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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

March 5, 2008

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

MEETING ON THE SUBCOMMITTEE OF PLANT LICENSE RENEWAL

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WEDNESDAY,

MARCH 5, 2008

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ROCKVILLE, MARYLAND

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The meeting was convened in Room T-2B3 of Two Mile Flint North, 11545 Rockville Pike, Rockville, Maryland, at 10:30 a.m., Dr. John Seiber, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

JOHN D. SEIBER, Chairman

OTTO MAYNARD, Member

WILLIAM J. SHACK, Member

MARIO V. BONACA, Member

SAID ABDEL-KHALIK, Member

JOHN W. STETKAR, Member

JOHN BARTON, Consultant

ACRS STAFF PRESENT:

MAITRI BANERJEE Designated Federal Officer

NCR STAFF PRESENT:

P.T. KUO

LOUISE LUND

TAM TRAN

GREG PICK

RANI FRANNICH

DR. KENNETH CHANG

DR. RAJ AULUAC

LINDA SMITH

ALSO PRESENT:

TERRY GARRETT

ERIC BLOCHER

LORRIE BELL

DIANE HOOPER

LUIS SOLORIO

DR. ARTHUR TURNER

TIM CARD

MAURICE DINGLER

DAVE GERBER

DEB DIXON

ALSO PRESENT: (CONT.)

PAUL CRAWLEY

GARY WARNER

DALE BERRY

PATRICK GUEVAL

JOHN HILLBISH

DON STEVENS

TODD MOSER

ROY MATTHEW

GEORGE WILSON

A-G-E-N-D-A

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

10:30 a.m.

OPENING STATEMENT

MR. SEIBER: The meeting will now come to order. This is a meeting of the plant license renewal subcommittee. I am John Seiber, Chairman of the Wolf Creek Plant License Renewal Subcommittee. ACRS members in attendance are: Otto Maynard, Dr. Bill Shack, Dr. Mario Bonaca, Dr. Said Abdel-Khalik, John Stetkar, and our consultant, John Barton. Maitri Banerjee, of the ACRS staff, is the designated Federal official for this meeting.

Today, we will examine the application for license renewal, the staff safety evaluation, and the staff's audit and inspection reports for the Wolf Creek Generating Station. Our review today is an interim review since the staff has several open items which must be resolved before we give this application an SER or a final review.

The ACRS is required by the Atomic Energy Act of 1954, as amended, to review all applications for new power reactor licenses or changes thereto. License renewal is one of the changes contemplated by the law.

Wolf Creek Generating Station is located

in New Strawn, Coffey County, Kansas. New Strawn has a population of about 425 residents. New Strawn is about three and a half miles from Burlington, Kansas, with a population of about 2500 residents, and that Burlington, Kansas, is located about mid way between Kansas City and Wichita.

Wolf Creek Generating Station is a four-loop, Westinghouse-type PWR with a large, dry, atmospheric containment. The balance-of-plant was designed and built by Daniels International with assistance from Bechtel. The maximum license reactor power is 2565 megawatts-thermal, which produces about 1228 megawatts-electric gross.

The plant is cooled by direct cooling from the Wolf Creek Reservoir, which is a manmade reservoir of about 6,000 acres, and actually the site, the licensee-controlled area, the site is 11,600 acres, which is a pretty large site as sites go. In its most recent reactor oversight program evaluation, Wolf Creek scored all green or no color in every category. Wolf Creek has not received a civil penalty in the last ten years.

The Wolf Creek Generating Station was originally licensed to operate on March 11th, 1985 to load fuel and power operation was attained on June

4th, 1985. The current license will expire on March 11th, 2025. By its application dated September 27th, 2006, the licensee, Wolf Creek Nuclear Operating Company, is requesting that its license be renewed to extend the term of the license by 20 years until March 11th, 2045.

The staff has prepared a Draft Safety Evaluation Report dated February 1st, 2008, which presents the staff analysis and determinations with regard to the information provided in the application. In addition, the staff has conducted an audit and inspection documented in its report dated December 5th, 2007.

In its Safety Evaluation Report, the staff identified five open items in the application for which there is yet to be a satisfactory resolution. During today's meeting, I would like both the Applicant and the staff to address each of these open items so that we can evaluate these issues and their proper resolution. The agenda today provides ample time for these discussions.

The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed position and action as appropriate for the deliberation by the full Committee.

The rules for participation in today's meeting were announced as part of the notice of the meeting previously published in the Federal Register on February 22nd, 2008. We have received no written comments or requests for time to make oral statements from members of the public regarding today's meeting. We have provided telephone bridge connections following the request from one of the stakeholders to listen in. To avoid unnecessary interruption and reduce the noise level, we request that these telephone bridge lines be kept in mute.

A transcript of the meeting is being kept and be made available as stated in the Federal Register notice. Therefore, we request that participants in this meeting use the microphones located throughout the meeting room when addressing the Subcommittee. Participants should first identify themselves and speak with sufficient clarity and volume so that they may be readily heard.

We will now proceed with the meeting and I call upon Dr. P.T. Kuo of the Office of Nuclear Reactor Regulation to introduce the presenters.

Dr. Kuo?

DR. KUO: Thank you, Mr. Chairman, and good morning.

My name's P.T. Kuo, Director of the Division of License Renewal. To my left is Louise Lund, who is the Project Management A Branch Chief, and she is responsible for the conduct of this review for Wolf Creek license renewal application. And to her left is Tam Tran, who is the project manager who is leading the review effort. And to his left is Greg Pick. He is the team leader for the Regional inspection.

And sitting in the audience there are many tech reviewers and, also, many branch chiefs supporting this review. Among them Rani Frannich. She is sitting on the extreme right, who was responsible for the project review before Louise took over and she's here to support the continuity. We also have Dr. Kenneth Chang, who is the Tech Review Audit Branch 1 Branch Chief, responsible for the mechanical and the materials engineering review areas. And we also have Dr. Raj Auluac, who is the Audit Review Branch Chief 2, whose responsibility is to review the structural, electrical and scoping areas.

We also have Linda Smith, who is the Branch Chief in Region 4, responsible for the inspection. And let me see if there are any other branch chiefs sitting there? But we have other tech

reviewers here reviewing different areas and supporting the review.

As Chairman, you mentioned that we forward the SER with open items to the Committee on February 1st, and in the SER it contends five open items, but, basically, in two major areas. The first major area is the station blackout. Two open items are related to this issue. One has to do with the boundary where the station blackout boundary ought to be. And the other is the medium voltage cables. That's the two open items that are related to station blackout.

And there are three open items that are related to metal fatigue in terms of methodology and the cycle contact, all that. So, during the staff review, staff will provide the Committee the details of these open items and where the statuses are.

Today's presentation, the applicant will lead off the presentation first, and then it will follow with the staff's presentation.

With that, I turn the presentation over to the applicant.

MR. GARRETT: Thank you.

I'm Terry Garrett with Wolf Creek, and good morning, Mr. Chairman, and members of the ACRS on behalf of Wolf Creek Nuclear Operation. We thank you

for this opportunity to talk about our license renewal application and discuss in detail the open items that Mr. Kuo mentioned.

On behalf of Wolf Creek's owners, we have expended significant resources in the preparation of our license renewal application and review, and the audits and the inspection process, and we really look forward to getting closer to final NRC approval.

I'd like to begin today by taking a little time in introducing the members supporting me today, not only from Wolf Creek, but, also, from STARS. And, just in a little bit of a preparation, I will talk about STARS in more detail later, but STARS stands for Strategic Teaming and Resource-Sharing Alliance. It is an alliance made up of a number of single utilities and some of the representatives here are from that STARS alliance who've also supported us.

To my left here I have today with me Eric Blocher, who was the STARS project manager for license renewal. To his left is Lorrie Bell. Lorrie is the Wolf Creek project manager responsible for our license renewal application. To her left is Diane Hooper. Diane is a supervisor of licensing at Wolf Creek. To my immediate right is Luis Solorio. Luis is a senior electrical design engineer for Wolf Creek. And to his

right is Dr. Arthur Turner. Dr. Turner is our lead technical person for license renewal application.

Also seated at the table behind some of you, the first person who would be on our right, would be Tim Card. Tim Card is a systems engineering supervisor at Wolf Creek. To his right is Maurice Dingler. Mo is a -- goes by Mo -- is a senior engineer at Wolf Creek. To his right is Dave Gerber. Dave is an associate with Structural Integrity Associates.

And then lastly, sitting in the audience there, if you would, raise your hand, Deb Dixon is an electrical engineer at Wolf Creek. To her right is Paul Crawley. Paul is the STARS manager responsible for the plant aging management program within STARS. To his right is Gary Warner, electrical lead with STARS. To his right is Dale Berry. Dale is the superintendent of operations at Wolf Creek. And, finally, to his right is Patrick Gueval. Patrick is a superintendent in major modifications at Wolf Creek and had the oversight responsibility for our license renewal application.

We also have in attendance John Hillbish, a license lead from STARS. Don Stevens, time-limited aging analysis lead. And, also, Todd Moser, who is a

STARS regulatory affairs manager.

Did I miss anybody? If I did, I apologize. And thank you.

CHAIRMAN SEIBER: Question: who actually prepared the application?

MR. GARRETT: I will actually talk about that --

CHAIRMAN SEIBER: Thank you.

MR. GARRETT: -- but the application was prepared in conjunction with Wolf Creek and STARS.

CHAIRMAN SEIBER: Thank you.

MR. GARRETT: But I will discuss that in detail.

CHAIRMAN SEIBER: Fine.

MR. GARRETT: For our agenda today, we'll describe the Wolf Creek Generating Station site, provide some current Station status, highlight some of the licensing issues and prospectus from the management asset over the years. Provide an overview of the licensing renewal project, the organization, and the approach we took. And then, finally, we'll address the safety evaluation report open items, as P.T. mentioned, that are related to Station blackouts and metal fatigue, and we believe they'll take most of the time for today's discussion.

Next slide. Thank you.

Just real quick, on the Wolf Creek site description, Wolf Creek Generating Station is located approximately three-and-a-half miles northeast of the town of Burlington. It's in Coffey County, Kansas. For those not familiar with the state of Kansas, which may be many of you, the site actually is 75 miles southwest of Kansas City. It's very rural as Jack mentioned. It's also three-and-a-half miles east of the Neosho River in the John Redmond Reservoir.

The Wolf Creek Nuclear Operating Corporation, and I'll refer to it as Wolf Creek many times, is a Delaware corporation. It was organization on April 14th, 1986. Wolf Creek is a jointly-owned corporation formed by the owners of the Wolf Creek Generating Station. Those owners are Westar Energy, with a 47 percent share, Kansas City Power and Light Company, which is a 47 percent share, and then Kansas Electric Power Cooperative, which owns the remaining 6 percent of the assets. And then Wolf Creek is the authorized agent for those owners and has the exclusive responsibility for the operation, maintenance, repair, and eventual decommissioning of the generating station.

As it was mentioned, the nuclear steam

supply system is a pressurized water reactor that was designed and supplied by Westinghouse Electric Corporation. It has a license core power of 3565 megawatts-thermal. The turbine generator output is approximately 1228 megawatts-electric. The architect engineer was Bechtel Power Corporation, and the containment was designed by Bechtel Power Corporation.

The Wolf Creek Generating Station utilizes a large cooling lake called Coffey County Lake for its source of circulating water. The lake is about a 5,090-acre impoundment and was created by erecting an earthen dam across the creek Wolf Creek, which is six miles upstream with a confluence with the Neosho River.

The entire operating staff and corporate staff of Wolf Creek is on site. We have a staff complement of approximately 940 people. We are also active members with the Utility Service Alliance and the STARS Alliance. These alliances were formed to provide a cost and resource sharing, technical bench strength, and collaboration with its members in a fleet-like atmosphere. There are 14 members of the STARS and Utility Service, or USA, Alliance and they are all single-station utilities.

We operate on 18-month cycles, fuel

cycles, and we operate at a continuous 100 percent power from the end of our Refuel Outage 14 to the start of our Refuel Outage 15. Our current cycle will end this month and we operated from Refuel Outage 15, which ended -- or, started -- it ended and we started that cycle on November 10th, 2006. Our next outage, again, begins later this month. Our current station power is 100 percent power and we operated at near continuous 100 power this cycle with one exception.

In January of this year we shut the unit down due to an issue related to voiding our emergency core fueling system, and I'll discuss that very briefly. In the interest of staying focused on the real issue here with license renewal, this was a significant issue for Wolf Creek, but it really is not related to license renewal. During normal, monthly emergency core cooling system surveillances, we discovered voiding in our emergency core cooling system piping. Voiding was found. We evaluated and removed the voiding. As part of the extent of condition review for that, we continue to look for expanded locations within the emergency core cooling system and found more voids. So we took the unit -- shut the unit down to Mode 3 to do a full extent of condition and understand the situation.

MR. BARTON: This was a recent? This hadn't happened before?

MR. GARRETT: This was in January of this year.

MR. BARTON: Okay, but it had not happened before?

MR. GARRETT: Had not happened before.

MR. BARTON: Okay.

MR. GARRETT: We took the unit off line to understand and remove all voids. We did that, returned the emergency core cooling system to operable status, and we took the unit back to full service on January 16th of this year.

CHAIRMAN SEIBER: Exactly where was the nitrogen bubble?

MR. GARRETT: The nitrogen voiding was found on the discharge side of the safety injection pumps.

CHAIRMAN SEIBER: Okay.

MR. GARRETT: The air was found on the suction side of the safety injection pumps. The nitrogen accumulated in there because we had leaking valves in our isolation tube accumulators.

So we determined that all required safety functions were met and would have been met with the

as-found gas voids in the emergency core cooling pipes.

DR. ABDEL-KHALIK: Terry, leaking valves, which valves?

MR. GARRETT: These would be valves on the accumulator fill lines.

CHAIRMAN SEIBER: Okay.

MR. GARRETT: This outage, we will go in and repair those valves as part of corrective action.

CHAIRMAN SEIBER: But the nitrogen came from the accumulator gas phase?

MR. GARRETT: The water is saturated with nitrogen, yes, and leaking through the valves. When it went to the low pressure system, it came out a solution.

CHAIRMAN SEIBER: Now, if the suction of the safety injection pumps had an air pocket, how do you determine that it continues to be operable?

MR. GARRETT: Well, we do do surveillances and we do additional surveillances for additional locations on the suction side to insure we continue to have full systems.

DR. ABDEL-KHALIK: So what is the basis of the second sentence of the last bullet on this?

MR. GARRETT: The second sentence --

DR. ABDEL-KHALIK: The second part of the sentence, would have been met.

MR. GARRETT: Would have been met, would have been met. When we went through and looked at the as-found conditions, we evaluated the amount of voiding we had. We did another evaluation to determine that the safety functions would have been met, the ECCS would have responded if called upon during those situations.

CHAIRMAN SEIBER: But the pump would not have pumped with the air pocket?

MR. GARRETT: It would have.

CHAIRMAN SEIBER: It would have?

MR. GARRETT: Yes.

CHAIRMAN SEIBER: Okay.

DR. ABDEL-KHALIK: So how much voiding was there?

MR. GARRETT: Art, can you describe it in a little more detail on that?

DR. TURNER: The largest void in the suction pipe was about two-and-a-half cubic feet of air at the conditions under which it was measured, which is lower pressure than it would have been at at the time it could have been entrained and mobilized to go to the pumps. We evaluated the predicted volume

fractions of air at the pump inlets based on some experiments that were done, sponsored by the Westinghouse Owners' Group, looking at the question of gas entrainment and how the gas entrainment process and transport process from the initial void location to the inlet to the pumps proceeds.

And then we looked at our pump performances, the flow rates we would expect to have during -- through the pumps at the times of voids could have been mobilized, and, based on analyses using that information, we concluded that the pumps would have continued to pump through the ingestion and passing the gas -- the air through the pump.

The duration of the air ingestion is a matter of 30 seconds or so. The volume fractions are higher than we would like in design, but we concluded that the pumps would still be capable of performance.

MR. BARTON: What kind of pumps are these?

DR. TURNER: These are 11-stage, horizontal shaft, high-pressure pumps.

CHAIRMAN SEIBER: Rotating pumps?

DR. TURNER: Centrifugal.

CHAIRMAN SEIBER: I got you. You filed an LER with that? I'm sorry?

MS. HOOPER: We haven't filed it yet, but

it will be filed.

CHAIRMAN SEIBER: Since January? I thought you had 30 days.

MS. HOOPER: Sixty days.

CHAIRMAN SEIBER: Sixty?

MS. HOOPER: Yes.

CHAIRMAN SEIBER: Okay. Did you do a follow-up inspection by the staff?

MS. LUND: Yes. I think the regional inspector has that on his slides.

CHAIRMAN SEIBER: Thank you.

MR. GARRETT: Next slide.

As part of this continuing investigation, Wolf Creek did form an instant investigation team. This is the highest level of root cause, an investigation we perform at Wolf Creek. Their results will be presented to our Corrective Action Review Board this week on Friday. And then, we also are participating in a recent Generic Letter that enters the issue relative to accumulation of gas, and we'll also be well under way in resolving that Generic Letter, responding to it as a result of this.

CHAIRMAN SEIBER: Okay.

MR. GARRETT: Next slide, please.

Moving on now to some licensing history.

Some of this has already been talked about, so just real quickly. We received our construction permit May 17th, 1977. Operating license was issued on March 11th, 1985. We commenced commercial operation September 3 of that same year.

In 1993 we performed a proximate 4.5 percent thermal power increase to take our unit from 3411 megawatts-thermal to 3565 megawatts-thermal. As part of that we also modified and upgraded our transformers and modified our first-stage nozzle blocks to realize the full extent of the electrical output.

CHAIRMAN SEIBER: This was not instrument accuracy recapture, this was a real upgrade?

MR. GARRETT: Yes, correct, a real upgrade.

MR. MAYNARD: That upgrade, how did you handle T-hot? Did you just go up in higher temperatures?

MR. GARRETT: Actually, at the same time, we reduced T-hot by five degrees. We did that as part of the entire analysis package to further ensure the longevity and reduce the propensity for stress, corrosion and cracking in our steam generator tubes.

CHAIRMAN SEIBER: What's nominal T-hot

right now?

MR. GARRETT: Great question. I should have off the top of my head. Dale, would you have an answer to that?

MR. BERRY: Yes, I'm Dale Berry with operations. T-hot runs 618.

CHAIRMAN SEIBER: All right. Thank you.

MR. GARRETT: Next slide.

I'd like to spend just a little time discussing some of the completed and ongoing or planned improvements we have at Wolf Creek, a lot from the perspective improving reliability and reducing maintenance.

In 1996 we replaced our normal charging pump with a centrifugal pump. We had had a positive displacement pump. We replaced that because of reliability issues and we wanted to reduce maintenance time.

Later, in 1999, we increased the total storage of our spent fuel pool. We increased the capacity that at this point we'll be able to have capacity through the end of 2025. We also replaced the original split pins with work-hardened stainless steel pins in 2003.

CHAIRMAN SEIBER: Did you notice

baffle-jamming at that time, or is this just a natural measurement of the cracks in the split pins?

MR. GARRETT: It was primarily due to OE due to cracking of the split pins.

CHAIRMAN SEIBER: Okay.

MR. GARRETT: We have made a number and continue to make a number of reliability improvements in our emergency diesel generators. We've replaced our governor. We have a number of heat exchangers that have been replaced or under way. We replaced our intercooler heat exchanger in 2006. We will be replacing our lube oil heat exchangers this outage in 2008. And then we have a jacket water heater exchanger planned for replacement tentatively in 2009.

CHAIRMAN SEIBER: What kind of boiler feedwater chemistry are you using?

MR. GARRETT: Boiler feedwater chemistry? I can't answer that. Does anybody --

DR. MAYNARD: Are you talking about for the diesel generator components or for just overall?

CHAIRMAN SEIBER: For the main plant.

DR. MAYNARD: Main plant.

MR. GARRETT: Dale, do you have --

CHAIRMAN SEIBER: Is it more balance, all volatile, or what?

MR. BERRY: We use a chemistry approach called high ammonia pH control. It involves adding ethylamine to the secondary system, as well as -- boy, I can't remember that other chemical -- hydrazine.

Does that answer your question, sir?

DR. MAYNARD: Yes.

CHAIRMAN SEIBER: Yes, we've heard about hydrazine recently. It's what the satellite's running on.

DR. MAYNARD: We took care of that one though.

DR. SHACK: What have been the issues on the heat exchanges?

MR. GARRETT: Basically, material degradation on the tubing, so we're replacing the heat exchangers with an upgraded tube material that will be more resistive to corrosion issues.

DR. SHACK: And that was a material change from what to what?

MR. GARRETT: We're going to stainless steel, you know, the material.

DR. TURNER: The original heat exchanger tubes were Admiralty or I think one of them was another copper alloy. We're going to L616.

MR. STETKAR: Your diesel is cooled by service water, right?

MR. GARRETT: That's correct.

DR. SHACK: I'm not sure this is the right place. Your PRA results are sort of dominated by station blackout leading to reactor seal coolants when you lose cooling. This is a Westinghouse plant. Have you upgraded your reactor pump seals to the current standard best-kind-of most-resistant to that sump cool?

MR. GARRETT: We have upgraded our reactor cool pump seal packages, yes.

DR. SHACK: Yes, okay.

MR. GARRETT: And I would believe it would be to the latest vintage.

DR. SHACK: Okay. So you're still left with that residual risk, but you've done what you can to get that upgraded?

MR. GARRETT: That's correct.

Our containment sumps, as part of the Generic Safety Issue 191, were replaced last outage. Basically, we took two sumps with a 400 square foot surface area to over 6,600 square foot surface area for our strainers.

CHAIRMAN SEIBER: Six thousand?

MR. GARRETT: Six thousand six hundred square feet.

CHAIRMAN SEIBER: Sounds like it covers most of the bottom containment.

DR. SHACK: Who is the supplier for your sump strainer upgrade?

MR. GARRETT: The vendor is PCI.

Also, in 2007 we replaced our plant process computer. This is an information gathering computer. We, also, as part of that upgrade, upgraded our control room simulator, our technical support center computers, and our emergency off-site facility computers.

CHAIRMAN SEIBER: You skipped the pressurizer nozzle.

MR. GARRETT: I did. Thank you. I will talk about the pressurizer full-structure weld overlays in a subsequent slide, but we did do a replacement there.

CHAIRMAN SEIBER: That is of interest in license renewal.

MR. GARRETT: I will discuss that in more detail later.

Some planned improvements this outage, we will be replacing our main steam and main feedwater

isolation valves, the valves, the actuators, and the controls. We're doing this primarily for liability reasons and single-point vulnerability reductions.

The existing valve actuators are electrohydraulic actuator and have been an equipment relay with the issue at the Station. And the hydraulic oil is a health risk.

CHAIRMAN SEIBER: Do you have electric feed pumps?

MR. GARRETT: I'm sorry?

CHAIRMAN SEIBER: Do you have electric feed pumps or steam turbine generators?

MR. GARRETT: Turbine generators, turbine feed pumps, correct.

CHAIRMAN SEIBER: Inside of the valves, the feedwater regulating valve are basically constant pressure, drop devices?

MR. GARRETT: That I'm sure I can answer. We do not --

CHAIRMAN SEIBER: That's the way most of them are designed.

MR. GARRETT: Okay.

DR. BONACA: All your feedwater pumps are steam driven, or do you have --

MR. GARRETT: We have one motor driven,

but the two mains are steam driven.

CHAIRMAN SEIBER: And they're both half capacity.

DR. ABDEL-KHALIK: What is the history of the leak test results for both the main steam isolation and main feedwater isolation?

MR. GARRETT: The history of the leak results, leak tightness? I can't answer that. Does anybody?

MR. CARD: I can take it, Terry.

Those are -- I'm Tim Card. I'm a system engineering supervisor.

Those are not containment isolation valves and, therefore, are not leak tested.

MR. MAYNARD: They're not?

MR. CARD: No.

MR. GARRETT: Thank you, Tim.

CHAIRMAN SEIBER: On the other hand, did you have a specification for those and if, during their in-service test were found to be leaking excessively, you would have repaired them, right?

MR. GARRETT: Yes.

CHAIRMAN SEIBER: Okay.

MR. GARRETT: Also, we're going through a series of our safety-related room cooler upgrades. We

have already done several and will continue. By March of 2009 we will have replaced the safety-related room coolers with new room coolers with better material properties. Again, that's due to material degradation due to the service water environment they're in.

2009, we'll be doing a main transformer uprate, and then in 2011 we'll be doing turbine rotor replacements and turbine controls and protection replacement. The turbine rotor replacements are largely due to degradation issues due to stress, corrosion, cracking, but we will also realize some megawatt-electric gain from that replacement.

