Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title:	Advisory Committee on Reactor Safeguards Subcommittee on Fermi Unit 3
Docket Number:	(n/a)
Location:	Rockville, Maryland
Date:	Thursday, August 16, 2012

Work Order No.: NRC-1809 Pages 1-324

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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SUBCOMMITTEE ON FERMI 3

+ + + + +

THURSDAY

AUGUST 16, 2012

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Michael Corradini, Chairman, presiding.

COMMITTEE MEMBERS:

MICHAEL L. CORRADINI, Chairman

J. SAM ARMIJO, Member

CHARLES H. BROWN, JR. Member

MICHAEL T. RYAN, Member

STEPHEN P. SCHULTZ, Member

JOHN W. STETKAR, Member

ACRS CONSULTANTS PRESENT:

WILLIAM HINZE

THOMAS S. KRESS

GRAHAM B. WALLIS

NRC STAFF PRESENT:

CHRISTOPHER BROWN, Designated Federal Official

MANAS CHAKRAVORTY

MICHAEL EUDY

JOHN FROST

TEKIA GOVAN

CRAIG HARBUCK

RAUL HERNANDEZ

BRAD HARVEY

KIM HAWKINS

JOHN HONCHARIK

REBECCA KARAS

KERRI KAVANAGH

ANDREA KEIM

GREG MAKAR

MICHAEL MCCOPIN

EILEEN McKENNA

ADRIAN MUNIZ

BRUCE OLSON

DEVENDER REDDY

KEN SEE

THOMAS SCARBROUGH
ANGELO STUBBS
FRANK TALBOT
SESHAGIRI RAO TAMMARA
DINESH TANEJA
DAVID TERAO
ZUHAN XI

ALSO PRESENT:

MIKE BRANDON, DTE
PATRICIA CAMPBELL, GEH
JIM HARRELL, DTE B&V Consultant
DAVID HARWOOD, DTE
DAVID HINDS, GEH
JOE LAPRAD, DTE
RON MAY, DTE
GERRY MILLER, DTE B&V
RYAN PRATT, DTE
BETH QUINLAN, DTE B&V
JOHN QUINN, Argonne National Lab
WALTER SCHUMITSCH, GEH
PETER SMITH, DTE
STEVE THOMAS, DTE B&V
JAMES THORTON, Duke Energy
BRYCE WEINAND, DTE B&V
BILL ZIEGLER, DTE B&V Consultant

T-A-B-L-E O-F C-O-N-T-E-N-T-S

PAGE

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

8:28 a.m.

CHAIRMAN CORRADINI: Okay. We'll come to order. The meeting will come to order. This is a meeting of the ACRS Subcommittee on FERMI Unit 3 COLA.

My name is Mike Corradini. I'm Chair of the subcommittee. The subcommittee members in attendance at this moment are Sam Armijo, Mike Ryan, John Stetkar, Charlie Brown, and our consultants: Tom Kress, Bill Hinze and Graham Wallis.

The purpose of the meeting is to discuss the SERs for Chapter 2, Site Characteristics, Chapter 3, Design of Structures Equipment and Systems, Chapter 10, Steam Power Conversion Systems and Chapter 14, ITAC, associated with the FERMI 3R COLA.

The subcommittee will hear presentations by, and hold discussions with representatives of the NRC staff and the applicant, Detroit Edison Company, regarding these matters.

The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed decisions and actions as appropriate for deliberation by the full committee.

Christopher Brown is the designated federal official for this meeting. The rules for participation in today's meeting have been announced as part of the notice of the meeting previously published in the Federal Register on August 1st, of 2012.

A transcript of the meeting is being kept, and will be made available as stated in the Federal Register notes. It is requested that speakers first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

Also, everybody silence every automatic personal device they've got so we don't hear it during the meeting, please. Or at least check that you've done that.

We've not received any requests from members of the public to make oral statements or written comments. The bridge line is set up, as I understand it. Do we have anybody on the bridge line? Somebody turn on the bridge line to make sure. Okay. I hear noise. So the bridge line we'll put on a listen in mode to begin with.

However, prior to the end of the meeting we'll open up the lines to take public comments. And if DTE or the staff have their consultants or their colleagues on the line, please let us know. We can turn on the bridge line to help answer questions.

Just a short reminder on my part. I sent out to the committee, and I think, I hope, the consultants, a summary of the past subcommittee meeting, since we've had some time pass since the last subcommittee meeting. And therefore, all I did was summarize what we had heard in the past chapters, so we're all kind of up to speed on that.

And as we noted, we're going to talk about Chapters 2, 3, 10 and 14 today. So let's proceed with the meeting. I'll call on Adrian Muniz to lead the discussion and start us off. Adrian.

MR. MUNIZ: Thank you. Good morning. My name is Adrian Muniz, and I'm the NRC lead project manager for the review of the FERMI 3 Combined License Application. We are going to be presenting you the staff review of Chapters 2, 3, 10 and 14.

However, I would like to bring to the committee members' attention that the review of the Chapter 2 and 3 is not completed at this time. We are presenting Chapter 2, minus Section 2.5, because the staff is still reviewing information provided by the applicant in support of their review of this section.

And Chapter 3, we have open items relating to the review of the soil structure interaction and analysis, as well as an open item related to the review of topical reports associated with the steam drive design. As stated in the SE, this topical report is related to a steam design are being reviewed as part of the ESBWR certification review.

The staff will discuss Section 2.5 and the inclusion of the Chapter 3 open items in a future ACRS subcommittee meeting. This concludes my opening remarks. And if there are no questions I would like to turn it over to Detroit Edison.

CHAIRMAN CORRADINI: Does the committee have anything to ask of Adrian at this point? If not, Peter, I think we'll turn it to you.

MR. SMITH: Thank you. So I'm Peter Smith from Detroit Edison. I just wanted to take a moment and introduce the folks that I have with me today, starting with Ron May, who is our Senior Vice President of Major Enterprise Projects, Dave Harwood who's the Director of Industry Development Group.

And then from my staff I have Joe LaPrad, who this is his first time here, and Ryan Pratt, and Mike Brandon, who's licensing manager for this project.

In addition to that I have from Black & Veatch, I have Steve Thomas, Bryce Weinand, Beth Quinlan, Gerry Miller, and contractors from NEI, Bill

Ziegler and Jim Harrell. And then also from GEH I have Patricia Campbell, Skip Schumitsch and David Hinds. So I'm going to be calling on lots of people.

CHAIRMAN CORRADINI: You get a gold star for remembering all those names. I have a hard time just knowing who Stetkar is.

MR. SMITH: Well thanks. We'll see if I do as well remembering all of the detail that's in Chapter 2, relative to the names here. So we're going to start with Section 2.1 which is geography and demography.

And basically this section of our application covers the site location and description. A description of the exclusion area boundary and our authority over, and control over that. And assessment of the population distribution in the area. Next slide, please.

So this slide shows a photo of the FERMI site, an aerial photo of the FERMI site. In yellow is the area that we have ownership and title to. And superimposed on that in the center, in green, is the FERMI 3 plant.

And the exclusionary boundary is in the kind of brownish color circle that surrounds the plant. That's probably within our owner controlled area, with the exception --

DR. WALLIS: That's a radius? That's a radius you're giving us here? 892 is a radius?

MR. SMITH: Yes, yes. That's correct.

DR. WALLIS: Where is it measured from?

MR. SMITH: It's measured from the center of the reactor building.

DR. WALLIS: Center of the reactor. Right down the middle of the reactor? Or is it --

MR. SMITH: The center of the building.

DR. WALLIS: The building.

DR. KRESS: How do you keep people out of the round part that's not, that's outside the yellow?

MR. SMITH: So if it's outside the yellow, that's in Lake Erie. And it governed actually by the U.S. Coast Guard. And there is a security zone that's established around the plant, that entry is prohibited.

DR. KRESS: So boats can't go in there?

MR. SMITH: They're not supposed to go in there. And actually we have surveillance of that. And we have a warning system. And we warn boaters if they encroach, and contact the Coast Guard if they fail to heed our warnings in that regard.

DR. WALLIS: You warn them. But suppose

they have malicious intent?

DR. KRESS: Now that was what I was wondering.

DR. WALLIS: How long a warning do you have to give them? The boaters, if the boaters have malicious intent.

MR. SMITH: So that would end up into, covered by the design basis security event.

CHAIRMAN CORRADINI: Which we're not going to discuss right now.

DR. KRESS: That was the basis of my question. I'm not worried about the guy in the boat.

MR. SMITH: We have people show up in there --

DR. WALLIS: People can get blown in there by a storm.

MR. SMITH: Yes.

DR. WALLIS: And not be out of control. And convicts could very well. Would you have to go and tow them out, or something? Or what do you do?

MR. SMITH: Well, we would call the Coast Guard.

DR. WALLIS: Call the Coast Guard. Does that take a long time?

MR. SMITH: I don't know that I would

necessarily have the experience. But if they end up o the shore that our security force will respond, and local law enforcement --

DR. WALLIS: Do they have --

CHAIRMAN CORRADINI: If I might just interject. Given the current units, what are the instances that you have run into this in the past?

MR. SMITH: I would say the frequency's quite low.

CHAIRMAN CORRADINI: All right.

DR. WALLIS: That doesn't mean anything.

MR. SMITH: Well, I --

DR. WALLIS: A one in a million, or a hundred?

MR. SMITH: I don't recall more than one a year. Okay. Next slide. This slide represents the population distribution, and the year projected for is 2018.

And basically this table shows that the population density at different radii to the year 2018, that are projected. And they demonstrate that, and are compared with the criteria of Reg Guide 4.7, demonstrate that --

DR. WALLIS: So density is people per square mile?

MR. SMITH: That's correct. And the population density averaged at a radius of 20 miles is less than 500 persons per square mile. And we're also located about 5.5 miles to the closest higher density population, which is the City of Monroe, population 32,000. And then when you get out into the 30 mile range, you're starting to encroach on the City of Detroit.

MEMBER ARMIJO: In the zero to five mile radius, that does not include plant workers or anything like, right? Or does it?

MR. SMITH: No, no. Because these are all census data.

MEMBER ARMIJO: Yes, yes.

DR. HINZE: Did you, you're right on the border with Canada. And certainly part of this goes into Canada. Did you find any difference in the statistics, or the handling of the statistics in Canada, than the U.S.? Are there variances here that we should anticipate?

MR. SMITH: In what regard from --

DR. HINZE: The difference in the way that Canada may handle their compilations and so forth, their statistics?

MR. THOMAS: There are slight differences in how Canada does their census. They do it on a different year frame, which is described in Section 2.1 But that was accounted for in the population distribution.

If you look at the, in Section 2.1 there's a figure that shows where the population is at, and how far out. I believe it's Figure 2.1-211, which shows the population --

This is going to be for the year 2000. It shows the population with the 50 mile, for all the segments including Canada, which accounted for how Canada does their census.

DR. HINZE: And you adjusted for that then?

MR. THOMAS: Correct.

DR. HINZE: Okay. Thank you.

DR. KRESS: How far is Detroit?

MR. SMITH: I'm sorry?

DR. KRESS: How far is Detroit?

MR. SMITH: Roughly 25 miles.

DR. KRESS: Southwest?

MR. SMITH: No, Detroit's to the north, north and probably more to the east from the plant.

DR. WALLIS: Can we go back to this exclusionary? You said it's a radius from the center of the reactor building. But there are several reactors there. You know, the different exclusionaries, the different --

MR. THOMAS: Yes. And they overlap.

DR. WALLIS: Why don't you just have one for the slice? You add them up, you add them up --

MR. SMITH: Well, from the standpoint of calculations --

DR. WALLIS: You add then up. For actual exclusionaries, presuming the sum of the three exclusionaries.

MR. SMITH: Yes. Establishing the exclusionary for that plant to make sure that it's --

DR. WALLIS: Yes, but you have to add the other plant.

MR. SMITH: -- all bound with -- That's correct.

DR. WALLIS: Which makes a significant difference in some places.

MR. SMITH: For us, no. Because there's --

MR. THOMAS: If you look at the figure, and you look at FERMI 2 in that --

DR. WALLIS: There's another circle there.

MR. THOMAS: -- and there's a similar

circle.

DR. WALLIS: That's right, that's right, a similar circle.

DR. KRESS: You only have one other plant --

MR. SMITH: That's operating, correct.

DR. WALLIS: In this one spot.

MR. SMITH: Yes. Any further questions on the population distribution? Okay. With that we'll move on to Section 2.2.

DR. KRESS: You have to re-do the environment impact state for this plan?

MR. SMITH: We did a new environmental report. And there is, a draft EIS was published last fall. And the final EIS is nearing conclusion, but is in a little bit of a quandary with waste confidence rule. Okay.

MEMBER ARMIJO: I got to ask you.

MR. SMITH: Okay.

MEMBER ARMIJO: What's the significance of the 500 persons per square mile? Is that just an arbitrary number picked out that you use to base your doses? For example, if people moved into the area within zero to 20 miles, and it went up to 501, 510, is that the end of the world? Or is that just --

MR. SMITH: No. I think that number --

MEMBER ARMIJO: -- a figure detail?

MR. SMITH: -- 500 per square mile comes from Reg Guide 4.7. So it's --

MEMBER ARMIJO: I think I should be asking my staff.

CHAIRMAN CORRADINI: Yes. Let's wait. Because I think John had a question too. So I'm going to hold you guys off until the stuff comes up.

MEMBER ARMIJO: Yes, okay.

CHAIRMAN CORRADINI: Sorry. But you said that. Okay. Go ahead.

MR. SMITH: Section 2.2, I want to go to the next slide. So Section 2.2 addresses nearby industrial transportation and military facilities. And it provides a description of facilities, transportation routes.

And also has evaluation of potential accidents involved with the locations of explosive or hazardous materials, aircraft hazards, toxic chemicals, fire and smoke and impacts to the intake from shipping. Next slide.

DR. WALLIS: What do you do about shipping? I mean, all kinds of stuff is shipped on the lake. And presumably there could be hurricanes or something that blow ships ashore on your facility?

MR. SMITH: So I guess there's two things I'll say. One is, this end of Lake Erie is very shallow.

DR. WALLIS: Ships go aground before they get there?

MR. SMITH: That's for the large lake freighters. And so they --

MR. THOMAS: Difference to Superior, this is a very shallow lake.

MR. SMITH: At this end. So the principle channels that are Toledo and out of the Detroit River are five miles away. And they're dredged to --

DR. WALLIS: The Detroit River isn't that far away. So a ship could run aground like three miles from you or something?

MR. SMITH: I think it would be closer to the five miles where the channel is. Because it drops off significantly once you get out of the dredged channel.

DR. KRESS: They don't really have hurricanes like you --

MR. SMITH: No.

DR. WALLIS: Then if it's a tanker that spills its cargo and the wind is from the east --

MR. SMITH: That's actually a left over one from when I sent the committee about, essentially what I'll call a noxious gas --

DR. WALLIS: Yes, something like that.

MR. SMITH: -- detection. But I think we want to come back to that, but --

DR. WALLIS: Okay.

CHAIRMAN CORRADINI: But you remember that discussion we had before, where we were looking for you guys to volunteer?

MR. SMITH: Yes. And I think we answered that question in the last meeting.

CHAIRMAN CORRADINI: Yes, you did. So you and the staff are on the same page.

MR. SMITH: Okay.

CHAIRMAN CORRADINI: We happen to be on a different book.

MEMBER STETKAR: That's not to the, we're on the same page. We're on the same page, it's a different book. Okay, keep on --

DR. WALLIS: It's a different language too, isn't it.

MR. SMITH: So I think I already started talking about some of the transportation routes. So we talked about the shipping channels which are on

Lake Erie, which are about five miles off shore from us.

In addition to that, we have the nearest major highway is Interstate-75, and Interstate-275, that are about four miles from the site. And also we have rail lines that are, the closes approach is about three and a half miles from the site. And they basically kind of parallel the Interstate-75 corridor. And then we have nearby airports, which I will describe in a moment.

CHAIRMAN CORRADINI: So if I might interject, just to remind Graham. I'm sure you remember, just in case. When we had this discussion about things, effluents that are outside the site that could kind of waft in, it was the rail lines where we were -- Because that's the closes approach.

DR. WALLIS: That's right. But there's probably bigger capacity on the lake that some --

CHAIRMAN CORRADINI: I don't know. I don't know.

MEMBER ARMIJO: It would have to be a big barge.

CHAIRMAN CORRADINI: It would have to be an awful big barge. I would think a large train, which tends to be what you see in the Midwest, might be the larger --

MR. SMITH: And I think the, I think tankers on the Great Lakes are kind of unusual. The types of shipping that goes on the Great Lakes is --

DR. WALLIS: They go all the way to Duluth --

MR. SMITH: -- vault carriers.

DR. WALLIS: Yes.

MR. SMITH: And they carry iron ore, they carry coal, grains, cement, stone. It's not typical that --

DR. WALLIS: How about natural gas? That's something that --

MR. SMITH: No.

MEMBER ARMIJO: Do you have any dock facilities at your site for bringing in heavy equipment or chemicals, or anything like that?

MR. SMITH: So we have, we currently have nothing that's active. We do plan to have a barge slip associated with the construction of FERMI 3.

MEMBER ARMIJO: So that would bring in equipment, but not necessarily large quantities of chemicals, or flammable materials?

MR. SMITH: Right.

MEMBER ARMIJO: Would that be under your

control?

MR. SMITH: Correct.

MEMBER ARMIJO: Okay.

MR. SMITH: We'll move on to the next slide, please.

MEMBER STETKAR: Peter, is it better -- I was going to wait until we get to the aircraft. But since this is locations of things, the previous slide. When you list the locations of the nearby airports, I noticed that Windsor International Airport is not on your list.

It's about, depending on where you put the center of the site, and where you put the center of the airport, about 26 miles from the center of the site. Is that just because you used less than 25 miles? Or did you just miss it? It's a countable airport.

MR. THOMAS: Right. It's a countable airport. It would be outside the, I mean, a plane path from that airport would be outside the -- The probability would be low obviously somewhere in the like --

MEMBER STETKAR: We'll talk about probabilities later. I was just curious why you didn't list the airport.

MR. THOMAS: I don't know the answer to that.

MEMBER STETKAR: I think it's Ypsilanti you list, which is like 23 or 4 miles away, which is a much lower --

MR. SMITH: Right. And Detroit Metro, which is --

MEMBER STETKAR: Detroit Metro's pretty obvious. It's 19 miles, yes.

MR. SMITH: 19 miles. But I think the other thing too is, the aircraft traffic control region. Because that's a common air traffic control region between Canada and the U.S. at that point.

MEMBER STETKAR: Yes. We'll talk about it probably later.

MR. SMITH: And so there's so many airways and --

DR. WALLIS: But since the airport has a size of the order of a few miles. Hard to know just when --

MEMBER STETKAR: I said depending on where you take the center of the airport, and the center of the site, it's 26. I could get an under 25 if I took edge to edge of properties.

DR. WALLIS: But if you take the center of

Atlanta or something, then it's a pretty big area.

MEMBER STETKAR: I was just curious why it wasn't on the list.

MR. SMITH: Okay. So we're on Slide 4. So explosives and flammable vapor clouds that were external to the site were considered, including the nearby highways and rail lines.

And as we had discussed previously, the location of the hydrogen and oxygen storage areas on site for our hydrogen water chemistry systems and other uses, are placed in accordance with EPRI guidelines for BWR hydrogen water chemistry storage.

We currently have on site gasoline storage. Where it's located currently is under the footprint of where FERMI 3 would be. So that will be relocated as part of the pre-construction activities for the site.

And they will be located in a manner that doesn't cause a possible hazard for FERMI 3. So we talked about airports a little bit. So the closest airport is a turf field called Mills Field. And --

CHAIRMAN CORRADINI: Say that again, I'm sorry.

MR. SMITH: There is a turf flying field --

CHAIRMAN CORRADINI: Oh.

MR. SMITH: -- that's the closest airport. So it's used for single engine aircraft in the vicinity. And Cessna's posing no hazard. And also we've evaluated the potential for aircraft impacts, using the guidance of SRP Section 3.5.1.

CHAIRMAN CORRADINI: I'm just having some trouble hearing. If people would just keep their voices up, please.

MR. SMITH: Oh, I'm sorry. Okay. Toxic chemicals. We had previously discussed that in the second to the last meeting you had. And it's relation to impact on the control room habitability. And we also assess fire and smoke from nearby homes.

Transportation of industrial facility is not impacting FERMI due to the distance things are located. And also we looked at collisions with the intake structure. Again, from shipping, and concluded that that does not propose a hazard to the plant. And that's all I had on Section 2.2.

CHAIRMAN CORRADINI: Other questions from the committee? Okay. Keep on going.

DR. WALLIS: Well, I just wanted to get to this business of this extraordinarily flood on the river. Doesn't that wash down things and then --

Does that wash down types of chemicals from somewhere else upstream?

MR. SMITH: So I'm just trying to think of what's along Swan Creek. Swan Creek gets --

DR. WALLIS: The flow you're predicting is just huge. So somewhere upstream things will get washed into that area. Maybe that's something you should think about.

CHAIRMAN CORRADINI: You're point is that that would change habitability?

DR. WALLIS: Well, in Hurricane Irene, when Hurricane Irene came it picked up propane storage tanks, you know, washed then down river. So the river's full of propane tanks. It's not a trivial thing if something happens to those. You really have to --

MR. SMITH: I don't think that we considered that.

MEMBER STETKAR: One more question on locations of facilities. And this one might be easy. When you talk about military facilities, you said the nearest military facilities are Camp Perry Military Reservation, about 30 miles away, and Selfridge Michigan Air National Guard Base, about 50 miles to the northeast. Did you look over in Canada? Are there any Canadian air bases, or military facilities within that 50 mile radius?

MR. SMITH: I don't know that we explicitly looked. But that's where I came from originally. I served in the Canadian Armed Forces. And I know of nothing that's west of London, Ontario, and southwestern Ontario that's a military facility.

MEMBER STETKAR: I did a search. I didn't find anything either. But I was curious whether you did any kind of formal search.

MR. SMITH: No, it's -- Thanks.

MEMBER STETKAR: And the closest one I could find was over by London. Thanks.

