Non-Safety Related Switchgear #12	2000 A Continuous 4.76 KV	2000 A Continuous 15 KV
#11 and #12 Feedwater Pump	6000 HP 4000 V	8000 HP 13200 V
#11 and #12 Condensate Pump	1750 HP 4000 V	2400 HP 13200 V
#11 and #12 Reactor Recirculation MG Set Drive Motor	4000 HP 4000 V	4000 HP 13200 V

Onsite DC Power

- Changes to DC system under EPU conditions are not significant
- DC loading and battery requirements were reviewed for the design basis worst-case loading scenario – SBO mitigation
- EPU changes only result in changes to the timing of certain loads (no increase in the magnitude of DC loads)
- DC power systems have sufficient capacity to start and operate all connected DC loads required for design basis events
- DC power systems meet all applicable design criteria for battery capacity and DC equipment operation with adequate margin under EPU conditions
- Some 250 VDC Battery load changes (rearrangement of loads and minor relay changes) due to battery capacity margin management modification (not EPU)

Onsite DC Power

Essential Battery	CLTP Capacity Margin	EPU Capacity Margin
125 VDC Division I	15.83%	9.29%
250 VDC Division I	23.63%	20.64%
125 VDC Division II	26.58%	8.11%
250 VDC Division II	2.04%	22.81%

Station Blackout Capability

Station Blackout Capability

- Plant response discussed under “Special Events”
- No changes to SBO mitigation equipment
- New model more accurately includes CST-torus HPCI suction transfers
- Coping duration unchanged
- Existing DC load profile bounds EPU

Conclusion

Acceptable battery capacity, CST capacity, HPCI NPSH, and equipment temperatures within required limits

Electrical Grid Reliability

Electrical Grid Reliability

- Additional 345 KV line added to MNGP substation - increased transmission lines from 5 to 6
- Upgraded the 345 KV bus from a ring bus to a breaker-and-one-half system (USAR Section 8.2.1)
- Grid reliability study performed in two separate studies:
  - Requested 13 MWe in 2009 and 60.8 MWe in 2011
  - Reanalyzed and approved to upgrade output at one time in 2013
- Interconnection study included analysis for:
  - Regional single-line ground faults with breaker failure and 3-phase faults without breaker failure
  - Short circuit analysis calculated fault currents available with increased generation and verified fault currents are within interrupting capacity of MNGP substation breakers
- Conclusion: EPU does not adversely impact stability of MISO transmission grid in local area

Electrical Engineering – NRR Session

Acronym List

- A – Amperes
- ABA – Amplitude Based Algorithm
- AC – Alternating Current
- ACRS – Advisory Committee on Reactor Safeguards
- ADS – Automatic Depressurization System
- AOO – Abnormal Operational Occurrences
- AOP – Abnormal Operating Procedure
- AP – Annulus Pressurization
- App R – 10 CFR 50 Appendix R
- APRM – Average Power Range Monitor
- ARI – Alternate Rod Injection
- ARTS – APRM/RBM/Technical Specifications
- ASME – American Society of Mechanical Engineers
- AST – Alternative Source Term
- ATWS – Anticipated Transient Without Scram
- BPWS – Bank Position Withdraw System
- BSP – Backup Stability Protection
- BTU – British Thermal Unit
- BWR – Boiling Water Reactor
- BWRVIP – Boiling Water Reactor Vessel Internals Program
- cal – calorie
- CAP – Containment Accident Pressure
- CDF – Core Damage Frequency
- CLTP – Current Licensed Thermal Power
- CLTR – Constant Pressure Power Uprate Licensing Topical Report
- COF – Coefficient of Friction
- COLR – Core Operating Limits Report
- CPPU – Constant Pressure Power Uprate
- CR OP – Control Room Operator
- CRA – Control Rod Assembly
- CRD – Control Rod Drive
- CRDA – Control Rod Drop Accident
- CRDM – Control Rod Drive Mechanism
- CS – Core Spray
- CST – Condensate Storage Tank
- CUF – Cumulative Usage Factor
- DBA – Design Basis Accident
- DC – Direct Current
- DOR – Division of Operating Reactors
- EAB – Exclusion Area Boundary
- ECCS – Emergency Core Cooling System
- EDG – Emergency Diesel Generator
- ELTR – Extended Power Uprate Licensing Topical Report
- EOP – Emergency Operating Procedure