CHAIRMAN SEIBER: In your main transformer upgrade, do you have associated with that the large high-voltage circuit breaker upgrades, or are you going to use the same circuit breakers?

MR. SOLORIO: We're going to uprate the generator output breakers from their 2,000 amp rating to 3,000 amp rating.

CHAIRMAN SEIBER: That changes the impedance in the system, does it not?

MR. SOLORIO: It may, but I really couldn't answer that, but I don't think it's going to be that significant of a change.

CHAIRMAN SEIBER: Okay. I presume --

MR. SOLORIO: But most --

CHAIRMAN SEIBER: -- electrical engineers know how to do that.

MR. SOLORIO: The main transformer uprate is basically to give us some additional margin relative to the metadyne rating on the system.

CHAIRMAN SEIBER: Have you ever had to reduce power because of main transformer issues, temperature, gas accumulation, anything like that?

MR. SOLORIO: I don't recall any recently within maybe the last ten years. There may have been some in the past which were some of the issues related to the transformer due to hot oil temperatures received or alarms received. As to whether or not we reduced power or not, I couldn't answer that. But we've addressed those issues now. We don't have the hot oil temperature limitations any more.

CHAIRMAN SEIBER: Yes, but do you take gas samples of the oil?

MR. SOLORIO: Yes, we do.

CHAIRMAN SEIBER: Usually weekly, is that a weekly test?

MR. SOLORIO: Those are done -- I can't answer that, but those are done on a frequent basis and are main transformer samples even though they're

slightly high and elevated because of the high loading on the transformer, they're manageable and they're not degrading.

DR. SHACK: Just a question to come back. When you changed out the feedwater heater from the copper alloy to the new alloy, did you also raise the pH then?

MR. TURNER: The heaters we're talking about are the safety-related room coolers.

DR. SHACK: Wrong heaters.

MR. GARRETT: Also, in the near term, we will be establishing time frames for reactor vessel loop nozzle mitigations. Our reactor head is a low, susceptibility, reactor vessel head, and we do not have a time frame for replacement. However, we have purchased a reactor vessel head forging for delivery in 2010.

We have outstanding performance in our steam generators, largely due to our steam generator asset management program and team agreement with our NSSS vendor. Our steam generators have less than .9 percent plugging, and we expect to operate them until 2025. Our steam generator is a Model F Westinghouse generators with thermally treated Alloy 600 tubing and we continue to review the life cycle management

program for those generators.

MR. BARTON: Are those the original steam generators?

MR. GARRETT: That's correct.

MR. BARTON: Is there any explanation as to why the D-generator has got three to four times more plugged tubes than the others?

MR. GARRETT: What you're referring to is -- just for everybody's information -- is that the Alpha, Bravo and Charlie generators are only .4 to .6 percent range, and the Delta is at a 2.03 percent on a range for plugging.

MR. BARTON: Even though it's low, is there any explanation as to why that generator has about three to four times as many plugged tubes as the other three?

MR. GARRETT: Tim, did you hear the question? Can you address that?

MR. CARD: Yes. The answer is we don't have an absolute reason why.

MR. MAYNARD: I would suggest go back to the original delivery records for the steam generators. I think you'll find that the Delta steam generator came with some plug in the beginning. Also, the Delta steam generator was the instrumented steam

generator during startup.

MR. CARD: You're absolutely correct. It had the thermal study package on it. We've talked to Westinghouse significantly about that, but the answer is still we don't have an absolute explanation for it.

CHAIRMAN SEIBER: Is the Model F the one that had the pre-heater section to it?

MR. GARRETT: I don't know.

DR. TURNER: This is Arthur Turner. The answer to that is, no, they're not pre-heater steam generators.

CHAIRMAN SEIBER: Okay.

DR. SHACK: There was an RAI from the staff discussing your license renewal application. You know, you're using rotating pancake probes and bobbin probes to engage to inspect certain maybe this is why you can't find any cracks. You were using them for regions where they weren't qualified. Now, your response I think is a regulatory response. I was looking for the plain English response that says you're now on 97.06 and everything is great.

Have you really changed inspection techniques so that they're now using fully qualified techniques over the whole steam generator?

MR. GARRETT: Tim, can you address that

one?

MR. CARD: We're using fully qualified techniques as much as they are qualified. Okay? There are some areas that they just aren't qualified within the tube sheet. There is no qualified method for that.

DR. SHACK: Okay. But to the extent that you can, you're using --

MR. CARD: Absolutely, yes.

DR. SHACK: -- techniques, okay.

CHAIRMAN SEIBER: Have you plugged the inner rows of tubes where the U-bend is tightest?

MR. CARD: No, we haven't needed to. We have not needed to.

CHAIRMAN SEIBER: Okay.

DR. SHACK: You mentioned that you're still evaluating mitigating the hot leg welds. Why are those lower susceptibility, for example, than steam generator bowl welds? I would have thought they'd have been higher.

MR. GARRETT: They are higher susceptibility than the bowls.

DR. SHACK: Okay. So you already had cracking on the steam generator drain welds. You got a higher susceptibility region, and you're still

arguing whether you should still mitigate?

MR. GARRETT: Well, we will do the required inspections pre-marking 139, but what we're evaluating is whether we just skip the inspection and go right into mitigation.

DR. SHACK: And the mitigation would be a structural overlay?

MR. GARRETT: We actually haven't determined that yet. That's part of the evaluation, what would be the right technique for us to use.

DR. SHACK: What would be the candidates?

MR. GARRETT: I would say the stress improvement package, an overlay or an inlay would be the three we would evaluate.

DR. SHACK: Okay, inlay.

MR. GARRETT: Move on? Okay.

Now, I'll move into the discussion of the license renewal process and give a little overview of the project.

Wolf Creek uses STARS Alliance plant aging management project team for development of our license renewal application. The STARS member stations that make up the project aging management team are Calloway, Commanche Peak, Dowell Canyon, Palo Verde, South Texas Project, Wolf Creek, and then recently San

Onofre joined the STARS Alliance for this purpose. The STARS plant aging management project team was established in March 2004. The project team comprises a combination of utility staff and contractor staff. The contractor is Worley Parsons.

At Wolf Creek, then, we had six personnel dedicated to the license renewal effort: a project manager, an electrical lead, a civil structural lead, two mechanical leads, and one document services lead. These six, then, served as the interface between the Wolf Creek staff and the plant aging management project team. There were approximately 20 utility and contractor personnel located at the project management team's offices, and the personnel numbers have gradually increased as other STARS utilities began license renewal studies.

A prime responsibility of the Wolf Creek project team, then, was to facilitate communication between the plant aging project team and the Wolf Creek subject matter experts. We did that and involved them early so that the program will from the beginning in order to develop the right license renewal deliverables we had been reviewing and, therefore, be owned by the Wolf Creek staff.

Throughout the license renewal application

development we conducted internal reviews and also conducted a peer review prior to submittal. The comments from our internal review and the peer review then were dispositioned and incorporated into our submittal of the application.

In the scoping phase we utilized a component database. It included drawings and isometrics. We did make some changes based on audit reviews and regional inspections. Those changes were incorporated into the amendments of our application. And, finally, we were pleased to see that we had a conclusion, that we had an acceptable method for both the scoping and screening of our nonsafety-related systems, structures and components.

The STARS license renewal approach is a continuing process. The long term plan is for a sequential filing of license renewal applications by the STARS utilities utilizing this project team, and we'll do that to maximize the lessons learned from license renewal application to license renewal application. Wolf Creek was the lead plant for this effort. The next STARS submittal will be later this year. That Plant 2 number submittal and applications -- following the Plant 2 submittal this year, applications will be submitted by the STARS utilities

on about a one-year frequency.

The key focus of the plant aging management project team is to maintain a high level of industry involvement both from the perspective of incorporating industry lessons learned from other STARS submittals and other submittals, as well as contributing to industry working groups and meetings. We intend to make the industry review process a smooth process, maximizing both utility and industry efficiencies in the audits, inspections and responses through requests for additional information.

Another aspect of our STARS license renewal organization is that we have an oversight committee. The oversight committee is independent and provides valuation oversight of activities, processes and staffing. The oversight committee also looks for potential common strategies as we move forward related to aging management.

Next slide.

A little bit on our industry involvement throughout the participation in this. We have a number of participants involved in licensing renewal working groups and licensing renewal task force. Specifically, I'm on the license renewal working group. Paul Crawley and Eric Blocher from STARS are

on the license renewal task force. And then STARS has two members each on the following working groups: the mechanical working group, the electrical working group, the civil structural working group, and then, finally, the implementation working group.

Our participation peer reviews has included six peer reviews from November 2005 to October 2007. That included: the Pilgrim, Vermont Yankee; Wolf Creek's Indian Point; Kiwanee; Beaver Valley; and Prairie Island. We also have completed nine benchmarking audits from June 2005 through December 2007, and STARS will continue to participate in peer reviews with other stations in monitoring ongoing issues through the license renewal working groups and in observing industry audits.

Upon submittal of our license renewal application, we had a list of license renewal commitments, and this list was updated and adjusted to reflect audit questions, RAIs, regional inspections. Each commitment has been tracked and updated on Wolf Creek's regulatory commitment management system. Also, we will capture each of those commitments with the details in our corrective action program to ensure implementation. And then as we develop our implementation schedule, we will incorporate lessons

learned from industry interpretation and experiences.

Next slide.

Moving onto, now, to the GALL in the application. There are 39 total aging management programs. This includes three time-limited aging analysis aging management programs: metal fatigue, equipment qualification, and containment prestress. Of the 39, 13 programs have enhancements, 15 programs with exceptions, and we'll describe those in more detail in a later slide.

We are developing six new programs, including a seventh program which is the RCS supplement for reactor internals. That was listed as a plant-specific program in the SER.

As far as GALL consistency, we had 92.5 percent consistency with GALL using GALL standards nodes Alpha through Echo. We had one plant-specific program, the nickel alloy aging management program, which I'll discuss after we describe the programs with exceptions. So we'll come back to the nickel alloy.

DR. BONACA: I have a question on one of the exceptions regarding the bolting integrity. Are you going to talk about that later?

MR. GARRETT: Yes, we are.

DR. BONACA: You are.

MR. GARRETT: I'll turn it over to Eric Blocher and he'll describe the details of the exceptions and will entertain that question.

MR. BLOCHER: Thank you, Terry.

My name is Eric Blocher. I'm a STARS project manager. There are four groups of exceptions for Wolf Creek AMPs.

The first group of exceptions involves the use of a different code or standard division than that identified in the GALL. It specifies the use of ASME Section XI 2001 edition through 2002 and 2003 addenda. There are six AMPs that rely on the Wolf Creek third-interval ISI program that uses the ASME Code 1998 edition through the 2000 addenda.

The Wolf Creek flow-accelerated corrosion program is consistent with EPRI document NSAC-202L rev. 3, which is titled Recommendations for an Effective Flow-Accelerated Corrosion Program. The GALL specifies the use of NSAC-202L rev. 2. Wolf Creek FAC program, which adheres to revision 3 guidance, is consistent with revision 2 guidance specifically in the areas of scope and detection of wall thinning due to FAC.

The second group of AMP inspections involves a conflict with the Wolf Creek current

licensing basis with the GALL. The GALL specifies the use of regulatory guide 1.65, which is titled Materials and Inspections for Reactor Vessel Closure Studs for Reactor Vessel Closure Studs and Nuts. Wolf Creek is committed to regulatory guide 1.65 with three exceptions that are specifically identified in the Wolf Creek updated safety analysis report.

They are: (1) use of modified SA540 Grade B 24 stud material; (2) procurement of stud bolting material with a minimum yield strength of 130 ksi and a minimum tensile strength of 145 ksi; and (3) performance of volumetric inspections of removed studs per the ASME Section XI Code.

CHAIRMAN SEIBER: How often do you do the volumetric examinations for bolting?

MR. BLOCHER: With the reactor vessel studs?

CHAIRMAN SEIBER: Right.

MR. BLOCHER: Each outage.

CHAIRMAN SEIBER: Okay. Do you do them all or just a sample?

MR. BLOCHER: I'm not a hundred percent on that, but if you give a second, I can check.

CHAIRMAN SEIBER: Okay.

MR. BLOCHER: The next exception is Wolf

Creek performs visual inspections and functional tests of the Halon systems every 18 months, not every six months as suggested by GALL. The 18-month inspection frequency is specified in the Wolf Creek Fire Protection Program, which is referenced in the updated safety analysis report.

The Wolf Creek fuel oil program uses only ASTA standard D-1796 1983, not DA-1796 and DA-2709 for determining fuel oil concentration due to water. Wolf Creek technical specifications commit to using only D-1796 1983.

The third group of exceptions involves plant-specific considerations. The Wolf Creek chemistry program and the steam generator tube integrity program that relies in part on the chemistry program take exception to the EPRI secondary chemistry requirements for mixing of the steam generator bulk solution. Mixing ensures the chemistry of the bulk fluid is uniform and the samples are representative of the bulk steam generator secondary sump water.

Operating experience has shown that a 33-hour recirculation period will provide adequate bulk mixing and adequate samples. Three samples per week are not necessary to demonstrate the adequate mixing.

The Wolf Creek fuel oil AMP does not add fuel stabilizers, corrosion inhibitors, or routinely add biosigns. Wolf Creek relies on periodic sampling and analysis for particulates and corrosion products. Any accumulated water is removed monthly from the emergency fuel storage tank and emergency fuel oil day tanks and quarterly from the diesel fire pump tank.

The diesel fire pump fuel tank does not have interior accessibility for cleaning. Periodic sampling and testing for water and sediment have demonstrated that neither the emergency fuel day tanks or the diesel fire pump fuel tanks have any history, especially within the last ten years, of water or sediment exceeding the normal chemistry level.

A one-time inspection or pulsating current thickness examination on the external surface of the diesel fire pump fuel tank will be performed to detect corrosion-related wall thinning. Next slide.

CHAIRMAN SEIBER: What material is that fuel tank?

MR. BLOCHER: Carbon steel.

The fourth group of exceptions involves alternate aging management considerations than those identified in GALL. GALL states that the closed cycle cooling water program should monitor heat exchanger

parameters including flow, inlet and outlet temperatures, and differential pressure. In lieu of performance monitoring of all component cooling water supplied heat exchanger, Wolf Creek will perform performance monitoring of the component cooling water heat exchanger, system internal inspection activities, and component cooling water chemistry program to manage the aging effects in the component cooling water system.

For the closed cycle cooling water AMP, Wolf Creek does not perform inspection or testing of the CCW heat exchangers in the scope of license renewal due to criteria (a)(2) for spatial interactions only, such as plant heating and central chill water system.

DR. ABDEL-KHALIK: Is there a quantitative relationship that you can point to with regard to the second bullet, how monitoring the chemistry would give you a clear indication of degradation in heat transfer performance?

MR. BLOCHER: Well, criteria (a)(2) does not have an intended function of heat transfer. It's strictly pressure boundary for the heat exchanger. It's only in scope to protect criteria (a)(2) as a nonsafety-related interaction with safety-related

equipment, so we are concerned with the pressure boundary performance of that heat exchanger.

DR. ABDEL-KHALIK: Okay. Is there a quantitative relationship that would give you a 1:1 relationship between monitoring the chemistry and degradation in pressure boundary capability?

MR. BLOCHER: The GALL guidance is for Class 2 and Class 3 cooling water systems is based pretty much on maintaining water chemistry to maintain the pressure boundary of those components.

MR. STETKAR: Let me ask you a little different question.

MR. BLOCHER: Yes.

MR. STETKAR: Might get the same thing. I'm not a heat exchanger guy so you have to excuse kind of lack of experience here. But as I read your program, it focuses quite strongly on the component cooling water heat exchangers themselves, which, obviously, are an important element of the system. It's not clear to me, though, how managing only the component cooling water chemistry tells you anything about any of the other heat exchangers in the system, in particular safety injection, pump coolers, RHR heat exchangers, you know, all of those things that are cooled by component cooling water that may, in fact,

be stagnant for large fractions of their lives. So I'm not quite sure how just controlling the component cooling water chemistry tells me anything about the integral status of the other heat exchangers which have component cooling water on one side but other fluids on the other sides.

CHAIRMAN SEIBER: Let me modify that a little bit. We have to distinguish between safety-related heat exchangers and nonsafety-related heat exchangers. So if you want to address both of them separately, that would be okay.

MR. BLOCHER: That's where I was going to head, thank you.

CHAIRMAN SEIBER: Okay.

MR. BLOCHER: For the safety-related heat exchangers, the first bullet would apply. There was a range of activities that we do to maintain not only the pressure boundary intended function but the reduction of heat transfer intended function for those heat exchangers. Those involve various performance monitoring techniques, various inspection activities, and the chemistry program.

For the nonsafety-related heat exchangers, loss of heat transfer is not an intended. It's strictly pressure boundary function.

CHAIRMAN SEIBER: Right.

MR. BLOCHER: Normal chemistry controls with the EPRI secondary closed -- cycle cooling and secondary water programs do control corrosion for those materials and they have a good industry record in terms of that performance.

CHAIRMAN SEIBER: And nonsafety-related heat exchangers are in service all the time when the Plant's in Mode 1, and, therefore, the operating parameters tell you whether it's fouled or not, right?

MR. STETKAR: It depends on the heat exchanger and how they cycle their systems.

MR. BLOCHER: Right. So there's really two answers to your question. The safety-related heat exchangers have a higher degree of aging management requirements; whereas, the nonsafety-related heat exchangers, we're looking to chemistry to maintain aging in those that would impact the material performance.

MR. MAYNARD: Well, the nonsafety-related can be isolated from the safety-related?

MR. BLOCHER: That's correct.

Moving along to the third bullet.

DR. ABDEL-KHALIK: So how is the heat

exchanger performance monitoring done in this alternate --

MR. BLOCHER: For the main component cooling water heat exchanger, the performance monitoring does measure flow pressure and it does calculate thermal performance of that heat exchanger relative to the service water side of the heat exchanger and the component cooling water side of the heat exchanger.

DR. ABDEL-KHALIK: So you do measure inlet and exit temperatures?

MR. BLOCHER: For the main component cooling water heat exchanger. Not all the heat exchangers that are cooled by that component cooling water receive full performance monitoring. That's where we rely on other inspection techniques to determine fouling water, aging of those heat exchangers.

MR. STETKAR: Let me ask you just to make sure that I'm clear: you do performance monitoring, heat transfer coefficients, inlet/outlet temperatures on the safety-related heat exchangers, RHR heat exchangers, safety injection pump coolers, for example. Is that type of monitoring performed for those coolers?

MR. BLOCHER: Well, let me just share some of the monitoring that we do do with the various heat exchangers.

The let-down heat exchanger, the residual heat removal heat exchanger, safety injection pump coolers, and the PAS sample coolers are not periodically tested for flow inlet and outlet temperature and differential pressure.

MR. STETKAR: They are not?

MR. BLOCHER: They are not routinely tested for that. The component cooling heat exchangers are periodically tested to maintain heat transfer capability. The shell side, which is the closed cycle cooling water, flow and temperature measurements are used to calculate overall heat exchanger performance in terms of the fouling factor. The tube side, the raw water side, flow and differential pressure are measured and used as an indicator of tube fouling.

The component cooling water heat exchangers are periodically ND tested, eddy current testing, to detect aging of the tube pressure boundary. The performance monitoring and NDE of the component cooling water heat exchangers do provide a leading indicator for aging in the other CCW-supplied

heat exchangers. That is the section and aging regimen --

MR. STETKAR: Okay. Let me go back just because I want to make sure I understand the program. Let's go back and take the RHR heat exchanger, in particular, so we focus on a particular heat exchanger.

That, you say, is not monitored, in particular, for corrosion, tube thinning, heat exchanger performance, anything. You rely on the CCW chemistry to infer that part of that heat exchanger is okay. However, the other part of the heat exchanger is normally stagnant, filled with borated water to some boron concentration?

MR. BLOCHER: Well, if I could correct you, this is part of the RHR heat exchanger, correct?

MR. STETKAR: Correct.

MR. BLOCHER: Yes. The RHR heat exchanger does receive NDE for eddy current testing --

MR. STETKAR: Okay. Thanks.

MR. BLOCHER: -- we would be looking -- for tube thinning.

MR. STETKAR: Okay. Good.

CHAIRMAN SEIBER: It seems to me that safety-related part of that is its pressure boundary

capability?

MR. STETKAR: Well, RHR, you kind of need long term cooling also for research and stuff like that.

MR. BLOCHER: Have I answered --

MR. CARD: Terry? I need to correct that. We don't do NDE on RHR exchangers.

MR. GARRETT: Tim, you need to speak up.

MR. CARD: We don't do eddy current on RHR heat exchanger.

MR. STETKAR: You do not?

MR. CARD: We do not.

MR. STETKAR: Okay. Let me come back to the RHR heat exchangers then.

CHAIRMAN SEIBER: Well, you know, whether it's safety related or not, and to what extent, is set out in the FSAR and the approved NDE programs. RHR, while it has a function in the plant, the function is to cool down the reactor after it's been --

MR. STETKAR: But your RHR heat exchangers are your low pressure sump recirculation cooling LOCA response heat exchangers?

MR. BLOCHER: Correct.

MR. STETKAR: So they're certainly safety related and perform a safety-related cooling function?

MR. BLOCHER: Yes.

DR. ABDEL-KHALIK: So the question remains: how do you infer the thermal performance of that heat exchanger by just monitoring component cooling water chemistry?

MR. BLOCHER: Okay. Are you talking in relation to the second --

DR. ABDEL-KHALIK: I'm talking about the specific example of the RHR.

MR. BLOCHER: The inferred is the component cooling water thermal performance. The component cooling water heat exchanger is used as a leading indicator for the overall thermal performance of the component cooling water system, and we use that as an indicator of the other heat exchangers within the system.

Again, the other heat exchangers in the system do receive some maintenance activity in terms of cleaning and inspecting that would give us some additional assurance. We've also committed an enhancement to the program for when this when certain check valves are disassembled in the system that we will also inspect the system for overall cleanliness and fouling. So we use an overall system performance as an indicator for that 11:34:25.

MR. MAYNARD: I would suggest we might want to come back to this later in the afternoon, maybe give the Applicant a chance to talk to people back at the site as to what monitoring is done, not done, and sort it out there.

DR. ABDEL-KHALIK: Fair enough.

MR. MAYNARD: Can we do that?

DR. ABDEL-KHALIK: Thank you.

MR. BLOCHER: We can do that. Okay. Moving onto the third item on this slide.

The Wolf Creek fuel oil chemistry AMP uses a guidance of ASTM standard D-2276 Method A for determination of particulates, as opposed to the combination of D-2276 and D-6217. There is no indication that ASTM D-6217 is either technically superior to D-2276 as far as managing the effects of aging. It merely allows for a faster filtration time, or that the combination of the two standards adds any value beyond just the 2276 itself.

The Wolf Creek selective leaching AMP will use visual and mechanical methods to determine whether loss of material due to selective leaching is occurring rather than Brinell hardness testing. If these inspections detect dezincification or graphitization, which are indicators of select

leaching, then a follow-up examination will be performed. The follow-up examination or evaluation may require confirmation testing of selective leaching with metallurgic evaluation, which may include a micro-structure examination.

Next slide.

In the Wolf Creek bolting integrity AMP, the procedures for insuring bolting integrity identify pre-load requirements and general practices for in-scope bolting, but to not directly reference EPRI NP-5769 or NUREG-1339 as applicable source documents for these recommendations.

DR. BONACA: I have a question. Go ahead.

MR. BLOCHER: However, Wolf Creek procedures do reference and incorporate good bolting practices identified in EPRI-5067 and EPRI TR-104213. EPRI-5769 and NUREG-1339 are very closely related to EPRI NP-5065 and EPRI-104213 and they cross-reference each other.

EPRI NP-5769 notes that inspection of pre-load is usually unnecessary if the installation method has been carefully followed. Torque values provided in the Wolf Creek procedures are based on the criteria of stretch to cover the expected relaxation effect fasteners over the life of the joint.

DR. BONACA: Yes, my question is relating to this very issue. Because you are quoting EPRI and suggesting that the inspection pre-load is usually unnecessary, the installation method has been carefully followed. But, any way you look at the operating experience you had instances of missing or lose bolts, inadequate thread engagement, improper bolt application. So that challenges that consideration that installation method has been carefully followed. In some instances it may not have been followed.

And my next question really is: what are you monitoring; what parameters are you monitoring? In your program description, you only state you are not monitoring loss of pre-load, but you are not stating what you're monitoring except leakage. Is it the only thing that you monitor?

MR. BLOCHER: We use the EPRI guidance for establishing pre-load of the fastener and the joint. And, as indicated as the second half of the second bullet, we do monitor leakage. The GALL does specify that for non-Section 11 connections for pressure retaining components that are reported to be leaking, they are to be inspected daily. And what we do then, if the leak does not increase, the inspection

frequency in GALL can be decreased to bi-weekly or weekly. The Wolf Creek procedures require the inspection frequency to be adjusted as necessary based on trending of the inspection results to ensure that there is not a loss of intended function between the inspection intervals.