MR. SMITH: Okay. We're going to move on to 2.3. Why don't you go to that first main slide. Section 2.3 addresses meteorology. And it provides a overall summary of the regional meteorology. And compares the site characteristics to the relevant site parameters in the design certification document.

We also have a description of the local meteorology, which describes the meteorological monitoring programs for the current set of data that we presented in our application, as well as future meteorological monitoring of OCL.

And as we move to construction has the

current meteorological tower has to be relocated, which I'll talk about a little bit later. We also have a description of the analysis of the site specific short term atmospheric dispersion factors, and compared with values to the associated DCD values.

And we also will describe the analysis of the site specific long term atmospheric dispersion values, and compare those values with the associated values in the DCD. Next slide, please.

So this Section 2.3.1 discusses the regional meteorology. And we ended up determining what the extreme wind values, tornado values, precipitation values, and ambient design temperatures, and compare those values with the associated DCD requirements.

And we'll talk about these a little bit more on subsequent slides. But in summary the site characteristic values are bounded by the corresponding DCD site parameters, I guess that's the big takeaway. Next slide continues on and discusses extreme wind. And all the values are summarized here.

But as you can see that we continue to be bounded the DCD requirements. In addition our site specific tornado's based on the Reg Guide 1.76, Revision 1. And we were asked questions earlier this year regarding changes that were made in Rev 1, and as related to hurricanes.

And when we applied the guidance on Reg Guide 1.221, on hurricane winds, we concluded that we're not within the impacted area. So the tornado parameters are bounding for our site. Next slide, please.

MEMBER RYAN: Is that wind and water, or is it just wind?

MR. SMITH: I'm sorry.

MEMBER RYAN: Is the hurricane wind and water?

MR. THOMAS: We're going to talk about the flood scenario when we get to Section 2.4.

MEMBER RYAN: You kind of catch it -- I mean, I know you're not going to get a wind event hurricane that far away from the coast. But I'm curious about the way you see it coming up.

CHAIRMAN CORRADINI: Is it covered under the precipitation, I guess is the --

MR. SMITH: It's in the data within our assessment of precipitation.

MEMBER RYAN: Okay.

DR. WALLIS: By the time a hurricane gets to FERMI it's going to just be rain.

MEMBER RYAN: Yes. That's what I'm asking. But it could be ten inches or 12 inches of rain.

MR. SMITH: But it would have shown up in the statistics that we based our maximum precipitation on. So I'm not sure that we could distinguish from the source.

MEMBER RYAN: Okay.

DR. HINZE: In terms of dealing with the local meteorology, I had difficulty trying to determine whether you were getting these from Detroit Metropolitan, or from the site. Could you clarify where you used which --

MR. SMITH: Chris.

MR. THOMAS: I'm going to have Bryce Weinand speak to that. He's our company's meteorologist.

MR. WEINAND: Yes. My name is Bryce Weinand from Black & Veatch. Those values for the site specific 100 year and 50 year are based on ASE values. Fifty year has been reached by the multiplier to the 100 year.

But we also did look at actual wind data in a five county area surrounding the site to see how those compare to actual wind gusts that have occurred, based on the NCDC storm data base. And we found a gust around 103 mph, which is a little higher than the ASE guidance, but still bounded by the DCD value.

DR. HINZE: And how did you use the --

CHAIRMAN CORRADINI: You may have to speak up I think. You're microphone's not catching --

DR. HINZE: How did you use the local meteorological tower data? Did you use that --

MR. WEINAND: We looked at, we did look at the local meteorology tower, meaning at the FERMI site.

DR. HINZE: Yes.

MR. WEINAND: And they did not have any wind gusts that were comparable to the ones that were experienced in the region. They didn't, they were lower.

DR. HINZE: Okay. Thank you.

MR. SMITH: Continuing on to the next slide, Steve. So continuing on with regional meteorology and get to precipitation. So the FERMI site maximum rainfall rate is 17.3 inches per hour, compared to the DCD value of 19.4.

Again, all of them are bounded by the DCD. And the maximum short term rainfall we've determined to be 5.8 inches in five minutes, compared to the DCD value of 6.2 inches in five minutes.

MEMBER STETKAR: Are those values so-called PMP values?

MR. SMITH: Yes.

MEMBER STETKAR: Neither probable nor maximum. But they're design values.

CHAIRMAN CORRADINI: I was waiting for him to --

MEMBER STETKAR: Bill Shack sent me a citation last night, and unfortunately I didn't bring it in, from the genesis of that term. And it says, well, people used to kind of characterize it as what they thought might be the kind of physically the most rainfall you could get. But they've now sort of decided that it's just a number that people use for designs.

MR. SMITH: Okay.

MEMBER STETKAR: I could find the exact quote. It's sort of interesting. But it is what it is.

MR. SMITH: Yes.

MEMBER STETKAR: The important thing is, that 17.3 inches per hour was not an actual measured quantity at any of your meteorological stations, right?

MR. SMITH: These are all derives. And then the snow loads as well are --

DR. WALLIS: I had trouble with the snow loads. Because they seem to be different numbers in different placements. But the main load is snow plus water.

Now I saw you had 24 inches of water all over this roof. Now is this a flat roof? You've got two feet of water over the whole roof. I didn't understand it.

CHAIRMAN CORRADINI: They're going to answer that question, aren't you?

MEMBER STETKAR: Pretty poor design --

MR. HINDS: This is David Hinds of GEH. I'm sorry, could you repeat -- Is the --

DR. WALLIS: The maximum load that you've got is very close to this 162. And it's made up of snow. But it's also made up of two feet of water. I didn't understand how you got two feet of water all over the roof.

MR. HINDS: It's I'd say highly improbable. There is drainage off the roof.

DR. WALLIS: It can't be there, can it?

MR. HINDS: No. There is drainage off the roof. And --

DR. WALLIS: But it's not a flat roof?

MR. HINDS: The roof on the reactor building, yes.

DR. WALLIS: It's completely flat?

MR. HINDS: It's flat. But there is drainage --

DR. WALLIS: But the drainage can be blocked by ice. I understand that.

MR. HINDS: Yes.

DR. WALLIS: So it can be a swimming pool up there.

MR. HINDS: It's highly improbable. I mean, there's drains off the roof, drains. And it's highly improbable. But for conservativism --

DR. WALLIS: But the basis is, above two feet it would spill over some parapet or something. You cannot accumulate more than two feet. That was the basis of this two feet?

MR. SMITH: That's the weight it said --

DR. WALLIS: Because it just reaches the limit of 162. So that's a problem. If it were two foot one inch, you wouldn't meet the requirement. So it's --

CHAIRMAN CORRADINI: Do you understand Dr. Wallis' question?

MR. HINDS: I don't think that it's possible that it could build up beyond that. But I could pull some more --

DR. WALLIS: Well, I had trouble --

MR. HINDS: -- design details of the area.

DR. WALLIS: -- about these. It just seemed to appear without --

CHAIRMAN CORRADINI: Let me ask his question a different way. Did you just make it because you made the most conservative set of calculations, and it just made it?

Or is there a physical, I want to call it -- You call it a parapet, I want to call it a physical boundary over which it starts just flowing over? And it just happens to meet it? That's what I think you're asking.

DR. WALLIS: Yes. I mean you get ice on that thing, it changes.

MR. HARVEY: This is Brad Harvey. I'll go with the staff meteorologist. I was partly involved with the review of the ESBWR roof design. And the two feet is based on the fact that there is two foot high parapets along the top of the roof. And so your concept of having a two foot deep swimming pool is correct. That's where the 162 pounds per square foot

--

CHAIRMAN CORRADINI: So they're assuming none of their drains work and --

DR. WALLIS: And there's no ice buildup on the parapet.

CHAIRMAN CORRADINI: Right.

DR. WALLIS: There's no ice buildup on the parapet. Although there is a snow pack everywhere else.

MR. HARVEY: The idea was that you couldn't have any more than equivalent of two feet of liquid water on that roof, because of the height of the parapets. That's where the 162 came in.

DR. WALLIS: That's if the parapet's clear, there's not a snow pack or ice on the parapet, which there probably would be. But do you assume that gets washed away or something?

MR. HARVEY: Well, that would have to be around the entire perimeter of the roof.

DR. WALLIS: That's right. That's right.

MR. HARVEY: Which I think is somewhat unlikely.

DR. WALLIS: So that is the basis of the number?

MR. HARVEY: That's correct.

CHAIRMAN CORRADINI: Thank you.

MR. SMITH: Next slide, please. So again in regional meteorology we looked at all the ambient temperature profiles. And again, we are bounded by the DCD in all cases.

And including with, we talked about this two meetings ago on the control room habitability and the parameters associated with the transient room temperatures analysis for that. Next slide.

And then this is just a comparison of the control room habitability temperatures. And the DCD values. Our site characteristic values and the DCD site parameter values. And we have monitored them to them all. And I'm not going to try to go through the --

MEMBER STETKAR: I understand how the maximum high humidity average wet bulb flow temperature index is calculated now.

MR. SMITH: Yes.

MEMBER STETKAR: I don't know what it means, but I understand how it's calculated.

MR. SMITH: So my little piece of folklore on that is if you take the acronym for that, WBGT, that used to be the call sign for the PBS station in Rochester, New York.

MEMBER STETKAR: Oh, there you go.

CHAIRMAN CORRADINI: That just means for me, I have to remember Rochester. Keep on going.

MR. SMITH: Next slide, please. So talking about local meteorology. Local meteorology was characterized using data from our on site meteorological tower. The location of the existing on site meteorological tower is in the vicinity of FERMI 3, and --

DR. WALLIS: How does the tower measure the diameter of hailstones?

MR. SMITH: It doesn't.

DR. WALLIS: Well, you quote a diameter of a hailstone, right. And you quote four inches I think is the maximum size. How was that determined?

MEMBER STETKAR: Somebody picked it up.

MR. WEINAND: This is Bryce Weinand from Black & Veatch. In the hail section in this are the hail sizes are from actual storm reports that are from the NCBC storm data base. So these weren't actually observed at that site by anyone who reported it.

MR. SMITH: So we had collected at least five years of hourly data. And we had a 94 percent data recovery rate from our met column. We have data that goes back into the pre-year of the '80s.

DR. WALLIS: Well, was it not recovered because the wind was so strong you couldn't measure it?

MR. SMITH: No. I think it was issues with the instrumentation itself, or --

DR. WALLIS: Because usually when the instrumentation fails it's from some extreme weather event.

MR. SMITH: Right. But so we have local from the other weather stations for us that we compared the data that we got. And it's comparable to what --

MR. WEINAND: Yes. We did review the data. And when that review was done there was a, you know, percentage of observations that were out of range, or did not match the surrounding Detroit metropolitan conditions. And we assessed it to see if it was realistic, based on certain criteria and --

DR. WALLIS: So you threw out the extreme data somewhat?

MR. WEINAND: They were, this data was either a sensor got stuck at a certain temperature. So that the sensor malfunctioned until it got realized and fixed. But that's basically the percentage of data that was either missing or during maintenance periods.

CHAIRMAN CORRADINI: You mean the six percent?

MR. WEINAND: Yes.

CHAIRMAN CORRADINI: Okay. That's what I thought you meant.

DR. WALLIS: I don't want to look at it myself. But I guess the staff should be reassured that the six percent isn't missing because it was some extreme case, which should have been recorded as being important. That's all. And I don't want to dig into it. But maybe the staff can reassure us that this --

CHAIRMAN CORRADINI: Why don't we -- Does the staff want to answer now or later?

DR. HINZE: Let's see here. Are we talking about wind data here, or just temperature data?

MR. HARVEY: This is Brad Harvey again with NRO, with the staff. The on site meteorological data is primarily used to do dispersion analysis. We primarily rely on off site data for the climatic extremes because of the length of the record.

For instance, the meteorological tower is designed for dispersion data collecting. So it's an average wind speed over 15 minutes or an hour, which is different than the extreme three second gust.

Met tower is not designed to collect three second gust data, which is where, what you do your structural considerations. So the extreme condition's probably going to be your worst, your best case version anyway, if indeed it was a storm that blew your system out.

MEMBER SCHULTZ: Thank you. Are the data recovery rates similar to what you would see at other reactor sites?.

MR. HARVEY: Yes.

MEMBER SCHULTZ: Thank you.

DR. HINZE: Considering the location of the tower, how representative are these values of what's really happening at the site of the reactor? Considering the gradings that you have with land and sea breezes, how representative are these?

I note in the document that you talk about the new position as being more representative. So the question is, how good are these data? What do these data really mean? What are their implications?

MR. WEINAND: Well, the data actually does indicate such phenomenons such as the land and sea, or lake breezes, we noticed. Lake breezes generally occur during the spring through the summer.

So it's in an area where it does still measure such phenomena. But the new met tower is also located at a distance that's similar to the shore line of the lake. That's about equivalent to what the FERMI 3 structures will be at.

DR. HINZE: Actually it's considerably closer to the shore line, isn't it?

MR. WEINAND: It is, from the current met tower, yes.

DR. HINZE: Well, it's closer than the reactors. Well, what kind of gradient can one anticipate at the east end of Lake Erie? At the west end of Lake Erie, associated with the land sea breezes. What kind of gradients can we anticipate in terms of the wind, in terms of the direction and temperature of the result?

MR. WEINAND: For during the lake breeze scenario you would get a, the direction would predominantly be out of the east or east southeast. Wind speeds, just depends on if it would be -- My guess would be somewhere between five to ten miles per hour, at the ten meter level.

DR. HINZE: The sea breeze. And how fast would that drop off? What's the gradient? What kind of gradient are we looking at?

MR. WEINAND: As right along the coast? Along the --

DR. HINZE: I know. But spatially, in from the shore line you have the two positions of the present tower and then the new tower. What kind of gradient can you expect.

MR. WEINAND: Well, typically a land raise will continue inland for approximately six or eight miles. So there could be a little bit of a gradient between the new met tower and the current met tower. But I'm not thinking that it would be significant.

MR. SMITH: So we're going to operate those two met towers over an overlapping period before we take the current met tower out of service.

DR. HINZE: So you'll be able to determine the gradient. And how will you use that gradient? Will that be used in any way?

MR. WEINAND: I don't, I mean, I don't have a --

MR. SMITH: So I think the answer to that is, until we have data we don't know what we're going to do with it. So the typical process that we would have in our plant, and all nuclear plants is we would see some deviation between something that we're going to rely on.

And we're going to evaluate it under our corrective action program. And do whatever evaluations are necessary to be able to understand and assess the impacts, and compensate for that.

DR. KRESS: How high is the tower?

MR. SMITH: They're some 60 meters.

DR. KRESS: You don't worry about gradients in the vertical direction?

MR. SMITH: So we have instrumentation at ten meters and at 60 meters.

DR. KRESS: Your dispersion calculations assume ground level releases?

MR. THOMAS: Some. For the on site that are calculated for the control room, those use the ground level for the exclusionary boundary in the all population zone, using PAVAN to do the ground release. For the XOQDOQ that are used for the long term chi over Qs, that's using a mixed mil dose.

CHAIRMAN CORRADINI: Okay.

MR. SMITH: Next slide. So this slide basically describes what the data from the on site met tower was used for. It was used in the toxic chemicals evaluations and atmospheric dispersion analyses that are deflected in all the site. And also we used it in the evaluation of the new tower impacts, using the SACTI code. Next slide.

Section 2.3.3 describes the meteorological monitoring. Some of this we already talked about. The existing tower location. And then two slides that give a picture that shows where the tower is again.

But basically where the existing tower is is under the footprint of the FERMI 3 cooling tower would be located, just slightly southwest of the FERMI 2 tower block and southwest of FERMI 2. We have descriptions of the instrumentation and data recording equipment, and data acquisition and processing. Next slide.

So one of the things that we dealt with during the review of our amplification was the data that was gathered in the 2001 to 2007 time frame in the application.

And during our environmental audit it was observed, and we had previously identified this as well, is that over the period of time that the tower's been in service, since the early '80s, that there's been tree growth in the vicinity of the towers.

And some of the trees were in locations that did not meet the current height and distance requirements. So we had a series of requests for additional information that we addressed the issues associated with that. Next slide.

MEMBER ARMIJO: Did you conclude those trees made any significant difference?

MR. SMITH: Our conclusion was they didn't make any significant --

MR. THOMAS: We're going to talk about that also. They weren't in the slides here.

MR. SMITH: Yes, so in the next slide. So this is a photo from the FSAR. Where the tower is located with the red dot in the center of the overlay of where the FERMI 3 cooling tower would be. And just to the west of that there's a growth of trees. And so the way we went about assessing that, and you can see on the next slide as well, is --

DR. WALLIS: When these trees keep growing, you going to cut them down? Or are you going to rely on the new tower?

MR. SMITH: Well, ultimately we'll be going to the new tower. But tree cutting on the FERMI site is kind of a difficult thing to do. Because all of these trees are in a part of the wetlands region that we are.

So now it just so happens that over the period of time since this photo was taken that there's been weather events at the site that have taken out some of the trees. So it ultimately kind of became to some degree a self limiting issue. But if we -- And these are mature trees now. You know, they were at a mature -- I wouldn't expect them to continue their, to continue growing.

MEMBER SCHULTZ: Peter, is the existing tower on that picture?

MR. SMITH: The existing tower is the red dot.

MEMBER SCHULTZ: The red dot.

MR. SMITH: Yes.

MEMBER SCHULTZ: And the new tower is going to be --

MR. SMITH: We have to go to an earlier slide of the site. It's about --

MEMBER SCHULTZ: It's on the other side?

MR. SMITH: It's going to be on the southeast, closer to the lake.

MEMBER SCHULTZ: Okay.

MR. SMITH: And it's about three-quarters of a mile, roughly, from the current location. But located right on or close to the lake shore. On the south part of the site.

MEMBER SCHULTZ: Thank you.

MR. SMITH: Next slide, Steve. So we had

aerial photos showing the state of the trees over different periods of time. And we also had met data from the tower during those periods of time when we did comparisons and analysis with that data.

DR. WALLIS: So your new tower is right on the lake. So it's going to be much more susceptible to these sea breezes and things like that.

MR. SMITH: Yes. Or it could be.

DR. WALLIS: Whatever micro climate is set up on the shore. So how far --

DR. HINZE: Do you know the dimension, how far we're from the lake currently?

DR. WALLIS: But your map in the earlier, your new tower is right on the lake. So it sticks out on a promontory.

DR. HINZE: About a tenth of a mile. About 500 feet.

MR. SMITH: Yes, the current location and then --

DR. HINZE: No, the new location.

MR. SMITH: The new location and the current location is -- I don't know that it --

DR. WALLIS: It's on Slide 3.

DR. HINZE: Well, FERMI 2 and 3 are about three times the distance from the shoreline than the new tower will be.

MR. SMITH: Next slide, please. I already talked about this, that we performed an analysis using the data from different periods of time and compared them. And ultimately we ended up using a blind set of results that were the most limiting or dominant.

MEMBER SCHULTZ: Peter, I take it that these two data sets were used for updating FERMI 2 analyses. Is that true? Well, let me finish the question. If so, what difference did one see between the two sets of data?

I understand that they're within the DCD site parameter values. But that is bounding. But with regard to those two sets of data, what difference did you see? It goes back to the question about the trees and so forth.

MR. THOMAS: You said FERMI 2, did you mean FERMI 3?

CHAIRMAN CORRADINI: No I think he meant FERMI 2, I thought.

MEMBER SCHULTZ: You've got the existing tower. These two studies were done, an ARCON analysis, 96 analysis was done. I presume you were updating the results that were then applied to FERMI 2. Perhaps for control room habitability or other purposes. Just wondering what the differences were.

MR. THOMAS: Well, first let's speak to the differences between the results from the '85 to '89 data, to the 2000 data.

MEMBER SCHULTZ: Well, that's what I'm really interested in for the --

MR. THOMAS: Bill, can you talk to that?

MR. ZIEGLER: Good morning. I'm Bill Ziegler with Numerical Applications. We did the ARCON analysis and the PAVAN analysis using the meteorological data that was just talked about.

When we analyzed the 2000s data and the 1980s data there were differences. There was not a uniform trend that these particular release receptor pairs were more limiting in the 2000s, or in the 1980s. There was a mixture.

So what we did was we put them side by side. And for every release receptor pair, for every time period, so two through the eighth we picked the most limiting higher of two, and used that as the final answer for the other evaluations that were done downstream.

The differences were not large. The first decimal place after the decimal point was as large a number that we saw in terms of a difference. Usually it was the second decimal place after the decimal point. there were no orders of magnitude differences between the two.

MEMBER ARMIJO: Well, did you conclude that the trees had nothing to do with this? Or natural variability over a period of time, different periods for --

MR. ZIEGLER: We did not choose to attribute the cause to either one. We simply looked at --

MEMBER ARMIJO: It changed.

MR. ZIEGLER: -- the 1980s vintage data, which we knew was not influenced by the trees.

MEMBER ARMIJO: Yes.

MR. ZIEGLER: And we looked at the 2000s data, which did have some influence. We could tell some differences in the ten meter wind speeds that were being influenced by the trees. So we knew that the 2000s data had some influence.

MEMBER ARMIJO: Yes.

MR. ZIEGLER: We didn't declare that the differences were solely due to the trees. We simply chose both sets of data and took the limiting values from within each set.

CHAIRMAN CORRADINI: Does that, Steve, you had a follow on though.

MEMBER SCHULTZ: Well, I'll have a follow on to what you just described. So you indicated that at ten meter height there was a difference. And it sounded as if, from what you said, that then the 60 meter height showed less of a difference.

MR. ZIEGLER: Yes. There was almost no difference. But there were some last decimal place sort of differences in the resulting higher chi over Qs. The 60 meter and the ten meter data is used to generate a delta temperature.

And the delta temperature then generates an atmospheric stability. And occasionally that delta temperature is going to be affected by the ten meter that is changing by the trees.

The 60 meter wind speeds, I do not recall looking directly at the 60 meter wind speeds by themselves in the 2000s data, and comparing them to the 60 meter wind speeds in the '85.

I don't recall doing that comparison. But I do remember seeing that the ten meter data was showing some influences in the wind directions and wind speeds.