Acronym List

- EPRI – Electric Power Research Institute
- EPU – Extended Power Uprate
- EQ – Environmental Qualification
- FEM – Finite Element Model
- FHA – Fuel Handling Accident
- FIV – Flow Induced Vibration
- FW – Feedwater
- Gd – Gadolinium
- GDC – General Design Criteria
- GE/GEH – General Electric - Hitachi
- GNF – Global Nuclear Fuels
- GRBA – Growth Rate Based Algorithm
- HCTL – Heat Capacity Temperature Limit
- HELB – High Energy Line Break
- HFCL – High Flow Control Line
- HP – High Pressure
- HP – Horse Power
- HPCI – High Pressure Coolant Injection
- hr – hour
- HTC – Heat Transfer Coefficient
- HZ – hertz
- IASCC – Irradiation Assisted Stress Corrosion Cracking
- IGSCC – Intergranular Stress Corrosion Cracking
- IMLTR – Interim Methods Licensing Topical Report
- IRM – Intermediate Range Monitor
- K-value – Heat transfer rate
- KV – kilovolts
- L_a – Containment Leakage Rate
- LBA – Large Break Accident
- LHGR – Linear Heat Generation Rate
- LOCA – Loss of Coolant Accident
- LOOP – Loss of Offsite Power
- LPCI – Low Pressure Coolant Injection
- LPRM – Local Power Range Monitor
- LPZ – Low Population Zone
- LTR – Licensing Topical Report
- M&E – Mass and Energy
- MAPLHGR – Maximum Average Planar Linear Heat Generation Rate
- MCPR – Maximum Critical Power Ratio
- MELLLA – Maximum Extended Load Line Limit Analysis
- MELLLA+ – MELLLA plus
- MG – Motor Generator
- MISO – Midwest Independent Transmission System Operator, Inc.
- Mlbm – Million pound mass

Acronym List

- MNGP – Monticello Nuclear Generating Plant
- MOV – Motor-Operated Valve
- MS – Main Steam
- MSIV – Main Steam Isolation Valve
- MSIVC – Main Steam Isolation Valve Closure
- MSIVF – MSIV closure with failure of position scram
- MSL – Main Steam Line
- MSLB – Main Steam Line Break
- MSO – Multiple Spurious Operations
- MVA – Million Volt Amps
- MWe – Megawatts Electric
- MWt – Megawatts Thermal
- NCL – Natural Circulation Line
- NPSH – Net Positive Suction Head
- NPSHa – NPSH available
- NPSHr – NPSH required
- NPSHreff – NPSH required effective
- NRC – Nuclear Regulatory Commission
- NRR – Nuclear Reactor Regulation
- NSPM – Northern States Power – Minnesota
- OE – Operating Experience
- OLMCPR – Operating Limit Maximum Critical Power Ratio
- OLTP – Original Licensed Thermal Power
- OPRM – Oscillation Power Range Monitor
- PAT – Power Ascension Testing
- PBDA – Period Based Detection Algorithm
- PCI – Pellet Clad Interaction
- PCT – Peak Clad Temperature
- PRNMS – Power Range Neutron Monitoring System
- PRV – Pressure Relief Valve
- psia – pounds per square inch absolute
- psig – pounds per square inch gauge
- PSP – Pressure Suppression Pressure
- PUSAR – Power Uprate Safety Analysis Report
- QC2 – Quad Cities Unit 2
- RBM – Rod Block Monitor
- RCIC – Reactor Core Isolation Cooling
- RCPB – Reactor Coolant Pressure Boundary
- RCS – Reactor Coolant System
- Rem – Roentgen equivalent man
- RG – Regulatory Guide
- RHR – Residual Heat Removal
- RIPD – Reactor Internal Pressure Differential
- RPS – Reactor Protection System

Acronym List

- RPV – Reactor Pressure Vessel
- RRP – Reactor Recirculation Pump
- RSD – Replacement Steam Dryer
- SBA – Small Break Accident
- SBO – Station Blackout
- SC – Safety Information Communication
- SE/SER – Safety Evaluation Report
- sec – second
- SLMCPR – Safety Limit Maximum Critical Power Ratio
- SLO – Single Loop Operation
- SNR – Signal Noise Ratio
- SPDS – Safety Parameter Display System
- SRLR – Supplemental Reload Licensing Report
- SRP – Standard Review Plan (NUREG-0800)
- SRV – Safety Relief Valve
- SW – Service Water
- T-M – Thermal – Mechanical
- TAF – Top of Active Fuel
- TCD – Thermal Conductivity Degradation
- TCV – Turbine Control Valve
- TEDE – Total Effective Dose Equivalent
- TS – Technical Specifications
- UPS – Uninterruptible Power Supply
- USAR – Updated Safety Analysis Report
- V – Volt
- VAC – Volts AC
- VDC – Volts DC
- VPF – Vane Passing Frequency
- ZR4 – Zircalloy
- ^{o}F – Degrees Fahrenheit