For pressure-retaining components reported to be leaking, the site corrective action process is followed. So when we do --

DR. BONACA: -- your monitoring leakage?

MR. BLOCHER: Correct.

DR. BONACA: That's the only thing you monitor, and you're making a point about loss of pre-load that I don't think is well supported by operating experience. But maybe we'll hear from the staff how they're dealing with this issue later on in the day.

MR. BLOCHER: Correct. I do want to clarify that discussion is for the nonsafety-related bolting. The safety-related bolting would fall under the Section 11 programs.

DR. BONACA: And what kind of parameters do you monitor for those?

MR. BLOCHER: Visual inspections and other NDE inspection performed consistent with the Code.

DR. BONACA: So, essentially, leakage too?

MR. BLOCHER: Correct.

DR. BONACA: Okay. So we're back to leakage. I don't know if it is -- anyway, we'll hear from the staff when they do the presentation about the SER how they view that.

MR. BLOCHER: Okay.

For the fire water AMP, GALL specifies annual hydrant hose hydrostatic tests. Wolf Creek performs a hydrostatic test of the power block hoses every three years. Wolf Creek may rely on replacement of existing fire hoses with a new fire hose every five years in lieu of performing a hydrostatic test.

GALL specifies annual gasket inspections. Wolf Creek performs gasket inspections at least every 18 months. Since aging effects are typically manifested over several years, difference in inspection testing frequencies are insignificant.

The fuel oil chemistry AMP does not specify flashpoint testing as part of the lubricating oil analysis program as indicated in GALL. The Wolf Creek analysis program, instead, specifies fire point analysis to determine fuel oil contamination.

Terry will continue our discussion with some background on the plant-specific nickel aging management program. Terry?

MR. GARRETT: Eric. Again, I'm Terry Garrett.

The nickel alloy aging management program is a plant-specific program, as I mentioned earlier. Basically, the program manages cracking due to primary water stress corrosion cracking in plant locations that contain nickel alloy, 600 material, and nickel Alloy 82 and 182 weld metal with the exception of the steam generator tubing. The steam generator tubing, which is Alloy 600, manages part of our steam generator tubing integrity aging management program.

The nickel alloy program includes the reactor coolant system pressure boundary locations, the reactor coolant system non-pressure boundary locations, and then non-reactor coolant system locations. The program uses inspections, mitigation techniques, repair/replacement activities and monitoring of operating experience to managing the aging of Alloy 600 at Wolf Creek.

Mitigation techniques are implemented, when appropriate, to preemptively remove conditions that contribute. Two primary water stress corrosion cracking, repair/replacement activities are performed to proactively mitigate Alloy 600 material, or as a corrective measure in response to an unacceptable flaw

in the material. Mitigation repair activities are consistent with those detailed in MRP 1.39.

We're also to stay involved in the industry and incorporate guidance and other things, specifically the alloy aging management program will be supplemented with implementation of applicable NRC orders, bulletins, and Generic Letters associated with nickel alloys with staff acceptance, accepted industry guidance, and, finally, with participation in industry initiatives, such as owner group program, EPRI and materials reliability program, or for managing aging effects associated with nickel alloys.

Upon completion of these program, but not less than 24 months before entering the period of extended operation, Wolf Creek will submit an inspection plan for reactor coolant system nickel alloy pressure boundary components to the NRC for review and approval. Operating experience is continually monitored, provide improvements and modifications to our nickel alloy aging management program as needed.

I'd like to discuss a little more detail about two of our inspection results and the mitigation we performed in the past.

Next slide.

As a result of operating experience information we had obtained regarding steam generator bowl drain flaws, we added bare metal visual inspections two of our steam generator bowl drains in our March 2005 refueling outages scope. The inspections found through-wall cracking in the Alloy 82/182 weld material of our steam generator bowl drains on two of our steam generators. The weld metal was completely removed and replaced with an Alloy 52 weld metal. And, in addition to that, we decided to go ahead and perform the same for the other two generators, which did not have indications of flaws. So we removed all the susceptible material on all four of our steam generator bowl drains in that outage.

The root cause was most likely primary water stress corrosion cracking that was due to the extensive OE we obtained from similar configurations. In the NDE we did perform, it had identified branching axial and circumferential cracking typical of primary water stress corrosion cracking.

DR. SHACK: What was the extent of this cracking?

MR. GARRETT: Art, can you talk about that?

DR. TURNER: The tube drains where there

were through-wall cracking, the surface penetration on the OD surface for the larger one was a fraction of an inch, something on the order of a quarter-of-a-inch. The one on the other one was very small. The leaks were detected by the boric acid crystals that accumulate at the leak locations. On the one that had the most leak, we probably had less than a cubic inch of boric acid crystals accumulated. On the one that has the smaller leak, we had maybe a tenth-of-a-cubic-inch of boric acid crystals accumulated.

During the investigation of the leaks, we did grinding in depth with florescent dye penetrant UT -- surface inspections, and that's where we found that as we got deeper, we got a network of cracks instead of just the single surface penetration, and that's our best evidence that it was PWSCC.

CHAIRMAN SEIBER: Do you have a bowl drain on both the hot and the cold like?

MR. GARRETT: It's a single bowl drain at the very bottom of the bowl which would capture both.

CHAIRMAN SEIBER: Okay. But it's exposed to basically T-hot temperatures?

MR. GARRETT: Yes. The basic configuration, if you can imagine the lighter plate coming down, there's a very small gap right above the

bowl drain itself.

Next slide.

During the Fall 2006 refueling outage, we had decided or made the decision at Wolf Creek to actually perform full structural weld overlays on our pressurizer nozzles that contain Alloy 600-type materials in lieu of an inspection only. The MRP would -- required us to do an inspection, but we decided to go ahead and just do the mitigation and take care of the issues once and for all.

So as part of that planned pre-examination inspections we performed, we discovered circumferential indications on our pressurizer surge relief and safety nozzle safe end dissimilar metal welds. Full structural weld overlays were applied to the pressurizer nozzles, and, again, this is what I want to point as an indication of our proactive approach in mitigating pressurizer via structural weld overlay processes.

Just so you can see on the slide here, and over here, this shiny area here would be the -- the conical shape would be the full structural weld overlay applied.

Next slide.

DR. ABDEL-KHALIK: If we could go back to

the previous slide, the steam generator bowls?

You indicated that there is like a small hole in the sheet separating the hot side from the cool side that goes right above that drain that serves both the hot and cold side. So there is direct bypass, possibly, from the hot to the cold?

DR. TURNER: That's correct, yes.

DR. ABDEL-KHALIK: And how fast does the water go through that hole, do you know?

MR. GARRETT: No, but it is a very small gap.

DR. ABDEL-KHALIK: Small, like what, quarter-of-an-inch?

MR. GARRETT: Does anybody have the dimensions?

MR. CARD: It's about an inch tall. I mean it's -- they call it a mouse hole, okay, and that's what it is. It's right at the bottom of the divider plate, right on the bottom of the bowl above the bowl drain, and it looks like a little mouse hole. But it's about that tall.

DR. ABDEL-KHALIK: So there is continuously a bypass from the hot leg to the cold leg through that mouse hole?

MR. CARD: There would be some small --

it's, basically, negligible. It's not considered in anything that we do.

CHAIRMAN SEIBER: Well, the water in the drain, itself, is stationary?

MR. CARD: Yes.

CHAIRMAN SEIBER: And it's the steam generator DP that drives water during operation through the hole so the temperature of the hole is as T-hot basically.

DR. ABDEL-KHALIK: Thank you.

DR. SHACK: Now, you presumably also have an Alloy 52 weld where the pipe is coming into the generator head --

MR. CARD: Yes.

DR. SHACK: -- the stainless pipe to the bottom of the steam generator? Has that been inspected?

DR. TURNER: The pipe coming into the bottom of the nozzle, it's a stainless steel nozzle and it's a stainless steel weld. The actual nozzle connection that was attached by the Alloy 52/152 bowl drain weld was stainless steel, and so there is not an Alloy 62.

DR. SHACK: No, I meant the hot leg.

DR. TURNER: Oh, the hot leg of the steam

generator?

DR. SHACK: Right.

DR. TURNER: We do not have Alloy 52 or 152 in either the hot or cold leg --

DR. SHACK: I see.

DR. TURNER: -- nozzles of the steam generators.

CHAIRMAN SEIBER: What is it?

DR. TURNER: It's stainless steel.

DR. SHACK: So you have an Alloy 182 weld to the reactor vessel, but not to the steam generator?

DR. TURNER: That's correct.

CHAIRMAN SEIBER: Okay.

MR. GARRETT: The next area, then, we're ready to get into would be discussion on the Safety Evaluation Report open items.

CHAIRMAN SEIBER: Well, you're a little ahead of schedule, right?

MR. GARRETT: Yes.

CHAIRMAN SEIBER: So ten minutes ahead of schedule. Why don't we consider taking our lunch break at this time and we will recess until 1:00 and you can begin that portion of your presentation at that time.

MR. GARRETT: Thank you.

(Whereupon, the meeting recessed at 11:51 a.m. to reconvene at 1:00 p.m.)

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

1:00 p.m.

CHAIRMAN SEIBER: If we can take our places and start for the afternoon?

At this time, I'd like to ask the Wolf Creek Nuclear Operating Company to resume their presentation.

MR. GARRETT: Thank you, Mr. Chairman, and Wolf Creek is fine.

We do have some follow-up items that we have gotten answers. We could address now if you would prefer. From this morning's session we had two or three questions that we said we would follow up on.

CHAIRMAN SEIBER: Okay.

MR. GARRETT: We could address those now if you would like.

CHAIRMAN SEIBER: Go ahead.

MR. GARRETT: Okay. Eric, you start.

MR. BLOCHER: Thanks, Terry.

One question this morning dealt with the periodicity of inspections and the type of inspections for reactor vessel studs. The reactor vessel studs are visually inspected each outage, all of them are inspected, and over a ten year interval, all these studs are volumetrically inspected. I forget who,

specifically, asked that question.

The second question was dealing with the closed cycle cooling water heat exchangers. We verified that the component cooling water heat exchanger is eddy-current tested and performance monitoring. The other closed cycle cooling water heat exchangers that that service are not, specifically, performance monitoring.

In license renewal space we manage the chemistry on the closed cycle cooling water side of those, as well as the chemistry on the heat sink or source side of those heat exchangers. In addition, each of those heat exchangers also receives an external services monitoring inspection that's performed by the system engineer walk down process at Wolf Creek.

CHAIRMAN SEIBER: Is that consistent with the GALL report?

MR. GARRETT: Yes.

CHAIRMAN SEIBER: You did not have to take exception?

MR. GARRETT: We did take exception to the performance --

CHAIRMAN SEIBER: Okay. Go ahead.

MR. GARRETT: So, again, the exteriors now

will be the SER open items.

The draft has five open items over the Wolf Creek submittal and no confirmatory items. The first two open items are tied to scoping of station blackout equipment for license renewal purposes, and the remaining three items are metal fatigue related. We'll address the first two items on station blackout first.

Next slide, please. Thank you.

This has been a challenging issue for Wolf Creek. The Wolf Creek position is that we have performed the scoping of our station blackout equipment in accordance with the regulations for license renewal scoping and station blackout in Interim Staff Guidance ISG-2, which was issues in March 2002.

We have based the scoping boundary on the Wolf Creek current licensing basis and design configuration. The NRC staff and Wolf Creek are, obviously, in disagreement. Essentially, we disagree on the determination of what the license renewal scoping boundary should be for plant station equipment.

I must also note that there is a similar disagreement between the industry and the NRC on this

particular issue, and there have been a series of meetings and discussions between the NRC and NEI, the license renewal working group, and various industries, individual licensees regarding, again, what constitutes the plant portion of offsite power system for purposes of the license renewal scoping. And it's a complicated issue that's a very plant specific issue, so I do want to spend a little time, if I could, just to explain a little bit of --

(Whereupon, the matter went off record briefly due to interruption by PDA broadcast.)

MR. GARRETT: Okay. The disagreement, we believe, came about because of what we see as a change in how the NRC is now applying the scoping guidance originally issued as ISG-2. Also, as I mentioned, NEI has provided an industry position paper to the NRC staff.

By way of background, the NRC issued the SBO rule to ensure capability of withstanding a total loss of alternating electric power for a specified duration and maintaining reactor core cooling during that period. The SBO rule, station blackout rule, in conjunction with implementing regulatory guidance, directs licensees to establish appropriate procedures and training for coping with the station blackout

event. So a plant's current licensing basis is a primary focus of scoping activities because the plant's current licensing basis defines the means by which licensees comply with the SBO rule.

It's incumbent on each licensee in their renewal application to determine on a plant-specific basis the level of reliance placed on the plant system portions of the offsite power to demonstrate compliance again with the requirements of the SBO rule. Again, so now we believe the NRC is requiring -- the issue now, we believe, is the NRC staff is requiring inclusion of switchyard circuit breakers at transmission power, again, switchyard circuit breakers at transmission power, in the scope of our license renewal and that's beyond what is established now in a current licensing basis.

The problem we have with that position is: first, are switchyard circuit breakers at transmission voltage are not the equipment that's relied upon to cope with the station blackout event, or to provide protection to the onsite AC circuits, or to provide plant operator-controlled isolation and energization ability for recovery. The plant equipment that is scoped into our license renewal is the equipment that is relied to cope with the SBO, to provide protection

to the onsite AC circuits, and to provide that plant operator-controlled isolation and energization ability for recovery.

The second issue, then, is that we don't believe there is clear regulatory guidance or requirements for inclusion of switchyard circuit breakers at transmission voltage under the licensing new rule.

And, then, lastly, we don't believe there is a measurable increase in safety by changing the scoping boundary to include switchyard circuit breakers at transmission voltage.

Again, the two open items related to the station blackout are the inclusion of the switchyard circuit breakers and the inclusion of underground switchyard cable, and I'll address both of those in more detail later.

But, before I do that, I do want to take the opportunity now to have our design electrical engineer, Luis Solorio, using the next slide, which is a simplified diagram of the Wolf Creek offsite power supply and switchyard, to explain how we cope with the SBO, how we protect the onsite AC circuits, and how we recover using in-scope plant breakers.

So, with that, I'm going to turn it over

to Lou, and when the slide comes up -- next slide, please -- I'm going to use a pointer and stand to the side to help show, as Lou is talking, what he's referring to.

I'll step aside for a second while he continues.

MR. SOLORIO: Thank you, Terry.

As Terry stated, my name is Luis Solorio. I'm a senior electrical design engineer at Wolf Creek.

What we have presented here is a simplified, electrical, one-line diagram of the Wolf Creek 345 KV switchyard. The Wolf Creek switchyard has eight 2000 amp-rated line and generator breakers connected in what is referred to as breaker-and-a-half scheme.

Before we get into the detail of the alignment, I would like to take a few minutes to give a brief overview of the configuration of the Wolf Creek switchyard.

The switchyard is comprised of the following: two (2) 345 KV buses, and we will refer to those as the west bus and the east bus; there are three breaker strings which are used to connect the two 345 KV buses together; there are eight (8), as I stated earlier, 345 KV breakers that connect the two

buses; we have one generator output that is connected between breakers 50 and 60; and three transmission lines into the switchyard versus the La Cygne Line, which is connected between breakers 110 and 120; the Benton Line, which is connected between breakers 70 and 80; and the Rose Hill Line, which is connected between breakers 40 and 50.

We also have a plant startup transformer that is connected to the west bus, 345 KV bus, and a switchyard number 7 transformer that is connected to the east 345 KV bus.

At Wolf Creek, the offsite power source are each of the 345 KV switchyard buses, that is, the west bus, 345, and the east 345 KV bus.

As described in our license renewal submittal, the SBO recovery paths are: the primary SBO recover lineup for safety circuits dealing with Train Bravo is up through ESF transformer number 2, through the plant breaker 201, to 13.8 KV bus feed from the startup transformer secondary. The startup transformer is included in the recovery path and is connected via a short overhead tie line to the west 345 KV bus via normally closed disconnect switch 345-163.

The second SBO recovery lineup for safety

circuits, Train A, is through ESF transformer number 1 up through normally closed disconnect switch 13-23.

As part of the license renewal resolution to one of the open items, Wolf Creek is proposing to include the underground cable from the normally closed disconnect switch 13-23 up to and including the switchyard breaker 13-48. Additionally, Wolf Creek will include in the proposal to resolve other alignment issues, the number 7 transformer, and overhead 345 KV bus leads up to the east 345KV switchyard bus, which also includes normally closed disconnect switch 345-167.

MR. BARTON: Are you proposing to include the dotted blue lines on the schematic --

MR. SOLORIO: That is correct.

MR. BARTON: -- up to these parts? Okay.

MR. SOLORIO: That dotted blue line is the underground portion we are proposing to include that in scope.

MR. BARTON: Okay. Got you.

MR. SOLORIO: Next I would like to discuss or describe for you the protection of downstream safety circuits for both recovery paths.

Plant breaker 201 provides protection for downstream safety circuits, Train B, in the primary

SBO recovery lineup from the West Bus through the start-up transformer. Breaker 201 is designed to protect for start-up transformer faults, West 345 KV and overhead tie line faults, cable faults, from breaker 201 to ESF #2 transformer and any ESF #2 transformer faults through cross stripping.

Switchyard breaker 13-48 provides protection for downstream safety circuits, Train A, in the secondary SBO recovery path lineup from the East Bus through #7 transformer. Switchyard breaker 13-48 is designed to protect per #7 transformer faults East 345 KV faults and line faults, underground cable faults from breaker 13-48 to ESF #1 transformer, and ESF #1 transformer faults.

Next I would like to discuss and describe for you the plant operator control to energize and deenergize safety circuits.

SBO restoration begins when offsite power is restored to one or both of the 345 KV buses, that is the West or the East. Once offsite power is restored to the west 345 KV bus, plant operator action is required to close plant breaker 201 to energize ESF #2 and subsequent closing of normal feed breaker to the safety bus.

For the secondary SBO lineup, once offsite

power is restored to the east 345 KV bus, plant operator action is required to close switchyard breaker 13-48, the energize the ESF #1 and subsequent closing of normal feed breaker to the safety bus.

MR. STETKAR: So you have at Wolf Creek in the control room control switches for 13-48?

MR. SOLORIO: That is correct.

MR. STETKAR: Thanks.

MR. SOLORIO: They are direct-wired from the plant batteries.

The NRC staff has asked Wolf Creek to include the following 345 KV breakers to be in scope to the license renewal for SBO recovery. They are switchyard 345 KV breakers 40, 70, and 110. For the primary SBO recovery lineup and breaker 60, 90, and 120 for the second SBO recovery lineup. The issue Wolf Creek has with the NRC's position is that the identified 345 KV breakers do not meet the requirements as stated in the Draft Safety Evaluation Report. 1) Plant breaker 201 and switchyard breaker 13-48 provide the protection for downstream safety circuits. The previously mentioned 345 KV breakers do not.

2) Plant operator controls for energization and deenergization of safety circuits is

accomplished by plant operator control of breaker 201 and switchyard breaker 13-48. The previously mentioned 345 KV switchyard breakers do not have plant operator control.

And, 3), closing plant breaker 201 and switchyard breaker 13-48 accomplishes the recovery lineups. Closing previously mentioned 345 switchyard breakers does not accomplish the SBO primary or secondary lineups.

In conclusion, the proposed primary and secondary SBO lineups, as previously described from the West or the East 345 switchyard, meet the NRC's staff's technical recommendation requirements as listed in the Draft SER without the inclusion of switchyard 345 KV breakers.

MR. BARTON: So what's the problem?

MR. SOLORIO: We don't have a problem.

(Laughter.)

DR. BONACA: Is the staff accepting the inclusion?

MR. SOLORIO: It's an open item.

DR. BONACA: It's an open item.

DR. KUO: Yes. This is an open item in the SER and it's an open item right now. During the staff presentation we're going to provide the details

of why we disagree with their proposal.

But just a little background about this issue. About four or five years ago we started meeting with the industry on this very issue, station blackout. Now, we had many contentious meetings. The best way to say about the meeting is that we agree to disagree with our positions. However, we agreed one has to go forward and that resulted in the ISG, Interim Staff Guidance No. 2. And since then many plants matched the ISG-2 requirement with a few exceptions.

Only until recently, about two or three months ago, NEI tried to contact the staff on behalf of the industry and we have had two meetings on this already. The first meeting, the industry come in and, basically, complained about ISG-2. That is not what appears to be reasonable.

We had discussion during the meeting and, as a result of the meeting, the industry decided to appeal. So we had a second meeting, which our associate director, Bruce Boger, attended, and what we said is that we were going back to clarify. The gist of the meeting was that the ISG-2 was not clear enough, so we said we're going to clarify our position and issue a revised ISG-2 with the intention to

clarify the staff position even more so. And just today we issued the revised ISG-2.

In the meantime, on March 3rd, Tony Petrangelo, the NEI -- I don't know his position; it's a high position -- sent a letter to Jim Beyer's and described what the disagreement between the industry and the staff. In the letter, Tony requested that the staff should follow ISG-2 guidance. So here I'm a little confused.

The first meeting we had a few months, I think the complaint was the ISG-2 was not clear enough. Now that the industry appears to tell us that ISG-2 is good and should be followed. So here we're trying to understand exactly what are we talking about.

But put that aside in the generic terms for the past review, our staff will actually discuss in detail about our relation later on.

MR. BARTON: Is this the first time this has come up? This can't be the first plant that's got this breaker-and-a-half system or configuration and I'm sure there's other plants that have got this also. Is this the first time this has come up as an issue?

DR. KUO: Well, like I said, after we issued the ISG-2, most plants have matched the

ISG-2 guidance. Now, with a few exceptions, and we can discuss the exceptions later on, but this is the first time that a plant came up, okay, during our review that disagree with the staff position.

CHAIRMAN SEIBER: I think what you're saying is: if you want to get power back to the plant through at least one of these three sources, you have to be able to operate the 345 KV breakers, one of the six of them, in order to feed an emergency bus. Is that what you're saying?

DR. KUO: I'm sorry.

MR. TRAN: Yes.

CHAIRMAN SEIBER: You have six 345 KV breakers and they connect the three offsite power sources to one of the two emergency buses, and I take it what the staff is saying is you have to include these six in order to be able to connect the plant to the offsite power grid.

DR. KUO: That is correct. That's what we are saying.

MR. STETKAR: You're not requiring anybody to be able to operate the circuit breaker on the other end of that transmission line. Why? Isn't that about as equally important to restore offsite power?

CHAIRMAN SEIBER: Sure it is. That's part

of the question. Who owns the breaker?

MR. STETKAR: Suppose we have a ring boss?

MR. MATTHEW: I could answer that question. This is Roy Matthew. I am from DE, Division of Engineering.

The station blackout requirement for offsite power recovery is they have to have two paths. One is from the offsite source, one is from the onsite source. The question that we have here today is the source from the offsite power.

The offsite power, the requirement is you have to have two independent paths coming to your bus, and it should be collected from the switchyard breaker to the plant bus.

MR. STETKAR: And why does this proposal not satisfy that requirement?

MR. MATTHEW: This proposal doesn't satisfy because we have on the part of the station blackout rule, we say there are two factors controlling the offsite power path recovery time, coping duration time. Each plant has a coping duration, and the calculations and how you figure that out is described in reg guide 1.55.

MR. STETKAR: Okay. Let me ask you about timing, then. Is there any evidence in the data from

actual offsite power recovery to say that the particular circuit breakers included within the plant boundary has any effect on the time to restore power to the in-plant buses? Is there any evidence?

MR. MATTHEW: Like I said before, reg guide 1.55 --

MR. STETKAR: No, no. I'm asking you is there any evidence?

MR. MATTHEW: Evidence, okay. The station blackout recovery coping duration is based on two things. One is the loss of offsite power frequency.

MR. STETKAR: I'm not asking you about the duration. I'm asking you, is there any evidence -- is there any evidence --

MR. MATTHEW: Right.

MR. STETKAR: -- in the real data from real losses of offsite power --

MR. MATTHEW: Right.

MR. STETKAR: -- and there have been probably more than 100, maybe less than 200 of these events --

MR. MATTHEW: Yes.

MR. STETKAR: -- is there any evidence --

MR. MATTHEW: Yes.

MR. STETKAR: -- to say that the time to restore power to the onsite buses is determined by the particular circuit breakers in the switchyard that can be controlled from the plant? Is there any evidence --

MR. MATTHEW: Let me give you a short answer for that. Each component in the pad that recollects the offsite power, each component has a risk value, so the circuit breaker on the switchyard has a fatal probability of failing. So all these are built in.