MEMBER SCHULTZ: Okay. Thank you. That's very helpful.

MR. SMITH: Move on then? Next slide. So I think we talked about a lot of this already. The location where there will be design through. And then we're going to overlap the operation for at least one year, is our intention. Next slide.

So as Bill already talked about, atmospheric dispersion factors were calculated in comparison with the values used in the design basis accident analysis in the BCB.

And on site atmospheric dispersion factors were calculated for the control room and technical support center. And all site atmospheric dispersion factors are calculated for the exclusionary boundary and low population zone. Next slide.

So for the on site control room and technical support center atmospheric dispersion factor values, they were determined using ARCON96 as Bill just mentioned. And as previously discussed we had talked about how we accounted for the influence of the trees in calculating those parameters.

And for the off site exclusionary boundary and LPZ and atmospheric dispersion analysis, they were determined, as Bill said, by the PAVAN computer code. And the power block envelope approach was used in determining the distances between the release points and the source receptor pairs.

So long term atmospheric dispersion factors. So they were determined using the XOQDOQ code. And again, the power block envelope approach was used for determining the distances in between source and receptors.

And also we had done a similar accounting for the potential impact and the tree height, and the data from both periods. And then recognizing that we had, you know, in the east direction, that a considerable amount of transport is over water, we made some adjustments using higher stability classes to account for the different roughness between the water and land. And then next slide.

The results show for long term atmospheric dispersion that the site specific long term atmospheric dispersion, the deposition factors for all locations were not bounded by the DCD. And then as permitted by the DCD we did site specific dose analysis.

MEMBER SCHULTZ: Which we've already looked at.

MR. SMITH: Right, in Chapter 12. And that's it for 2.3.

CHAIRMAN CORRADINI: Questions by the

committee?

MEMBER STETKAR: Yes, I had a couple. Things that we didn't cover. And these are hopefully quick ones. You have a discussion of fog and smoke in there. And it said that you took fog data from Detroit Metro, because obviously your met tower doesn't collect fog data.

You say, well, the airport has similar elevation and relative proximity to Lake Erie as the FERMI site. Detroit Metro's about 12 miles from the shoreline, as best as I can tell, and depending on where you put the dot in the middle of the airport.

I live in a coastal location in southern California. Twelve miles can make quite a bit of -- And I work with Zion, on the other shore of Lake Michigan. Twelve miles can make a heck of a lot of difference in the fogging.

What's the actual experience in that area for fog? The only reason I'm interested in fog is, and there's going to be a follow up question on the cooling tower, is contamination of the switch yard.

MR. SMITH: Okay.

MEMBER STETKAR: So I guess the larger question is what's your experience been on Unit 2 with either fog related or cooling tower plume deposition related contamination of your switch yard on Unit 2? Did you have operating experience there?

MR. SMITH: I don't think we've had any issues that I know of in the 16 years that I've been associated with FERMI 2. And I think there's a discussion about, you know, the normal precipitation in comparison with the amount of deposition is sufficient to wash it.

MEMBER STETKAR: Okay. Then you're not aware of any problems?

MR. SMITH: No.

MEMBER STETKAR: Did you look at all sort of interrelated -- There's a discussion in the FSAR about possible deposition on the new Unit 3 switch yard from the Unit 3 cooling tower.

And there's an analysis that's done that says, well, anything that gets deposited is going to be, you know, further away from the site. Unit 3 switch yard is about 4,000 feet southwest from the Unit 2 cooling towers. Did you look at deposition on the Unit 3 switch yard from the Unit 2 cooling towers?

MR. WEINAND: No, we did not assess the FERMI 2 cooling towers.

MEMBER STETKAR: Okay.

MR. SMITH: But to follow on with that --

MEMBER STETKAR: It's --

MR. SMITH: -- from a similarity --

MEMBER STETKAR: I don't know high the Unit 2 cooling -- I know how high the Unit 3 cooling tower is. The Unit 2 cooling towers are lower, right?

MR. SMITH: They're 450 feet, about 150 feet shorter.

MEMBER STETKAR: Yes. So therefore, the plume would tend to come down in a shorter distance than what you estimate it being for Unit 3. I forgot what that number was.

MR. SMITH: But then again, the relative location -- FERMI 2 cooling towers are to the north and further to the east of the existing FERMI 2 switch yard. And the FERMI 3 switch yard is --

MEMBER STETKAR: Yes. But since it's further away --

MR. SMITH: Right.

MEMBER STETKAR: For the either fairly stagnant conditions or the rare instances where you have minor breeze blowing from the northeast, it would tend to be in that direction. But the simple answer is, no you didn't look at it.

MR. WEINAND: We didn't. I mean the salt deposition that was predicted from the FERMI 3 cooling tower was by .02 kilograms per kilometer square per month. And the longest dry period, dry stretch that we analyzed from Detroit Metro airport is approximately one month.

So it's likely that concentration -- In FSAR it states about 300 kilograms per kilometer squared is about the lower limits of salt deposition on some bushings that might cause some contamination.

And so if you divide that value, let's say within a few, say .02 times that by four, say .08, it's a significant amount of time that would be required. And it's not likely that there would be a dry stretch.

MEMBER STETKAR: What you're saying is essentially you'll get it washed off by natural precipitation, even if you do get hard deposition --

MR. WEINAND: Yes, I think that would happen --

MEMBER STETKAR: Okay.

MR. WEINAND: I think it goes on the order of, if you divide that, it's several years that it would take for a buildup to -- I mean, I don't know. Without looking at the actual FERMI 2's cooling tower. But you would think possibly it would be similar. Or if you, it may be higher because it's a lower --

MEMBER STETKAR: You'd expect a higher deposition closer into the cooling tower because it's lower than what you calculated for 3. How much, I don't do those analyses. I just, I'm looking at them. I remember that hot air rises.

MR. SMITH: I think were I was going is that from the location of where the deposition is is in the offshore correction, except for under --

MEMBER STETKAR: Under reasonably stagnant air conditions you'll, you know, get closer. And under, it would have to be a light breeze, but -- It was just curious, you know.

Because Unit 2's switch yard is fairly close to the Unit 2 cooling towers. Unit 3's switch yard is fairly close to the Unit 3 cooling towers. Vice versa isn't quite the same.

CHAIRMAN CORRADINI: So can I --

DR. WALLIS: It's the temperature of the air, isn't it? The air is really cold. And you get condensation and the stuff comes down as rain, drizzle. That's what brings it down. And it can come down quite a long way from the tower itself.

CHAIRMAN CORRADINI: So can I just follow up on your kind of quick, off the cuff? So I take it you're going to come back to us and -- Because you, the way at least I understood your explanation is that if we just looked at 3 alone, the time scale that it would take to essentially have that accumulation is the order of years.

If you either cross comparison I guess I'm curious what you're conclusion would be. Just so we close this out in my mind. So will we hear back from you about this?

MR. SMITH: Yes. Are you asking to --

CHAIRMAN CORRADINI: I'm asking you to do the same sort of thought experiment you did between, on Unit 3 with 3, with Unit 2 and 3. So we look at a time scale of how long it would take to build up to the limit. That's what I guess I'm --

MR. SMITH: Okay.

CHAIRMAN CORRADINI: That would help us. Okay.

MR. SMITH: Thanks. Okay, we're ready to move on to 2.4.

CHAIRMAN CORRADINI: Go ahead.

MR. SMITH: Okay. So Section 2.4 deals with hydrology and covers a number of topics, overview of the hydrology in a region, assessment of flooding, assessment of minimum lake levels, groundwater, and radionuclide transporting in groundwater. Next slide, please.

So this is another, again pictorial of the site. But the site's located on the western shore of Lake Erie. Swan Creek, which is the body right to the north of the site, approximately a mile from the location of FERMI 3.

DR. WALLIS: So Swan Creek is really a piece of the lake, it's so wide.

MR. SMITH: At that point. And as soon as you go inland it becomes fairly small, fairly quickly.

DR. WALLIS: I notice you don't give us any numbers here about these floods. But there is a table where you said that 500 year flood is for 5,000 cubic feet per second in Swan Creek. Five thousand cubic feet per second I think it says in the table.

And then the maximum credible flood is about 30 times that. And the staff's maximum credible flood is about 40 times that. Now a 500 year flood is way out at the end of the distribution, almost never happens, right.

How can something 40 times as big be credible? I mean, the 40 times as big must be the billion year flood or something, if you look at the statistics.

CHAIRMAN CORRADINI: Are you asking him or the staff? You're asking him about his 30 --

DR. WALLIS: Well, I'm saying --

CHAIRMAN CORRADINI: -- time one.

DR. WALLIS: -- they're not giving any numbers here. And we have these weird numbers in the table. How can you account for this enormous flow rate? And when you get it, I understand Swan Creek becomes about four or five times as wide. So the lake gets bigger. And it still doesn't challenge anything?

MR. SMITH: That's a good thing.

MEMBER STETKAR: That's a big lake.

CHAIRMAN CORRADINI: So you want him to --

DR. WALLIS: Well, the first question is, why should we believe these enormous flow rates, which are bigger than ever occurred in the Connecticut River, and I think in the Colorado River.

I mean, these are huge flow rates. Why should you come out with some numbers which are so enormous? And with so far away from your 500 year flood --

CHAIRMAN CORRADINI: You're looking for help I assume, over on here --

MR. THOMAS: Right. Between Gerry and Beth, can you guys help answer those?

MEMBER STETKAR: -- those numbers come

from?

MS. QUINLAN: This is Beth Quinlan from Black & Veatch. I think the numbers are referring to in terms of our, those very large numbers, which I think is 164,000 CFS --

DR. WALLIS: Cubic feet per second --

MS. QUINLAN: Yes.

DR. WALLIS: That's bigger than ever occurred on the Connecticut River, ever.

MS. QUINLAN: Well, that is based on a theoretical, probable, maximum flood.

DR. WALLIS: But it can't be probable if it's way beyond the comparable.

MS. QUINLAN: It's just the way it's defined. I don't think anybody really expects that flood to ever occur. I don't know that there's a recurrence interval.

I've heard people say that the probable maximum flood is one in 10,000 years, or one in even greater recurrence intervals. We certainly don't expect a flood of that to occur.

DR. WALLIS: But if it does occur then it's going to wash down all kinds of stuff, as we had in Hurricane Irene, as I was saying, propane tanks and things. You get all kinds of stuff in that kind of a flood. If you have storage tanks for propane on a big thing, not little things.

So ten miles upstream they may end up banging against the wall of the plant. Just the scale of this thing is immense. And I don't think it makes any sense. But if you're going to consider that sort of scale, you've got to consider all the effects. It's a huge flood.

MS. QUINLAN: Well, I would agree that it is a huge flood. And that we don't really ever expect that to happen.

DR. WALLIS: But --

CHAIRMAN CORRADINI: Can I try his question differently? Are you trying to tell us that this is the outer bound calculation that only looks at inundation, but not the coincident effects?

DR. WALLIS: No, what I'm saying --

CHAIRMAN CORRADINI: That's what I think she's saying.

DR. WALLIS: One thing. Is it so far beyond the 500 year flood, 40 times the 500 year flood doesn't make any sense if you look at the statistical curve.

You look at, if you plot the statistical curve for flooding on the, actually something developed by Dartmouth College in the 1800s or something.

So this would be -- the probability of this thing is absolutely minute.

MS. QUINLAN: I agree.

DR. WALLIS: And putting it down as a number in a report though, makes one think about it. And if it is that big, there are all kinds of contingent effects, you know, extra effects, other than just water that you have to think about. So if you're going to put it in the report, you've got to consider what it really does.

MEMBER ARMIJO: Something that dramatic you'd have geological evidence to --

DR. WALLIS: I think the best solution would be to --

MEMBER ARMIJO: Get rid of it.

DR. WALLIS: -- show that the probability of this thing is so tiny, it's not a maximum probability at all.

CHAIRMAN CORRADINI: I'm waiting for John to say something.

MEMBER STETKAR: No, I'm waiting for everybody to finish. You guys all ought to come to our subcommittee meetings on Reg Guide 1.59. That's the whole basis for this nonsense. The whole basis for the nonsense of design basis flooding is that's what the staff says you ought to do.

It's not probabilistic, it's not maximum, it doesn't have a recurrence interval, despite what people might want to try to make up, anecdotal experience. It's simply a number.

That number doesn't have any relationship to any other number that's calculated by any other probable maximum method. Because they're all done independently. They're simply numbers.

DR. WALLIS: But if this happened --

MEMBER STETKAR: On the other hand, from a design basis perspective, if you can show that the site can withstand that absurd number, whatever it means, you're okay.

DR. WALLIS: If this happened you'd have something like --

MEMBER STETKAR: Which is the way it's used.

DR. WALLIS: -- three feet of silt --

MEMBER STETKAR: It's not a probabilistic --

DR. WALLIS: -- deposited all around the plant.

CHAIRMAN CORRADINI: So I'm going to take a prerogative. I think you're right. But I think what John is saying, his subcommittee is generically handling it. And you will --

MEMBER STETKAR: Well, we're frustrated.

DR. WALLIS: I think it's an absurdity. It's an absurdity that's created by the regulatory structure.

MEMBER STETKAR: Well, but It's the way traditionally these analyses are --

DR. WALLIS: Okay. If you're going to put it in a report, you can't just leave the number in there for someone to look at and say, that's shocking.

MEMBER STETKAR: You're asking for an assessment of the frequency of a hazard, and an evaluation of the consequences of that hazard. That's not a design basis construct.

DR. WALLIS: Either show that it's -- Because it's so unlikely that it should never be in the report. Or if it is in the report, look at all the consequences of it.

CHAIRMAN CORRADINI: I don't think we disagree with you. I just don't think we're going to --

MEMBER STETKAR: It's a generic issue for all flooding analyses that are --

DR. WALLIS: Yes. But somebody from the outside looking at the report like this, would say, well, I'm not going to say what they'll say. But they're going say some things which are striking. Because when this sort of thing happens it washes away all the dirt, all the surrounding -- It does all kinds of stuff.

DR. KRESS: But that's the nature of design basis accidents. You just deal with it.

DR. WALLIS: But if you're going to have a design basis, you've got to analyze it realistically. If you're going to say there's that much water, you've got to say what it does.

DR. KRESS: Well, usually the design basis --

MEMBER STETKAR: I'm sorry, you don't analyze design basis LOCAs realistically, Graham.

DR. KRESS: That's right, that's right.

MEMBER STETKAR: You don't analyze design basis LOCAs realistically.

CHAIRMAN CORRADINI: They got you there, Graham.

DR. HINZE: No, come on --

DR. WALLIS: Then you've got to look up

the LOCA again.

MEMBER STETKAR: You don't analyze design basis LOCAs realistically.

DR. WALLIS: But they're not such extremes as this.

MEMBER STETKAR: Yes, they are. Double ended guillotine shear of the largest pipe in the plant, coincidentally with a loss of off site power.

DR. WALLIS: If it happens then you have to analyze all the things that happen, right.

MEMBER STETKAR: And they don't do it realistically.

DR. WALLIS: But they still do it. They have to do it.

MEMBER STETKAR: They do a stylized analysis --

DR. WALLIS: If it's an --

CHAIRMAN CORRADINI: Okay. I'm going to declare a truce. I think we're in agreement with your observation. I do think though it's a generic issue that John's committee's taken up. So Graham volunteers to help you.

MEMBER STETKAR: It's a real problem with all of these, the LOCAs.

CHAIRMAN CORRADINI: I think you're right though. Because yesterday, just to put the point forward, in Steve's committee relative to seismic, I asked a similar question on the phone about, if the seismic --

I'm sure John will tell me I did something wrong in trying to say the words. But basically the seismic analysis is the same thing. If I'm going to push this to a large amount, I have to look at the coincident effects.

DR. WALLIS: But then you have to do a proper analysis.

CHAIRMAN CORRADINI: Correct.

DR. WALLIS: And in the LOCA it may be absurd, but they have to analyze large break LOCA. They spend hundreds of millions doing experiments on this thing.

CHAIRMAN CORRADINI: I have this funny feeling we're going to spend an awful lot of time on these natural disasters the next few years.

MEMBER STETKAR: Yes.

CHAIRMAN CORRADINI: Let's move on.

DR. WALLIS: But have you ever seen what happens in a flood like that? In the Gulf Coast gets covered with three feet of salt. That's the kind of thing that happens. And it takes two years to clean it up.

CHAIRMAN CORRADINI: Or the hotel along the river gets washed away.

DR. WALLIS: Yes, it does. And where does it go?

CHAIRMAN CORRADINI: Yes, in Vermont --

DR. WALLIS: It goes down into Lake Erie.

MEMBER STETKAR: Okay. Well, we --

CHAIRMAN CORRADINI: I think you can see, the committee is passionate about this.

MR. SMITH: Absolutely.

CHAIRMAN CORRADINI: Keep it in mind.

DR. WALLIS: What are you going to do?

MEMBER STETKAR: Nothing.

CHAIRMAN CORRADINI: I think they're going to call it, this is a design basis number that they satisfy.

MR. SMITH: Correct. Which is the next slide.

CHAIRMAN CORRADINI: Yes. I think that's, from a regulatory standpoint, just to make sure Professor Wallis is on. I think they're, from the licensee standpoint, that's all they can do.

DR. KRESS: Yes. It's similar to the fact that when you look at the evaluation of safety goals.

You don't look at the societal risks. You just look at the individual risks. And that's all that's in the regulations.

CHAIRMAN CORRADINI: Okay.

DR. KRESS: So as long as you satisfy those, you're okay.

CHAIRMAN CORRADINI: Now we've moved to his hobby horse. So I'm going to --

DR. KRESS: I'm not going to --

CHAIRMAN CORRADINI: Let's move.

MR. SMITH: Okay. Slide four, please. Okay. So this is a summary of the results for our local intense precipitation. I'm afraid to say the word probable maximum flood from Swan Creek, and wind driven surge from Lake Erie. And the takeaway from this is that all of our calculated values are within the bound --

DR. WALLIS: So if this flood raises the water level .1 foot above Lake Erie as I understand. And I read the tables, .1 feet. All this water only raises the level .1 feet above the lake.

MR. SMITH: Yes.

DR. WALLIS: That's what I read.

MS. QUINLAN: The reason that Swan Creek flooding doesn't really have much of an effect is because that model run was made with Lake Erie at the 100 year level, and with the surge.

DR. WALLIS: That's right.

MS. QUINLAN: And so essentially the shoreline of Lake Erie is already well inland --

DR. WALLIS: It really goes up the river.

MS. QUINLAN: -- is into the river. Yes. So the stream really does --

DR. WALLIS: I understand that. I understand that. Okay.

MR. SMITH: Next slide.

MEMBER STETKAR: Before -- I was writing notes on something else, so you'll have to excuse me if I'm not in sync. Did I skip a discussion of the maximum level of Lake Erie? Or are you going to get to that?

MR. SMITH: We're going to get to that.

MEMBER STETKAR: You're going to get to that. Okay. I'll wait. Sorry, I'll go back in my hole.

MR. SMITH: Okay.

DR. WALLIS: Local tsunami thing with the --

MEMBER STETKAR: I don't have the control here with the --

CHAIRMAN CORRADINI: This is a committee. There is no control. There's only persuasion.

MR. SMITH: So one of the three flooding scenarios we considered would be the local intense precipitation. And for the flood analysis we did a local intent precipitation. Precipitation rate of 5.8 inches in five minutes was assumed.

And the analysis assumed the additional water input due to snow melt and all of the drain paths on the FERMI 3 elevated areas are assumed to be blocked. That's all of the precipitation. We assumed the flow down the slopes of the elevated areas.

And then for the analysis, the flow paths from the elevated areas are limited to a single flow path, resulting in conservative water level predictions. And then the results of this analysis, so that the predicted water level's 4.1 feet below the FERMI 3 plant grade elevation.

DR. WALLIS: The plant grade is not eroded in any way?

MR. THOMAS: We have design provisions in the FSAR to mitigate the effects from erosion, or --

DR. WALLIS: Is it prevented by having large rocks, or grass? Or what is it, what prevents the erosion?

MR. THOMAS: It's large rocks or grass. There's standards within the State of Michigan for mitigating the effects of water, based on velocity.

DR. WALLIS: Well, you know that once it starts it's likely to make a canyon very quickly.

MR. THOMAS: That's correct, it would. And that's why we have provisions to preclude that from occurring.

DR. WALLIS: Okay. Well, what is the sense of your point? Because I'm thinking of all the hundreds of roads that turn into canyons in Vermont in the last year? Okay. I'll assume it's all done properly.

MR. THOMAS: Providing more paths for the water to move away from the plant.

DR. WALLIS: Someone's on top of it, right.

MEMBER STETKAR: Steve, I think I know the answer to this question. But I just want to make sure I understood some of the drawings. Are the, are all of the RTNSS -- I couldn't find, at lease where I was looking, I couldn't find a good topographical map of the site. Are all the RTNSS structures also up at, whatever number you want to use, 289.3?

MR. SMITH: All the situated structures

and all the RTNSS structures are up on the elevated area.

MEMBER STETKAR: They're all on the same elevation?

MR. THOMAS: Yes.

MEMBER STETKAR: Okay. Thanks. That helps. Thanks.

MR. SMITH: Next slide. So the probable maximum flood due to watershed precipitation. And I think we already started talking about this with Swan Creek. So this is the second of three flooding scenarios.

And for this flood analysis the maximum precipitation rate over the watershed is assumed, the analysis assumes the additional water input due to snow melt. And water losses due to infiltration are not credited in the analysis, which makes the analysis conservative.

And the maximum water level for the probable maximum flood analysis is with the maximum water level in Lake Erie due to a coincident probable maximum surge.

And in this case the water level is driven by the lake water levels you've previously discussed. And again, the results are not again, below the, you know, the elevated areas.

DR. HINZE: This assumes that no one, that there's no infiltration.

MS. QUINLAN: That's correct.

DR. HINZE: That's when the soil is frozen.

MS. QUINLAN: The soil is saturated or frozen. But yes, there's no infiltration.

DR. HINZE: Okay.