MR. STETKAR: Let me give you a little bit of -- I've worked with offsite power recovery for about 25 years.

MR. MATTHEW: Oh, okay.

MR. STETKAR: So you don't have to explain to me end and risk assessments. So I understand probabilities and I understand recovery times and coping times. I've also looked at a lot of data.

I'm asking you if you're saying that the control envelope for the plant control, if the key element of the control envelope is the restoration time of offsite power, then there must be some evidence to support where that envelope is drawn. Because if, for example, the key element was

restoration of the transmission lines, that would evidence to say that the plant boundary should extend out to the transmission lines. If the evidence was the entire stability of the interconnected grid, like South Florida, then, indeed, Turkey Point should control the entire interconnected Florida grid.

So the question is: what is the technical basis for drawing that interface line? And if there's evidence to say that, indeed, the recovery time is strongly dependent on delays in switching, I would like to know that.

MR. MATTHEW: I don't have the details here because this review is not about the station blackout rule.

MR. STETKAR: What is it about then?

MR. MATTHEW: Actually, the license renewal rule requires for the applicants to comply with the provisions of station blackout rule. Station blackout rule is the current licensing basis. You don't have the data right now. During the rule making all these were considered. My understanding is the coping duration, the staff assessment during that time was you bring the power up to the switchyard breaker, and from the breaker, at the end of the coping duration, you will maintain the power back to the bus.

So, from a technical point of view, I would say the breaker is a qualified isolation device for protective coding extra function and recently we have issued a Generic Letter about interfaces that need to be maintained between the plant's fission system operators and that's an issue that was being reviewed right now. So the switchyard breaker is a wider component. And, also, if you look at the ISG-2, it clearly says that it starts from the switchyard breaker.

So we haven't changed any position. If you look at the ISG-2, it says its breaker, and I don't understand the certain applicant coming back and ask why they had to consider the breaker.

MR. MAYNARD: I'm really struggling with the staff's position here as to where they have to bring the offsite power to. Wolf Creek has breakers, which are breakers and breakers, to the East and West Bus, and I believe that's the licensing basis for the station blackout and stuff is that the time frame for which power is brought to the East and West Bus. If you take it to inside of the breakers there, inside of the switchyard breakers 110, 120, and those, that you're getting into the line. And I'm kind of withdrawing that. Then you take it clear back to who

controls that breaker. Do you go clear to where that power is being generated? At what point do you stop? And it looks like Wolf Creek's licensing basis is when power is brought to the East/West Bus, either one of those, that, do they have the breakers to isolate and control and get the plant? If you go inside of those others, it's really kind of a no-man's land of, you know, where do you stop then type thing. Where's the boundary?

MR. WILSON: All right. Well, first of all, when they first submitted this, they didn't have the path that went all the way up with that disconnect switch. They stopped before they transformer.

Second of all, we didn't ask them to -- I'm George Wilson. I'm the electricial engineering branch chief in DE.

We never asked them to include all six breakers. We asked them to include one circuit breaker, and the staff can correct me, but I think that once you would do the screening of it, a circuit breaker is an active component, so then it would screen out. We would like them to scope the mounting of that circuit breaker and those bolded connections, and then that's how we clarified the ISG statement.

What we have to have was we have to be

able to ensure that there's a continuity path to restore offsite power into the distribution bus and that's what we want. So if you include one of the six circuit breakers, the circuit breaker itself, since it's an active component, would screen out, but the bolding around the circuit breaker would still be in scope. None of the control powers or anything associated with that circuit breaker is in scope, but the mounting is. That ensures a continuity path, one of the two paths from that distribution bus into the plant, but when they were originally submitted to us, they did not include that other path, the path that's on the right. I'm sorry. I can't see the board from here.

The path that's on the right side, I think it goes to East Bus. They stopped at the one disconnect switch and we said that was not good enough. And this proposal, we have just -- I mean I, personally, had just seen it. I think we got it Friday or we got it Monday, so we're just now looking at this. This wasn't originally what was proposed and what we had challenged the licensee on.

So that answers the first question.

But the second question is is that, like we said, if we include the bolding, which is a passive

component with one of the circuit breakers on either side, the East or the West, they would choose, we'd include at least one of those circuit breakers, whoa, it's an active component, it washes out, it doesn't do any of the control power, but we wanted to look at the bolding and that's how we clarified the ISG.

To answer your question that you had asked earlier, I don't think I have data to separate out what you would like. I'll go back and look. I do have data that talks about the loss of offsite power and we update that, but I don't think we get into specific details. I could probably get that from NRC, but --

MR. STETKAR: You might not be able to. Are you saying, though, when you say one circuit breaker, am I correct to interpret that to mean one and only one of those six or eight, depending on how you count them --

MR. WILSON: Right. If it would be a ring bus, we'd bring in one --

MR. STETKAR: No. Let's talk about this particular configuration.

MR. WILSON: All right.

MR. STETKAR: Are you saying that one and only one of those -- since there are eight circuit

breakers -- would be in scope and not any of the others --

MR. WILSON: Well, on the East Bus we would ask for them to pick one circuit breaker. They would get to pick one of the three circuit breakers that they would want to choose.

MR. STETKAR: And one and only one for the West Bus?

MR. WILSON: Well, the West Bus, the way I think the way it is, I think I'd have to look at it. I think I'd have to choose two, so I'd have to choose three of the eight. I'm sorry. I can't see --

MR. STETKAR: It's not clear why that makes sense right at the moment, but certainly not the full set?

MR. WILSON: No, it's not the full set. The licensee gets to choose which ones that they want. We're not making them do the entire ring bus or their entire -- you know, if a ring bus or breaker-and-a-half alignment. That's not what we've asked the licensee to do. We didn't ask for them to do -- we understand you've got multiple ways.

MR. STETKAR: The bus work itself?

MR. MAYNARD: That doesn't a lot of --

MR. STETKAR: Acreage of the bus work

itself?

MR. MAYNARD: That doesn't make a lot of sense, though, unless you know which offsite line you get back. I mean you end up with having to do all eight. One doesn't make sense.

MR. STETKAR: That's what I was trying to understand whether it meant one breaker per line or one breaker per --

MR. MAYNARD: Per bus.

MR. STETKAR: -- per bus, or one breaker per what?

CHAIRMAN SEIBER: It would almost have to be one breaker per line.

MR. STETKAR: Exactly.

MR. MATTHEW: To clarify --

CHAIRMAN SEIBER: But the reactor components are outside the license renewal rule except those parts of it that are --

DR. BONACA: If the staff has not reviewed the issue, I mean, maybe they should wait before they pronounce it. So we may, after we review it, we'll find it is acceptable.

MR. MATTHEW: Actually, the new clarification ISG we just issued, we have attached four figures there to show what is exactly in the

scope to inform all the parties involved to see what the staff interpretation is. The breakers or breaker that'll be scoped in the license renewal will be depending on the plant configuration. Where you're on the east side bus or the west side bus where that feed is going to the breaker-and-a-half scheme, in some plants we have seen they need only one breaker, some plants we saw two breakers, some plants have three breakers. So it depends on where your tie from the plant is going to the switchyard.

So I would ask all of you to take a look at the figures that we have put in ISG, that's pretty clear. At the last meeting, industry said the figure was clear, so this is further clarification so that the people doesn't misinterpret our guidance again.

MR. STETKAR: Maitri, can we get a copy of that, the new ISG? You said that the revised ISG was just issued --

DR. KUO: We will get a copy for the Committee. We were just issued --

MR. STETKAR: Have you seen the revised, the new --

MR. GARRETT: Yes. I would also state that that we in the industry are not in agreement with the revised --

DR. KUO: But that was the one that we just issued this morning is issued for public comment, is a draft. Okay. So it hasn't been finalized yet. We want to get input from everybody.

DR. ABDEL-KHALIK: Has the staff had the opportunity to review the configuration that's on the table right now?

MR. WILSON: No. We just received it. That was the point I made. We just received this I think Friday. We have not looked at this. Originally, they did not include that breaker. They went to the disconnect before that, so this is something new that they've proposed to us.

DR. KUO: We haven't had a chance to review this.

MR. SOLORIO: This is correct, but I must define it. In this proposal, it does not include including a 345 KV breaker.

MR. MAYNARD: Yes. It sounds like this will probably address the underground cable part of the issue but not on the breakers. And where do you stop?

MR. SOLORIO: It has always been at Wolf Creek that offsite power is at the 345 KV bus level. Those breakers in the switchyard are controlled by our

grid operator. Over the last ten years, grid stability and reliability have been a big issue in the industry. IMPO has put out very many documents and grid reliability is always paramount in the nuclear field. We've been asked to coordinate with our utility members that operate that grid and establish what are the minimum requirements for a stable grid, and that has always been what is the grid voltage on your West or East Bus. They can tell you what it will be and they can run contingency analysis for us to predict what that voltage will be on the loss of the nuclear unit coincident with LOCA loading. It is the 345 East and West Bus voltages is what they predict. Offsite power cannot be re-established at Wolf Creek until one of those buses is restored. We wait until those buses come restored. We get indication. Plus, we also contact the grid operator, are you stable, are your grid voltages stable? And grid stability is a configuration of generation units and loads, and until you tie one line in and bring another line in and you make that electrical node tied, you have a difficult time of regulating voltages.

That tie is the commonality as was referred to as that common tie in that Design Criteria in 17 that was being referred, two offsite sources.

Two lines in and you can be common at a switchyard. That's where you can be common.

Our offsite power sources start on that lineup through #7 and the through the start-up. They are supposed to infinitesimally look out, that is, you have to have two lines in for your license. We have three. So you can lose one line. You're still fine. You lose two lines, you got one line in. You're not fine any more. You're not legal. You have to do something else.

I understand it's comments, but these are all grid operator-controlled breakers.

CHAIRMAN SEIBER: All right. I understand that.

MR. STETKAR: Let me ask you, I think I've read Westar owns the 345 grid?

MR. SOLORIO: That's correct.

MR. STETKAR: Where are the 345 KV breakers operating from?

MR. SOLORIO: Topeka, Kansas.

MR. STETKAR: Topeka. Do you have at Wolf Creek communication procedures in place with whoever's operating the breakers --

MR. SOLORIO: -- the transmission grid operator --

MR. STETKAR: Yes, I want to call them system operators because each place has a different name for these folks.

MR. SOLORIO: Yes.

MR. STETKAR: The folks in Topeka who operate those circuit breakers, are there protocols and procedures for restoring lines back into the Wolf Creek switchyard and do you exercise those capabilities?

MR. SOLORIO: Wolf Creek has participated in several black start recovery programs and training programs and actually simulations with the Southwest Power Pool. We input to them. We communicate the importance of reliable offsite power, what that means as a minimum to us, and the configurations that we'd like to have. We communicate that to and they've incorporated that into their black start manual, and it says, when an event comes such that we have a blackout, we have got agreements with them that says, Wolf Creek is paramount; we will restore 345 KV voltage to you first.

MR. STETKAR: And there are written agreements --

MR. SOLORIO: It's in their black start manual protocol.

MR. BARTON: Further question on that Westar and the Wolf Creek agreement. Whenever Westar wants to work in the switchyard, is there agreement with how that gets coordinated with the plant operators and what control does the plant operation have over the maintenance that's being done, or what oversight do they have on maintenance that's being performed by Westar in the switchyard which Westar owns?

MR. SOLORIO: The switchyard is owned, operated, and designed by Westar Energy.

MR. STETKAR: Okay.

MR. SOLORIO: There are written agreements. We call them procedures that we control the activities, accessibility, work activities of the Wolf Creek switchyard. It still is under their control. We have all the breakers at the Wolf Creek are monitored and indicated in our main control board, and if there's work to be done, they know that they can't come into that switchyard without first contacting their grid operator. Their grid operator then contacts our control room, and vice versa. If we want to go in there, we contact the control room. The control room contacts the grid operator. It's a handshaking situation that we do for the switchyard

that I think is --

MR. BARTON: And the control room knows what maintenance is being performed by Westar?

MR. SOLORIO: Yes, they do. We control that through what is called the switchyard work authorization. They know the work activities.

CHAIRMAN SEIBER: After the Northeast blackout, there was quite an interest in the control of system operators and the communications between system operators and nuclear power plants, and in performing the stability analysis having realtime capability to do that. As far as license renewal is concerned, I consider these two separate issues. In other words, there are requirements for system operation that licensees must fall along with their system operators, and then there are requirements on the equipment that must function in order to be able to assure ourselves that we comply with the rule.

Now, the question is not how many failures do you have and, you know, is this risk-significant. The question is: there is a rule and do you comply with the rule? If you don't like the rule, you've got to change the rule and that's a two-year process.

And, actually, the ACRS is not the people to give permission to go beyond the rule or do

something less than the rule. And so you're going to have to reach an agreement between the staff and the licensee here in order to achieve what it is you want to achieve.

MR. GARRETT: I understand.

CHAIRMAN SEIBER: And, strangely enough, looking at the bolting of the circuit breaker, to me is not very much compared to assuring that the circuit breaker is operable, and you can do all the quality assurance work that you would need to do, plus the analysis to make sure that when you open the breaker it didn't blow up, you know, which has always happened from time to time, and so, in an effort to resolve our discussion on this, I think that the Applicant and the staff need to work together to come to a resolution that's satisfactory to both and meets the rules. It has to meet the rules.

DR. KUO: And during the previous meetings, yes, we did talk about it. If the industry has a problem with the rule, then the right way to do it is to have a rule making, to petition for a rule making and change the rule, which I asked about it and it looks the industry didn't want to do that.

CHAIRMAN SEIBER: Right. I think you can go for a rule making or you can ask for an exemption.

MR. MAYNARD: I think the main thing here is I think there's a difference in what the staff and what the industry believe the current requirements are, and whether this position constitutes a change or not, and I don't think we're going to resolve that in this meeting.

We can discuss whether we think it's safe or not, or needed or not from that standpoint, but I think it's kind of a legal issue and I think it's probably a little more generic than just this plant's -- seems like it's an industry/NRC generic issue on what -- does this constitute a new requirement or is this not a rule.

CHAIRMAN SEIBER: And I think that's where we need to leave it at this point because it is a legal issue.

MR. MAYNARD: Yes. One point of clarification here. I do believe that Wolf Creek does control breakers 50 and 60 from the control room.

MR. SOLORIO: That's correct. They're the generator breakers.

MR. MAYNARD: Yes, those are the generator main output breaker, right, so that's the only two in there that Wolf Creek has control of in the control room?

CHAIRMAN SEIBER: Right. But, you know, some of the typical things about working in the switchyard, we used to put two locks on the gate and it took two people to get in there, the plant people and the offsite people. There was an operator with them all the time. We knew exactly what they were going to do and when they were going to do it.

MR. SOLORIO: We do that.

CHAIRMAN SEIBER: Now, I'm not sure that everybody has that.

MR. SOLORIO: We have that.

CHAIRMAN SEIBER: But, as far as I can tell, since I do reliability work here, the responses that I've seen look like everybody has it, an arrangement similar to that.

Okay. Why don't we move onto the second set of three open items, which has to do with fatigue.

MR. GARRETT: Well, before I begin, Mr. Chairman, there were some comments made. I do want to address those because I think they're a little bit inflammatory and I take a little bit of a -- it concerns me.

Mr. Kuo commented on that the industry and come and complained about their revision to their guidance. I would not characterize that as

complaining. We were trying to understand why they were changing to guidance that had previously been followed, and our industry has been working with them on that.

I'd also like to say that we believe we are complying with the station blackout rule as written. We're complying with the license renewal requirements as written, and we do not see it as a change in what we're doing. We see it as a change in the application of their interpretation of the rule.

Frankly, I have a real concern when we have to make a change that doesn't have a technical basis to warrant it or a regulatory basis to warrant it, and that's what concerns me. And it's not a trivial issue just to go ahead and say, we're going to include a circuit breaker at Transmission Voltage 1; we're going to pick one and then do the requisite monitoring and everything else. That incurs costs, that incurs significant resources, and, as utility owner and operator, I want to apply my resources to things that make sense and provide safety benefit, and that's my comments on that. Thank you.

So, moving on.

So, again, for open item 2.5.1, what we are proposing is that Wolf Creek will include and

expand what we originally submitted to include up to the East and East Buses as Mr. Solorio identified.

On the second open item 3.0.3.1 10-1, which is the inaccessible medium voltage cable, again, because we'll go ahead and extend up to on the east side to the East Bus that will include the underground medium voltage cable and that should resolve that open item.

CHAIRMAN SEIBER: Okay. We'll note that as being your position.

MR. GARRETT: I'm sorry?

CHAIRMAN SEIBER: We'll note that as being your position.

MR. GARRETT: Thank you.

So now moving on to metal fatigue, which should prove just to be as lively. The three main open items, again, are associated with metal fatigue. Wolf Creek submitted the license renewal application in 2006 with an established fatigue management program. As part of the license renewal effort, Wolf Creek also evaluated the environmental effects for a period of extended operation.

Our license renewal application submittal was based on industry precedent and plant license renewal SERs. Throughout the audits and the RAIs that

were part of the license renewal processes, questions have been raised by the staff, mainly focused around the fatigue monitoring program calculations and methodology. As these questions have emerged only for Wolf Creek but other than industry, we have had extensive discussions with NRC staff to understand the concerns and try to address them as best we could to resolve the Wolf Creek open items.

With that introduction, then, I would like to turn over to Dr. Art Turner to walk us through the three open items. Art?

DR. TURNER: Thank you, Terry.

As Terry said, my name is Art Turner and I've been technical lead on the fatigue issue for Wolf Creek.

I wanted to just start with discussing briefly the design basis, the original design basis, for fatigue for the Wolf Creek Plant. People frequently refer to the original design basis as being a 40-year design. But, in actuality, the calculations are all done on a specified number of transients, which may or may not occur in 40 years, 60 years, or a hundred years.

As long as the assumed number of cycles have not occurred, that no type of cycle has occurred

more times than it was designed for, the original design basis fatigue calculations remain valid, and in order to assure that that remains the case, you need to track the number of cycles that have occurred and compare that to the number of cycles that you're designed for.

So for locations where we do not consider the effects of environment, the only thing that is required to assure the validity of the fatigue calculations for the period of extended operation is to count the cycles. Wolf Creek has an aging management program for fatigue monitoring, which includes as it's first step counting the number of cycles that have occurred.

Next slide, please.

The management program starts with counting cycles, but we also do two types of calculations to calculate the fatigue usage that's occurred, not just the number of cycles that have occurred. We do the fatigue usage calculation in two ways.

One is what we call cycle-based usage calculations, and for that calculation you simply count the number of cycles and then multiply the number of cycles that have occurred by the fatigue

usage per cycle that was calculated in the original design calculations. That means that you assume that the cycle was as severe as is defined in the design basis.

The second basis, which is really where the open items area, is for stress-based monitoring. Stress-based fatigue calculations provide a benefit by calculating fatigue usage from actual plant temperature and pressure transients that occur rather than from assume conservatively bounding design transient definitions.

For locations where we do not consider the environmental effects of fatigue, we do not expect to ever have to rely on either cycle-based fatigue usage calculations or on stress-based fatigue usage calculations. We expect that we will always be able to demonstrate that we are within the design basis by simply counting the cycles.

CHAIRMAN SEIBER: Okay.

DR. TURNER: However, we have for license renewal considered the effects of the reactor coolant environment at selected locations within the reactor coolant pressure boundary. We have looked at the locations that were identified as being of concern or of most interest by NUREG/CR-6260.

For a newer vintage Westinghouse plant, there are seven locations that have been identified in NUREG-6260. We are monitoring six of those seven. The seventh location is in the reactor vessel that's at the junction between the lower head and the shell. The original design calculated fatigue usage at that location was so low that we were able to multiply it by one-and-a-half to get from 40 years to 60 years and by the maximum environmental factor and still be well below one. So we validated that that was good for 60 years. We do not monitor that location.

The other six locations are listed on the slide. They are the reactor pressure vessel inlet nozzles, the reactor pressure vessel outlet nozzles, the safety injection nozzles, the accumulator safety injection and RHR connection nozzles, the surge line hot leg nozzle, and the charging nozzles.

The first four of those, we track fatigue usage with environmental factors applied using cycle-based fatigue usage. There is not really any controversy about cycle-based fatigue usage since you're using the design calculations to determine what the alternating stress was and what the fatigue usage is per cycle.

The bottom two nozzles, the surge line hot

leg nozzle and the charging nozzles, which we consider as one location even though there's a charging nozzle and an alternate charging nozzle, the analyses are the same for the two nozzles, so that we consider just single location. For these locations we expect that we may have to rely on stress-based fatigue monitoring, then arises whether the methodology that's used in stress-based fatigue monitoring or fatigue calculations are valid and are conservative. I wanted to make a few points about that.

The first one is that the methodology that's used is designed to be fully compliant with the intent of the ASME code. We do not use the most general formulation of fatigue calculation that appears in NB-3200. That portion of the design by analysis of the code is a completely general prescription for how you calculate fatigue usage which you can apply to any body with any type of loads, any pattern of loads you want to apply, and it defines clearly what is meant by the alternating stress, what is the alternating stress for a cycle under completely general and loading geometry conditions.

That type of generality is rarely needed, and, in fact, is not used at all in any of the design

calculations that I've ever reviewed because for locations that are of real interest you always are able to take advantage of the symmetry of the component that you're looking at and a knowledge of the types of loads that you're trying to analyze for. An example of this is in portion NB-3600 of the code, which is for piping components, which gives much simplified equations for doing fatigue calculations for pipes that are different -- they are consistent with but different from those in NB-3200.

Another thing I wanted to bring up because I know it's come up is the -- our answering questions from the staff we have used the terms one-dimensional stress and virtual stress and I think we've caused more confusion than we've caused enlightenment by using those terms. In the methodology that's used, what is calculated is a scalar parameter, one-dimensional scalar parameter meaning much the same thing, but it's a scalar parameter. This parameter is designed so that the range of the change in the parameter over a cycle is larger or equal to the range of change that you would get in the stress that's considered to be the alternating stress by the code.

By following the time history of this one-dimensional parameter and picking off the peaks

and valleys, we are able to determine the alternating stress values that we should use to go into the ASME fatigue design code and determine the fatigue usage for the cycle. In order to use a scalar parameter to do that, we have to make a number of simplifying assumptions and the problem is to make sure that those simplifying assumptions are not only simplifying, but also conservative.

In order to do that, we take full advantage of the location where we're trying to do the calculation; in our case, most of our locations are on the inside surface of nozzles near the pipe-to-nozzle connection where the geometry is cylindrical and the pre-surface means that you have no sure stresses on that surface. And what that means is that the principle axes of the stress are axial, circumferential and radial. And as long as you stay on the inside surface of a cylindrical body, that will be true.

So we make use of the fact that the component itself that we're concerned about is cylindrical or axisymmetric. The loads that we apply to that body are not axisymmetric. In particular, we apply bending loads, which are not axisymmetric loads, but we do the calculation for the location around the

circumference where the bending stress is expected to be the maximum.

There's also been talk about the Green's function methodology. A Green's function is used in all this for calculating the thermal stresses. Unlike the bending moments and the pressure, the thermal stresses depend not only on the instantaneous temperature at a point, they depend on the temperature gradients in the component. And the temperature gradients, in turn, depend on the time history of the temperature of the -- generally the temperature of the fluid.

In order to be able to calculate an arbitrary temperature-time history, the temperature gradients that arise from an arbitrary fluid temperature-time history we make use of the Green's function methodology which allows us to build up the temperature cycle as a series of step functions. And then we continue that process to go from the temperature gradients to the stress.

Now, if there is an assumption or a simplification in that process that's important, it's not the Green's function per se. It's the fact that the temperature that the heat transfer, the conducted heat transfer within the component is typically done

with a one-dimensional heat transfer analysis. That's completely valid for the middle of a pipe. It has some problems, perhaps, when you get to the nozzle. It's better at the ID of a nozzle than it is at the OD of a nozzle. But the parameters and the coefficients used in the process are designed to make sure that the calculation, though not exact, is always bounding.

DR. SHACK: Well, you do the one-dimensional heat transfer. Now, what are the simplifications you make in the stress analysis for that step temperature change?

DR. TURNER: The same ones that are prescribed in the code, we look at the linear gradient through the wall of the component and the maximum difference between the linear gradient and the surface temperature. So, basically, you've got the nonlinear component, which is the in-stress effect, and then you get the through-wall bending stress effect from the linear component, and the average temperature really doesn't make a difference to the local calculation. It does affect the bending moments through thermal expansion.

DR. ABDEL-KHALIK: So the 1-D conduction calculation just assumes that the pipe is infinitely long or what?

DR. TURNER: Yes. It would be exactly correct for an infinitely long pipe. But a pipe that's long compared to its wall thickness, it's pretty accurate.

DR. ABDEL-KHALIK: So why would that be reasonable even at the junction of a nozzle with a larger component?

DR. TURNER: Well, we are well away from the -- in all of the locations that we are looking at for Wolf Creek, we are well away from the junction between the branch pipe and the run pipe. We are near the pipe end of the nozzle where you've gone down through the thickness transition of the nozzle and have gotten the thickness of the wall down close to the wall thickness of the pipe. We tend to be, essentially, at the beginning of that thickness transition is where most of our locations will turn out to be unless there is another reason why the stress is high on the ID somewhere else, such as a thermal sleeve.

At the ID of the pipe, the heat paths -- to put it in probably not technical terms, the heat paths are not aware of the fact that the pipe's going to get thicker when it gets to the outside surface. Your initial flow will pretty much be -- from the ID

will be radial. As you go through the wall thickness of the pipe, the direction of the heat flow will go into -- will pick up an axial component and so it won't be one dimensional any more. So as I get further and further from the ID of the pipe, my one-dimensional proximation gets to be worse and worse.

DR. CHANG: Excuse me. This is Ken Chang.

Before going too far, I agree with most part of Art's presentation, especially at the nozzle safe end where the geometry is exactly similar to the infinite cylinder. I have no dispute on that.

But I reserve the right of commenting and discussing further at the nozzle corner radius area, which you already mentioned that area is not symmetric any more. Okay. And I will reveal some additional information from review of other plants, plants other than Wolf Creek, plants like A and B and C. Some of them I reviewed yesterday. We'll share with you as a preview for tomorrow's presentation. But if I don't say something like this, I will have forgotten totally. By the time when I get up there, I don't know what to say.

(Laughter.)

DR. TURNER: I think I can have the right to respond a little bit to that, but -- and I don't

want to respond in length. But what I would say is that for our fatigue monitoring program, our calculations are done for very specific locations on the pressure boundary. We make no claim that the methodology is good for a general stress analysis for an entire nozzle including when you get close to the connection between the branch and the run pipe.

The locations for which we do our calculations were determined from the design stress analysis as being the locations which have the maximum fatigue usage in the design calculations, and we limit our development of equations for doing the stress calculations to those very specific locations and none of them -- for our case they are where the thickness transition of the nozzle begins but they are not well into the thick part of the nozzle where you're getting close to the intersecting pipe.

The reason why they tend to all be out close to the nozzle safe end is because the stresses are sensitive to the pipe loads only when you're in the thin part of the nozzle. As you get into the thicker and thicker parts of the nozzle, the effect of the pipe loads becomes fairly small and the fatigue usage due to piping loads goes away.

So you might have a location that's

important in the thicker part of the nozzle if you're completely dominated by thermal stresses, but if you have a situation were you're concerned about pipe loads, you will always be at the portion of the nozzle that's close to the diameter of the pipe.

DR. CHANG: Yes. The Applicant's presentation focuses on taking -- select the worst location based on the design analysis. I totally agree because I have certain part of the design analysis I performed for many, many of the units. Okay.

My name's Ken Chang. Sorry. I forgot to mention.

The design analysis was performed at the time. The purpose is to demonstrate 40 years fatigue life with no environmental impact on fatigue, with no FEN, with no EAF. Now the criteria has changed. What's design analysis pick the most critical location may not be the critical location unless you further proof subject to the new conditions, the new requirements, the new factors, the new chemistry concerns, that's still critical.

And we also already found from the organization performed in other plant that this analysis constitutes -- come out the result to be less

than what's called conservative. It's actually you have to do other -- you have to adjust other factors to make it consistent.

Based on all the same assumptions and conditions, input and assumption, if everything is the same, the correct ASME analysis come up CUF higher. With that I disagree that you can neglect the nozzle corner or the plant radius. That's you justified to me to a strict ASME code analysis.

CHAIRMAN SEIBER: And that is covered in the staff's presentation?

DR. CHANG: I can repeat most of what I say and I repeat again tomorrow in the Vermont Yankee presentation.

CHAIRMAN SEIBER: Okay.

DR. TURNER: I think the issue of the blend radius and so on, my interpretation of that is that a question is being raised as to whether we have chosen the right points to do our analysis. And that may be an open issue. It's not one that has come up in our dealings with the staff. I do understand it's come up for another applicant. But, for us, that question of whether we have chosen the correct locations based on the design analyses is, to us, somewhat of a new question. But it's a legitimate

question if we're doing our calculations for the wrong location, then, clearly, we aren't going to get conservative answers.

Now, I will mention one other thing, that Ken mentioned the fact of environmental factors. Well, the way environmental factors are done is we do the mechanical thermal calculation and then we take the calculated fatigue usage and then we multiply that by environmental factors where appropriate. So the worst case -- the highest fatigue usage place without environmental factors that is on the wetted surface will also be the highest fatigue usage location once you have applied the environmental factors.

DR. SHACK: Because you're using a bounding environmental factor ignoring strain rates?

DR. TURNER: Not for all cases, but you are correct. If we are looking at strain rates, then we could get into a situation where the higher strain amplitude locations have higher strain rates and then actually give us a benefit. I agree that's a possibility.

DR. CHANG: Ken Chang again.

Just for the record, we are not only dispute whether you analyzed the right location as a component. As a component, you can say I evaluate the

transition zone, I can evaluate the safe end, I can evaluate the cross region, or to the far end, I say I can evaluate the header pipe. In that, nobody analyzes the header pipe.

Well, not only the dispute on the location, we also generally disagree with the methodology of the so-called 1-D virtual stress. It is not ASME NB-3200 analysis. If you dwell on your whole analysis based on NB-3600 analysis, the code states clearly, NB-3600 analysis is a simplification of the NB-3200 analysis.

The basis of the methodology is NB-3200. It's not NB-3600. NB-3600 is to simplify it to such a degree that you can easily analyze the piping, infinite piping, not the complicated geometry. Infinite piping, I will extend that to transition to reducer as long as you have table transition. You have axial symmetry.

But when the axial symmetry is gone, or when the loading is not axisymmetric -- when the loading is not axisymmetric, that criteria, the simplification doesn't work where the code starts, not starting from NB-3600. The code starts from NB-3200.

One of the competitors doing analysis will flat out say, our fatigue monitoring program performed

per NB-3200 analysis, six component, principle stress, stress intensity, not 1-D virtual stress. I have gone through this iteratively many times on this plant and we decided to go RAI, and that's the typical approach we're going to ask the whole industry. You demonstrate through at least RAI on the controlling for every component where the axial symmetry is gone or the loading is not axisymmetric.

MR. MAYNARD: I'm trying to sort out a little bit on -- I don't understand what -- it's obvious there's a disagreement and that there's still an open item. It sounds like some of it might be even an open item for the whole industry from what you said going out with an RAI to the rest of the industry on the methodology. I think it's important that we just understand what the issue is or what the open item is here.

DR. CHANG: I welcome further questions when the staff up there to do the presentation.

CHAIRMAN SEIBER: Well, let me ask this question. You're into this kind of analysis because when you count, you don't have enough cycles left to make it to 60 years? I take it that's the --

DR. TURNER: There are a number of issues. One is that the environmental effects are a new thing.

That it was not part of the original design basis.

CHAIRMAN SEIBER: Right.

DR. TURNER: In general, when the original fatigue calculations were done, the designer had the objective to get the fatigue usage calculated to be less than one. Point-99 was less than one. That was good enough. If he could get to .99 with very little work, then he stopped. He didn't go further.

Consequently, most of our fatigue design calculations of record are very, very, very conservative. If we take those conservative calculations and apply the environmental factors, virtually everything fails. But that is not really indicative of the fact that we have unsafe conditions in the industry if environmental factors are considered. It's simply that we didn't do the sufficiently-detailed analysis because that wasn't part of the concern at the time they were done.

So we don't have enough cycles using all of the assumptions that were done in the design analyses to be able to demonstrate that we can design for the environmental-assisted fatigue.

So there are a number of things that -- I will just state that I disagree with several of the interpretations of the code that Ken just stated. So

I think the issue is deeper than, perhaps, the issues that are applicable to Wolf Creek and they may end up having to be resolved on an industry-wide basis.

DR. ABDEL-KHALIK: But aside from his concerns about the methodology, how about the choice of the locations for which the analyses have been made?

DR. TURNER: We started from the design calculations.

DR. ABDEL-KHALIK: Is that the right thing to do?

DR. TURNER: It's may not be 100 percent bulletproof. I think it's a probably pretty good start.

We're going to get to talking about benchmarking here in a minute, and I believe one of the things that's going to be desired from a benchmark is that your calculation extend to a much larger portion of the pressure boundary than the local area around the location where we're calculating to validate that we have, in fact, chosen the right location. So I believe that we are going to get to the answer to this probably by a benchmarking approach. I think that's going to be the bottom line.

CHAIRMAN SEIBER: Why don't we move on?

MR. BARTON: I've got a question for a moment. I don't know if this is related to this specific discussion you had, but in section 4, you have TLA on secondary system hydro testing and you have the design limit for the plant as 5, and up through 2005 you already experienced this transient four times, and the estimated cycle for a 60 year period is also four. Can you explain that one?

DR. TURNER: The hydrates, we do not expect to ever do another hydrates. With the hydrates is part of the original validation of the plant.

MR. BARTON: Right.

DR. TURNER: And, in fact, that number four is conservative by a factor of four because what happened was that each of the steam generators was hydro tested individually, so there were four hydro tests and we counted that as four, but each component was hydro tested once. So we do have a lot more margin. We can correct that. But even if we were already at four, we would still expect the end of 60 years to be four.

MR. BARTON: That's what the TLA says and I was just wondering --

DR. TURNER: We don't do it again. We

don't intend to ever do a hydrates again.

MR. BARTON: Okay.

DR. SHACK: I wondered why you did four hydro tests in the first place.

DR. CHANG: May I supplement that?

CHAIRMAN SEIBER: Yes.

DR. CHANG: The requirement for hydrates is exempt by code case N-498 and N-416. So starting from the issues of N-498 and N-416, that requirement is no longer there. So you don't have to look at the cycle whether four is conservative, or four is bounding, or anything. From here on the hydrates is exempt. Look at the code case N-498 and N-416.

DR. TURNER: We don't even to do elevated pressure leak tests any more. We do system leaks --

MR. BARTON: I was just trying to understand what the TLA was all about. Okay. I understand. Thank you.

DR. CHANG: You're welcome.

CHAIRMAN SEIBER: Okay. Let's move on.

DR. TURNER: Okay. In order to do a stress based monitoring program, we didn't start our stress based monitoring program the day we started the plant. Therefore, we need to have a base line to start from. We need to estimate how much fatigue

usage was accumulated before we actually started the monitoring program.

In our submittal, we have a calculation of that baseline. It was based on looking at the period that we had monitored, which at that time was close to ten years, and then using those data to backward calculate what we thought was going to be was a conservative usage that accumulated before we started the monitoring. The way we did that included a lot of engineering judgment and there were questions raised about whether we could justify some of the engineering judgment. We had to agree that we couldn't justify everything that we had do, and so we have since gone back and looked at a number of issues on the baseline.

We had some cycles which we had said occurred during the non-monitored period, but had never occurred during the monitored period. So the question was asked, how can your backward calculation have included those cycles if you didn't do that? We looked more closely at that issue and discovered that we had counted some cycles which, in fact, didn't occur. We had created a list of the cycles that occurred early in life before we even were doing cycle counting by going through control room logs, and the calls that were made in that were very conservative.

We counted seven events of loss of offsite power where we had no events which actually met the description of loss of offsite power.

We had counted I think at least one event of turbine trip without immediate reactor trip and we discovered that that event -- the two trips occurred, essentially, simultaneously as they were designed to do, so had not needed to do that event. There were some other cases where we had more events in the non-monitored period than the monitored period. We explicitly included usage to bound that. So we have now done a more conservative estimate of the baseline. We've completed most of that.

We have one more issue which has to do with the hot leg surge line nozzle and it's related the issue of stratified conditions in the surge line. In about 1994 Wolf Creek adopted modified operating procedures which are meant to mitigate and reduce the fatigue usage due to stratified conditions in the surge line. So we have to add an increment and we have not yet completed this to add an increment to the first -- the years of operation, the nine years of operation from plant start-up to the adoption of modified operating processes to account for the possibility that we had higher fatigue usage on the

hot leg surge nozzle.

We will complete that. When we've completed that, our revised baseline will be available for staff review. We expect that we will be able to close that open item.

CHAIRMAN SEIBER: I take it your revised procedure is more spray flow and more heaters?

DR. TURNER: That is correct.

The other question we've discussed I think already, which is the issue of the one-dimensional or scalar description of stress. I don't know that I need to add a great deal to what has been said except to point out that we do the calculations -- well, I have two things I do want to point out.

One, the only two places where we expect to have to rely upon stress based monitoring are the hot leg surge line nozzle and the charging nozzles because those are locations where environmental effects are important. And for both of those locations, the location of interest is near the pipe-to-nozzle connection and those places of interest were determined by looking at the original design calculations.

CHAIRMAN SEIBER: -- obvious though even if you don't do that, if you don't have a plant offer.

DR. TURNER: Well, I think they're reasonable places. They are places where you have a stress concentrator factor, perhaps you have some other perturbation, and you have thin enough walls so that you're still concerned about the pipe loads.

For the charging nozzle where the fatigue usage is almost entirely dominated by temperature cycles, the charging nozzles, unfortunately, experience big, rapid temperature changes due to loss of let-down and loss of heat to the regenerative heat exchanger. The location of interest is on the inside surface of the pipe.

For the hot leg surge line nozzle, the location was chosen by the analyst who had just completed doing a re-evaluation of fatigue for Wolf Creek to include effects of surge line stratification and they based the choice of the location on their revised calculations to address the surge line stratification issue. They identified the maximum fatigue usage location as on the outside surface of the pipe essentially at the beginning of the thickness transition.

At that time there was not a concern about the environmental effects of fatigue, so the choice of location was based entirely on just the thermal and

mechanical loads. At that location we do not need to apply the environmental effects. It's on the OD of the pipe. It's not wetted by the coolant surface.

But since it's the location where we have the monitoring program established, we have the transfer functions needed for the monitoring program developed, what we are doing is we are taking that, we are saying the fatigue usage without environmental effects at that location bounds the fatigue usage at any location on the wetted surface of that nozzle, and, therefore, if we take the OD location fatigue usage and multiply it by the environmental factors, we're clearly bounding the worst case on the wetted surface of the pipe. That assumption alone introduces a large degree of conservatism in the overall approach of the analysis.

Finally, I just want to say that we agree with the staff that an appropriate way to resolve these issues is to do some sort of a benchmarking calculation where we look at the fatigue monitoring program calculational methodology and compare it to a different calculation methodology such as a finite element analysis. We're in the process of -- we have spoken to the staff several times about doing a benchmarking analysis. We have essentially agreed we

are going to do a benchmarking analysis. We are in discussions to try to try to determine and set the extent and the type of transients that will be used in the benchmarking analysis, and other applicants are going through the same process so we expect that we will have some precedent that we can use to help resolve what we're going to do for the benchmarking analysis.

We have already done a comparative study for the charging nozzles looking at temperature pressure cycles only, and for those calculations we did show that there is a large degree of conservatism in the fatigue monitoring program calculations vis-à-vis a finite element analysis. So at least a portion of the benchmarking for that nozzle is completed.

The hot leg surge nozzle needs to include transients which have pipe-ending loads in them as well as transients that are pressure and temperature range.

We believe that when we've completed the benchmarking calculations that we will be able to close that open item.

The last open item is really two different items and they're fairly simple, and we believe that they're resolved, although they have not yet --

DR. SHACK: Just coming back to that, Art. I mean that solves the problem for you, but, in general, you still have this problem with being able to judge when the simplifications that you've put into the 1-D model are going to be valid and not valid.

DR. TURNER: And my understanding of the staff position is that a site-specific benchmarking is going to be required.

DR. CHANG: Let me put a clarification on this because we are talking about benchmarking of a computer code. If you use any computer code in the ASME class 1 qualification analysis, the benchmarking before you use the computer code should already existing, otherwise, what tool are you using. So we're talking about benchmarking now. We're not talking about benchmarking the computer code. We are talking about benchmarking the application to your particular plant configuration. Let's keep that point straight.

Secondly, I believe, Art, you mentioned thermal sleeves. I really doubt that Wolf Creek in the branch nozzles they still have thermal sleeves. Can you clarify that?

DR. TURNER: In the charging nozzles we have thermal sleeves.

DR. CHANG: How about the surge nozzle?

DR. TURNER: I don't believe we have a thermal sleeve in the surge nozzle.

DR. CHANG: Yes. So you cannot generalize that.

DR. TURNER: I don't believe that I said that we were considering anything to do with a thermal sleeve. We were not taking benefit through the thermal sleeve in the surge line nozzle. It does exist in the charging nozzle. It clearly needs to be considered in the analysis.

DR. ABDEL-KHALIK: How would the benchmarking of two methodologies answer the question of whether or not you picked the right points?

DR. TURNER: I am assuming that the benchmark -- the alternative calculation, which is almost certainly going to be a three-dimensional finite element analysis of either the entire nozzle and run pipe or at least a portion of the run pipe, and the finite element program will be able to easily look through its pile of output and identify for us where the maximum stresses are, it may or may not be able to identify for us where the maximum stress ranges are. We may have to do that manually. But if we have the full finite element analysis, it's a

relatively simple thing to verify that the location we're looking at is at least close to the maximum fatigue usage location.

DR. CHANG: Please, don't be misled by the staff. The staff is not dispute the principle, the theory of Green's function, transfer function. I fully endorse that. What we are talking about is how is the correct application of the Green's function, the transfer function, to the extra problems.

Now, talking about Vermont Yankee, we did a benchmarking of the configuration for Vermont Yankee only. Yesterday I went through a detail calculation for another surge nozzle. With all the stops pulled, the CUF is still much higher than 1. So it's not a trivial issue that as long as you sharpen your pencil, problem goes away. If things are that simple, everyone want to be a stress analyst. Nobody want a financial analyst.

DR. TURNER: That comment means I have to make a couple of more points.

One is we are using stress based fatigue monitoring as a tracking method. Our fatigue monitoring program we have committed to. We have not yet written action levels to put into our program which say that, when your calculated fatigue usage

reaches this level and for the 6260 locations, that will be a level including environmental factors, then you have to take corrective action. Those corrective actions could be refining your analysis. They could be repairing the component.

They could be replacing the component. Or they could be going to a different design basis such as a flaw tolerance approach with calculations of crack growth and periodic inspections. Those are, more or less, the possible corrective actions.

We have committed to setting our action levels low enough so that we have time to take action so that we have at least two or three operating cycles before we would expect to step across the one. So if we are wrong in our original calculations and with environmental factors applied we don't get to the end of 60 years, we will have to take action. So we are not trying to, by calculation alone, say that there is not environmentally-assisted fatigue concern. All we're trying to do is say that we have a valid monitoring method that will alert us to the fact that we're getting to a limit in time to take corrective action.

Obviously, if we grossly under calculate the fatigue usage because our program is wrong, our

monitoring tool isn't very good. We don't believe that that's the case and we believe that we can demonstrate it's not the case by an appropriate benchmarking procedure.

Let me get through the last open item. The last open item is actually two open items. One has to do with the reactor vessel internals.

Wolf Creek is the first plant to go through the license renewal process where the reactor vessel internals were designed in accordance with the ASME Code Section NG, which requires fatigue analysis of the core support structures and other structures which could have an influence on the core support structures. Therefore, we do have fatigue analyses for the reactor vessel -- some components of the reactor vessel internals.

Unlike the pressure boundary components where the fatigue usage is only from the prescribed transient cycles in the reactor vessel internals analysis, there is also the requirement to look at high cycle fatigue effects. A high cycle fatigue effect, for example, would be flow-induced vibrations. In order to -- and that is dependent on the time of operation, not any number of cycles. And so to extend the high cycle effects from a 40-year operating period

to a 60-year operating period you need multiply fatigue usage from high cycle effects by one-and-a-half and then add it back to the fatigue usage from the prescribed numbers of transients.

Wolf Creek did not have in its possession the detailed information about how much contribution to the overall fatigue usage came from high cycle effects and how much came from the transient effects. We were unable to obtain that information before the staff audits occurred, so we were not able to do that calculation. We have since received that information. We had Westinghouse look at the detailed original calculations and tell us how much of the fatigue usage in our design reports came from high cycle effects. We've been able to extend the calculations now to 60 years.

For the components that had high fatigue usage to begin with, the high cycle effects contribute virtually nothing, and, therefore --

CHAIRMAN SEIBER: Do you believe this was resolved?

DR. TURNER: We believe this is resolved, and when the staff has the opportunity to review our documents that we can close that issue.

DR. SHACK: Say that one again for me,

Art. So that the high cycle is contributing virtually nothing. They're just so small.

DR. TURNER: Yes. What it turns out is that the majority of fatigue usage for the core support components comes from gamma heating, and the gamma heating is worse in massive components. The stresses from gamma heating are worst in massive components. Massive components don't experience high cycle effects. So if you have high usage from gamma heating, you don't have any usage from high cycle effects.

The final issue, which is the other half of open item 4.3, has to do with reactor coolant sample lines. These are actually class 2 components. They do not have a detailed fatigue analysis, but they do have a limit that says if you expect to experience more than 7,000 full temperature range cycles, you have to use a reduced allowable stress.

In our original review of the calculations, we couldn't verify that a reduced allowable stress had been used for lines that are used on a daily or ever-other-day basis, which amounts to something on the order of 11,000 cycles over a 60 year operating period. And so we originally made a commitment to

recalculate for those sample lines.

Subsequent reviews of the original calculations we have verified that, in fact, a stress range reduction factor of .9 was used. If you use a factor of .9, you're allowed 14,000 full temperature range cycles. We believe that this is the basis for closing this open item. Again, we believe we will be able to close it when the staff has an opportunity to review the calculations.

CHAIRMAN SEIBER: Okay. Do any of the members have additional questions or comments?

DR. ABDEL-KHALIK: You don't see any circumstance under which you would have more frequent use of the sample lines?

DR. TURNER: No, but my understanding of the sample lines is they're used to take chemistry samples. I guess if we got bad chemistry, we could take more frequent use -- we need to take more frequent samples. These are on the primary system. Chemistry is usually not a problem on the primary system.

DR. SHACK: You've got bigger problems than your fatigue and your sample lines.

MR. STETKAR: This might be too much detail. But how often do your normally pull those

samples now for routine operations?

DR. TURNER: Well, the 11,000 cycles is calculated as once every other day and that's the best information we were able to get.

CHAIRMAN SEIBER: Moving on.

MR. BARTON: Are you finished? I've got a couple of scoping questions if you are.

In plant level scoping, you talk about the turbine control oil system and the E-8C. Are they both the same? The reason I'm asking you this is, you've got turbine oil system not in scope, yet EHC systems for ATWS seems to be required.

CHAIRMAN SEIBER: Turbine oil is usually --

MR. BARTON: It says turbine control oil.

CHAIRMAN SEIBER: I don't know what that is.

MR. BARTON: That's what I wonder, whether it's part of EAC system. It doesn't say turbine lube oil. I understand that. But it says turbine control oil is not in scope, yet EAC system appears to be in scope for ATWS. So I don't know whether --

CHAIRMAN SEIBER: What turbine do you have?

MR. GARRETT: General Electric.

MR. BARTON: This is Section 2.2 plant level scoping table 2.2-1. You may want to look at that.

And one more, condensate storage tank is not in scope, I understand it, but you get the foundation and the valve house are in scope. Is there a reason for that?

MR. BLOCHER: Could you repeat that question?

MR. BARTON: Condensate storage tank is not in scope, yet the foundation for the tank and value house, which is on the foundation, are in scope.

MR. BLOCHER: The condensate storage tank is in scope. I believe it's the -- are you looking at the mechanical section or the structural section?

MR. BARTON: 2.4, scoping and screening, it's under structures.

MR. BLOCHER: Okay. Those are scoped and structures. I believe the tank is covered in the mechanical section --

MR. BARTON: Okay.

CHAIRMAN SEIBER: Any more questions.

(No audible response.)

CHAIRMAN SEIBER: If not, let's take a break until 3:00.

(Whereupon, the meeting recessed at 2:44 p.m. to reconvene at 3:00 p.m.)

CHAIRMAN SEIBER: I think everyone has taken their seats. We will being now with the staff's presentation.

Okay, Tam.

MR. TRAN: Good afternoon. My name is Tam Tran and I'm the project manager for the Wolf Creek Generating Station License Renewal Review Project. I, along with other members of the project, will discuss the staff review of the Wolf Creek License Renewal applications as documented in the safety advisory report with open items.

MS. LUND: Excuse me, Tam. This is Louise. Tam, can you get a little closer to the microphone.

MR. TRAN: The SER was provided to the Applicant on February 1st, 2008.