MR. SMITH: Next slide. So then flooding from Lake Erie. Probable maximum surge and seiche. And this is the third of three flooding scenarios that were considered. And the initial water level is assumed to be at the 100 year maximum lake water level of 576.4 on the plant data.

The analysis assumes a constant 100 mile per hour wind in the direction that results in the maximum flood water level. Assuming steady 100 per mile wind speed is very conservative, as the three second gust for the FERMI site is less than 100 miles per hour. And the analysis determines the maximum still water levels and considers the impact from the wave --

DR. WALLIS: How big are the waves with the 100 mile an hour wind?

MS. QUINLAN: This is Beth Quinlan again, from Black & Veatch. At an offshore site the waves would be 11 feet. I was thinking it's also a period of 11 seconds. We did an analysis taking that wave from that offshore point, and brought it across shore.

Again, during the surge the water, the shoreline really will be on shore. So we did a whole transformation of wave breaking, and changes in wave height, all the way from the point in the model to the site and looked -- By the time we get to the site the wave's about two feet tall with a run up of three feet.

DR. WALLIS: So it's really small, even with this weather.

MS. QUINLAN: That's because at that point the water depth is very shallow. And so the wave is broken.

DR. WALLIS: So it breaks offshore.

MS. QUINLAN: We'll have some of this information in another slide there.

MR. SMITH: I think it's the next slide. So this figure is in the FSAR. It's also linked with this in the SER. And I think that --

DR. WALLIS: So these 100 mile an hour winds don't produce barge impacts and things like that? Things that float on the lake in a 100 mile an hour wind are not going to --

DR. HINZE: I think that they get off the lake.

DR. WALLIS: There's no solid in this water? There's no --

CHAIRMAN CORRADINI: Not for this calculation. Because either is bound, so I think they're going to say to you. Is that a correct assumption?

DR. WALLIS: So the regulatory requirement is that the water just be clean water?

MR. SMITH: It seems to be clean water. So this slide basically talks about the alternative three that we used from the ANSI/ANS. That's 2.8 guideline for determining the design basis flooding at all reactor sites.

And so we did all three of the scenarios, the alternatives that are described and the alternative rate. The 25 year flood probable maximum surge incession, 100 year initial lake level, turns out to the be the most limiting for us.

And the maximum calculated flood elevation is 3.4 feet below the FERMI plant grade, which is 2.4 feet below the design flood elevation for safety related and RTNSS structures.

MEMBER STETKAR: Peter, can I ask a question? This is just, I got confused about something. And this is a curiosity. I'm not trying to set you up. And probably your meteorological folks might be able to comment.

This is excerpted from the SER, but when I looked at the maximum lake level that you used in these analyses, there's a statement, at least in the SER.

It says the applicant compared the average monthly water levels from 1970 through 2007, to the water levels observed over the entire period of record, which was 1918 through 2007.

It found that the period from 1970 through 2007 include the highest water levels from the state itself. The averages of the monthly water levels for the period from 1970 through 2007 were also higher than the averages for the entire period of record, 1918 through 2007.

I might be misinterpreting that. But at least on the surface that says to me the Lake Erie level has been rising over the last century or so. Is that true? Or am I misinterpreting the words?

MR. MILLER: This is Gerry Miller from

Black & Veatch. Actually the flows through the Great Lake systems are controlled by the Corps of Engineers.

MEMBER STETKAR: Yes.

MR. MILLER: So the lake level has gone up. But that's only because they're allowing --

MEMBER STETKAR: Because it's just --

MR. MILLER: -- more water to go in.

MEMBER STETKAR: -- the way that they're controlling.

MR. MILLER: It's the way they're controlling it.

MEMBER STETKAR: Okay. Thanks. I was hoping that was the answer. But, thank you.

MR. SMITH: So I'll move on here. So minimum lake levels. So to make your normal lake levels approximately 571 feet. And the historical minimum lake levels about 565.1 feet. And that's all plant datum.

The station water system and the backup fire pumps take suction from Lake Erie. And the elevation of the intake structure and the pumps is designed to ensure that they have sufficient submergence and NPSH during periods of low water level. And then for ESBWR the ultimate heat sink is entirely contained with the ESBWR reactor building.

And --

DR. WALLIS: How are they protected against debris?

MR. SMITH: I'm sorry.

DR. WALLIS: How are they protected against debris. And if you have 100 mile an hour wind with 11 foot waves, it's going to churn up a lot of mud and rocks and vegetable matter and stuff. They have -- How are they protected against the soil and debris?

MR. SMITH: There are screens on the intakes.

DR. WALLIS: Yes. I understand that. But if you get a huge amount of debris in the water.

MR. SMITH: So I don't rely on these screens. They can function.

DR. WALLIS: It's an ultimate heat sink?

MR. SMITH: No the ultimate -- This is not the ultimate heat sink. So and it isn't for FERMI 2 either.

DR. WALLIS: But the station water system does play a pretty important role.

MR. SMITH: I don't disagree, but we've isolated really from reliance on Lake Erie for safety related purposes.

DR. WALLIS: Well, in the case of this 100 mile an hour wind on the lake, would these intakes plug up with debris?

CHAIRMAN CORRADINI: I don't think they analyzed --

DR. WALLIS: This is not in the regulations?

CHAIRMAN CORRADINI: I don't want to speak for you, but I sense that you haven't analyzed for this?

MR. SMITH: No.

DR. WALLIS: There was a quad to analyze it. But I mean, it seems to me that would happen.

MR. THOMAS: Well, also if you had this flood from this partial or sustained 100 mile an hour wind, the station water structure and the cooling tower structure is not protected from that flood. Debris or not, it's not --

DR. WALLIS: It's a bit like the last question. If you're going to postulate something like a 100 mile an hour wind or something, you can't just look at some superficial thing.

I mean, you look very carefully at the level and all of that. But 100 mile an hour winds for a while on the lake do all kinds of things besides just raising the level.

MR. SMITH: I don't disagree.

DR. WALLIS: I don't understand this business of postulating something and not looking at all the effects.

CHAIRMAN CORRADINI: Can we at least hold off your question for the staff, since I --

DR. WALLIS: Maybe it's something generic that John is looking at.

CHAIRMAN CORRADINI: I think the answer to that is yes.

DR. WALLIS: I'll leave it to John to sort it out properly.

CHAIRMAN CORRADINI: But let's ask the staff when we get to that point, all right. Because I think you deserve an answer, at least at this point, to see where it sits. Go ahead.

MR. SMITH: Okay. Now for something completely different. Groundwater. Mike, be ready. Okay. So in Section 2.4 we looked at groundwater. The DCD requires that the maximum groundwater level be at least two feet below the plant grade.

FERMI 3 plant grade is at 590 feet. And the historic height groundwater level is 577.3 feet, which is approximately 13 feet below grade. So both the maximum historic high groundwater, and the probable maximum groundwater elevations are more than two feet below plant grade. And therefore, the DCD requirements are satisfied.

DR. WALLIS: Again, this is based on historic? It's not based on this water flowing at 40 times the maximum historic rate? Again this, you don't have to do it for the groundwater, but you have to do it for the roof.

MR. THOMAS: Well, also, as described in, excuse me. Also as described in the FSAR, if you postulated that your max groundwater level was due to the surge where it saturated the elevated area, that still satisfies the DCD --

DR. WALLIS: Still satisfies it, right.

MEMBER ARMIJO: What is the current groundwater level? Just for --

MR. THOMAS: It's about this 570. Oh, the current?

MEMBER ARMIJO: Yes, current. Right now, not the historic maximums or anything else. Just what is it right now?

MR. THOMAS: I don't have that specific number. It's a few feet below the max. But I don't have that.

MEMBER STETKAR: Is that, does it track lake level pretty well?

MEMBER ARMIJO: You would think, hydraulics being hydraulics.

MEMBER STETKAR: In fact that's what I'm trying to get at. So you don't have an answer to what the current groundwater level is?

MEMBER RYAN: It's either a little ahead or a little behind the length.

MEMBER STETKAR: Actually not.

MR. THOMAS: During the break or during lunch I can pull out the --

MEMBER ARMIJO: Fine.

MR. THOMAS: -- year's data. There's some figures that are in the FSAR that give the monitoring well water levels. And we can pull that out for you.

CHAIRMAN CORRADINI: That's fine. I think it's just FYI for us.

MEMBER STETKAR: But FYI, let me ask you, because you're going to get into a couple of other things here. So I might as well ask before you get too far into hydrology. What's your experience been on Unit 2 with groundwater intrusion to buildings, underground cable ducts, pipe ducts and things like that?

MR. SMITH: So we have had water intrusion on FERMI 2 into underground ducts. And I'd say to a lesser degree in building this plant. I'm not aware of a part and a problem.

MEMBER STETKAR: Because of that, are you planning to install any de-watering systems in Unit 3 for underground ducts, and in particular pipe chasings and underground cable ducts? Because there will be some of those. Or for any buildings?

MR. THOMAS: The plan right now is not too install APR.

CHAIRMAN CORRADINI: I think we had discussed that previously. I remember we had brought this up.

MEMBER STETKAR: Well, we brought it up under the design certification. But remember the design cert -- Did we discuss it here also?

CHAIRMAN CORRADINI: I thought we did. I thought we did. Because I think somebody over on that side of the table asked the same question about this. And I seem to remember currently there was no plans.

MR. SMITH: No, but it's a good point from the operating experience standpoint. That when we get to the detailed design. Because right now we're going through a program at FERMI 2 where we are upgrading all of the bus ducts and --

MEMBER STETKAR: I checked your cable history. You haven't had any weathered cable faults. You've had cable faults from other reasons, but --

MR. SMITH: Okay. We're on Slide 11 now. So the groundwater flow is in Bass Island's aquifer at the FERMI site. And prior to the development of the area to the west of the site, the predominant groundwater flow direction was toward the east, toward the lake.

And this is something that when we did our studies for FERMI 3 that there was a change from what we experienced when the original studies were done from FERMI 2. Because now with de-watering of inland quarries in the vicinity of or in Monroe County, that the predominant flow of groundwater is from the lake --

DR. WALLIS: Can you give me an idea of the flow rates? I mean, how many feet does this water go in a year? It doesn't go very fast, does it?

MR. SMITH: No.

DR. WALLIS: It's got very straight gradient.

MEMBER STETKAR: It just goes back from the plant to the lake, to the groundwater. A thousand years or a hundred years?

DR. WALLIS: It goes a few feet in a year, doesn't it. I'm just trying to get an order of magnitude.

MR. THOMAS: I'm just trying to -- It's about three -- Let me look that number up for you.

DR. WALLIS: Okay.

MR. SMITH: So when we did our transport radionuclides analysis we did it in both directions. Assume --

MEMBER RYAN: This reversal occurred on the previous decades, or 100 years?

MR. SMITH: I would say since the 1960s.

MEMBER RYAN: Fifty years. So it would take 50 years for it to turn around the other way?

DR. HINZE: No

MEMBER RYAN: No?

DR. HINZE: It shouldn't do that. The head's high enough to just push it right back. It shouldn't take 50 years, since it's in the Bass Island.

CHAIRMAN CORRADINI: It's in the what? I'm sorry.

DR. HINZE: Well, it's in the Bass Island, which is fracture porosity. And that's going to move very rapidly.

MEMBER RYAN: Yes, Okay. It's like I -- Thank you.

MR. THOMAS: I can respond to your question regarding transit times.

MEMBER RYAN: Please.

MR. THOMAS: We looked at transit times to the, you know, we have this well that's just off the site to the west, that we had to look at transit time to that well.

And we also had to look at transit time to the lake. The lake's closer. Obviously when we did our testing, or when we did the investigation, we had a variety, or we had a range of hydraulic kind of activities that were measured.

MEMBER RYAN: Sure.

MR. THOMAS: And so the, depending on which hydraulic kind of activity, it's going to be, you know, between one and 40 years. So about 20 years average depending on your --

MEMBER RYAN: Between one and 40.

MR. THOMAS: Yes. You know, depending on your hydraulic --

MEMBER RYAN: The certainty in that mean is pretty significant. It's 20 plus or minus 20.

Plus 20, minus --

DR. WALLIS: We're going to build channels in the rocks and things.

DR. HINZE: Is that in the Bass Island? Or is that in the glacial drift?

MR. THOMAS: That's in the Bass Island.

DR. WALLIS: The aquifer actually encompasses the whole site doesn't it?

MR. SMITH: It does.

DR. WALLIS: So that's what governs it?

MR. SMITH: Correct. Next slide, please. So this, we'll start talking about our accidental release of liquid effluents to groundwater. And so the ESBWR design includes provisions to preclude accidental release of radioactive liquids.

And the elevations of the liquid effluent tanks are below the groundwater elevation. So a postulated breach in the building would allow groundwater to flow into the building in lieu of effluent accidents in the building.

So our analysis of accidental release to groundwater assumes that there are two possible flow paths. One inland toward the well, and one to the lake. The minimum distance is from the source to the postulated receptor. And --

MEMBER RYAN: What's the transit time? That's more important than distance.

MR. SMITH: So we would just look up transit times.

MR. THOMAS: Right. I will give you one transit time. What we did is, when we did the modeling -- And Jim can speak to this because he did the analysis. But we used inputs to try to maximize, or minimize the time to maximize the concentrations at the receptor.

So the, as far as hydraulic connectivity, that was an average value. We used a limiting gradient. We used a low value for our factor of porosity, which significantly increased the velocity --

MEMBER RYAN: If you get that much to the receptor you could, without dispersion and --

MR. THOMAS: Right. You know --

MEMBER RYAN: -- all those kinds of things.

MR. THOMAS: We wanted a maximum, you know, if we wanted to end up on the conservative analysis, you know, so we used assumptions and inputs to maximize the concentration at the receptor.

MEMBER RYAN: Did you do any uncertainty

analysis runs to see how it varied, based on the parameter assumption?

MEMBER RYAN: We -- Jim, you want to speak to that?

MR. HARRELL: Yes, this is Jim Harrell. We looked at a range of parameters. And ultimately only documented the limiting parameters. But to give you an idea of the transit times that we used to the closes well and to Lake Erie, were .65 years and 1.83 years, which were the very low end of the transit times.

MEMBER RYAN: I'm just curious. How about the range? You know, it's always helpful to understand what, where you picked those numbers, and what the range of numbers could be. Do you have those handy?

MR. HARRELL: The upper ends were over 18 years for the transit time.

MEMBER RYAN: Okay. And what you just, the low number you mentioned, that was the lowest number?

MR. HARRELL: Yes.

MEMBER RYAN: Okay. Thanks.

DR. WALLIS: Are you following a Reg Guide or something when you do this? Or does each plant choose its own method?

CHAIRMAN CORRADINI: They're looking to you to answer that.

(Simultaneous speakers.)

MR. SMITH: There's a history with this --

MEMBER RYAN: One at a time, please. One at a time.

MR. SMITH: There's a history associated with this analysis in that initially we started to use RESRAD as a code to model. And the difficulty that us and others have experienced is how do you model the instantaneous release? And so after doing many tricks to try to do that, we ultimately migrated to another analysis --

MEMBER RYAN: What code did you use?

MR. HARRELL: We actually just used hand calcs, spreadsheet calc, just standard diffusion type calc.

DR. WALLIS: And the radionuclides follow the water?

MR. HARRELL: Yes.

DR. WALLIS: They don't attach chemically to the soil at all? They just follow the water.

MEMBER RYAN: That's probably not an unreasonable assumption to be --

DR. WALLIS: Or some nuclides --

MEMBER RYAN: -- extra conservative, but then I'm sure there's going to be some radionuclides that will move and some that probably will not.

MR. HARRELL: To answer your original question, we followed the guidance of the standard review plan as well as the branch technical position that describes --

DR. WALLIS: So there is a regulatory position.

MEMBER RYAN: Thank you.

MR. SMITH: Next slide. So on our analysis results that included the concentrations of these radionuclides in the mixture at the receptor is less than the associated 10 CFR 20 units. And some --

DR. WALLIS: Are you going to give us any numbers? Are they far away from it, or close to it?

MR. THOMAS: They are, let me give you that summary. We had to go through a couple of iterations. You know, we basically did a step wise approach to the analysis, where first we just take credit for --

The initial analysis we just took credit for radioactive decay. And then some of the results did not meet the limits when we just took credit for decay.

So we had to take credit for a limited number of the isotopes. We took credit for the Kd factors, the absorption factors that we obtained through testing.

MEMBER RYAN: You did testing for Kds?

MR. THOMAS: We did testing for a selected number of Kds, or a selected set of Kds. Well, there's, let's see, cerium, cesium, cobalt, iron, manganese, ruthenium, silver, strontium. I can't -- It starts with a Y.

MEMBER RYAN: Yttrium.

MR. THOMAS: You know, we did yttrium and zinc. Are the ones that we selected. And that was based on an initial screening that we had done.

MEMBER RYAN: Yes.

MR. THOMAS: And so we factored those in the analysis. We still did not have acceptable results. So we had to take credit for some dispersion. Is that what you would characterize that, Jim?

And when we ended up, you know, and for the case to the lake, and the case to the well when we met the criteria we stopped that, you know, we stopped that analysis.

So the result to the lake, you know, the maximum sum of the ratio was about .2, or is it moving around 20 percent of the limit? For the case to the well it was lower than that. But that's because we had to do one additional dispersion case for the case to the well.

MEMBER RYAN: Was the dispersion assumption based on measurements?

MR. HARRELL: Yes.

MEMBER RYAN: What measurements? How did you do that?

MR. HARRELL: We looked at longitudinal dispersion. We used measurements, and then we also used equations to get an average.

MEMBER RYAN: What kind of measurements? I mean, that's what I'm trying to understand, is how you come up with a dispersion model? Based on what data? If you want to have it as a take away when you come back --

MR. THOMAS: Yes, I think that would be good.

MR. HARRELL: Yes, we want to do a look up for you.

DR. WALLIS: And this is all for the worst case, where it gets to the lake in a year and a half or something?

MR. HARRELL: Right.

MR. THOMAS: .65 years to the lake and 1.8 years to the well.

DR. WALLIS: Well, I thought it was the other way around.

MEMBER RYAN: I guess what I think all the questions that you're hearing are based on is what -- You know, and I appreciate the fact that you're concerned with modeling.

But we're trying to get a picture of, you know, what was conservative? How conservative was it? What answer did you get? And how might, you know, where is that answer different from say a nominal case? Or a not conservative case.

We're trying to understand the range of possible outcomes. And what conservatism or non-conservatism that's based on.

DR. WALLIS: It would help to have a probabilistic analysis.

MEMBER RYAN: At least get some insight. So that's, I mean, sorry for all the questions. But that's kind of what we're trying to understand.

CHAIRMAN CORRADINI: So why don't we take it that you're going to get us back a bit, a discussion.

MEMBER RYAN: Yes, okay.

CHAIRMAN CORRADINI: And let's keep on going.

DR. WALLIS: In my state, the water is reputed to flow in veins, not in this kind of porous medium. Because there are cracks in the rocks, you know.

MEMBER RYAN: Well, there are limits to --

DR. WALLIS: It might just hit one of these cracks. But you know, this isn't like that? This soil is a porous medium?

CHAIRMAN CORRADINI: I don't think it's granite.

DR. WALLIS: Well, it has veins in it.

CHAIRMAN CORRADINI: Like beautiful Vermont.

MEMBER RYAN: I'll bet you it's a fault.

MR. SMITH: Let's go to the next slide. We'll go to the next slide. So we're moving on to groundwater monitoring. And essentially we're talking about the groundwater monitoring program that we'll have after licensing, during operations.

DR. WALLIS: We don't have any check until we ask the staff about how realistic your groundwater modeling was.

CHAIRMAN CORRADINI: Well, I think we can ask the staff that while they give us some details as they approach them.

DR. WALLIS: Okay.

MR. SMITH: So basically this slide says that the groundwater monitoring program that we'll have established conforms with the pertinent guidance. And it will make use of existing wells to the extent practical. And will be monitored during construction and during operations. That's all I have on 2.4.

MEMBER SCHULTZ: One question with regard to the monitoring program. In FERMI 2 are there any issues associated with tritium release?

MR. SMITH: Yes. Actually we started, when we were starting to do this project, we were delayed in being able to go in and drill because there was tritium discovered in water that was leaking from some of the cable vaults that I talked about earlier.

MEMBER SCHULTZ: Okay.

MR. SMITH: And so we got an extensive groundwater monitoring program. But the principle source for us was not from leakage of piping. It was from, we have a release path from the -- It's a glance seal exhauster.

MEMBER RYAN: Say that again? I'm sorry.

MR. SMITH: The glance seal exhausters on the main feedwater pump turbines has a path. And that was a -- So what we were seeing is tritium that was being released to the atmosphere and then --

MEMBER RYAN: Hit the train.

MR. SMITH: So that's a --

MEMBER RYAN: What are the guides of tritium concentration you're seeing from that?

MR. SMITH: My recollection -- They were barely detectable.

MEMBER RYAN: Even with that little bit --

MR. SMITH: Well, I remember taking my water samples down to the chem lab. And waiting an hour while they would count. And they would get like --

MEMBER RYAN: Doesn't help me. I need to know --

MR. SMITH: Yes, I know. I just don't have --

MEMBER RYAN: Okay. That's fine. We can find out later.

MR. SMITH: So just -- I'll do a lookup for you on what we saw historically.

MEMBER RYAN: Thank you.

MEMBER SCHULTZ: Does that account for the phrase to the extent practical? In your slide you have the phrase, we're going to use existing wells to the extent practical. Is that location --

MR. SMITH: Yes. Because some of the wells --

MEMBER SCHULTZ: -- or because of the tritium?

MR. SMITH: No. Some of the wells that we have are going to be removed because they're in the power block area. So when we --

MEMBER SCHULTZ: Okay.

MR. SMITH: -- go into construction we won't have access to them. So --

MEMBER SCHULTZ: So what I would -- What I take from what you've said is, yes there has been tritium associated with FERMI 2. But it's an issue that's well understood, has been addressed, is continuing to be addressed.

And the program for Unit 3, albeit there's considerations associated with release that are different in design. But all of that can be accounted for based on what you know about FERMI 2.

MR. SMITH: Yes.

MEMBER SCHULTZ: Thank you.