Next slide.

I will begin with a brief overview of the Wolf Creek license renewal review, then Mr. Greg Pick, the Region 4 lead inspector, will discuss the license renewal inspections. Next, I will continue with the discussion of the SER results Section 2 to 4 of the SER.

Next slide.

License renewal application was submitted in September of 2006. The license renewal application was covered in detail earlier in the day.

Next slide.

Next I will discuss the safety evaluation report. The safety evaluation report with open items related to the license renewal of the Wolf Creek Generating Station was completed and issued to the applicant on February the 1st, 2008. The staff provided available input into the SER with the aid of 250 audit questions; 137 of these questions were aging management program related questions; 82 items was aging management review related questions; and 31 items were time limited aging analyses related questions.

The staff was also aided with additional information provided by the applicant and respond to 95 request for additional information items that were issued to the applicant ending on December 7, 2007.

The information collected from the questions and the RAI letters was used to develop the SER. The SER contained five open items and no confirmatory items.

Next slide.

NRC audit teams conducted various audit activity at the Wolf Creek site during the periods as listed on the slide. The staff started to review with the scoping and screening methodology audit in January of 2007. This was followed with a series of onsite audits and inspection from March through October 2007. Region 4 conducted two inspections in September and October 2007 to review the Wolf Creek scoping and screening and aging management program.

At this time, I would like to introduce Mr. Greg Pick to lead the discussion on the license renewal inspections.

MR. PICK: Thank you, Tam. Good afternoon, members of the ACRS.

Next slide, please.

The current performance at Wolf Creek, all the findings and performance indicators are green. We just completed our inspection of the corrective action program last Friday, so that any review of that is pre-decisional. The end-of-cycle letter was issued on March 3rd. In that cover letter of that, we discuss that there were four issues in the cross-cutting theme related to problem identification, related to a low threshold. The applicant had just become aware of that themselves and they were initiating actions for

review. So we chose not to issue a substantive cross-cutting issue.

The special inspection related -- we initiated a special inspection for the ECCS voiding. The next week of the onsite portion will be next week where the team will review the root cause analysis that was just completed by the licensee, and a couple of weeks ago there was a Notice of Enforcement Discretion issued because of leakage in the CCP Alpha room cooler. The diesel was out of service, so they to declare the feature, the CCP Bravo, inoperable. What the NOED did was give them an additional 15 hours to repair the leak on CCP Alpha room cooler, which is also one of the room coolers being replaced on their upcoming outage.

DR. ABDEL-KHALIK: Were there any hardware changes made in response to the ECCS voiding, like adding vents?

MR. PICK: No, I don't believe so yet.

DR. ABDEL-KHALIK: No hardware changes?

MR. GARRETT: Yes, there was. We did install additional vents and reconfigured some horizontal piping runs.

I'm Terry Garrett from Wolf Creek, and, yes, we did install additional vents at high points

and adjusted some long, horizontal runs of piping to make sure the high point vent was at the high point.

DR. ABDEL-KHALIK: And that will be the focus of your follow-up inspection?

MR. PICK: A follow-up inspection will be to review the root cause analysis that they recently completed.

DR. ABDEL-KHALIK: Rather than the corrective actions they've taken?

MR. PICK: The team is also looking at corrective actions. I'm avoiding that because it's all pre-decisional.

DR. ABDEL-KHALIK: Okay. Thank you.

MR. PICK: Next slide, please.

The inspections were performed. The first week had five inspectors, concluded the license renewal PM. And the second week of inspection, the dates were already provided, included the license renewal PM and two inspectors from Region I. We completed our scoping and screening review during the first week and we reviewed 22 of their aging management programs.

Next slide.

Related to scoping and screening, this document in the report, there's some minor drawing

errors. Those consisted of drain valves that were in scope, but were not included on the drawings. There was a diesel generator starting air line between the Alpha and Bravo trains that was held by seismic restraints that we felt should be included. The licensee agreed and included that.

The license renewal PM had a question about whether the pressurizer spray nozzle should have been included. The team was provided sufficient information that it has a control function, not an accident function, so we agreed it is not included.

CHAIRMAN SEIBER: Right.

MR. PICK: And during our walk down of the switchyard, if you recall the diagram they put up, the bolding for the disconnects at the 1321 and 1323 disconnect, they had not included that. They agreed with us and they already amended their license renewal application to include that as a passive feature that should be monitored.

As far as the aging management programs, the observations and findings by the team were all the review we did relatively minor. But the one-time inspection they referred to a NUREG. In reality, they wanted to do a sample methodology, which was a 9090 sample methodology. They clarified that in that same

license renewal amendment.

MR. BARTON: A question on that. Go ahead, John.

MR. STETKAR: I beat you. I'm curious. Got to come back to the RHR heat exchanger just to keep focused on a particular piece of equipment. And the staff, basically, accepted the licensee's discussion about chemistry control and inspections of the component cooling water heat exchanger to provide adequate assurance of the status of CCW-cooled heat exchangers. And, again, I'll mention RHR just to keep a single word although there are some others. I'm curious of your basis for accepting that conclusion.

DR. CHANG: Ken Chang.

This question was raised during the morning discussion when the applicant made their presentation, and, luckily, we have a lunchtime break. I took that break to contact my lead reviewed, who is right now at Beaver Valley, asking him about the basis we accept this. And that person is an industrial expert in this area. What he recollect in reading the SER is the reason of accepting that is based on three things. One is, although they don't do performance testing, however, they do measure heat transfer capability, and how to define a C transfer capability,

that's beyond me. Only the applicant knows what parameter is to measure the heat transfer capability.

Secondly, the heat exchangers are also periodically tested with NDE. That means eddy current testing for CCW heating --

MR. STETKAR: Wait. Let me -- excuse me. I don't want to interrupt you too much here, but I'm going to keep us focused on the RHR heat exchanger and not the component cooling water heat exchanger. They are two completely separate heat exchangers. They're both related to component cooling water, but they are completely different heat exchangers.

DR. CHANG: Okay.

MR. STETKAR: And the discussion that you were just having certainly does relate to the component cooling water heat exchanger. I don't have any questions about the programs related to the component cooling water heat exchanger, none at all. I think it's a fine program.

I'm concerned about -- and I'll use the example -- the RHR heat exchanger --

DR. CHANG: Yes.

MR. STETKAR: -- which the applicant specifically told us this morning that there is no eddy current testing of that heat exchanger.

DR. CHANG: Yes.

MR. STETKAR: There is no inlet/outlet flow monitoring or temperature monitoring to measure heat exchanger performance, and there is no internal inspection of that heat exchanger.

DR. CHANG: There is one more added part of the inspection.

MR. STETKAR: Okay.

DR. CHANG: Inspection of the internal surfaces of the check valves to try to identify --

MR. STETKAR: Those are component cooling water check valves at the return to the component cooling water pumps. They do not tell me anything about the status of the tubes or the shell side of the RHR heat exchanger.

DR. CHANG: But the heat transfer capability, that is not only the component cooling water, also IHX also.

MR. STETKAR: I didn't hear anything in the presentation this morning in the answer to my question, nor did I read anything in the documents that mentioned anything about monitoring the heat transfer capabilities of the RHR heat exchanger.

DR. CHANG: I will take this note back and respond to you.

MR. WEN: That was mistaken.

My name is Peter Wen. I'm the former audit team leader.

The way I understand this issue is, the component cooling water heat exchanger is the leading indicator to anything bad for RHR heat exchanger that we're sure component cooling water heat exchanger. It's how we are approved.

MR. STETKAR: I am not enough of a materials person to make any judgment of that, but the duty cycles and the operating fluids are certainly different on those two heat exchangers. So it's not immediately clear to me why a normally-operating heat exchanger with service water on one side and component cooling water on the other side of the tubes is necessarily bounding for a heat exchanger that's normally on standby with borated water on one side and stagnant component cooling water on the other side.

MR. BARTON: Plus, the component cooling water heat exchanger services more than one --

MR. STETKAR: Yes. Well, it's a -- no, it's a completely different animal.

CHAIRMAN SEIBER: Well, component cooling takes care of some safety-related --

MR. STETKAR: Yes.

CHAIRMAN SEIBER: -- and I suspect, if my memory's any good, the RHR is not a safety-related -- you're required to be able to go to shutdown in 72 hours by your tech specs --

MR. STETKAR: Right.

CHAIRMAN SEIBER: -- and to do that you have to use RHR. On the other hand, to mitigate an accident situation, RHR is not required to my memory.

MR. STETKAR: That might help me if I can get it clarified.

At Wolf Creek, are the RHR heat exchangers used for low pressure recirculation cooling after a LOCA?

MR. BERRY: Dale Berry, Wolf Creek operations.

Yes, the RHR heat exchangers are used for long term core cooling post LOCA, recirculation of the containment --

MR. STETKAR: So they're --

MR. BERRY: Does that answer your question, gentlemen?

MR. STETKAR: Yes. Thanks.

MR. BARTON: So we're talking apples and oranges.

DR. ABDEL-KHALIK: So, really, the issue

still remains. You cannot infer the condition of the heat exchanger, like the RHR heat exchanger, by monitoring the chemistry or the condition of the component cooling water?

MR. BARTON: That's true.

DR. SHACK: Unless you assume it is a leading case because this last less control of chemistry.

DR. ABDEL-KHALIK: That could be.

MR. MAYNARD: I'm not sure any specific monitoring is done. Most of these heat exchangers you do know what your inlet and outlet temperatures are. RHR is used during -- other than accident situations, obviously, for shutdown and stuff, and you are monitoring -- in fact, that's one of your key control parameters, is controlling the temperature across there. So you are getting some performance monitoring, but I'm not sure that --

DR. SHACK: It's usually good enough that you have to reduce your cool-down rate.

MR. MAYNARD: -- heat exchangers in the others, you are seeing what the difference in temperature and you are able to identify whether you have any -- you know, is it operating a lot. I'm just not sure what the GALL requirement is and what they're

doing, and stuff, as to whether that takes care of that. That's what I don't know.

MR. STETKAR: I don't know. You know, in terms of trending performance to identify degrading conditions, I suspect that the normal cool-down requirements, as long as you can cool down as fast as you need to cool down, you wouldn't necessarily see any trends in reduced heat transfer coefficient. Nor would you know anything about the status of the condition of the tubes itself unless you had a tube failure and got high radiation in the component cooling water system.

CHAIRMAN SEIBER: But to know whether it's safety related or not, you actually have to look at the key list.

MR. STETKAR: That's right. Well, these heat exchangers must be safety related.

CHAIRMAN SEIBER: Well, I don't know that.

MR. MAYNARD: Mostly they also fall under the code for code inspections I would think.

CHAIRMAN SEIBER: Yes, but that's for pressure boundary.

DR. ABDEL-KHALIK: That's pressure boundary.

DR. KUO: Well, this is our

take-away items. We will come back to the Committee with an answer.

MR. STETKAR: The question in my mind is more, because the staff accepted it, I was a bit curious about the rationale for that acceptance.

DR. KUO: Yes. We'll come back to you. Our reviewers just happen to be at Beaver Valley doing the audit right now, so we don't have the reviewer here. We will take this away and come back to you.

CHAIRMAN SEIBER: They may come back with the wrong answer.

(Laughter.)

MR. BONACA: Since you are taking assignments, let me --

CHAIRMAN SEIBER: Why don't we go on.

MR. BONACA: Yes. Let me ask the question I asked this morning about the bolting integrity program. The GALL report, the GALL essentially says that the loss of pre-load is a parameter to be monitored, and the licensee took the position that they don't monitor it and really what they're monitoring is leakage. Why does the staff find it to be acceptable, this exception?

DR. CHANG: Coincidentally, the staff who reviewed this bolting integrity is also at Beaver

Valley. I also talked to him during lunchtime. What he recalled is the GALL requires the use of two documents and the applicant used two documents, which he said closely related and almost identical requirement. They cross referenced each other. In other words, NP-5769 or NUREG-1339 is equivalent to NP-5067 and EPRI TR-104213. The later set is what the Wolf Creek is based on, and in the reviewer's opinion, it's close enough to be accepted. And, further, of relaxing the daily monitoring, that if the leakage does not increase, then the GALL allows them to relax that requirement. Instead of daily, you can go to biweekly or to go weekly. And on that basis, since Wolf Creek is doing additional steps as described in the SER, so he felt that this is enough to core that this is more restrictive than the straightforward GALL requirements. So on that basis --

MR. BONACA: That's a separate issue. My issue was purely talking about parameters to be monitored or inspected, and there is a main parameter which is also pre-load, and the licensee says, if you have a good procedure to bolt the system, you don't have to worry about it. So, therefore, we are not worrying about it and we just inspect for leakage.

And it seems to be inconsistent, very

inconsistent with what the GALL report says. So I was wondering what's the logic for saying it's acceptable. Realizing, also, there's a precedent, which means every other applicant now can make the same statement and simply not monitor loss of pre-load, which is something that I've seen oftentimes monitoring.

DR. CHANG: Yes. Certainly it's a very good question. However, our audit process has gradually changed in the direction that each person is responsible for reviewing the area repeatedly from A plan to B plan to C plan to maintain consistency.

And this person, name Jim Davis, is the bolting integrity expert, and so he is reviewing every plan by the same criteria so consistency between plans are maintained. But if you ask me what are the parameters he reviewed, I don't have a list, so I have to get back to you if you want a list.

DR. BONACA: I understand. I am concerned about the exceptions being taken on GALL in general. I've raised the concern in two previous applications recently because we see an increasing number of exceptions, and I go back to the SER, I read -- each exception oftentimes requires ten pages of discussion on how the staff accepted it, and it's almost like there is no logic behind that except it's a lot of

discussion and some convincing, and then whatever is the exception is accepted and I'm concerned about where that goes.

I mean GALL was an agreement between the industry and the staff on how to deal with aging problems, and there was a place for exceptions, too. But I look at things like this and I don't see a basis discussed there for why it was acceptable.

DR. KUO: Okay. We will get back to the Committee with a response. Perhaps it will get back to the Committee sooner than the next full Committee meeting.

DR. BONACA: Because some of the other exceptions like based on the ASME codes, that's fine. I understand that. But something like this should have some explanation of why it's acceptable.

DR. KUO: We'll get back to you.

MR. BARTON: Are you still on aging management programs?

MR. PICK: I have two more things to talk about.

MR. BARTON: All right. I've got a question when you get done.

MR. PICK: The other areas we looked at where we had some observations were the accessible

medium voltage cables and the inaccessible medium voltage cables.

MR. BARTON: That's one of my questions, so go ahead.

MR. PICK: With the accessible medium voltage cables, there's a current license basis issue related to submerged cables. The electrical branch has engaged the licensee and continues to evaluate their calculations and their basis for the cable qualification. Those discussions are ongoing.

CHAIRMAN SEIBER: You're talking about environmental qualification?

MR. BARTON: This is the medium voltage, inaccessible medium voltage, between EQ? Is that what you're talking about?

MR. PICK: No. That was under --

MR. WILSON: We are engaging with Wolf Creek right now. They sent us some calculations. What this is is a cable that's in a manhole that's actually submerged in water.

MR. BARTON: That's my question. They said this was a new program going to be implemented prior to license renewal, but, yet, ongoing plant operations would indicate you need to be doing something, going, looking for water, and I found out

some place that there was water in a manhole.

CHAIRMAN SEIBER: Right.

MR. BARTON: A PM supposedly was in place, but you guys found water in the manhole even though it's a PM program in place. I want to know, since that program apparently is ineffective, what is the applicant now doing to satisfy that requirement.

MR. WILSON: The only portion -- and I'm the electrical chief -- that we're looking at right now, we're engaging Wolf Creek specifically on the qualifications of cable. They stated that the cables are qualified to be submerged. We're challenging them on that right now. So that's the part that I'm doing. If you're looking at the PM portion, that would end up going back to Region IV.

MR. BARTON: Well, you guys felt that that PM program did not pick up the water in the manhole. The inspection in September 2007 found that.

MR. PICK: And they left the water in the manhole because they believe the cables are qualified. We do not and did not have enough information to challenge the operability.

MR. BARTON: But you guys are looking at that issue?

MR. PICK: Correct.

MR. WILSON: That's correct. Right now we're challenging --

MR. BARTON: I got you.

MR. WILSON: -- find out the answer and feed it back to Region IV and to the residents.

MR. BARTON: Got you.

MR. PICK: Now, for that, as far as license renewal, within two years of the period of extended operation we'll be evaluating that. They'll make the manholes dry. They'll initiate work requests, enter it in their corrective action program. The team found that was sufficient activities for the applicant for license renewal purposes.

MR. BARTON: Okay.

MR. PICK: Next slide, please.

So upon conclusion of our inspection, the team concluded that the screening and scoping of the nonsafety-related system structures and components was implemented as required by the rule. The aging management portions of the license renewal activities were conducted as described in the application and the processes on-site would be able to manage the effects of aging.

Any additional questions?

CHAIRMAN SEIBER: How did you evaluate

exceptions to the aging management programs?

MR. PICK: The starting point was the headquarter staff accepted it. We looked to see whether the licensee's processes --

CHAIRMAN SEIBERSo you're just looking conformance?

MR. PICK: Correct.

Any additional questions?

(No audible response.)

MR. PICK: Thank you.

MR. TRAN: Thanks, Greg.

I will now begin the discussions of the results of the safety evaluation report.

Section 2 discussed structure and component subject to aging management review. Section 2.1 of the SER covers scoping and screening methodology for the license renewal application and the staff concluded that the applicant's methodology meets the review criteria in the standard review plan and in accordance with the rules.

Section 2.2 covers the plant-level scoping results of the relevant system and structures. The staff found the result by the applicant meets the review criteria in the standard review plan and in accordance with the rules.

Next slide.

Relative to mechanical system, the staff identified a number of components that were later brought within scope by the applicant. These components provide support functionally to a needed mechanical system intended functions. This is in accordance with 10 CFR 54.5(a)(2) and 10 CFR 54.4(a)(3). The functions of the components were not obvious at the time the applicant performed scoping and screening activities. Based on the small number of items identified, the staff believe that the available guidance in identifying such components by the applicant is adequate.

Consistent with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1), the staff concludes no omission of mechanical component and structures within the scope of license renewal after license renewal application amendment and subsequent to the staff review.

Next slide.

MR. BARTON: I have a question. On structures, there's a masonry wall in the turbine building in the truck bay that has a crack that apparently cannot be repair due to its being inaccessible. The crack continues to increase. Design engineering has found the wall acceptable. How

long can this wall continue to grow before the wall is not able to perform its intended function since it cannot be repaired? Did you guys look at that?

MR. TRAN: I have a reviewer here.

MR. THOMAS: This is George Thomas. I'm not the staff reviewer. I am a person in the branch and I'd like to get back to you.

MR. BARTON: Okay.

MR. MAYNARD: The turbine building is a nonsafety-related structure.

MR. BARTON: Yes.

MR. MAYNARD: I'm not sure what the wall --

MR. BARTON: I don't know what the intended function of the wall is. It just says it's cracked, it's continuing to grow, and it's okay by design engineering. So if the wall fails, I don't know what's affected. I really don't know.

DR. KUO: Yes, it is rather strange that the masonry wall in the turbine is being within the scope of license renewal, but we will take a look.

MR. BARTON: If it's not important, doesn't serve any safety function, or doesn't protect any safety system if it collapses, why are we even looking at it I guess is my question.

CHAIRMAN SEIBER: It shouldn't be in --

MR. BARTON: All right. It shouldn't be in the scope then.

CHAIRMAN SEIBER: Okay. Go ahead.

MR. TRAN: Next slide.

Section 2.5 covers scoping and screening of electrical and instrumentation and control systems. The staff identified one open item, which is open item 2.5-1, associated with the station blackout recovery paths to offsite sources. For this open item, the staff determines that the recovery path should be included within the scope of license renewal.

I have more text here, but I believe that issue has been discussed sufficiently this morning. If you want me to go ahead and continue with the text, with any additional information. Do you have any question there? Okay.

DR. ABDEL-KHALIK: When do you think you will complete your review of the additional inclusion within the scope that has been presented to you?

MR. TRAN: I will refer that to the electrical branch.

MR. MATTHEW: You're asking the --

MS. LUND: -- when you're going to have a chance to review --

MR. MATTHEW: As soon as they submit the open item license amendment. We haven't seen anything. We just heard that today they are going to add some other components and cables in the path. So as soon as we see the applicant response to the open item, we will review it. And, also, we have to look at the ISG, what the industry comments are, the proposed ISG that we issued for comments.

MS. LUND: Even though they provided it in the slides and provide the slides to the project manager just a few days before the meeting today, it's not been provided to us formally. It hasn't been submitted.

DR. KUO: It has not been formally submitted to us.

MS. LUND: That's what he's saying.

MR. MATTHEW: So we have no way to review right now.

DR. SHACK: But your second bullet up there is pretty categorical.

MR. TRAN: Yes, and this second bullet here is captured in the SER right now.

MR. MAYNARD: I think from what the applicant presented today, it still doesn't resolve this issue. That is still an open --

CHAIRMAN SEIBER: It is a description of the open item.

DR. SHACK: Well, it's a description of a position I think. If that's the position, then --

MR. BARTON: Should be when it says that's the position.

MR. MATTHEW: Yes, this is an open item, so we still have to get the applicant's response how they're going to solve it.

CHAIRMAN SEIBER: Well, the applicant can submit a change or arguments that show the changes needed and the staff can consider that, and, if you don't reach agreement, there's no license renewal.

DR. KUO: That's correct.

MR. GARRETT: This is Terry Garrett.

If I could, please, we have responded twice that we disagreed that the circuit breaker at transmission voltage had to be included and wasn't necessary, and we will submit our new proposed resolution to the issue by April 1st.

CHAIRMAN SEIBER: We will wait for that to occur --

MR. MAYNARD: And I'm sure you realize the ACRS isn't going to resolve a legal issue on --

CHAIRMAN SEIBER: We are not the referee.

MR. MAYNARD: They are going to have to work with the staff. There are other avenues. There are legal processes to go through to resolve disputes, and stuff, but what they're submitting isn't going to resolve what the staff's position is.

CHAIRMAN SEIBER: Well, the only thing we can do is not concur and then everything stops until such time as the issue is resolved.

DR. KUO: And we said it before, there are other avenues to get this resolved. One is to file a petition for rulemaking, so in case that you are not happy with the station blackout rule. The other is that you can file exemption request --

CHAIRMAN SEIBER: Right.

DR. KUO: -- and then we consider the exemption request on its own merit.

CHAIRMAN SEIBER: Okay. Let's move on.

MR. TRAN: Just to add to that. We issued the SER open item to the applicant February the first. And in the transmittal letter, we'll request the applicant to respond to us by April the first.

CHAIRMAN SEIBER: Okay. Good.

MR. TRAN: Next slide.

In summary, the staff found the applicant's scoping and screening methodology meets

the requirements pursuant to 10 CFR 54.4 and 54.21.

With addition of the license renewal application and amendments, the scoping and screening results provided by the applicant included all structure, system, and components within the scope of license renewal and subject to aging management review, except for open item 2.5-1 that we discussed earlier.

Next slide.

Secion 3 covers aging management review. The review of the aging management programs was performed mostly by the license review audit team as documented in the SER and listed here. This line represents the review by the staff as documented in SER and is slightly different than the slide of the similar statistic presented earlier by the applicant.

The audit team reviewed 39 aging management programs. Of the 39 aging management programs, two of the aging management programs reviewed are

plant-specific programs. Eleven are consistent with generic aging lesson learned AMP, aging management program. Twelve programs have exceptions. Eleven programs have enhancements. Three programs have both exceptions and enhancements.

There were also other reviews performed by many engineering division and contributing to the development of the SER Section 3.

MR. BARTON: Tam, do I conclude from this table that everything is okay here, you guys are happy with this? Or, what's the purpose of this table other than give me some numbers on number of aging management programs? Is this significant other than it's just a numbers table?

MR. TRAN: Just to capture the overview of all the aging programs that we have looked at and documented SER. We have one open item by the way under Section 3.

MR. MAYNARD: I'd like to be fair to the staff. A lot of times we ask for this type of information, so they get a feel for some things.

MR. TRAN: Okay. As a result the staff review, one open item was identified related to station blackout recovery and the associated aging management program. For this open item, which is related to open item 2.5-1, the staff finds that inaccessible medium voltage cables aging management program does not include the underground medium voltage cables from 13.8 kiloVolts switchgear to transformer connecting the switchyard.

These inaccessible medium voltage cables provide connection for station blackout with restoration of offsite power path to onsite distribution system. If these underground cables are not managed, significant moisture can affect the cables' intended functions. Therefore, this is an open item.

MR. STETKAR: But what we saw this morning should -- once it's -- should resolve at least this open item?

MS. LUND: Yes, yes, what we heard this morning, right.

MR. TRAN: As shown on this slide, at the time of the application submitted, the latest Wolf Creek sampling data from June 2005 to May 2006 indicate below-grade environment is non-aggressive.

Next slide.

As a part of the license renewal, Commitment 17 includes provision to ensure groundwater samples are evaluated periodically to assess the aggressiveness to the groundwater through concrete. These consist of periodic testing, chemistry monitoring two times every five years and visual inspection of buried plant structures.

DR. ABDEL-KHALIK: If you go back to the

previous table, does the sulfates trend bother you at all? This is, after all, a span of one year.

MR. TRAN: This captured the baseline information relative to aggressiveness of the underground environment.

MS. LUND: Actually, let me just answer that and then Dan can probably help you out with this as well -- I'm Louise Lund -- is that because for license renewal they were trying to get some baseline information is what Tam's trying to say, and so they basically took two readings over a period of time, okay, so it's not like they had years of trending data. And typically what we've seen, of course, with taking groundwater, you do see some variability.

Do you want to talk about that? And that's why we wanted to have them committed to taking this over time.

MR. HONG: Yes, my name is Dan Hong, and I'm a structural engineer. I did ask the applicant question about that number, and the applicant indicated the reason they were high because they took the sample around the winter time, and that particular well they clear the road.

MS. LUND: Basically, that's where you're getting a little bit higher core rise during in the

winter.

MR. STETKAR: These are samples only from one single well?

MR. HONG: One single well, yes.

MR. TRAN: Okay. Next slide.

Section 4 covers time-limited aging analyses. Section 4.2 of the SER covers reactor vessel neutron embrittlement analyses. There were three reviews performed to evaluate neutron embrittlement as documented in the SER. These were neutron fluence, upper-shelf energy, and adjusted reference temperature review; pressurized thermal shock review; and pressure-temperature limits review.

The staff concludes that the reactor neutron embrittlement analyses meet the review criteria in the Standard Review Plan and according with the rules.

As indicated on this slide, relative to reactor vessel neutron embrittlement, Wolf Creek has large margin with respect to pressurized thermal shock both for 40 years operation an 60 years operation. 270-degree F is the current 10 CFR 50.61 limit for place and axial welds.

I have a slide in your package that talks about the upper shelf energy. However, that slide is

slightly out of date as far as the numbers go, so I'm just going to go have them provide you the staff review information here.

The upper shelf energy for the limiting material at 60 year are 54 EFPY. It's 64 per pound. This is well above the end-of-license upper shelf energy acceptance criteria of 50 foot-pounds.

Next slide.

Section 4.3 covers metal fatigue analyses. The staff identified three open items associated with metal fatigue analyses. Dr. Ken Chang has gone through this issue with you in the morning and now we can elaborate some more and provide an opportunity for questions.

MR. MAYNARD: We beat it to death this morning.

DR. CHANG: Pardon me?

MR. MAYNARD: I'm sorry. Go ahead.

(Laughter.)

DR. CHANG: On this side, three open items are identified. Actually, they talk about five issues, and those five issues correspond to the morning that the applicant presented. Now, as always, easy ones first.

The first open item for the purpose of

license renewal, the staff is to verify the following through an additional audit: one is the vibratory flow and use vibration stress, they are much smaller as compared to thermal transient stress. Therefore, those high-cycle loading, which normally can produce a small fraction of usage factor, is not of any significance.

What's not stated here is the second part. There's a Class 2 component, sampling line, which is controlled by the 7,000 cycles, and if you have more than 7,000 cycles, you reduce allowable stress by the small little factor F, and in the morning you heard that they use a factor of .9. And so .9, you reduce allowable stress by ten percent it can go up to 14,000 cycles. They have done both of this. But just they did it after we have completed the three audit or four audits. So we do not feel it's legitimate or it's economic to go back to audit these two small items because we have other activities which require further audit upon completion. So this is open only for now.

Deep in my mind I think when I see the applicant's work I will be totally convinced that what they do is appropriate because this is a fairly straightforward exercise.

The second item, the staff is to review

the applicant's response to the follow-up RAI 4.3-1 to perform environmental assistance fatigue analysis at nozzle corners and at locations where the thermal stratification loadings are significant using ASME codes NB-3200 rules.

Now, I'd like to spend a little more time on this to give you what's the past and what's the future. Now, say, Wolf Creek falling in the middle. Wolf Creek first started this issue by looking into what are the computer code used to do your EAF analysis, stress-based monitoring, stress-based evaluation for CUF.

We went through 3, 4 iterations and some of the issues were already talked in the morning. Now they used 1-D, virtual stress instead of six components, stress tensile to perform the analysis, claimed to be conservative. Those all may be true. But, as a staff, we review whether the methodology is right. If the methodology is right, if that methodology plus a little bit of conservatism inputted in there will produce results which can fully justify, that is our intent.

Wolf Creek doesn't have a solution yet. But for another plant, which we will hear tomorrow, Vermont Yankee, also performed similar analyses, go,

just go NB-3200, perform the six component stress analysis. The six component will produce principle stress. The principle stress will produce stress intensity. The stress intensity will go into SN curve to get allowable cycles.

Now, the extra cycles divided by allowable cycles is a impression of the CUF, what you're allowed. We encourage people, if you have done some previous analysis, use the same assumptions, same methodology, same transients, same cycles, and show what you previously did is conservative. If you can demonstrate that, then at least you verify your conservatism.

What's come out of the Wolf Creek -- what's came out from the other plant analysis is is you use everything the same except you have to use different FEN values. We ask ourselves, why do you have to use different FEN values? If this FEN value was good for the previous analysis, it should be good for now. Why do you reduce your FEN factors?

It turned out to be that that analysis, unless you reduce the FEN factors, otherwise you recalculated CUF will be higher. Finding that cast a doubt in our mind. So that methodology, when you apply to specific configuration, and that

configuration is at the location of plant radius, and that plant radius location is the highest usage factor location at the nozzle. You know, you check the safe end, you check the plant radius. The plant radius CUF is higher than the safe end. So that is a controlling location for that configuration.

Which opens the question up, for each nozzle, for each transient condition, operating conditions, you may find the most critical components location safe end, weld, or the plant radius. It depends on whether you have thermal sleeve or you don't have thermal sleeve. It depends on whether your weld is ground flush or not ground flush. It depends on many things. So it's not a unique answer. The unique answer is later on you do six component stress analysis. You apply the stress concentration factor that the ASME code asked you to, and you say, this is the code analysis. If you do the code analysis and show that what I had previously done was higher than the code analysis, in that you have a case. Otherwise, the code that you've previously done is cannot be considered as analysis of record because in the future you cannot project future cycles, future CUF based on some analysis which is shown not to bound the actual case.

Did I go too far?

(Laughter.)

DR. CHANG: That is to explain why we lay these requirements on Wolf Creek because what we have done for other plants leading us to believe what we're asking Wolf Creek to do is realistic.

Then, yesterday, I review another plant.

DR. SHACK: Just come back to this, Ken. The critical point here is whether they can use the existing design analysis to identify the high cumulative usage locations. I thought I heard violent agreement that this method was not generally applicable, that they would apply it only in locations where, in fact, the stress field was simple enough that you could use it, but the question really came down to whether you could use your existing design basis analysis to identify the high CUF locations and you can do that as long as, essentially, the time history of the transients isn't too different.

DR. CHANG: Right.

DR. SHACK: And I'd be interested in your Vermont Yankee calculation where if they did the 3200 evaluation without considering the fatigue evaluations, would they have found different locations than they did with the fatigue evaluation. That

concerns me a little bit more. I didn't hear any disagreement over whether you could use a simplified analysis in a complicated stress state, which seems to be a little iffier and would make life more complicated for licensees if they had to go back and redo 3200 analyses at multiple locations because the histories could be different enough that you're no longer at the bounding location.

DR. CHANG: That is totally -- that question makes a lot of sense. For that configuration, you do the original Green's function analysis or you do NB-3200 analysis. It did not change the most critical stress location. But the most critical location is not the safe end, it is at the plant radius, nozzle corner.

DR. SHACK: But that's okay. Everybody's got their 3200 analysis.

DR. CHANG: Not necessarily.

DR. SHACK: Well, if they have their 3200 analysis, can they use that to identify the critical locations, and you're saying that you would agree that they could do that?

DR. CHANG: Right. However, the re-analysis, currently, we call the last analysis the analysis of record. If you use the same FEN, the CUF

come out to be .893. The old analysis come out to be .639. You got that? No. Point-639 to .893, 25, 30 percent increase in CUF. That's for this case. For another case, you don't know how much will be increased, how much will be reduced.

Now, you sharpen your pencil. I put in 25 different CUF or no -- I put in 25 different FEN values there. There is from 3.05 to 11.5, 11.04. That number comes down 2.356. But 356 compared to the old 639 is not the right comparison. The .893 compared to the old .639 is the right comparison because, under the same assumption, one is ASME code analysis, the other one is Green's function analysis.

Did that confuse you?

DR. SHACK: It didn't help, but that's okay.

(Laughter.)

DR. KUO: If I may try? You steer their current analysis methodology, they got a CUF value, say, .639.

DR. SHACK: No, no, let's not confuse the use of the Green's function in a complicated stress state with use of a 3-D analysis. I don't think there's any argument over that. You guys got them dead-to-rights. You can't do a simplified analysis in

a 3-D condition.

Are they going to have to redo the analyses to determine locations, or are you willing to agree that it's very good guide to use your original analysis to pick the most severe locations and to analyze those locations correctly?

DR. KUO: For the license renewal and as a result of the resolution of a GSI 1.90 that identified six critical locations based on NUREG/CR-6260, that's all we are looking at. We are not asking --

DR. SHACK: But Ken seems to be opening the door a little wider here.

DR. CHANG: Right.

DR. SHACK: I'd be saying, I don't like the locations you guys pick; go look at another one.

DR. KUO: I don't think -- he may correct me -- I don't think he's looking for additional locations other than those locations identified in NUREG/CR-6260. If I'm wrong, please, correct me.

DR. CHANG: The nozzle is a component. On the nozzle, one component you could have two locations, three locations. Pipe to nozzle weld, safe end and cross region.

No more. I'm not saying you have to do

more. But I say I accept the 2-D axisymmetric analysis for the pipe to the nozzle welds. For the safe end welds, I do not accept for the cross region. If cross region happens to be the critical location for your nozzle, like one of the VY nozzle, then what you do, the Green's function could be off by 30 percent. That's all.

DR. SHACK: I don't think there's any -- sounds like everybody in violent agreement here.

DR. ABDEL-KHALIK: Has the applicant submitted the details of the intended benchmark calculations to the staff for review?

DR. SHACK: Just the methodology.

MS. BELL: This is Lorrie Bell.

We did submit a case study on the charging nozzle back in July, but, no, we have not submitted anything on the surge line hot leg nozzle.

DR. CHANG: In response to that, we did receive something, explanation of the methodology on the charging line, but me and my staff has not agreed with the explanation yet, especially the charging and alternate charging nozzle, there are so many different transients of charging and letdown shutoff and return to service, prompt return service, delay return to service, never return to service, or whatever.

We have a question asking them to identify what I call Wolf Creek to explicitly consider the different contribution of the usage factor for each category of charging events. We didn't receive that. And you may say that you could have submitted something in October, but we have not agreed to that yet either.

MS. BELL: This is Lorrie again.

I agree with what you said, but that's a different open item. And the question he was asking me, which on the study or the benchmark. What Ken's response was referring to is the baseline.

DR. ABDEL-KHALIK: Wouldn't it make more sense if they have or they are in the process of developing a methodology to benchmark their calculations to check the ability of the method and of the ability to identify the correct locations? Wouldn't it make sense for them to tell you what they're planning to do before they actually do it?

DR. CHANG: Yes, it would make a lot of sense. But what in the past few cycles we have been obtaining is repeatedly we receive say we use 1-D virtual stress instead of six component stress, and this 1-D virtual stress, you never find anywhere in the literature space, things like that, how do we

review?

DR. TURNER: Can I respond? This is Art Turner of Wolf Creek.

What I tried to say in my presentation is that we look at very specific locations. There are two things that are being talked about about locations here. One is the 6260 location, and the 6260 locations are identified simply as a nozzle. It doesn't say where on the nozzle you should look. So when Ken says he's looking at two or three locations on the nozzle, he's not expanding the 6260 scope.

But what we have done is we have identified from our design stress analyses where on that nozzle we think the maximum fatigue usage occurs and that is what we have analyzed. Ken is saying that for another plant, which is not -- I can't comment on because I don't know anything about their analyses or what they did -- but, for us, we have a reason to have chosen our three specific locations and we have a reason to believe that the methodology that we are using is conservative for those specific locations.

We did not look at the blend radius, which I'm not sure I understand where that is, but I think where he means is the radius where the branch connection meets the run pipe, which we do not

consider, based on our design analyses, as a critical location for the nozzles we are trying to analyze.

DR. CHANG: So, that is --

DR. ABDEL-KHALIK: I am trying to understand the process. You still sort of have committed, at least in your presentation this morning, to do these benchmark calculations. Are you going to sort of explain the methodology ahead of time to the staff, or are you just going to wait until you complete these benchmark calculations and present them at that time?

DR. TURNER: Well, my understanding is that the staff understands the methodology that we are using. They don't believe that we've presented evidence that it is a conservative method of calculation for the location -- even for the locations we're considering.

Ken mentioned that we sent an explanation of why we think it's conservative. That's a logic argument. It isn't necessarily convincing. I think what will be convincing is to do a benchmark calculation. What I think is still possibly not agreed to is what is the scope of the benchmark -- the benchmarking analysis, are we going to simply compare two methods of analysis at one location, which is the

location where we're doing the monitoring, or are we going to also open the question of whether there is another location we should be considering, and Bill raised the right question, and that is, unless we do the benchmark to include the entire set of design transients, if we choose a subset of those transients, we may not find that the maximum fatigue usage is at the same location as it is in our design analyses.

DR. CHANG: Based on my best memory of a month and a half ago, the Vermont Yankee so-called benchmarking -- for the time being we call benchmarking -- considered 25 pairs of transients, and each pair is fully analyzed, evaluated, and for that benchmarking I believe the result is correct, 25 transient pairs, each one with its specific FEN values, and the summation of the CUF, I cannot dispute that.

Now, we talk about benchmark. Please, be advised, we do not consider any of those kind of analysis as a benchmarking of the computer code. You're benchmarking only for your specific plant. If you use this code for your plant, this is what benchmarking is.

So what benchmark before for Vermont Yankee would say this is benchmark for the Vermont

Yankee case. It seems the benchmarking problem came out to different solutions which say, well, you did one nozzle; we want you to do two more nozzles, because the result could be different. And that is not only our recommendation, it's also weak at the upper level management support.

Now, if I'm wrong, P.T., you can correct me.

(Laughter.)

DR. CHANG: I don't mean P.T. Okay. Now, this requesting to do strict, straight ASME code analysis without any transfer function or Green's function before you prove it's right, apply to the surge nozzle and to the charging nozzle.

Other nozzles, I agree, it's not a problem because, straightforward, the times one-and-a-half, times FEN, you get it done. Fine, no problem.

For the charging and surge line, in order to do this demonstration fo re-analysis, show it's okay, for the surge line, you've got to consider the proper cycles of insurge and outsurge due to stratifications for the operation before the MOP. What is MOP? Modified operating procedure. That is the procedure recommended by Westinghouse.

You say, you do this, you minimize your

transient cycles of insurge/outsurge, you minimize the transient severity, small identity because they constantly create an outsurge flow during the heat-up and cool down. So you don't see transients.

Now, some plants say after implement MOP, has essentially eliminated all the insurge -- surge training in one direction. If that's the case, what is of my concern with Wolf Creek is the so-called backward projection of surge line transients before the MOP. If you use the period of time you have pending monitoring data after the MOP, the training cycles are much less. You cannot possibly use those transients to backward projection.

What happens in the first eight, nine years? Which you don't know what's the best way of operating your -- to perform your heat-up and cool down to minimize the surge line transients. That is the largest disagreement so far is backward projection of insurge/outsurge transients so that you minimize the first nine years of transients.

After MOP, transients do not occur. Naturally, you have smooth sailing.

DR. ABDEL-KHALIK: So how do you propose for them to recover that old data?

DR. CHANG: That's what Beaver Valley is

trying to recover right now. You've got to go into and review the operating log, operating history, so see at the time when the surge -- when the spray charging balance find out if the surge flow going this way or going that way. It's a tedious operation.

But you're operating an expensive facility relating to public safety. So even with tedious, painful, you still got to do it. You're not just creating a factor, based on this 20 years operation I project A. No, the previous nine years not much happened. I put a factor of two. Two is not the issue.

You know what happened on the Beaver Valley? After MOP, nothing happens. Before MOP, maybe ten times. After MOP, I say nothing happens, but I still assume there are two times. It's by a factor, it's not by a percentage. That's what's beauty about MOP, modified operating procedure.

So, although this is three open items, actually, there are five. You've got to apply the re-analysis to the charging, to the surge, but my main concern is on the surge, it's not on the charging.

So, maybe it's only one slide, but I really put a lot of things in there. I'm done unless you have more questions.

MR. TRAN: In summary, the SER contained five open items. Two open items are related to station blackout recovery paths. Of these two, one open item relates to the scoping and screening of the recovery paths to the offsite power source, and one relates to the aging management program for the underground cables.

The remaining three open items are to the metal fatigue analyses and Dr. Chang has just covered that.

In conclusions, the staff found the pending closure of the five open items, the requirements of 10 CFR 54.29(a) have been met for the license renewal for the Wolf Creek Generating Station.

CHAIRMAN SEIBER: That's quite a statement there at the end.

MR. TRAN: Next slide.

This concludes our presentation.

CHAIRMAN SEIBER: Does the staff have anything more to say?

(No audible response.)

CHAIRMAN SEIBER: If not, the licensee?

(No audible response.)

CHAIRMAN SEIBER: What I'd like to do now is to go around in the room and discuss with the

members what their impressions and issues and concerns are at this point in time.

Maitri, if you could take good notes, that would be helpful to me.

Mario?

DR. BONACA: I think that this was, in general, a good application in spite of the issues that have been raised and being dealt with. I think that we are seeing one of the same issue for Vermont Yankee. I think it's on its way to resolution.

I just raise the question in regard to one of the exceptions. Typically, I've expressed my concern recently about many exceptions in many applications we have seen right now, but I understand that licensees want to stay with their existing problems as much as they can if they can do that.

So, in general, I think -- I don't have any further concerns.

CHAIRMAN SEIBER: John?

MR. BARTON: I thought it was pretty good application. I had a lot of questions with the scoping and screening, but my questions got resolved today. I think I don't have any more issues with that. I think, also, station blackout may see the light at the end of the tunnel on that issue. But the

fatigue analysis, I don't know where we are with that one.

(Laughter.)

MR. BARTON: But, other than that, I don't have any major concerns with this application. Jack.

CHAIRMAN SEIBER: Thank you, John.

MR. STETKAR: I'll echo what John said. I think that I'd like, just for my own curiosity, to see the rationale for accepting the exception for CCW chemistry control and things like that because that would help me, at least personally, to understand a bit of the staff's rationale, especially with the desire for consistency in treatment of these issue across a broad range of applications.

I hope that there is light at the end of the tunnel for the plant system boundary definition for the station blackout issue. I think that that's both general and plant specific decision in that the -- my only concern is that the basic technical intent of the regulations should be applied consistently from site to site.

DR. BONACA: I second that statement, but a way by John with regard to the bolting issue. I expect I will hear something about that.

CHAIRMAN SEIBER: Bill?

DR. SHACK: You know, it seems to me that we have two sort of semi-generic issues here with the station blackout and the fatigue. I assume they'll be resolved. We seem to be making some progress in at least defining the problems and I think just general, technical agreement over things. There are some details to be worked out yet.

CHAIRMAN SEIBER: Okay.

DR. ABDEL-KHALIK: I agree with all the comments raised by my colleagues. I'm sort of somewhat concerned about sort of the lack of understanding of what the purpose of this benchmarking is, whether it is going to resolve the issue of the adequacy of modeling or will it also address the issue of selection of the proper locations to be analyzed, and I'm hopeful that at the end of this exchange this issue will be resolved.

I'm also sort of concurring with John's comments about using proxy methods to infer something that may not have a direct relation to what you're actual using as a proxy.

CHAIRMAN SEIBER: Otto?

MR. MAYNARD: Well, I'm confident the issues will be resolved. I'm not confident as to how soon they're going to be resolved, but they will be

resolved or there won't be any action.

MR. STETKAR: We do have 17 years.

(Laughter.)

MR. MAYNARD: I do believe that it has to go beyond the point of just arguing back and forth as to what is the requirement. You need to elevate it up, do whatever you have to do within the legal, regulatory process, or whatever, to get it up, get a decision made, and then either say we don't have to do it or we've got to do it, and get on with it. It's not going to do any good to just keep battering back and forth at the staff level here, and the ACRS certainly will not be the ones who will resolve whether it is or is not a legal requirement there. So I do think it is time to move on with that.

I think everything else has been discussed. I will say I thought the license renewal application was one of the best from a PDF format, including the USAR, the ability to find things. I found more stuff in there than what I needed to, wanted to. And so, from that perspective, it was very good to be able to click on things and it automatically take you to the documents and to where you needed to go. I really did appreciate that.

DR. SHACK: If they could only train the

design certification guys who hand you these 2,000 page documents with no way to navigate through them, not even a bookmark to begin with.

MR. MAYNARD: Maybe you could sell your process or technology to the others because it really was beneficial from a user-friendly standpoint.

CHAIRMAN SEIBER: Thanks, Otto.

Generally, at this point in the process, the ACRS has an opportunity to make a choice and that choice is whether we write an interim letter or not. That, generally, is not done if issues are well understood by both the staff and the applicant and on their way to resolution. And I'm not completely convinced that it solves each and every problem that is out there unless somebody is on an errant path and that needs to be identified.

But the question I want to ask each of you is, do we need an interim letter at this time? Mario?

DR. BONACA: I don't think so, in particular because we found some open issues that we wait for the stuff to resolve. I don't think we, as a Committee, have a position on each of the issue right now, have really a message to communicate to the Commission. I don't think we need an interim letter.

CHAIRMAN SEIBER: John?

MR. BARTON: I agree. I don't know how you would weigh a letter on the fatigue analysis anyhow.

(Laughter.)

MR. BARTON: So would agree not to write a letter.

CHAIRMAN SEIBER: The other John.

MR. STETKAR: Yes. I agree. I don't think that we could shed any particulars for found insights or knowledge on any of the issues. I think they're pretty well defined and we'll wait to see how they work out.

CHAIRMAN SEIBER: Bill?

DR. SHACK: No need for a letter.

CHAIRMAN SEIBER: No?

DR. SHACK: No.

CHAIRMAN SEIBER: Otto?

MR. MAYNARD: No.

CHAIRMAN SEIBER: Okay. I guess that concludes our review. I think there is significant work that has yet to be done, both by the applicant and by the staff. I would expect to see you when harmony reigns supreme and the issues are resolved. In the meantime, keep us posted as to the progress of how this is all going.

MS. LUND: One of the staff wanted to make one more charge. George Thomas wanted to make one more comment.

MR. THOMAS: I just wanted to respond to Dr. Barton's question regarding the concrete block masonry wall, the turbine building. The reason it's within scope, it serves a fire barrier function.

MR. BARTON: Fire barrier function.

MR. THOMAS: And I understand the crack noted was like less than a sixteenth-of-an-inch and it was not a through-wall crack.

MR. BARTON: I'm sorry. I didn't hear the last.

MR. THOMAS: The crack noted, I understand it was less a sixteenth-of-an-inch.

MR. BARTON: My concern was that it's continued to grow and engineering said it's okay. But at what point isn't it okay?

CHAIRMAN SEIBER: What does it fall under?

MR. BARTON: Yes, what does it fall under? What's the disaster if the wall collapses? It's something, yes.

MR. STETKAR: For a fire barrier, it just has to be intact. It's not structural.

CHAIRMAN SEIBER: If it's an outside wall,

you don't even care about that.

DR. BONACA: Before you adjourn --

DR. KUO: The staff will come back to the Committee with responses to three items as I noted down here. One is the bolting integrity program. And the second is CCW, or why the others are not considered. And the third one is masonry wall. We are going to come back to the Committee with response to these.

CHAIRMAN SEIBER: We look forward to SER with no open items.

DR. KUO: That's our goal.

DR. BONACA: I have one comment I would like to make before we adjourn.

CHAIRMAN SEIBER: Okay.

DR. BONACA: This is going to be, I believe, the last meeting that Dr. P.T. Kuo is going to be with us. He's retiring. And P.T. Kuo has been with us from the beginning of license renewal, essentially day one.

CHAIRMAN SEIBER: I agree with that.

DR. KUO: Many years.