DR. HINZE: Let me ask the question if I may, please. If the de-watering of one or more of the quarries is terminated, will there be any -- Will this trigger any action by you? Will you need additional wells? Will you do additional monitoring? Is there any trigger that will be set as a result of that?

MR. SMITH: So I'm not sure that there would be a trigger. From our analysis standpoint, you know, we've covered that eventuality. The monitoring program that exists today would certainly recognize the differences of that.

Because it covers the whole site currently, with the concentration around the existing power block. So I'm not sure that it would trigger us to do anything.

DR. HINZE: Anything more. Thank you.

MR. SMITH: Or anything different.

DR. HINZE: Thanks.

MR. SMITH: That's all I have.

CHAIRMAN CORRADINI: Okay. Any other questions from the committee? Okay. We're a bit behind, but let's take a break until, for ten minutes, until about 10:35 a.m., please, so we can get back and hear the staff with Chapter 2. And Graham had a couple of questions he would ask the staff at that point.

(Whereupon, the above-entitled matter went off the record at 10:24 a.m. and resumed at 10:37 a.m.)

CHAIRMAN CORRADINI: Are we okay? All right, why don't we get started? And the staff is up to talk about Chapter 2. And Tekia, I think you're going to kick us off?

MS. GOVAN: Yes.

CHAIRMAN CORRADINI: Okay.

MS. GOVAN: Good morning. My name is Tekia Govan. I am the NOC Project Manager for the Chapter 2 review of the FERMI 3 COL application. This presentation is being made to the ACRS Subcommittee and it will describe the NRC staffs review of this application and explain the conclusions related to their safety findings.

The review team consisted of Adrian Muniz as the Lead Project Manager, myself, Tekia Govan, the Hydrology and Meteorology Branch in which Jill Caverly is the Branch Chief. And the Radiation and Dose Assessment Team in which Michael McCoppin is the Branch Chief.

Chapter 2 entitled Site Characteristics

addresses geology, seismology, hydrology, and meteorology, the characteristics relating to the FERMI 3 site and vicinity in conjunction with the present and projected populated distribution, land use, site activities, and controls as presented in the FERMI 3 COL application.

The review of each of these sections focused on the applicant's demonstration that the characteristics of the site fall within the site parameters specified in the ESBWR design certification.

Or if outside those site parameters, that the design satisfies the requirements imposed by the specific site characteristics and conforms with the design commitments and acceptance criteria as it is described in the Design Certification Document.

As Adrian mentioned in his opening remarks, the staff still has open items in 2.5. And we will return to the subcommittee at a later date to present that section once the review is complete.

Aside from Section 2.5, the NRC staff review is complete with no open items. This morning the staff will discuss their review findings for 2.1 and 2.2, geography and demography, and nearby industrial transportation and military facilities, presented by Rao Tammara, 2.3, meteorology, presented by Brad Harvey and 2.4 hydrology will be presented by Henry Jones. At this time I would like to turn the presentation over to Rao Tammara.

MR. TAMMARA: Hello. My name is Seshagiri Rao Tammara. I'm a technical reviewer for the Sections 2.1 and 2.2. 2.1 contains geography and demography, 2.2 contains nearby industrial transportation and military facilities identification as well as the potential accidents evaluation of those facilities on the proposal site.

Our plan, next page, 2.1, most of the information is referenced by DTE, is incorporated by reference. And the site specific information is addressed for the site location as a part of COL item 2.0-2-A, exclusion area boundary as a part of COL item 2.0-3-A. And population distribution as a part of COL item 2.0-4-A.

Population distribution also requires to be addressed the population center distance and the population density. Of course there are no open items.

Site location and description, staff reviewed the applicant information pertaining to the site location and description based on the independent verification of the UTM coordinates which have been derived from the latitude and the longitude to determine the site location, and also the description of the area obtaining the information from the publicly available data and sources.

Staff found the applicant addressed information acceptable as it satisfies the guidance provided in NUREG-0800 2.1.1.

DR. WALLIS: There are no seasonal fluctuations, there's some places there are huge influxes of population. It isn't like that at all, is it?

MR. TAMMARA: I will address that one. This is just this part of 2.2 is location where it is --

DR. WALLIS: It's, and the people who actually live there. It's not, there's no fluctuations of people coming and going that matter.

MR. TAMMARA: But no, we are accounting the transient people are also included in our count.

DR. WALLIS: But in this area there's very little of that is not --

MR. TAMMARA: Right. Exclusion area authority and control as a part of COL Item 2.0-3-A, staff reviewed the applicant information pertaining to the Exclusion Area Authority and Control. Staff also independently verified the ownership of property in EAB, description of EAB and applicant's authority and control using the publicly available data and resources. And found the information to be acceptable as it satisfies the guidance provided in NUREG-0800 2.1.2

Next slide, please. COL Item 2.0-4-A contains the population distribution. Staff reviewed the applicant information pertaining to the population distribution including the population center distance and also population density.

Using the growth rates from the U.S. census and also the state census data, staff independently verified and calculated the, independently calculated also to check applicant's population projections, checked the population center distance and population density.

Based on the review and confirmatory evaluation, staff found the applicant's information to be acceptable as it meets the requirements of 10 CFR Part 20 and the guidance provided in NUREG-0800 Section 2.1.3.

MEMBER STETKAR: Seshagiri, if I look at the site I notice that, and draw a circle with a radius of about 20 miles around the center of the site, I notice that roughly about a third, and I didn't try to be very precise, about a third of that area is Lake Erie. I wouldn't expect a lot of people to live on Lake Erie.

So if I take two-thirds of that circular area and look at the ground area, and take the 2000 population census data with your transient population of 453,812 people, I get a population density on land of 542 people per square mile.

MR. TAMMARA: Right.

MEMBER STETKAR: So my question is why do the regulations allow me to distribute people over lakes and oceans and things like that where they probably won't live anywhere in the near time, future?

MR. TAMMARA: They're given then, originally of course I mean, you have to see the history, how the regulations and the guidance have been developed.

MEMBER STETKAR: Well, what's the intent of the regulation? I mean that's what I'm getting to.

MR. TAMMARA: Right.

MEMBER STETKAR: I would think that the intent of the regulation is to look at the population densities where people can live.

MR. TAMMARA: The intention of the regulation and the guidance is that you try not to put a plant where the density is really high because of --

MEMBER STETKAR: Okay, well --

MR. TAMMARA: -- potential impact item and that is the guidance.

So when they developed that guidance in the 1980, 1998, around that time frame, if you take a look at the Reg. Guide 4.7 and the regulatory provision C-2, there they have specified, I don't know what is the rationale to come up with 500 as the cutoff or whatever.

Maybe they looked at the history at where the plans were at that time and, because originally they might have located at really remote locations. I cannot answer the historical preview but they have come up with a recommendation that building for 20 miles of radius, you should determine and see whether you are within the range of 500 people per square mile. In doing that one, they did not distinguish this coastal area plant.

MEMBER STETKAR: Well, I guess that's my question is, is that rational? If for example, I had a plant sited on the center of a peninsula that was surrounded on 90 percent by water and I had population of 100,000 people on that peninsula, I could probably say that within a 20 mile radius I have less than 500 people per square mile out over that water. I mean, I haven't done that math but --

DR. WALLIS: Well, the same thing goes for a desert.

MEMBER STETKAR: Well, but I mean, people conceivably can live on a desert. You can build, I've seen people build houses in deserts.

CHAIRMAN CORRADINI: But I think you get his point.

MEMBER STETKAR: Yes.

MR. TAMMARA: I recognize your, I recognize your, I mean --

MEMBER STETKAR: But that's the way, that's the way the game is played.

MR. TAMMARA: No, no, that is the recommendation on the guidance given. But we are presently thinking of whether it is reasonable. If you go to the next steps, suppose you exceeded 500, what is the prescription? What is it, sure or not sure is not the regulation again, you see? If you exceeded 500, so what the guidance says is that you should look at the alternative use sites.

MEMBER STETKAR: Okay.

MR. TAMMARA: Evaluate alternative use sites and see whether you can come up with a rational justification to show the site you have picked has merits over the other ones, is advantageous. So if that is the case even, you know, suppose, if you can show and justify then still it is conceivable that you can select the site.

MEMBER STETKAR: Okay.

MR. TAMMARA: So therefore, on that basis even though your recommendation is good, I'm not saying when we talk about density we should talk about realistically. Therefore, you should exclude the land area, I mean water area. You should specify 20 miles consisting of land area, that should be a clause.

MEMBER STETKAR: Potentially habitable area or something like that, yes.

MR. TAMMARA: But however, the guidance given further is also now, is not a show stopper. So therefore, what I'm saying is presently even though it is not right, at the same time it is not stopping any plan to be not built.

MEMBER ARMIJO: So it's not right but it's not, you don't handle it in an irrational manner. It's --

MR. TAMMARA: The problem is we have to

make a modification to the guidance such that it will say you should calculate the density within the 20 miles excluding the water body or, you know, as you suggested maybe desert.

DR. WALLIS: There may be a reasonable rationale to say --

MR. TAMMARA: Right, that's what I'm saying.

DR. WALLIS: -- we shouldn't have more than a certain number of people within 20 miles. And I don't care where they are, whether it's water, land, desert, or what it is. That could be a rationale.

DR. KRESS: I can't resist --

DR. WALLIS: But when you talk about density, it gets a bit uncertain.

DR. KRESS: I can't resist saying it, if you'll pardon me, Mike --

CHAIRMAN CORRADINI: Did you get your question answered?

MEMBER STETKAR: Not yet, but Tom's got it.

DR. KRESS: These rules were put in to deal with societal risk. And we don't have good acceptance criteria for societal risk. And therefore we had to just rely on what we thought was reasonable assumptions back when we put these rules in. And we need to rethink the whole question of societal risk as to what I've been harping on for a long time. So I just have to bring that up.

MEMBER RYAN: When I think about population density I think about two things, one is where are they and, you know, the path of some kind of accident sequence that can happen --

MALE PARTICIPANT: How can you get them out?

MEMBER RYAN: -- at a plant and what exposure they're going to get, that's one.

And two, if there's time to evacuate people, how do you get them out? So I can see the situation where 500 people per square mile would be easy to get out, fine, plenty of roads, whatever the circumstances are. And I can see the challenge where that's not so good. The idea that I like a lot is the idea of revisiting this fundamentally.

MR. TAMMARA: That's what we are trying to. And at the same time, in addition to this one, the emergency planning and the other aspects that comes from looking --

MEMBER RYAN: All that outside data.

MR. TAMMARA: -- looking at the different points of view, evacuation times they are calculating and they are looking at them. So this is one part we are looking in Chapter 2. But in addition, they are looking in Chapter 13, different way also.

MEMBER STETKAR: Thanks. And, you know, I understand all of that. The reason I raised the question was, I also understand that if the population density, take a site without the lake, is higher than 500 people per square mile, there is this need to look at alternative siting possibilities and to justify why this site is reasonable.

What I'm questioning for this particular site since the population density on land at 2000, without projecting future is greater than 500 people, is why wasn't that analysis of siting done?

MR. TAMMARA: We went by the guidance, that's how.

CHAIRMAN CORRADINI: So can I say it back to you, then we're going to have to move on. So what you're saying is the guidance allows this sort of calculation. Based on the guidance you did not feel you needed to go further --

MR. TAMMARA: Right.

CHAIRMAN CORRADINI: -- given some sort of correction based on usable area versus just area.

MR. TAMMARA: Right, that's correct.

CHAIRMAN CORRADINI: John?

MS. HAWKINS: Can I just clarify?

MEMBER STETKAR: No I understand what was done.

MS. HAWKINS: Is the mic on?

CHAIRMAN CORRADINI: Yes, go ahead.

MS. HAWKINS: Oh, my name is Kim Hawkins, I'm acting Deputy Director for the Division of Site, Safety, and Environmental Analysis. And this is a subject that we talked at length recently.

And I think we recognize that the guidance has some deficiencies in them. We also talked about the fact that this was originally based on societal risks, the guidance itself, and that it is outdated.

And so it is something that in the context of our Reg. Guides or Staff Guidance that we do plan to pursue and look into this issue a little bit more in depth. But this is the current guidance that we have.

CHAIRMAN CORRADINI: Okay. All right, go.

MR. TAMMARA: Next slide, please. Section 2.2 deals with the identification of nearby industrial and transportation and military facilities. And further it will be assessing or evaluating the potential hazards from these facilities on the proposed plant.

So this section, COL Item 2.0-5-A is two portions, one is the identification. The other one is the potential hazards evaluation. As a part of COL Item 2.0-, next slide, please, location and description of the nearby facilities are being addressed in this section.

Staff reviewed the applicant information pertaining to the location and the description of all the nearby industrial, transportation, and military facilities for the evaluation of potential hazards, for these safe operation of the proposed plant.

Staff independently verified the locations, descriptions of the facilities including transportation routes and pipelines from the data available in public domain, and found to be acceptable as the information meets the guidance provided in NUREG 0800.

DR. WALLIS: What did you do about the lake? I mean, I can understand the railway, trains stay on the rails usually. And if there's an accident it has to sometimes spread.

But if there's a boat on the lake and there's a barge on the lake in a storm, it can be blown ashore. There's a much vaguer definition of where it's going to be. What do you do about that sort of thing?

MR. TAMMARA: We, I did not do the physical moment or impact of the barge but --

DR. WALLIS: But you did have to do something about the lake. There are traffic lanes on the lake. You just assumed that the ships are always in the lanes?

What did you do about the ships on the lake? They go to Detroit, the go to Toledo, and so on. Do you assume they're always in the shipping lane or can they drift out of it?

MR. TAMMARA: I looked at any hazardous material debris from the accident would impair.

DR. WALLIS: So you looked at --

MR. TAMMARA: But not at the physical accident itself.

DR. WALLIS: You looked at ships on the lake?

MR. TAMMARA: Yes.

DR. WALLIS: And you assumed that they are in a traffic lane if they release something? Where do you assume they are?

MR. TAMMARA: No, if it is released, what is the impact? That's all that we --

DR. WALLIS: But then where is the ship? Is the boat on the shore or is it in the lake, how far from the plant is it?

CHAIRMAN CORRADINI: I think he's asking you, I think he's asking you given the fact you're not worried about what the source is, where do you assume the source to be for what would come off the lake?

MR. TAMMARA: They have given the distance from the plant.

DR. WALLIS: So you assume that they're always in that shipping lane somewhere and not blown off course so they don't drift --

CHAIRMAN CORRADINI: Why don't we at least ask that of DTE since it really comes back to where they assumed it. So can we get a response from the --

MR. SMITH: So I think, this is Peter Smith. I think we covered this a bit --

DR. WALLIS: No, you covered it. I just wanted the staff to say what's the regulation. How does the regulation handle something like this?

MR. TAMMARA: The only distance, you've --

DR. WALLIS: What is the distance? How do you get the distance?

CHAIRMAN CORRADINI: Well, I think what, let me just nail it down this way so the system may be clear. The licensee assumed the distance based on essentially normal travel paths.

So the question back to the staff is, is the guidance such that that's what is allowed to be assumed? In other words, from a standard review plan standpoint, do you allow for some sort of variation or how do you allow for one?

DR. WALLIS: Well, but release is most likely it seems to be in some major storm, like this 100 mile an hour wind we were talking, that's when a release is most likely. It's also the time when the ship is most likely to be off course. So does the regulation address this at all? Apparently not.

CHAIRMAN CORRADINI: I think not.

DR. WALLIS: So this seems to be a void in the regulations, right?

CHAIRMAN CORRADINI: I think that would be a fair way of putting it. I think they look at the --

MR. TAMMARA: But we looked at the minimum distance where the accident would happen.

DR. WALLIS: How do you calculate that?

MR. TAMMARA: With the --

DR. WALLIS: Look at the maximum height of the lake and the draft of the boat or something? What do you, how do you come up with the minimum distance?

CHAIRMAN CORRADINI: But I think --

MALE PARTICIPANT: You could do it that way.

CHAIRMAN CORRADINI: -- let me just say it back and then I think we need to move on just so we can to everything else before noon. My impression is staff is in agreement with the licensee that the shipping channel is the location of the potential accident.

MR. TAMMARA: Right, that's correct.

DR. WALLIS: That's it? Staff agrees that's the only place the ship can be?

CHAIRMAN CORRADINI: I'm just asking that. That's my impression of the way the evaluation was done.

DR. WALLIS: I didn't get his answer though. You're answering for him.

MR. TAMMARA: That's what, no, no, what I am saying is suppose the accident happened on the ship.

DR. WALLIS: Yes.

MR. TAMMARA: Okay, so what I do is I calculate what is the minimum distance which will impact?

DR. WALLIS: How do you calculate that minimum distance?

MR. TAMMARA: We have the model. I have the amount of the chemical --

DR. WALLIS: How do you know where the ship is?

CHAIRMAN CORRADINI: He's doing the opposite -- he's doing the opposite calculation, Graham, he's saying how close does he have to be to make it an effect?

(Simultaneous speakers.)

DR. WALLIS: I believe it's an effective distance, that's what you'd do.

MEMBER ARMIJO: And it's less than.

DR. WALLIS: You don't do that for the train, you know where the train is, right?

MR. TAMMARA: No, no, no, no, no, you see the ship --

DR. WALLIS: Yes.

MR. TAMMARA: -- and one container, okay? This material is released, right? So I take the amount of this material here and then calculate what would be the distance to get one PSI pressure and what would be the distance I get the id alleged concentration and what would be the distance to get lower exposure limit distance?

DR. WALLIS: This is, explosions I understand.

MR. TAMMARA: Right, right. So if I calculate that the distance from the accident source, and this distance is lower than my planned distance --

DR. WALLIS: How do you know?

MEMBER ARMIJO: Well, that's, how do you know your, that's his point is how do you know that you're farther --

MR. TAMMARA: The minimum, you know the lake. I mean you --

MEMBER ARMIJO: I know what you're doing but Graham's question is, if the source happens to have been blown off course, it's really up close to the plant --

MR. TAMMARA: That, all those scenarios we --

MEMBER ARMIJO: You don't deal with, you don't do that.

MR. TAMMARA: We took the maximum worse case and see how far the channel is --

MEMBER ARMIJO: Within the channel.

MR. TAMMARA: -- within the one distance, yes. And if that I mean, one distance is satisfied, even that accident happened to your unsafe side --

CHAIRMAN CORRADINI: Okay, so to repeat it, they do use the shipping channel as the distance to compare to the minimum.

DR. WALLIS: Things like oil spills, major oil spills, Exxon Valdez, occur when the ship is off course. I won't berate, I won't say any more about this but it just seems a bit odd.

MR. TAMMARA: All right.

DR. KRESS: Well, personally, I think you'd have to deal with that in probability space.

MR. TAMMARA: Yes, that is another. If this condition is not met, okay, then the fall back position is how probable it is. So to get to the probability we need to have more data, how many ships are traveling, how many accident rates are there --

DR. KRESS: And often do you have --

MR. TAMMARA: -- and how often the accidents happen.

DR. KRESS: And that's the --

MR. TAMMARA: Then we have the calculated probability and then the probability --

DR. KRESS: If it's, if it's lower, yes, you don't have an acceptance criteria.

MR. TAMMARA: -- and then that probability has to be compared. If it is less than ten to the four minus six, then it is acceptable. Otherwise it is not so --

DR. KRESS: That's the way you would deal with it but I don't think it --

MR. TAMMARA: Right, but that's --

DR. KRESS: I don't think it's been done, but that's the way it, in PRA space that's the way it would be dealt with.

CHAIRMAN CORRADINI: Okay, I think we've answered the question. Let's move on.

DR. HINZE: I assume that you have eliminated the possibility of any problems associated with shale gas expiration or production. Michigan Basin is a very select target for shale gas expiration. And you've eliminated this.

DR. WALLIS: Is this fracking?

MALE PARTICIPANT: Fracking, we had thought of that.

CHAIRMAN CORRADINI: I guess I was going to ask the question, that's a good one. I hadn't thought of this one.

DR. HINZE: Well --

CHAIRMAN CORRADINI: But I guess, is there active fracking along that region? I thought it was on the eastern side of Lake Erie but not on this western side.

DR. HINZE: No, the Michigan Basin includes a number of shales, particularly the Antrim shale, which is, which is more centrally located. I mean, the question can be answered very simply because it's not located well for the shale gas. But, you know, this is a consideration.

CHAIRMAN CORRADINI: Okay.

MR. TAMMARA: Yes, I have to get back to you, how far it is out. If it is within, if it is about five miles, these facilities are mainly within five miles.

And if it is greater than five miles, then we have to see whether they have any potential to impact. So if it is greater than ten miles it is a little bit different story. But if that is within the ten miles, then I don't, I didn't see but I have to go and double check.

CHAIRMAN CORRADINI: Okay, so you'll get back to us.

MR. TAMMARA: Right.

DR. HINZE: Understandably.

CHAIRMAN CORRADINI: Thank you.

MR. TAMMARA: The analysis is within five miles, all the facilities.

Next slide, please. This slide deals with the evaluation of all the potential accidents from those identified facilities. The potential accidents includes, next slide, explosions, fires, aircraft hazards, collision with intake structures, liquid spills, and toxic chemicals.

DR. WALLIS: How do you deal with liquid spills on the lake?

MR. TAMMARA: We look at what, if the spill is there, it is mostly chemical and it will usually float on the surface of the water. And it will not really disperse that --

DR. WALLIS: Though it would be blown by the winds along the surface?

MR. TAMMARA: Winds and then it will be collected probably by the screens into the intake, in the intake. But that's, I don't think it is going to, you know, cloud on water, the impact is minimal. That's what we evaluated.

MALE PARTICIPANT: Depends what the liquid is.

MEMBER STETKAR: I want to go back, before you leave that I have some questions.

MR. TAMMARA: I haven't finished, I have

one more.

MEMBER STETKAR: Oh you haven't? Okay, I'll let you finish.

CHAIRMAN CORRADINI: Then he'll ask you his question.

MR. TAMMARA: Staff have reviewed the applicant sides specific evaluation of potential accidents. Staff also performed the independent confirmatory calculations in confirming the applicant's conclusions.

Based on the review of applicant provided information, the responses to the RAIs, staff evaluations and staff independent conformity analyses, the staff found the applicant conclusions to be acceptable as the evaluations are in accordance with the guidance provided in NUREG 0800 Section 2.2.3, except for one issue.

In response to the RAI 2.2-3-4 and 2.2.3-5, the applicant provided responses stating that the current site of propane storage tanks are located due to the construction of Fermi 3. Based on the maximum allowable volumes determined using the meteorology in Reg. Guide 1.78, Appendix A, prior to the operation of Fermi 3.

Since they are relocating they stated that they will put the tanks at the location based upon that Reg. Guide. However, in addition to 1.78, they have to also look at the explosion scenario from Reg. Guide 1.91 also. Because it is an explosive.

So therefore, staff considers a license condition is imposed to look at both explosion as well as a control room habitability issue in placing those relocated tanks.

Therefore, staff proposed, or imposed a license condition which states, "The applicant shall use tanks with a maximum capacity of 1000 gallons for onsite storage of propane. No more than 1000 gallons of propane will be stored in any single location, and no storage location will be located closer than the minimum safe distance of 854 meters, that is 2800 feet, from any Fermi 3 safety-related structure and main control room."

So this is the additional license condition.

MEMBER ARMIJO: Is this a standard requirement for propane storage at all nuclear sites?

MR. TAMMARA: Since --

MEMBER ARMIJO: Or is this unique to this particular site?

MR. TAMMARA: No, unique in the sense yes, it is unique. Previous applications where they have onsite storage of chemicals, they have the volume and they know at what location they are placing that tank, or cylinder, or whatever it may be.

But in this case the applicant has said they have presently 20 tanks with various locations. And due to the construction they have to relocate the tanks. So they neither give the volume nor the distance.

And they made statements saying that we will place, based upon the Guide 1.78, so whether that is the limiting case or 1.91 is limiting case, it is very difficult to judge. And there is no way staff has the, I mean, I do not know. Once the approval is given, what is the vehicle.

Therefore, what we have seen, what we have taken a look is what are the commercial tanks available in the market? So we researched into that one and we came up with a different, we have four kinds of tanks available commercially, 150 gallon, 250 gallon, 500 gallon, and 1000 gallons.

So looking at that one we talked, we will take a maximum 1000 gallon take and we calculated what would be the distance they have to put it in order to meet both explosion and fire and control room habitability distance.

So we calculated that one and then prescribe you should not use more than 1000 gallons and you should be --

MALE PARTICIPANT: Any closer than that.

MR. TAMMARA: -- be to that distance. That is the way we told them, you know, you have to abide by this.

MEMBER ARMIJO: But it's not, it's not consistent. Other plants in the country could have 2000 gallon tanks right now. I'm just wondering.

MR. TAMMARA: If they have 2000 gallon tank, they have to demonstrate that they have to put some, you know, much further than 2800 feet.

MEMBER ARMIJO: Okay, well --

CHAIRMAN CORRADINI: I think my impression is they limited it based on the condition that they wanted to put it this close, that's all.

MEMBER ARMIJO: Okay.

MEMBER SCHULTZ: These tanks are associated with Fermi 2, the tanks that are being moved at least.

MR. TAMMARA: I think so.

MEMBER ARMIJO: They're already there.

MEMBER SCHULTZ: So is there a license

condition that's going to be applied for Fermi 2?

MR. TAMMARA: Not that, that is a operational plant so when they locate probably, that plan has to, you know, show that they maintained the original license distance or whatever it is. I'm not sure, William. I am looking at only the part, from the prospect of Unit 3.

MEMBER SCHULTZ: I don't know whether the regulation analysis is more constraining than it might have been for Unit 2 but one would think that it ought to be --

MR. TAMMARA: If they look at, I'm pretty sure that --

MEMBER SCHULTZ: -- done the same.

MR. TAMMARA: I'm not sure, I mean, I cannot answer that.

MR. SMITH: So, this is Peter Smith. I just wanted, let me describe what these propane tanks are associated with. They were, they're associated with buildings that were built during the construction of Fermi 2 outbuildings that were used as warehouses and they migrated into being used as shops.

And they're all in the vicinity and they're heated by propane because they were, you know, kind of fabricated quickly. They weren't, you know, I think originally intended to be permanent buildings but they, you know, over time they became that way. And they were heated with propane. They're all in the footprint of the Fermi 3 Plan. So all of the, you know, and they're used as warehouses, et cetera that support Fermi 2 operation.

All of that infrastructure is going to be relocated, not necessarily with propane heat or anything else. And to, you know, purposefully design warehouses and other shop facilities and et cetera, they're showing in our site layout plan that we have displayed in the environmental report.

So the, in all likelihood these propane tanks are going to be, are going to disappear because that's not --

MEMBER ARMIJO: Okay, that's even better.

MR. SMITH: -- what they're doing in the building so.

CHAIRMAN CORRADINI: Thank you, Peter, that's helpful. John, I think you had a question.

MEMBER STETKAR: I do, on two areas. One is the toxic chemical releases, in particular from the rail lines. If I read the FSAR it just cites NUREG CR 2650 and it says, "Frequent shipments are defined as exceeding 30 per year for rail shipments."

Now I'll keep focused on railways because of time. And there's a sentence that says, "Potentially toxic chemicals are transported on the Canadian National Railway Lines based on the criteria in NUREG CR 2650, potential releases of toxic chemicals from railway traffic does not require further analysis."

Now I didn't study the New Reg, I didn't have enough time, but I did read bits and pieces of it. It's based on keeping toxic releases that affect control room operations less than ten to the minus five per year, I don't care and I don't want to know where that number came from.

But it does say, "Unless a transport survey assures shipping frequencies within eight kilometers to the plant on the order of, or lower than four per week for rail or 35 per week for truck, the control room should be isolatable and the shipping frequency then determines the degree of isolation needed."

I have no information about the frequency of toxic chemical shipments on the Canadian National Railway Line. Did the staff look at that?

MR. TAMMARA: We looked at the, not the shipments but we looked at the release and see whether it would pose a problem.

MEMBER STETKAR: I'm sorry, the guidance in the NUREG is not a single release, it's a frequency. So if you didn't look at the frequency of toxic chemical releases, and you only looked at a single release, are you saying that a single release from the worst possible toxic chemical that's on a rail car still wouldn't cause a problem for the main control room?

MR. TAMMARA: If the release doesn't give a concentration exceeding the IDLH of the control room intake, I think it is --

MEMBER STETKAR: Did you do that analysis?

MR. TAMMARA: Yes.

MEMBER STETKAR: You did. What's the worst chemical that's transported on that railway?

MR. TAMMARA: I have to go back and take a look, I don't know.

MEMBER STETKAR: Okay, in the interest of time --

MR. TAMMARA: Yes.

MEMBER STETKAR: -- as long, I'd be interested if you can follow up on that --

MR. TAMMARA: I'll look that, yes.

MEMBER STETKAR: -- maybe after lunch.

CHAIRMAN CORRADINI: But I guess, if I might just interject, I thought we went over this, not the frequency, this is something new I guess that --

MEMBER STETKAR: Well, I didn't, I wasn't --

CHAIRMAN CORRADINI: I thought had we gone over this relative to, on the rail line and what was the release in a prior meeting. And I have to dig back.

MEMBER ARMIJO: I think it was on, U.S. rails but I thought your question was related to the Canadian Rail Lines or was that addressed or not?

MEMBER STETKAR: There are a couple of rail lines there, one happens to be owned, Canadian National Railway. The other one is, somebody else owns it.

MEMBER ARMIJO: As long as all the rail lines were treated then it's okay.

MEMBER STETKAR: If we went over it before I apologize.

CHAIRMAN CORRADINI: No, no, I, we did --

MEMBER STETKAR: I looked back in my notes, I could find it.

CHAIRMAN CORRADINI: -- but not the frequency issue. We did go over the magnitude because

--

MEMBER STETKAR: Well, but, I mean, if they looked at the worst chemical that's transported on the rail line and even if it blew up everyday, they don't get the concentration at the control room. I don't care what the frequency --

MEMBER ARMIJO: And that should be sufficient.

MEMBER STETKAR: That should be sufficient.

MEMBER ARMIJO: Even though the regulation says you have to calculate the frequency you don't care.

MEMBER STETKAR: I don't care. If they looked at the worst that could be transported and the concentration, that's --

MR. TAMMARA: Yes, I have to get back to you on that, yes, I will.

MEMBER STETKAR: -- and that's fine.

CHAIRMAN CORRADINI: What's the added confirmation number?

MEMBER STETKAR: Let me ask you about the, and remind me if we went over this before too because I'm obviously not keeping good notes.

CHAIRMAN CORRADINI: Well, I'm not sure if you were at the meeting I guess.

MEMBER STETKAR: I may not have been. Aircraft crash --

MR. TAMMARA: That we will address in Chapter 3 this afternoon.

MEMBER STETKAR: Okay, I'll wait.

MR. TAMMARA: Yes. That is a part of 3.1.

MEMBER STETKAR: That was quick. That's fine, I'll wait.

MS. GOVAN: Okay, at this time Brad Harvey will present Meteorology and Air Quality.

MR. HARVEY: Hello, my name is Brad.

CHAIRMAN CORRADINI: Brad --

MR. HARVEY: I'm sorry.

CHAIRMAN CORRADINI: I'm just looking at my notes, I apologize. I want to make sure the Committee's all on the same page. As I have it, on the October 21, 2011 meeting, something I'm sure is just stuck in your brain, when we went over Chapter 6, there was an offsite rail accident limiting case.

And as I have it in my notes, basically we came to the conclusion that the committee would prefer that the licensee volunteer to have a, what I'll call a noxious gas detection system.

But all the calculations both by staff and by licensee showed that they were within the bounding analyses, therefore it wasn't an issue from a, essentially from a bounding calculation of a effluent. But that's, it was Chapter 6 that we went over then, sorry. I'm sorry, Brad, go ahead.

MR. HARVEY: Okay. Again, my name is Brad Harvey. I'm a Senior Physical Scientist in the Hydrology and Meteorology Branch within the Division of Site Safety and Environmental Analysis.

And I'll be discussing the staff review of the Fermi 3 COL FSAR Section 2.3, Meteorology and Air Quality. There are five subsections in Fermi 3 FSAR Section 2.3 related to meteorology and air quality. 2.3.1 is general climate, 2.3.2, local meteorology, 2.3.3, meteorological monitoring, 2.3.4, short-term or accident diffusion estimates, and 2.3.5, long-term or routine diffusion estimates.

SER Section 2.3 also discusses the staff's review of Chapter 2 Appendices to the Fermi 3 FSAR, Appendix 2A which provides inputs to the ARCON96 computer code, which is the atmospheric dispersion model used to evaluate design basis acts and airborne releases through the control room, and Appendix 2B which provides the ventilation stack pathway information for modeling routine releases to the atmosphere.

The status of SER Section 2.3 is that there are no open items. However, there is one confirmatory item related to Regulatory Guide 1.221, which is design-basis hurricane and hurricane missiles for nuclear power points.

Reg. Guide 1.221 was issued in October 2011 to address NRC staff's concerns that the design basis tornado wind and missile specified Reg. Guide 1.27, excuse me, 1.76, were not found in all areas of the United States.

The staff subsequently issued an RAI asking the applicant to include new site characteristics in FSAR called hurricane wind speed and hurricane missile spectra, or provide a justification as to why the FSAR should not be updated to include these new site characteristics.

And as response to this RAI, the applicant stated that the Fermi 3 is located well inland from areas impacted by hurricanes and concluded that the Fermi 3 tornado site characteristics are bounding.

The NRC staff found the applicant's assessment acceptable and notes that the applicant has committed to providing this information in a future revision of the FSAR. This commitment is Confirmatory

Item 02.03.01-20.

This next slide presents the staff's review of COL Item 2.0-7-A. This COL Item requires the COL applicant to supply site-specific information in accordance with SRP Section 2.3.1, that is the applicant should describe averages and extremes of climatic conditions and regional meteorological phenomenon that could affect the safe design and siting of the plant. The applicant presented this information in Section 2.3.1 of the FSAR.

FSAR Section 2.3.1 includes information on a general climate of the Fermi 3 site such as long term means and historic extremes for temperature, water vapor, precipitation, and wind.

This FSAR section also includes frequencies of severe weather phenomenon in this site that could affect plant operations such as thunderstorms and lightning, strong winds, tornadoes and water spouts, hail, drought, dust and sandstorms, and freezing rain and ice storms.

On most instances, staff in this review FSAR Section 2.3.1, is the applicant's consideration of Fermi 3's climatic site characteristic values that correlate to ESBWR climatic site parameter values.

The ESBWR site parameters are the

postulated environmental features of an assumed site that the General Electric-Hitachi used to design the ESBWR.

And 10CFR5279D1 states the COL FSAR, "Should contain information sufficient to demonstrate that the Fermi 3 site characteristics fall within the site parameters specified in the ESBWR design certification.

The ESBWR climatic site parameters include the following, extreme wind, which is defined as 100 year return period, three second gust value, which is applied to seismic category 1-2 in radwaste building structures, and a 50 year return period, three second gust value, which is applied to other seismic category NS standard plant structures.

The NRC staff reviewed the basic wind speed map in the American Society of Civil Engineers Design Load Standard ASCE 705 for the portion of the United States that includes the Fermi 3 site and obtained the same 50 year return period value as the applicant.

The applicant used the conversion factor from ASCE 705 to convert the 50 year return period to 100 year return period value. Because the applicant's extreme wind site catches values are consistent with

ASCE 705, the staff finds the applicant's extreme wind site characteristic values to be acceptable.

Another set of ESBWR climatic site parameters associated with design basis tornado, which includes a maximum tornado wind speed, pressure drop, and rate of pressure drop.

The applicant shows this tornado site characteristics faced on Revision 1 to Regulatory Guide 1.76. The proposed Fermi 3 site is located in Tornado Intensity Region 1, which is where the most severe tornadoes frequently occur.

The most severe design basis tornado characteristics apply to COL sites located in Region 1. Because the applicant's design basis tornado site characteristic values are based on Regulatory Guide 1.76, the NRC staff concludes that the applicant has chosen a set of acceptable tornado site characteristic values.

The third set of site parameters on a maximum ground-level weight of the normal and extreme winter precipitation events, for use in a winter roof load design.

In accordance to an interim staff guidance staff document ISG-7, the applicant chose the maximum recorded snow cover value recorded in the site region to derive its maximum ground-level weight for a normal winter precipitation event.

Also in accordance with ISG-7, the applicant chose the sum of the weight of the maximum recorded snow cover and weight of the historic maximum two day snowfall event to derive the maximum ground level weight with extreme winter precipitation event.

DR. WALLIS: But that, what really dominates it is this two feet of water that's assumed on the roof.

MR. HARVEY: That's a worse case.

DR. WALLIS: That's far bigger than the snow load.

MR. HARVEY: That's the point, that's the design basis and --

DR. WALLIS: But it doesn't say here, you're talking about normal and extreme winter events then, it's two feet which really dominates everything. That's not an event, I mean, that's just a bounding assumption.

MR. HARVEY: Yes. NRC, the NRC staff found the applicant's winter precipitation site characteristic values to be acceptable because they were derived based on the guides provided ISG-7.

MEMBER STETKAR: But Brad, I mean,

answering, if they still showed that the ground level accumulation was greater than the DCD they'd still have a problem, right?

MR. HARVEY: In theory, you, I don't see --

MEMBER STETKAR: Because they do the, you know, the snow pack plus incident precipitation at ground level --

MR. HARVEY: Yes.

MEMBER STETKAR: -- in addition to the roof bearing stuff.

MR. HARVEY: Yes, yes.

MEMBER STETKAR: And they were okay on that, too, that's fine.

MR. HARVEY: I think one third of the site parameter value.

MEMBER STETKAR: Yes. Just for Graham's but I mean, you know, if you were in a place where you got a huge amounts of snow, despite the artificiality of the --

DR. WALLIS: What do they do with the falling icicles and things like that?

MEMBER STETKAR: -- two feet of water, you could still have other, other --

DR. WALLIS: You get huge icicles

sometimes in the winter, that weighs hundreds of pounds. Is there any problem with them, I mean, they fall on any kind of equipment or anything --

MR. HARVEY: I suspect they might be bounded by the --

DR. WALLIS: -- or something --

MR. HARVEY: -- they are design basis tornado missiles.

CHAIRMAN CORRADINI: They're 1000 feet away, they're not going to fall on a propane tank.

DR. WALLIS: Well, they're not going to fall on the propane tank, thank you.

MR. HARVEY: But you have design basis tornado missiles, which is a car and a pipe. That --

DR. WALLIS: And that probably covers all this stuff.

MR. HARVEY: I would assume that would cover an icicle.

The last set of climatic site parameters I will be discussing are related to ambient design temperatures. The ESBWR has site parameter values for 2 percent, 1 percent, and 0 percent annual exceedance maximum dry bulb, the mean points in a wet bulb temperatures, as well as non points in a wet bulb temperatures.

DR. WALLIS: How do you define 2 percent exceedance of a temperature?

MR. HARVEY: That's the, that temperature is exceeded no more than 2 percent of the hours.

DR. WALLIS: It's under the time, okay.

MR. HARVEY: So there's 8760 --

DR. WALLIS: Zero percent is very difficult to ever establish.

MR. HARVEY: Say what?

DR. WALLIS: You never get to the exact tail of a distribution. So zero percent is really a phantom.

MR. HARVEY: It's been interpreted as a historic maximum.

DR. WALLIS: Really means something like 0.001 or something. Zero is impossible to get to and it, you know?

MR. HARVEY: Yes. The applicant's 2 percent and 1 percent exceedance temperature values were based on data published by ASHRAE for Detroit Metropolitan Airport.

The applicant's 0 percent exceedance temperature values were based on a hundred year return period values that were also derived from the Detroit Metropolitan Airport data.

The Detroit Metropolitan Airport is the closest first order National Weather Service climatic observation station to the Fermi 3 site. And in order to confirm that the Detroit Airport data are general represent of the Fermi 3 site conditions, the staff generated dry bulb and dew point statistics from the Detroit Airport 2001, 2007 data and compared these statistics to data recorded by the Fermi 3 onsite meteorological program for this same time period.

The staff found that some of the high temperature and humidity statistics, such as the maximum 1 percent exceedance values, the Detroit Airport data tended to be higher or more conservative than the Fermi 3 data.

The staff attributes this to the Fermi 3 site being located closer to Lake Erie and the lake's moderating effects on temperature during the summer. The staff therefore concludes that the Detroit Metropolitan Airport temperature and humidity data are appropriate for use in determining ambient design temperature site characteristic values for the Fermi 3 site.

ESBWR also has a unique set of three site parameters related to its control and habitability area transient temperature analysis. The staff performed independent assessments and came up with similar values as the applicant. Therefore the staff finds the applicant's ambient design temperate site characteristic values to be acceptable.

New slide. The next slide presents the staff's review of COL Item 2.0-8-A. This COL Item requires the COL applicants to supply site specific information in accordance with SRP Section 2.3.2, that is, the COL applicant should provide summaries of the local or site onsite meteorological data, an assessment of potential influence of the proposed plant in this facility on local meteorological conditions, a description of the impact of these modifications on plant design and operation, and a topographical description of the site and its environs.

The applicant presented his information in SCR Section 2.3.2 of the FSAR. The applicant provided summaries of dry bulb and dew point temperatures, wind roses, wind direction persistence, atmospheric stability, and inversions in FSAR Section 2.3.2 from the data collected onsite during the five year period 2003 to 2007.

The applicant also provided the staff a copy of its hourly meteorological database for this period of record. After responding to a set of RAIs on the hourly database and resulting data summaries to be presented in the FSAR, the staff was able to conclude that the applicant has adequately described local meteorological conditions at the site.

The applicant also provided data on precipitation, fog and smog, vertical mixing layer heights, and wind roses from nearby climatic data stations. The staff evaluated and independently confirmed these data as presented in the FSAR.

The applicant also evaluated the influence of Fermi 3 and its facilities on local meteorology, the logic potential influence on local meteorology from the construction operation of Fermi 3 will be plumes from the 600 foot tall natural draft cooling tower, which will be the primary means of heat dissipation for the plant.

The most likely impacts in the operation to cooling tower are plume shadowing and salt deposition. The use of drift eliminators along with good dispersion resulting from the height of the tower and buoyant plume rise will result in minimum ground level concentrations of particulate matter that should not adversely impact outdoor, electrical --

DR. WALLIS: What?

MR. HARVEY: It's design particulate matter in the water, in the cooling water.

DR. WALLIS: In the cooling tower water?

MR. HARVEY: You're correct.

DR. WALLIS: Where does it come from?

MR. HARVEY: Well I don't think it's, they're using purified water so wherever their source of their --

MR. SMITH: The source, this is Peter Smith, the source of cooling tower make up water is Lake Erie.

DR. WALLIS: And Lake Erie is notoriously salty.

MR. SMITH: It's a fresh water lake but it has dissolved solids in it.

DR. WALLIS: There are some solids. So it's whatever, it's not the usual kind of salt.

MEMBER STETKAR: It doesn't have to be NaCl, it can be --

DR. WALLIS: Whatever happens, the mineral deposits.

MR. HARVEY: It's just whatever you've sunk in Lake Erie.

CHAIRMAN CORRADINI: Mineral deposits.

DR. WALLIS: Mineral deposits, right.

CHAIRMAN CORRADINI: Hard water.

DR. WALLIS: Okay, that's right, thank you.

DR. HINZE: Brad, you assume that the data from the onsite monitoring is representative of the Fermi 3 conditions?

MR. HARVEY: For atmospheric dispersion primarily.

DR. HINZE: Right, for this local meteorological data semblance. The data from the onsite monitoring is representative of Fermi 3 then.

MR. HARVEY: Within reasonable limits, yes.

DR. HINZE: How do you justify that?

MR. HARVEY: Proximity of the tower to the site.

DR. HINZE: And you are considering that the offshore, onshore breezes are not going to be affected at all?

MR. HARVEY: I don't think the offshore breezes will. The onshore breezes, probably. The only thing we use the data for, at least in this section of 2.3.1, we did a comparison of the Detroit Metro Airport with the temperature recorded onsite.