DR. BONACA: Many years, and so I would like to congratulate him here and I'm sure we all share that view and wish him well.

DR. KUO: Thank you very much.

CHAIRMAN SEIBER: Is there any way we can prevent him from retiring?

(Laughter.)

DR. KUO: Well, I will be here tomorrow, too.

CHAIRMAN SEIBER: I agree whole-heartedly. I think license renewal has advanced a lot under your direction and I think it's been a successful program and well managed. Thank you.

DR. KUO: It's been my privilege. Actually, it's also my pleasure to have been able to work with the Committee for so long, and thank you for your guidance and support. It's been very enjoyable.

CHAIRMAN SEIBER: Same here. Any other comments, questions? With that, this meeting is adjourned.

(Whereupon, the meeting adjourned at 4:22 p.m.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Reactor Safeguards

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Charles Morrison
Official Reporter
Neal R. Gross & Co., Inc.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Advisory Committee on Reactor Safeguards (ACRS)
License Renewal Subcommittee
Wolf Creek Generating Station (WCGS)

Safety Evaluation Report (SER) with Open Items

March 5, 2008

Tam Tran, Project Manager
Office of Nuclear Reactor Regulation

1

U.S.NRC

Presentation Outline

- Overview of WCGS license renewal review
- License renewal Inspection and Audit
- SER Section 2: Scoping and Screening review results
- SER Section 3: Aging Management review results
- SER Section 4: Time-Limited Aging Analyses (TLAAs)

2

U.S.NRC

Overview (LRA)

- License Renewal Application (LRA) submitted September 2006
  - Located 3.5 miles northeast of the town of Burlington, in Coffey County, Kansas
  - Westinghouse PWR, carbon steel-lined concrete (DRYAMB) containment
  - 3565 megawatt thermal, 1228 megawatt electric
  - Facility Operating License Number NPF-42 expires March 11, 2025

3

U.S.NRC

Overview (SER)

- Safety Evaluation Report with Open Items (SER) issued to the applicant February 1, 2008
  - 250 Audit Questions
    (137 AMP, 82 AMR, 31 TLAA)
  - 95 RAI items issued
  - 5 Open Items
  - No Confirmatory Items

4

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Audit and Inspection - Chronology

- Scoping and Screening Methodology Audit
  1/8 – 1/12, 2007
- Aging Management Program (AMP) Audit
  3/26 – 3/30, 2007
- Aging Management Review (AMR) Audit
  5/7 – 5/11, 2007
- Time-Limited Aging Analysis (TLAA) Audit
  7/9 – 7/11, 2007
- Region IV Inspection (Scoping and Screening & AMP)
  9/10 – 9/14, 2007 & 10/22 – 10/26, 2007

5

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License Renewal Inspections

Greg Pick

Region IV Inspection Team Leader

6

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Current Performance

- Green PIs & Findings
- Corrective Action Program
- Special Inspection – ECCS Voiding
- NOED – CCP A Room Cooler

7

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Regional Inspection

- Performed by Regions IV, I and NRR
- 2 weeks - September and October
- Scoping and screening 1 week
- Aging Management Programs

8

U.S.NRC

Inspection Results

- Scoping of nonsafety-related systems
- Aging Management Programs
- Amendment 5 corrected items
- Current License Basis Issue

9

U.S.NRC

Conclusion

- Scoping and Screening
- Aging Management Programs

10

U.S.NRC

SER Section 2: Structures and Components Subject to Aging Management Review

Section 2.1 Scoping and Screening Methodology

- Staff's audit and review concluded that the applicant's methodology is consistent with the requirements of 10 CFR 54.4 and 54.21.

Section 2.2 Plant-Level Scoping Results

- Consistent with 10 CFR 54.4, the staff found no omission of plant-level scoping systems and structures within the scope of license renewal.

11

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Section 2.3 & 2.4 Scoping and Screening Results: Mechanical Systems and Structures

- As a result of staff review, the License Renewal Application was amended. The staff concludes no omission of mechanical components and structures within the scope of license renewal and subject to AMR, consistent with 10 CFR 54.4(a) and 10 CFR 54.21(a)(1).

12

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Section 2.5 Scoping and Screening Results: Electrical and Instrumentation & Control Systems

- OI 2.5-1:
  - SBO recovery paths should be within the scope of license renewal to ensure offsite power can be restored to the plant.
  - The scoping boundary should be a circuit breaker at transmission voltage.
  - The staff's concern: Wolf Creek's scoping boundary is at motor-operated disconnects. One path includes an underground cable (connects the disconnects to a transformer) that will not be age-managed.

13

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SER Section 2: Structures and Components Subject to Aging Management Review

Summary

- The applicant's scoping and screening methodology meets the requirements of 10 CFR 54.4 and 54.21.
- Scoping and screening results from the LRA and the amendments included all SSCs within the scope of license renewal and subject to AMR, except for the SBO recovery paths to offsite sources (OI 2.5-1).

14

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SER Section 3: Aging Management Review Results

Section 3.0.3 Aging Management Programs (AMPs)

	Plant specific	Consistent with GALL	With exception	With enhancement	With exception & enhancement
Existing	1	6	11	11	3
New	1	5	1		

15

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Section 3.0.3.1.10 Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

- OI 3.0.3.1.10-1:
  - Medium Voltage Cables AMP does not include the underground medium voltage cables from 13.8 kV switchgear to transformer connecting the switchyard.
  - Cable connections are for SBO restoration of offsite power path to onsite distribution systems.
  - Staff's concern is that significant moisture can affect the cable intended functions.

16

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Section 3.5 Aging Management of In-Scope Inaccessible Concrete

	Acceptance Criteria	WCGS	
		2005	2006
pH	>5.5	7.0	8.7
Chlorides	<500 ppm	5.0	41.2
Sulfates	<1500 ppm	30	717

17

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Section 3.5 Aging Management of In-Scope Inaccessible Concrete (cont'd)

- Future commitments
  - Periodic testing of ground water will be performed as part of the Structures Monitoring Program.
  - Monitor chemistry of ground water twice every five years
  - Visual inspections of buried plant structures are performed when opportunistic excavation occurs. However, more frequent inspections may be performed based on prior inspection results, industry experience, or exposure to a significant event.

18

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SER Section 4: Time-Limited Aging Analyses

Section 4.2 Reactor Vessel Neutron Embrittlement Analyses

- Three reviews were performed to evaluate neutron embrittlement
  - Neutron fluence, upper-shelf energy, and adjusted *reference temperature*
  - Pressurized thermal shock
  - Pressure-temperature limits
- The staff concludes that the reactor neutron *embrittlement analyses meet the review criteria in the* Standard Review Plan

19

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Reactor Vessel Fluence: 270° F (10 CFR 50.61 limit)

	40 calendar years 35 EFPYs	60 calendar years 54 EFPYs
Fluence E > 1.0 MeV	2.23×10^{19} n/cm²	3.51×10^{19} n/cm²
Calculated RT_{PTS}	136° F	142° F
Measured RT_{PTS}	109° F	109° F

- Surveillance Capsule X was removed at 13.83 EFPYs with a lead factor of 4.3 for an equivalent exposure of 59.5 EFPYs.
- The critical beltline element is the lower shell plate R2508-3.
- The projected peak fluence values for R2508-3 are 2.23×10^{19} n/cm² (35 EFPY/40 calendar years) and 3.51×10^{19} n/cm² (54 EFPY/60 calendar years).
- The calculational methodology adheres to the guidance of RG 1.190.

20

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Upper Shelf Energy (USE) Decrease, at 30 Ft-lb Transition Temp.

PV Element	Fluence $x10^{19}$ n/cm² E>1.0 MeV	Predicted °F	Measured °F	USE Decrease Predicted %	USE Decrease Measured %
Lower Shell Plate R2508-3 Longitudinal	3.49	67.83	61.06	25	4
Lower Shell Plate R2508-3 Transverse	3.49	67.83	53.96	25	0

- Surveillance Capsule X data
- Values verified by the staff

21

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Section 4.3 Metal Fatigue Analyses

- Three open items were identified related to metal fatigue analyses.
  - OI 4.3: For the purpose of license renewal, the staff is to verify the following through an additional audit:
    (1) Vibratory stresses are much less than thermal transient stresses.
    (2) High-cycle fatigue is insignificant.
  - OI 4.3-1: The staff is awaiting the applicant's response to the follow up RAI 4.3-1 to perform EAF analysis at nozzle corners and at locations where thermal stratification are significant using ASME NB-3200 rules.
  - OI 4.3-3: The staff is awaiting the applicant's response to the followup RAI 4.3-3 to complete the committed update of the baseline fatigue analysis to account for additional insurge and outsurge cycles and the differential contribution of fatigue for each category of charging events

22

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Open Items (OI) Summary - Five OIs

- Two OIs related to Station Blackout (SBO) Recovery
  - OI 2.5-1 Scoping and screening related to offsite power source recovery
  - OI 3.0.3.1.10-1 AMP associated with SBO recovery paths for inaccessible voltage cables (underground cables)

23

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Open Items (OI) Summary - Five OIs (cont'd)

- Three OIs related to Metal Fatigue Analyses
  - OI 4.3 To verify that vibratory stresses and high-cycle fatigue are insignificant
  - OI 4.3-1 The applicant was requested to perform EAF analysis at nozzle corners or where stratification is significant.
  - OI 4.3-3 The applicant to complete the committed update of the baseline fatigue analysis for insurge/outsurge and charging events

24

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Conclusions

- On the basis of its review, pending closure of the Open Items, the staff determines that the requirements of 10 CFR 54.29(a) have been met.

25

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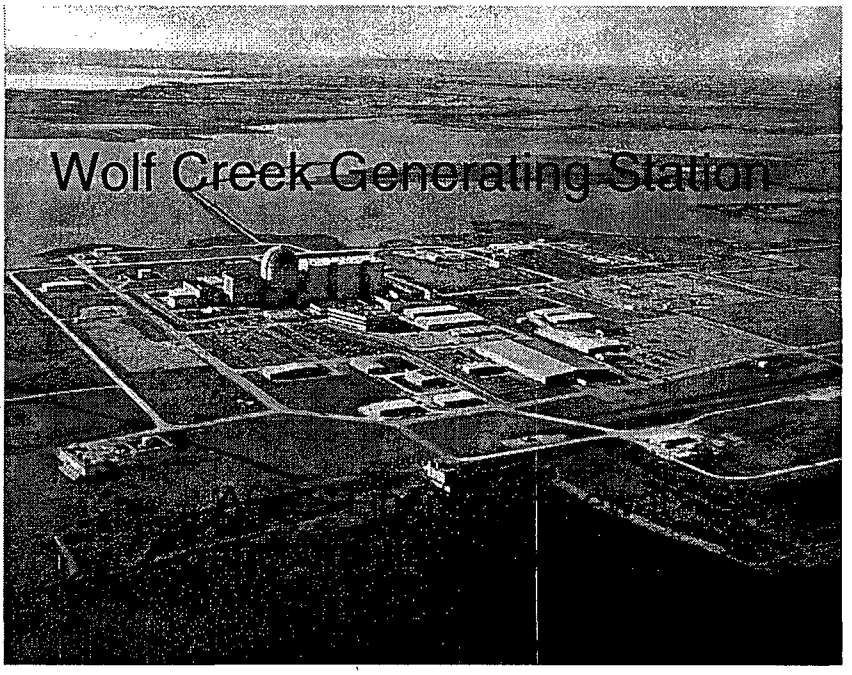
End of Presentation

Thank you for your time and attention

26



Personnel in Attendance

Wolf Creek Nuclear Operating Corporation (WCNOC)

Terry Garrett	Vice President Engineering
Patrick Guevel	Superintendent Major Modifications
Diane Hooper	Supervisor Licensing
Lorrie Bell	License Renewal Project Manager
Luis Solorio	Senior Electrical Design Engineer
Dr. Arthur Turner	License Renewal Technical Lead

Strategic Teaming and Resource Sharing (STARS)

Paul Crawley	STARS Manager
Eric Blocher	STARS Project Manager

2

Agenda

- Wolf Creek Generating Station (WCGS) Site Description
- Current Station Status
- WCGS Licensing History & Highlights
- License Renewal Project
- Open Items
  - Station Blackout
  - Metal Fatigue
- Questions

3

Site Description

Wolf Creek Generating Station (WCGS)

- Wolf Creek Nuclear Operating Corporation (WCNOC)
- Westinghouse (NSSS), Bechtel (AE)
- 4 Loop PWR
- 3565 MWt
- Once through cooling from Coffey County Lake
- Staff complement: approximately 940

4

Plant Status

- Startup from RF15 –
  - November 10, 2006
- Unplanned shutdown –
  - January 11-16, 2008
  - Unit taken to Mode 3 due to Emergency Core Cooling System voiding
- Current plant status
- Next outage March 2008

5

Emergency Core Cooling System (ECCS) Voids

- Two issues
  - Voiding in Safety Injection System discharge piping due to Nitrogen
  - Voiding in Safety Injection System suction piping due to air
- Forced outage, voiding removed
  - Required safety functions were met and would have been met with the as-found gas (void) volumes in the ECCS piping

6

Emergency Core Cooling System Voids

- WCNOC Incident Investigation Team formed
  - Scope
  - Immediate actions
  - Results
  - Additional actions planned or underway
- Generic Letter resolution
  - Actions underway
  - Industry collaboration

7

Licensing History

Construction Permit	May 17, 1977
Operating License Issued	March 11, 1985
Commercial Operation	Sept 3, 1985
Thermal Power Increase (4.5% MWt)	Nov 10, 1993
License Renewal Application	Sept 27, 2006
Operating License Expires	March 11, 2025

8

Completed Significant Improvements

1996	Normal charging pump upgrade
2000	Spent fuel pool re-rack
2003	Split pin replacement
2006	Emergency diesel reliability upgrades
2006	Containment sump strainer upgrade
2006	Pressurizer nozzles weld overlay
2007	Plant computer upgrade

9

Planned Significant Improvements

2008	Main Steam isolation - valves, actuators and controls
2008	Main Feedwater isolation - valves, actuators and controls
2008	Safety related room cooler upgrades
2009	Main transformer uprate
2011	Turbine rotor replacement
2011	Turbine controls and protection replacement

10

Wolf Creek License Renewal Project

- Wolf Creek used the STARS Plant Aging Management approach for development of our license renewal application
- Utilized experienced utility and contractor staff
  - 6 Dedicated on-site personnel
  - 20 Personnel at the STARS Office
- Strong station ownership of product
  - Good engagement of station subject matter experts in development of program changes

11

STARS License Renewal Approach

- Schedule sequential plant submittals to maximize benefits
- Maintain cognizance of industry direction, influence key decisions
  - Provide timely feedback from predecessor plant and other industry submittals into process
- Improve efficiency of reviews, audits, and inspections
- Perform assessment by STARS License Renewal Oversight Committee

12

STARS Industry Involvement

- NEI Involvement
  - Executive License Renewal Working Group
  - License Renewal Task Force
  - Discipline License Renewal Working Groups
- Peer Reviews at Other Stations
- Benchmarking and Audits
- Monitoring of Issue Resolution at Other Stations

13

License Renewal Commitment Process

- Adjusted during audit/inspection process
- Tracked by WCGS commitment tracking
- Capture in corrective action program to facilitate implementation
- Develop implementation schedule consistent with industry experience

14

Application of GALL

- 39 Aging Management Programs
  - 13 programs will be enhanced
  - 15 programs with exceptions
  - 7 new programs
- GALL consistency
  - Aging evaluation 95.2% consistent with GALL (standard notes A thru E)
  - Plant specific Nickel Alloy program
  - RCS supplement for reactor internals

15

AMP Exceptions

- Use of different code/standard revision
  - ASME Section XI Code edition and addenda (6)
  - EPRI NSAC-202L Rev 3 (Flow Accelerated Corrosion)
- Consistent with current licensing basis
  - Regulatory Guide 1.65 material exceptions
  - Inspection Test Frequencies for Halon systems
  - ASTM Fuel Oil Standards in Technical Specifications
- Plant Specific Considerations
  - Steam Generator wet layup chemistry sampling
  - Fuel Oil additives
  - One-Time thickness examination of diesel fire pump fuel oil tank

16

AMP Exceptions Continued

- Alternate Aging Management Considerations
  - Heat exchanger performance monitoring, system internal inspection activities, and Closed Cycle Cooling Water (CCCW) chemistry program in lieu of performance testing
  - CCCW Chemistry in lieu of performance monitoring / inspections for criterion (a)(2) heat exchangers
  - Equivalent ASTM standard for determination of fuel oil particulate
  - Qualitative determination of selective leaching in lieu of Brinell Hardness Testing

17

AMP Exceptions Continued

- Alternate Aging Management Considerations
  - Use of bolting guidance consistent with EPRI NP-5067, EPRI NP-5769 and EPRI TR-104213
  - Relaxation of daily monitoring when bolted connection leakage rates do not increase
  - Replacement/hydrostatic testing frequencies for fire hoses and gasket inspection frequencies
  - Fire point analysis in lieu of flash point testing for fuel oil contamination of lubricating oil

18

Plant Specific Nickel Alloy Aging Management Program

- Manages cracking due to primary water stress corrosion cracking in plant locations that contain Alloy 600
- Examinations consistent with industry and NRC requirements
- Committed to supplement program based on industry OE and to submit inspection plan for NRC approval
- Program inspection findings
  - Steam Generator Bowl Drains
  - Pressurizer Nozzles Weld Overlay

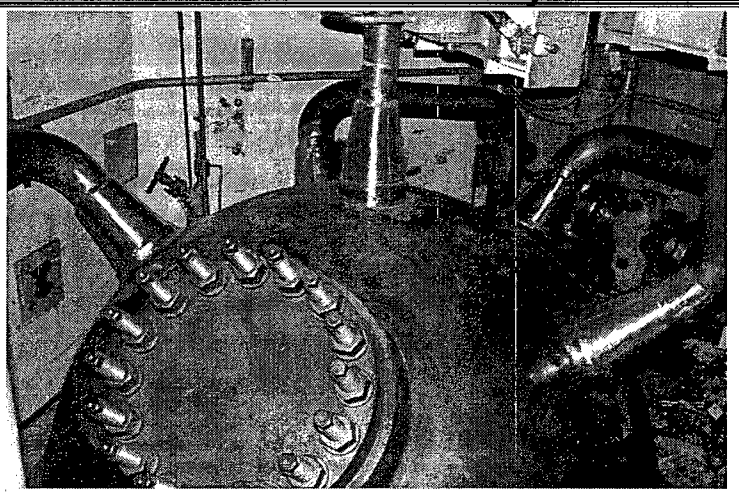
19

Steam Generator Bowl Drain Repair

- Inspections performed during 14th refueling outage, March 2005 in response to industry operating experience
  - Two Steam Generator bowl drains identified with through wall cracking of Alloy 82/182 weld metal
- All four Steam Generator bowl drain welds replaced with Alloy 52 weld metal prior to start-up

20

Pressurizer Nozzles Weld Overlay



21

SER Open Items

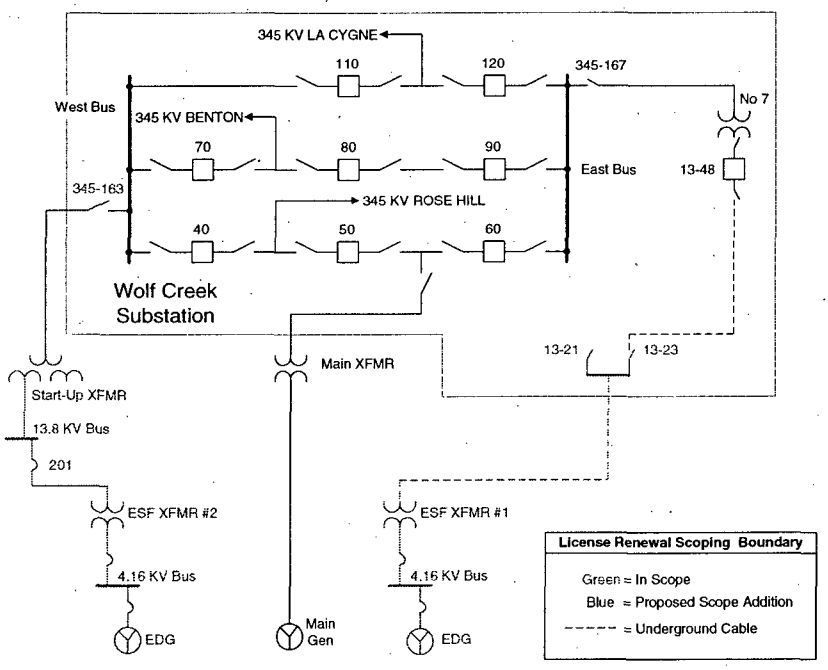
- Five Open Items
  - Two on Station Blackout
    - Station Blackout Scoping Boundary
    - Switchyard Inaccessible Medium Voltage Cable
  - Three on Metal Fatigue
    - Baseline fatigue usage factors
    - Uniaxial (1D) stress methodology
    - Fatigue analyses (Internals and RCS Sample lines)
- No Confirmatory Items

22

License Renewal
SBO Recovery Open Items

- WCGS Scoping of the plant system portion of the offsite power system is in accordance with;
  - 10 CFR 54.4(a)(3) License Renewal Scoping
  - 10 CFR 50.63(a)(1) Station Blackout (SBO) Rule
  - RG 1.155 "Station Blackout"
  - ISG-2 (March 2002) / NUREG-1800 Staff Guidance for SBO Scoping
  - USAR Section 8.2 "Offsite Power System"

23



Open Item 2.5-1
Station Blackout Scoping

- SBO Boundary is at disconnect switches 345-163, 13-21 and 13-23.
- The proposed SBO Boundary will be up to the to the East and West switchyard bus connection points.
  - Includes disconnect switches 345-163, 13-21, 13-23 and
  - Equipment beyond 13-23 through breaker 13-48, the #7 Transformer and disconnect 345-167

25

Open Item 3.0.3.1.10-1
Inaccessible Medium Voltage Cable

- Inaccessible medium voltage cable beyond disconnect 13-23 is not within the current scope of license renewal
- Inaccessible medium voltage cable upstream of disconnect 13-23 to breaker 13-48 will be included in scope of license renewal

26

Metal Fatigue

- Design Basis: Fatigue analyses based on defined transients
  - Specified number of events
  - Specified severity of events
- Specified numbers projected to be sufficient for extended period of operation
- Continued validity of design analyses verified by Fatigue Monitoring Aging Management Program

27

Fatigue Management Program

- WCGS Fatigue Management Program
  - Cycle Based Fatigue: Based on Transient Cycles Tracked
  - Stress Based Fatigue: Based on Actual Transients
  - Includes Environmental Effects for 6 of 7 NUREG/CR-6260 locations
    - RPV inlet nozzles
    - RPV outlet nozzles
    - safety injection nozzles
    - accumulator safety injection-RHR nozzles
    - surge line hot leg nozzle
    - charging nozzles

28

Open Item 4.3-3 Baseline CUF

- Stress Based Monitoring Requires Accumulated Cumulative Usage Factor (CUF) for Period Before Monitoring Initiated
  - Original baseline CUF calculations based on back extrapolation of data from monitored period
    - May not have conservatively accounted for improved operations during monitored period
    - May not have conservatively bounded number of occurrences for all transients prior to monitoring
  - Revised baseline CUF to address possible non-conservative assumptions

29

Open Item 4.3-1 Stress Based Monitoring Methodology

- Stress based fatigue (SBF) CUF calculated using uniaxial fatigue methodology
  - Transfer functions reduce tensor stress to single scalar value for each time increment
  - Alternating stress for fatigue calculated from stress peaks and valleys
  - Validation that methodology bounds usage calculated by NB-3200 analysis is required

30

Open Item 4.3-1 Uniaxial Fatigue Methodology Validation

- Charging nozzles
  - Completed case study demonstrated conservatism of the fatigue program analysis for temperature transients
- Surge line hot leg nozzle
  - Benchmark the FatiguePro analysis using an ASME NB-3200 stress analysis
  - Confirm fatigue program usage results for temperature and mechanical load transients bound NB-3200 analyses

31

Open Item 4.3 Fatigue analyses

- Reactor Internals
  - CUF for reactor internals depends on specified transient cycles and high cycle fatigue effects
    - Fatigue usage from high cycle effects proportional to accumulated operating time
    - Fatigue usage from specified transient cycles depends on actual number of transient occurrences
  - Information on contribution of high cycle effects obtained to allow extension of CUF calculations for the extended period of operation

32

Open Item 4.3 Fatigue analyses

- Reactor coolant sample lines
  - existing calculations remain valid for up to 14,000 full temperature range cycles
  - projected number of full temperature range cycles for 60 years is 11,000
  - design of these sample lines has thereby been validated for the duration of the period of extended operation

33

Comments and Questions