And you would expect for the onshore case, that Detroit, Edison would have the more severe climatic conditions. And that's what they based their climatic site characteristics on.

DR. HINZE: Well you'll find out once you get the overlap of the new tower, I guess.

MR. HARVEY: That's correct.

DR. HINZE: And then you may have to reconsider?

MR. HARVEY: Well, that's up to the applicant, I guess, if they choose to share that information with us but, yes. Locating a meteorological tower is a set of compromises in terms of physical structures, wetlands --

DR. HINZE: I'm sure.

MR. HARVEY: -- so there is, there's always not really an ideal location so the applicant is doing the best they can with what they have to deal with.

DR. HINZE: Thank you.

MR. HARVEY: Sure. Okay, I think we're on, we finished local so we're on Slide 19, okay?

This next slide presents the staff's review of COL Item 2.0-9-A. This COL item requires the COL applicants to supply site-specific information in accordance with SRP Section 2.3.3, that is the COL applicant should describe its onsite meteorological emissions program and provide a copy of the resulting meteorological data.

FSAR Section 2.3.3.1, discusses a pre-application meteorological monitoring program for Fermi 3. The pre-application monitoring program is based on the pre-existing operational meteorological monitoring program equipment used for Fermi 2.

Information presented in the FSAR includes tower and instrument siting, instrumentation accuracy and thresholds, instrumentation calibration, service, and maintenance, and data acquisition, reduction, and processing. The applicant also provided the staff with a copy of its hourly onsite meteorological database for the seven year period 2001 through 2007.

The visual inspection of the meteorological monitoring program by the staff during a site audit revealed that the distance from the meteorological tower to a wooded area located west of the tower did not meet the distance offset criteria specified in Regulatory Guide 1.23.

The staff compared the lower or ten meter onsite wind speeds recorded in 1985, 1994, and 2003, 2005 periods and found an increased frequency of slow wind speeds as time went on.

The applicant eventually conceded that the potential exists for the wind speed measure at the ten meter level during the 2001 to 2007 period to be lower than the actual wind speed at the ten meter level.

In response to these concerns, the applicant provided the staff a copy of the 1985 through 1989 onsite meteorological database and stated that the aerial photographs of this site, the area surrounding the Fermi 3 meteorological tower confirmed the absence of significant air flow obstructions to wind measurements during this earlier time period.

The staff also performed a comparison of stability class frequency distributions based on a difference in temperature measure between the 60 meter and ten meter levels on the onsite meteorological tower because the '85, '89 period and 2002, 2007 period of record and found the frequency of extremely unstable conditions more than doubled during the more recent time period.

Discrepancies in wind speed and stability class frequency distributions between the 1980s and 2000 databases, created uncertainty as to which meteorological data set is more representative of long-term dispersion conditions.

Given the uncertainty in the data, the

staff asked the applicant to evaluate the dispersion analyses presented in FSAR Sections 2.3.4 and 2.3.5 using both sets of data and using more conservative or bounding dispersion estimates in the subsequent dose assessments.

MEMBER SCHULTZ: Brad, we just talked a bit about the tower replacement. The one year overlap period, I recall is typical when towers are replaced. Is that, just wanted to confirm that.

MR. HARVEY: The staff has no specific guidance on that. But it sounds reasonable because you get a whole annual cycle. And I think the intent would be to compare during that annual cycle what you see between the two towers.

MEMBER SCHULTZ: That's been done before but something you mentioned, suggested that this comparison is not going to be provided to the staff once the one year is completion, is there an expectation by the staff that the information will be provided in terms of the comparison?

MR. HARVEY: That's a good question. I guess the answer would be yes. But there's no regulatory hook at the moment for them to do that. It's a commitment that they've made in their FSAR but the applicant can maybe speak to that.

MEMBER SCHULTZ: Is that a commitment that has been made?

MR. SMITH: We made a commitment to do the comparison but we didn't make a commitment to --

MR. HARVEY: To share it with us.

MR. SMITH: -- to report on the results of that.

MEMBER SCHULTZ: Have you set criteria that will determine for you whether there's a difference between our A and B?

MR. SMITH: No, I think as I said earlier, I think when we see the data we'll know what we need to do and can handle it through the existing processes, typically into our corrective action program --

MEMBER SCHULTZ: Corrective action program.

MR. SMITH: -- and then evaluation of the differences and taking the appropriate actions that are necessary based on that.

MEMBER SCHULTZ: Thank you.

MR. HARVEY: FSAR Section 2.3.3.2 discusses the operational meteorological monitoring program for Fermi 3. Because of the natural draft cooling tower for Fermi 3 will be built in the approximate location of the existing onsite meteorological tower, the applicant has committed to erecting a new meteorological tower prior to the construction of Fermi 3.

This new meteorological tower will be located far enough away from the proposed Fermi 3 natural draft cooling tower so the measurements on the new meteorological tower should not be adversely affected by the new cooling tower.

The applicant has made a commitment that the new meteorological tower will be operational for at least one year prior to decommissioning of the existing meteorological tower to ensure that the meteorological parameters measured at the new meteorological tower are representative of the atmospheric conditions at the Fermi site. The staff finds this commitment acceptable.

The next slide presents the staff's review of three COL items related to performing atmospheric dispersion analysis supporting design basis accident assessments presented in FSAR Chapter 15.

COL Item 2.0-10-A requires the COL applicant to supply site specific information in accordance with SRP Section 2.3.4 to show that the site's offsite and onsite dispersion values as calculated in accordance with Regulatory Guides 1.145 and 1.194 and compare to dispersion values in Chapter 15, result in doses less than those stipulated in 10 CFR 5279 and the applicable portions of SRP Sections 11 and 15.

The applicant used the computer code PAVAN to estimate atmospheric dispersion estimates or X over Q values, at the exclusionary boundary and at the outer boundary of the low population zone for potential accident releases of radioactive material. The PAVAN model implements the methodology outlined in Regulatory Guide 1.145.

The staff independently ran a PAVAN code using both the '85, '89 and 2002, 2007 meteorological data sets. The staff finds the applicant has identified appropriate EAB and LPZ atmospheric dispersion site characteristics values using the 2002-2007 data set, which is bounding.

MEMBER SCHULTZ: Is the door closure during refueling, is that for the whole outage period or just during that refueling window or movement of fuel?

MR. HARVEY: Actually, I'm going to come to that in a couple slides, Steve, if we can wait.

MEMBER SCHULTZ: Okay, thank you.

MR. HARVEY: COL Item 2A.2-1-A, requires the applicant to run ARCON96 atmospheric dispersion model for all the design basis accident source and onsite receptor combinations listed in ESBWR DCD Tier 2 Appendix 2A using site specific meteorological data.

The applicant used the computer code ARCON96 to estimate X over Q values at the control room and TSC for potential design basis accident releases of radioactive material.

The ARCON96 model implements the methodology outlined in Regulatory Guide 1.194. The applicant provided the results from both the '80's data and the 2000 data sets in the FSAR.

The staff reviewed the applicant's ARCON96 input and output files for both the 1980s and 2000 meteorological data sets and found the inputs to be consistent with the information presented in Appendix 2A of Tier 2 to the ESBWR DCD.

Because the FSAR included the X over Q values calculated with both the 1985, '89 and the 2001 to 2007 data sets, the staff accepts the control room and TSC X over Q values presented by the applicant.

COL Item 2A.2-2-A requires the COL applicant to have the doors and personnel airlocks located on the sides of the reactor building and fuel building closest to the control room closed during the movement of irradiated fuel bundles if the X over Q values and therefore the doses from these release points could be higher than those calculated for the fuel handling accident which assumes these doors are closed.

The applicant responded to this COL information item by stating that the doors and personal airlocks on the east side of the reactor building and fuel building will be administratively controlled, administratively controlled to remain closed during refueling. The staff finds the applicant's response to the COL item to be acceptable. That answers your question.

MEMBER SCHULTZ: Thank you.

MR. HARVEY: New slide. The next slide presents the staff's review of COL Item 2.0-11-A. This COL item requires the COL applicant to supply site specific information in accordance with SRP Section 2.3.5.

That is the COL applicant should provide X over Q values in atmospheric dispersion estimates for D over Q values by calculating concentrations in the air and the amount of material deposited on the ground as a result of routine releases of radiological effluence into the atmosphere during normal plan operation.

The applicant used the XOQDOQ computer code to estimate X over Q and D over Q values resulting from routine releases. The XOQDOQ model implements the constant mean wind direction model methodology outline Regulatory Guide 1.111.

The staff reviewed, performed an independent evaluation of the applicant's XOQDOQ results by executing the XOQDOQ model using both the 1985, '89 and 2002, 2007 onsite meteorological databases. The staff obtained similar results for the site boundary and special receptors of interest.

The applicant used a higher value '85, '89 or 2002, 2007 X over Q and D over Q values in its offsite airborne dose evaluation presented in FSR Section 12.2.

The staff finds the applicant's approach at using the higher or more conservative of either the 1980s or 2000s X over Q and D over Q values in its offsite airborne dosing evaluations to be acceptable.

This last slide in my presentation summarizes the conclusions and status of SER Section 2.3. The FSAR met the regulatory requirements, addressed regional and local climatic information including climatic extremes and severe weather occurrences that may affect the design and siting of a nuclear power plant.

The FSAR also presents appropriate information on the atmospheric dispersion characters of the site to determine that the radiological effluence of postulated accidental releases as well as routine operational releases are within the commission guidelines.

All COL guidelines were adequately addressed by the applicant. There are no open items. There is one confirmatory item relating to updating the FSAR to address the design-basis hurricane winds and missiles presented in Regulatory Guide 1.221.

DR. WALLIS: Why are you worried about hurricanes in Detroit?

MR. HARVEY: We're particularly not but we had this NUREG Guide on --

DR. WALLIS: Does the Reg. Guide design basis says a hurricane can occur anywhere, including Nevada or somewhere?

MR. HARVEY: No actually, no it does not, no.

DR. WALLIS: So what is this design basis hurricane wind do about Detroit? How does it calculate hurricanes in Detroit?

MR. HARVEY: Based --

DR. WALLIS: I think that normal storms are probably equivalent to --

MR. HARVEY: And you're correct and that's basically what the applicant told us.

DR. WALLIS: Yes. So what's the problem?

MR. HARVEY: There is no problem. There is no problem.

DR. WALLIS: But there's a confirmatory item.

MR. HARVEY: They have committed to update their FSAR to include information on hurricanes. That's the confirmatory item.

DR. WALLIS: But it's not important.

MR. HARVEY: It's not important. But it is a confirmatory item so I felt obligated to point that out. Any other questions?

CHAIRMAN CORRADINI: Other questions by the committee? Okay. I wanted to thank Brad for that. Now I, it's more of a, some of us including particularly me, have a side meeting in about ten minutes. So my question is for Henry, do you have something you want to go over now or can we break now and come back a bit early to catch up on Section 2.4?

MR. JONES: That's up to you, what you want to do.

CHAIRMAN CORRADINI: You're, we're not going to, the staff is at the ready regardless of either approach?

FEMALE PARTICIPANT: Let's break right now.

CHAIRMAN CORRADINI: Okay.

DR. WALLIS: You heard the discussion earlier?

CHAIRMAN CORRADINI: Right, so my suggestion, if I, I'm sorry?

DR. WALLIS: I just wondered if he's going to get into this --

CHAIRMAN CORRADINI: Well I'm sure he's going to get into something you're going to ask a question about so that's why I'm anticipating, okay? So my suggestion, my suggestion is that we break now, come back and do 2.4. The only thing we might take a few minutes before we start 2.4 is if the licensee has some information they were going to look up.

We lost Mr. Stetkar already to a side meeting. He wanted to make sure I thanked the staff and the licensee at this point, he may not be back in time, on how detailed the site information was and the review was.

He said in comparison to others this was excellent. So, for Stetkar that was an unusual comment so I thought at least I'd put that one on the record.

MALE PARTICIPANT: Yes, I agree with that.

CHAIRMAN CORRADINI: All right? So at this point, let's take a break for lunch, we'll try to come back at quarter to 1 and we'll see whether licensee has some things to give us on details or we'll jump right in to what Henry's going to talk about in 2.4, okay? Thank you.

(Whereupon, the above-mentioned matter went off the record at 11:50 a.m. and resumed at 12:45 p.m.)

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

(12:45 p.m.)

CHAIRMAN CORRADINI: Okay, Henry you're the only lone survivor up there but --

MR. JONES: I'm okay, no problem.

CHAIRMAN CORRADINI: -- we'll start up as we planned. But I want to turn to DTE because they had some, we had asked them for some specific numbers on various things and I'll turn to you guys to try to walk through some of the things you know.

MR. THOMAS: Certainly. I'm Steve Thomas from Black and Veach and I first want to talk about the Windsor Airport just for a couple minutes. We did, to screen airports out we used the screening criteria that's in the SRP Section, the 3.5.15 or 3.5.13 based on the, you compare your flights per day to the factor of 1000 times the distance squared.

And in this case, based on the 25 mile distance I end up with 625,000 flights which is much greater than the flights per, I mean not flights per day but flights per year from the Windsor Airport. So the Windsor Airport would screen out from the consideration.

MEMBER STETKAR: You could have screened out a whole bunch of other ones though --

MR. THOMAS: Yes, right but that's --

MEMBER STETKAR: -- in your list based on that criteria.

MR. THOMAS: -- right, but that's the reason why that one's on there.

MEMBER STETKAR: That's, okay, okay.

MR. THOMAS: The second item, and Mr. Armijo is not here but dealt with the normal or like the current floodwater level as a FYI-type issue, and went back and looked at our contour maps that we have and it's approximately 567 feet, you know, it varies a little bit during the year but it's approximately --

CHAIRMAN CORRADINI: Oh, this is the ground, this is what Sam had asked?

MR. THOMAS: Correct.

CHAIRMAN CORRADINI: So about ten feet below --

MR. THOMAS: Right, about ten feet below the historical high.

CHAIRMAN CORRADINI: -- the historical high, okay.

MR. HERRELL: All right, the other, there was a question about the hydrodynamic dispersity and what parameters were used, what measured parameters were used and how they were biased.

CHAIRMAN CORRADINI: This was for the groundwater liquid effluent accident calculations?

MR. HERRELL: That's correct.

CHAIRMAN CORRADINI: Okay.

MR. HERRELL: Oh, my name is Jim Herrell, sorry. The parameters were calculated based on EPRI document estimation of hydrodynamic dispersivity in selected sub-surface materials. And that document includes several inputs, the inputs are hydraulic conductivity, hydraulic gradiant, effective porosity, and distance.

And those, all of those inputs were biased in a conservative direction. For example, as we were talking about the time to get to the lake being from one to 18 years kind of a number, we would have used the load velocity end, or the load conductivity end to provide the most conservative result for the dispersivity.

MEMBER RYAN: So you always pick the most conservative one in the range?

MR. HERRELL: That's right, that's correct.

MEMBER RYAN: Yes, okay great, thanks.

DR. WALLIS: You would have used the high conductivity wouldn't you, when you were interested in the shortest time.

MR. HERRELL: Well for the shortest time we would use high. But for dispersivity --

DR. WALLIS: You'd use the other one.

MR. HERRELL: That's right, that's correct.

DR. WALLIS: Do you actually have measurement to these things or do you just have a big distribution of assumptions?

MR. THOMAS: For --

MR. HERRELL: Go ahead.

MR. THOMAS: We have measured values for those but it's a range because you're taking measurements from several different locations onsite.

DR. WALLIS: So the conductivity of the soil varies by that big a factor?

MR. THOMAS: The measured conductivity varied based on the locations.

MEMBER RYAN: The first rule of geo-hydrology, Graham, is just one more quote, please.

MR. THOMAS: That's right.

DR. WALLIS: Only one?

MEMBER RYAN: So I submit, it is a good observation but I sympathize that it's very difficult to say, I mean you're going to get a pretty significant range of datas in most regions, so I appreciate the comment. But, thank you.

CHAIRMAN CORRADINI: Okay, I don't have anything else listed that we were asking you on specific information. So I think we've caught up on all the little facts we were asking of you. Or did I miss one? You guys want to consult on that?

MR. HERRELL: Yes, there was, there was a question about the Fermi 2 cooling tower salt deposition.

CHAIRMAN CORRADINI: That's right, I have that down. I apologize.

MR. HERRELL: Okay.

CHAIRMAN CORRADINI: In terms of the bounding analysis in terms of the cross analysis between Unit 2 and 3.

MR. HERRELL: Yes. And what I did was I tried to envelope how much salt would need to be, come out of all three, you know, Fermi 2 cooling towers plus the Fermi 3 cooling tower in the month period to cause contamination that would be harmful to the bushings.

What a calculation comes out to be is about 300 kilograms per kilometer squared per month which, versus our model predicted impact for the Fermi

3 is 0.02 kilograms per kilometers squared per month.

So there is unrealistically that a cooling tower could probably reach that type of salt deposition rate based on the salt composition of the water that we are using.

CHAIRMAN CORRADINI: I heard what you just said. I don't appreciate it. What you said to us before that I kind of appreciated was that if you looked at only Unit 3 and the switch yard with Unit 3, it was in the order of years of no precipitation to wash out the stuff.

And then I was expecting you were going to give us some sort of --

MR. HERRELL: Well --

CHAIRMAN CORRADINI: -- seat of the pants of the compare.

MR. HERRELL: Yes, I mean, if you just do take the Fermi 3 --

CHAIRMAN CORRADINI: Oh, so you're just thinking of doing the division of the two and that will give me an idea?

MR. HERRELL: Yes.

CHAIRMAN CORRADINI: Okay.

MR. HERRELL: I mean, if you take the Fermi 3, base some Fermi 3 cooling tower of that 0.02

--

CHAIRMAN CORRADINI: Oh, 0.02.

MR. HERRELL: -- that's the kilograms per kilometer squared per month.

CHAIRMAN CORRADINI: Okay.

MR. HERRELL: And that's what the SACTI model predicts, as the seasonal maximum. Now if you, within a, we're taking, using that based on the 300 kilograms per kilometer squared per month concentration for bushings, that would take 15,000 months of a dry period, which is --

CHAIRMAN CORRADINI: Okay so even longer than what you --

MR. HERRELL: That's 1,250 years.

CHAIRMAN CORRADINI: Yes, I got that part.

MR. HERRELL: So --

CHAIRMAN CORRADINI: I didn't think I was just going to, I didn't think I was just going to divide the two but that's what you're telling me?

MR. HERRELL: Yes.

CHAIRMAN CORRADINI: Okay, fine. Thanks.

MR. HERRELL: Thank you.

CHAIRMAN CORRADINI: Okay, now we've caught up. Henry?

MS. GOVAN: Okay, before we begin --

CHAIRMAN CORRADINI: Oh, yes.

MS. GOVAN: -- Section 2.4, there was one look up of the NRC staff to identify the worse chemical that could be released from the railways and extending the --

CHAIRMAN CORRADINI: Right, in terms of the bounding calculations.

MS. GOVAN: Correct.

MR. TAMMARA: Right, yes, what the FSAR says, if you go to that section railways, then they identify the railways are to 3.5 miles of it. And they say that, you know, they did not identify any specific chemical because of confidentiality or whatever.

So what I tried to do myself as a confirmatory calculation is take, they have calculated in response to my RAI, some propane tanks of 99,000 gallons, four and a half miles away from the facilities.

I assumed the maximum train car load of 132,000 pounds as prescribed by Reg. Guide 1.91. And then I calculated what would be the minimum explosion distance at 3.5 miles of railway, whether it would be the minimum safe distance. I calculated for the explosion.

And then I modeled the ALOHA calculation, if it is open and released, what would be the plume transport to get me to the ideal concentration in the control room of 2100 ppm. So I based it upon that one, I made that considerative calculation and they happened to be within one mile. The minimum distance I calculated was one mile.

CHAIRMAN CORRADINI: So three and a half miles is what's car be --

MR. TAMMARA: Therefore what I said, okay, even, you know, if I take that highly explosive, hazardous chemical, it will meet both criteria. Therefore, I'm all right. I mean, that was the confirmatory analysis I have performed. And then, you know, it is okay I thought.

DR. WALLIS: Can I ask you where these tanks are? Are they beside the Swan Creek?

MR. TAMMARA: Pardon?

MALE PARTICIPANT: This is the railway.

DR. WALLIS: These 3000 gallons of propane, are they beside the Swan Creek somewhere?

CHAIRMAN CORRADINI: I think they're traveling on the railway.

DR. WALLIS: Are they on the railway?

MR. TAMMARA: Yes, right, that's what --

DR. WALLIS: So, they're going to stay there. They're not going to get washed away at all in the flood?

MR. TAMMARA: That I did not, if that full amount is released, in respect of what accident that is, I didn't --

DR. WALLIS: Is that on the railroad bridge over this creek and there's this 199,000 cubic feet per second flowing in the Creek?

MR. TAMMARA: 199,000 --

CHAIRMAN CORRADINI: I think he's looking for the intersection of your --

DR. WALLIS: Propane.

CHAIRMAN CORRADINI: -- very large flood and propane tanks going through on the railway.

DR. WALLIS: Because in Hurricane Irene in Vermont, there were instances where many propane tanks were washed down rivers. That river became full of propane tanks.

MR. TAMMARA: That's a scenario I did not look at.

DR. WALLIS: And you've got a flood here which is unbelievable that I'm going to hear about in five minutes. And I just worry about the intersection of the two, that's all.

MR. TAMMARA: I did not specifically address each scenario. What I said is irrespective of what the accident scenario was --

DR. WALLIS: Right.

MR. TAMMARA: -- if the whole amount is released --

DR. WALLIS: Yes, I understand, I understand that.

MR. TAMMARA: -- what would, but so I cannot answer that question.

DR. WALLIS: I'm just saying that if you consider this unbelievable flood and propane tanks are buoyant under some circumstances, and they might wash up somewhere near the plant and then have their explosion.

And I'm not saying this is utterly fantastic, because it happened in Vermont. So it goes back to another question I have. And I understand that there --

CHAIRMAN CORRADINI: I think you're looking for the intersection of these two. I think there's some help, there's some discussion here?

MS. HAWKINS: Well the only, this is Kim Hawkins. The only thing that I would add is his review responsibility is to look at the consequence of those tanks collectively, you know --

DR. WALLIS: That's right.

MS. HAWKINS: -- exploding and --

DR. WALLIS: That's right.

MS. HAWKINS: -- I don't think the scenario that you're talking about is something that our guidance supports.

DR. WALLIS: I don't care what the guidance says. I'm talking about reality.

CHAIRMAN CORRADINI: Or your version of reality.

MS. HAWKINS: Right.

CHAIRMAN CORRADINI: Excuse my English.

DR. WALLIS: About what can and does happen sometimes. And if the guidance doesn't have it in it, maybe the guidance should be more modified.

MS. HAWKINS: Perhaps the --

DR. WALLIS: I understand that you follow the guidance and the guidance often is wise, but sometimes there are things missing. And it's those things that are missing which, they sometimes create events, that's all.

MS. HAWKINS: But I'm not sure, I just want to explore your, the scenario you're proposing because I'm not sure that I understand. The scenario is that if one of these tanks were to somehow get into a high rate of water flowing, it would carry the tank somewhere else.

DR. WALLIS: Yes.

MS. HAWKINS: And is your concern that it might carry the tank close to the plant and then what would happen next?

DR. WALLIS: Yes, the Swan Creek is something over about a mile from the plant.

MS. HAWKINS: Right.

DR. WALLIS: And the Swan Creek in flood state is bigger than that. I'm not sure if it's, you know, I'm just, I don't know, I haven't, I don't know all about its shape and everything. I'm just saying this is the kind of thing that I've known to happen and I just don't see it being considered, that's all.

MS. HAWKINS: Did you want to address that at all, Rao?

MR. TAMMARA: One thing I can say is --

CHAIRMAN CORRADINI: I don't think it's addressable.

MR. TAMMARA: -- what is the probability of that happening?

DR. WALLIS: I haven't the slightest idea.

MR. TAMMARA: So that, if the probability, there is another guidance --

DR. WALLIS: It's happened in the state of Vermont. Maybe it can't happen near Detroit, I don't know.

MR. TAMMARA: Because there are soil scenarios, it has to float --

DR. WALLIS: It has happened, so.

MR. TAMMARA: No, no, it has to float, it has to --

DR. WALLIS: Yes and --

MR. TAMMARA: -- explode, it has to release and --

DR. WALLIS: Yes.

MR. TAMMARA: -- there are so many, it is like a PRA event.

DR. WALLIS: But there are so many other improbable events which are in the guidance.

CHAIRMAN CORRADINI: So if I might just intervene, I think we've established that this is something that was not considered --

DR. WALLIS: That's fine.

CHAIRMAN CORRADINI: -- and they don't feel the guidance requires them to consider it.

And what I also hear, I'm just interpreting, I'll let staff correct me. And what I also hear is that if it were to be considered it would be from a risk perspective not from a bounding perspective.

MS. HAWKINS: Yes.

DR. WALLIS: But we don't know yet because it hasn't been done.

CHAIRMAN CORRADINI: Yes, that's right, that's correct. Are you done?

DR. WALLIS: Yes.

MR. TAMMARA: There were two questions asked --

CHAIRMAN CORRADINI: Oh, I'm sorry. I thought you were done.

MR. TAMMARA: -- one is this one. The other one I tried to find where is the shale fracking, how far it is away from. But I could not locate that facility within five miles. I went and looked the search for it so I don't know.

I will still search for it but whether it is within the five miles or not, I cannot give a definitive answer at this time. If it is was within the five miles and if we missed, probably we should include. If it is beyond five miles we are only concentrating the facilities within five miles of the plant. So the brief time I had, I could not locate.

CHAIRMAN CORRADINI: Sure.

MR. TAMMARA: If anybody knows exactly where it is located --

CHAIRMAN CORRADINI: I think you'd turn to the licensee to help you.

MS. HAWKINS: Yes.

MR. TAMMARA: So.

MS. GOVAN: Well we'll take it as a confirmatory item.

MR. TAMMARA: Confirmatory item, we will look into it.

MS. GOVAN: Or action item.

MR. TAMMARA: Yes, action item, that's right.

CHAIRMAN CORRADINI: But, all right.

MS. GOVAN: Henry will now present hydrology for the staff.

MR. JONES: Good afternoon. The hydrology today, I will present the Sections of 2.4.2 which are floods, 2.4.3 which is the probable maximum flooding on streams and rivers, 2.4.5, which is surge and seiche flooding, 2.4.6 tsunami, and 2.4.12, groundwater, and 2.4.13, accidental release of liquid effluents in ground and surface water.

First, Section 2.4.2, Action COL Item

floods. And what we're looking at here are the historical floods for the site, the whole watershed. Then you look at the individual type of flooding which includes the other sections which I mentioned.

You look at the combination possible, maybe like surge and a river flooding, et cetera. Then you look at factors affecting potential run off. And then specifically, this is the section that handles the local intense precipitation for the site.

DR. WALLIS: Now you don't give us any numbers here but I think in the table, you have historical flooding that the 500 year flood, probably not records over that long of a time but --

MR. JONES: Exactly.

DR. WALLIS: -- was 5000 cubic feet per second, 5000 cubic feet per second.

MEMBER ARMIJO: Now in the historical flooding, you know, you've got documentation --

MR. JONES: Exactly.

MEMBER ARMIJO: -- and then you're guessing about 500 years because there's no documentation there.

MR. JONES: Exactly, it's --

MEMBER ARMIJO: But, you know, at Fukushima there was a lot of work done either before the fact or after the fact on geological evidence of major tsunamis. And there is, they found evidence of --

MR. JONES: But that was their, they over, the decided not to include that in their evaluation.

MEMBER ARMIJO: Well, you know, it was a work in progress. But you can get evidence of historical flooding from geological evidence if you look for it.

MR. JONES: Paleo floods, that's what's you're talking about, paleo flooding.

MEMBER ARMIJO: Right, yes, paleo flood, yes, right. And the question is for, when you have a flood of the type that Graham was talking about, these massive, horrendous floods, there would be, if it ever had happened in that area there would be geological evidence, somehow, if somebody looked for it. Is that the --

MR. JONES: Well in this case --

MEMBER ARMIJO: -- staff doesn't require that now.

MR. JONES: Well in this case you have to also be careful because you have the Ice Ages, you know, a lot of the Great Lakes were formed so it's a whole different --

MEMBER ARMIJO: Right.

MR. JONES: -- scenario that we're in, we're in between Ice Ages.

So a paleo flood may happen under a totally different circumstances that would be occur in the lifetime of the planet now so it may not have any relevance whatsoever.

MEMBER ARMIJO: It may be a totally different basic type of flood. So I guess it's really getting to, it's when you get to these horrendously huge floods, is it really valuable to put that into the regulations of the probable maximum flood?

MR. JONES: Well, the problem that goes back to when we had the debate about what's, the probable is no statistical, what happened, they used to call them maximum and then people said well how can you call them maximum? How do you know they're bounding? Someone said well, they're probably the maximum, so it has nothing to do with statistics.

And what it does, it follows the hierarchal approach in which you try to use something outrageous, sometimes unphysical. And if you're able to show something is so conservative that it's out of the bounds of something that's in reality and it still doesn't flood the site, then they don't have to do any detail analysis.

MEMBER ARMIJO: That's fair enough. If it was called a deterministic flood, you know, out of the air then --

MR. JONES: We do that in tsunami.

MEMBER ARMIJO: I'd believe that.

MR. JONES: We do 1D, no friction, and it's so unrealistic, we do hot start, the slide starts instantaneously.

MEMBER ARMIJO: Yes.

MR. JONES: We do all of that and the site, if you only get 18 feet and your site's 51 feet.

DR. WALLIS: This is dangerous because then, in this example you came up with 199,000 cubic feet per second as your maximum flood, in the SER, which is 40 times this 500 year flood.

MR. JONES: Yes.

DR. WALLIS: Forty times.

MR. JONES: Yes.

DR. WALLIS: It seems absolutely incredible.

MR. JONES: It is.

DR. WALLIS: And 500's almost incredible itself.

MR. JONES: I concur.

DR. WALLIS: All right, okay, for this site it's okay because the river spreads out over a mile and it's not very bad. But if you applied this kind of thing to some other sites --

MR. JONES: It would be different then.

DR. WALLIS: -- you would have a, you would have a real problem.

MR. JONES: But it's different. Every site --

DR. WALLIS: No, but if you used the same assumptions on another site --

MR. JONES: We have. And you get different results for every site because the PMP is not the same, the meteorological conditions are not the same for every site.

DR. WALLIS: Well you mean it can rain, it can rain near Detroit 100 times harder than it can rain in Vermont? I don't believe you.

MEMBER STETKAR: You don't know, what's the PMP or the PMF for your site in Vermont? You don't know what it is.

DR. WALLIS: Well that's what I was going to raise. I mean this, this maximum flood --

MEMBER STETKAR: It's much higher than anything you've ever seen.

DR. WALLIS: This maximum flood, if 200,000 CFS --

MEMBER STETKAR: It's not the same as Detroit.

DR. WALLIS: -- is bigger than it's ever been recorded at Vermont Yankee.

MEMBER STETKAR: That's right.

DR. WALLIS: And --

CHAIRMAN CORRADINI: But I think, Graham, though, if I just might intercede because we're going to have to move on. What I think I'm hearing is they've followed the guidance, the guidance is not risk informed --

DR. WALLIS: Yes but let's go, let me finish my thing. The drainage, the watershed is 106 square miles for this thing, right? At the Vermont Yankee it's about 100 times or more bigger.

So am I going to take your number and multiply it by 100 times for Vermont Yankee and get 100, get something like 200 times the historical highest water flow rate? That's absolutely preposterous.

MR. JONES: You can't take one site and project at the other. You have to do --

DR. WALLIS: But the rain, the rain isn't going to be 100 times more intense in Detroit than it is in Vermont.

MR. JONES: It's not just the rain. What you do is you take --

DR. WALLIS: We've got more snow than you do.

MR. JONES: -- you take the physics of the meteorology for the area --

DR. WALLIS: Doesn't make sense.

MR. JONES: You take the meteorology for the area, you take the storm, you orient it for the watershed, it's for the whole wide watershed --

DR. WALLIS: You don't, we get more water than you do, I mean it doesn't make sense.

CHAIRMAN CORRADINI: Can I, I'm going to stop this so we can go on.

DR. WALLIS: Okay.

CHAIRMAN CORRADINI: But at break, you two can caucus.

DR. WALLIS: Yes we can.

CHAIRMAN CORRADINI: And we'll see who wins.

DR. WALLIS: Well you see, I'm thinking, no, no, no, it's not a question of who wins --

MALE PARTICIPANT: It doesn't make sense.

DR. WALLIS: -- it's a question is if you take these numbers, somebody wise take --

CHAIRMAN CORRADINI: No, but I think --

DR. WALLIS: -- and then starts looking at other sites, there's going to be a problem.

CHAIRMAN CORRADINI: But I think what Henry is saying, unless, he can correct me if I'm wrong but at this point I'm going to try to have the last word on this is, it's much location, location, location, almost like real estate.

DR. WALLIS: It's not. It doesn't rain, it doesn't rain 100 times harder than --

MEMBER STETKAR: Graham, you can't say that.

DR. WALLIS: Why not?

MEMBER STETKAR: Because it is different in their analyses.

DR. WALLIS: Not by that margin.

MEMBER STETKAR: How do you know?

DR. WALLIS: Not by that margin.

MEMBER STETKAR: Did you do the analysis for your location?

DR. WALLIS: It can't be, it can't be. I don't believe it.

MR. JONES: We've done it.

MEMBER STETKAR: Graham, okay --

CHAIRMAN CORRADINI: That's why I think we --

MEMBER STETKAR: -- believability is one thing.

DR. WALLIS: We have a foot of rain from Hurricane Irene, they have 100 feet of rain in this area? Come on.

MEMBER STETKAR: You know, I know what they do. I don't support what they do because it's silly. But I know what they do and you can't do that extrapolation from your experience --

DR. WALLIS: How?

MEMBER STETKAR: -- in the Vermont back hills to Detroit, Michigan because the meteorology is different, the topography is different, the hydrology is different.

DR. WALLIS: Worse, all our topology is worse.

MEMBER STETKAR: How do you know it's worse? How do you know it's worse?

DR. WALLIS: Because it runs off from the rocks and doesn't get --

MEMBER STETKAR: How do you know it's worse?

DR. WALLIS: And because they've got a flat plain for it to spread on --

MEMBER STETKAR: I have much easier transport.

DR. WALLIS: -- and we have a valley. Come on, no. I don't know want to push up but obviously something is really crackers about this, right?

MEMBER STETKAR: The whole deterministic flooding analysis doesn't make any sense.

DR. WALLIS: Thank you.

MEMBER STETKAR: But at least it's done consistently.

DR. WALLIS: But if it were done, I'm very worried about it being done consistently this way for my area.

MEMBER STETKAR: Well they must have done it for Vermont Yankee.

DR. WALLIS: And they get a rain --

MEMBER STETKAR: Then in fact, they will be doing it and redoing it.

DR. WALLIS: To get these kind of numbers, we have a drainage area 100 times as big as theirs. We're going to have roughly 100 times as much water.

CHAIRMAN CORRADINI: So let's take this

off line.

DR. WALLIS: Okay so let's leave it, let's leave it.

CHAIRMAN CORRADINI: Henry.

MR. JONES: Okay so, to continue --

DR. WALLIS: But the staff take note, this is a problem.

MR. JONES: To continue, the staff reviewed included the effects of local intense precipitation, we've performed independent evaluation based on the methods from the National Weather Service, Hydro Meteorological Reports 51 and 52 which are applicable for this area. We verified the PMF due to local intense precipitation, verified that the problem maximum --

DR. WALLIS: Are these numbers somehow, can you send me this derivation and the method that you used?

MR. JONES: Oh yes, this is since 1970. This HMR's been around since, and their standard, even the other agencies use these, Bureau of Rec and also the Corps.

DR. WALLIS: Then something must be wrong. Could you send me the --

MR. JONES: Sure.

DR. WALLIS: -- whole report then?

MR. JONES: I have them. And verified, and said we verified the site drainage and verified that the runoff from the local intense precipitation would not exceed the site grade parameter. Any questions, further questions on this section?

MEMBER STETKAR: Henry, the only question I have --

MR. JONES: Yes.

MEMBER STETKAR: -- and this is, I think I now know the answer, but what I'd personally recommend is the entire section pays very close attention to flooding of safety related structures.

In Tables 19A4, I think it is, in the DCD, there are external flooding requirements for RTNSS structures. So I hope that you thought about flooding a RTNSS structures because RTNSS structures must also be protected against external flooding, or have appropriately high entrance points or whatever.

And I couldn't find any mention of the staff's evaluation of potential flooding of RTNSS. And that I believe is something that --

MR. HARVEY: We could check on that.

MEMBER STETKAR: -- that is within the site specific, because there are requirements in the certified design for external flooding protection of RTNSS, so --

MR. JONES: No, we can check on that. Might be an answer to another chapter.

MEMBER STETKAR: That's why I asked the staff, or that's why I asked the applicant this morning about whether or not everything in RTNSS, is up, you know, at the same elevation as the safety related.

CHAIRMAN CORRADINI: Their answer was to the affirmative.

MEMBER STETKAR: Their answer was to the affirmative.

MR. JONES: That's right, so that means that they, so they would be safe under the same scenario.

MEMBER STETKAR: But in terms of the staff's review, I think it's something that needs to be --

CHAIRMAN CORRADINI: Double check that.

MEMBER STETKAR: -- confirmed, because if there is something, you know, downslope between the lake and the higher plateau, I'm going to call it that, it could be susceptible to that lake flood.

MR. JONES: The next section is probable

maximum flood on streams and rivers. There were no open items and the staff's review, you can go to, you got that? Okay, good, confirmatory analysis of the PMP on Swan Creek watershed, we discussed this extensively already.

We independently calculated the probable maximum flood on Swan Creek using the hydrographic, SCS hydrographic method and using some of the models from the Army Corps of Engineer.

And what we did is we verified the conditions of Lake Erie and concluding snow melt and wind effects and coincident wave activity were accounted for in the modeling of the water surface elevation.

And we also looked at the combined events using ANSI 2.8-1992, which is what we use for our guidance for combined events. And we found that the flood level did not exceed the grade level or the level for the safety structures. Any questions on 2.4.3?

CHAIRMAN CORRADINI: No.

MR. JONES: Okay. Section 2.4.5, probable maximum surge and seiche flooding, we came to the same conclusion as the applicant and agreed with their conclusion, that there was about a 586.4 feet NAVD 88, and that with wind wave breaking, that you'd get another foot or so for a total of 586.7, which is below the site grade for the Fermi site.

Actually what you have mostly in the Great Lakes, you have a seiching, but what you do is you look at the period using a simplified equation. And if your waves don't match the period that you do for resonance than you are, actually don't have a seiching effect, cannot go into, be applied.

So what we did is we looking at the Fermi site location and they came to the conclusion that their natural period of oscillation was 29 to 124 seconds.

But the wave activity that would produced by any storms on the lake would be only 11 seconds, and so that you don't meet the resonance for seiching to occur. And usually the maximum amount of seiching that you would ever occur would be a maximum of seven feet anywhere in the Great Lakes.

And so how do we verify this? We looked at the historical data of seiching in Lake Erie. They ran a state of the art model STWAVE, which was created by the Corps of Engineers. And they looked at the wave inducements and simulations over the entire area of the plant.

We looked at the input and output files of the applicant. And then considering everything in the Lake Erie 100 year lake level, we determined that they did, met the requirements that the seiching or the surge flood does not reach the site grade or the safety structures. Any questions on surge?

Okay, tsunami, Section 2.4.6. Simply, there is no history in this area of tsunamis actually seiching, which some people call kind of a tsunami for the lakes is what you get in this area.

There is no subduction zones, no strikes, no faults, no volcanoes. The area there, there's no chance of a landslide with rocks, it's shallow. You're never going to get the volume of water to create a near shore tsunami. And we actually modeled this for another site, actually hypothetically and dropped something in the water and it didn't reach the site, so.

MEMBER ARMIJO: Didn't do much.

MR. JONES: Yes.

DR. HINZE: But the symmetry is such that you won't get submarine slides so.

MEMBER ARMIJO: You can't, yes.

MR. JONES: So this isn't, so you, you know, that rules it out for the Great Lakes. Any questions on this section?

Okay, let's go to groundwater, Section 2.4.12. Here we looked at the hydrogeological characteristics of the area, the effects of groundwater on plant foundations, and the reliability of safety-related water supply and dewatering systems.

The review, the staff included the publicly available information on the regional, local groundwater aquifer characteristics and site specific parameter tests.

We also looked at the geological layering and the sequence of formations in the area. And we reviewed the groundwater sources and sinks surrounding the site. And we verified the operations and safety-related systems that do not rely on dewatering.

And another side is that, you know, Section 2.5 actually corresponds to this in that, you know, it shows extensive detail on the geology. And a lot of time when we look at tsunami or anything like that we actually look at Section 2.5 to verify for slopes stability, any chance of landslide, and the characteristics of the area.

DR. HINZE: Perched water tables are common in this type of glacial drift. Is there any evidence of that in this area?

MR. QUINN: We have some maps that we can show you in the back of this packet, for some details. Yes, I believe there could be perching but it seems that in the lacustrine sediments and the glacial drift and the rock fill that comprise the unconsolidated upper portion of the site, it seems fairly continuous in terms of water levels.

DR. HINZE: Are there any specific locations, locales that give rise to these perched? And how close to the surface are they?

MR. QUINN: I don't know what the depth below grade is for high water levels. And your initial question was?

DR. HINZE: Well, are there locales for the lacustrine sediments, for example, that would suggest that you would have perched water tables in this specific area of the plant?

MR. QUINN: There's not any evidence of a local high of significance.

MALE PARTICIPANT: What does "of significance" mean?

MR. QUINN: Well, that you do have variability, you have variable flow directions if you consider the unconsolidated monitoring wells and their water levels.

DR. HINZE: Are these, are the perched tables, are these ephemeral?

MR. QUINN: No, I believe they're --

DR. HINZE: They're continuous.

MR. QUINN: -- they're continuously run, yes.

MR. JONES: Are there any other questions on groundwater?

Okay, I'll go on to the next one, please. Section 2.4.13, the accidental releases of liquid effluents on ground and surface waters, considers all the potential effects of a relatively large accidental release from the systems that handle liquid effluents generated during the normal plan operation.

Normally I think in the guidance they put 80 percent release. And I think the applicant did 100 percent release in this case which is even more conservative.

The staff reviewed a confirmed ground water levels pathways and velocity calculations from a postulated source to a receptor, which would be offsite, and evaluated plausible combination of the ground and surface water characteristics.

And a lot of this is based on the previous section where we characterized the groundwater and we look at how it's going to be dispersed, dilute, the concentrated liquid effluents as related to the existing potential for future water uses.

We evaluated and verified radionuclide release simulations were adequately conservative. and we confirmed that the radionuclide levels would be below the required levels for the receptors.

DR. WALLIS: Could I ask you about this?

MR. JONES: Sure.

DR. WALLIS: When the applicant described what they did, they made a lot of these conservative assumptions, so the tail of distribution. And then they said they didn't meet the requirements. So they had to start taking credit for things, so they nibbled away at some things --

MR. JONES: Exactly.

DR. WALLIS: -- until they met the regulations. Is this the usual way or isn't --

MR. JONES: Yes.

DR. WALLIS: -- there some kind of guidance which says --

MR. JONES: Yes.

DR. WALLIS: -- you should assume various things and get on?

MR. JONES: But what happens is what we

did discuss here was that what we use in hydrology especially as a, what we call, they've been using here the hierarchal approach.

DR. WALLIS: Right.

MR. JONES: And that's why we get such extremes like you said, that it's not plausible. And what you do is, if you're okay with the unplausible and outrageous --

DR. WALLIS: Then you stop.

MR. JONES: -- you stop. But on the other hand, if you're impacted by it --

DR. WALLIS: Right.

MR. JONES: -- then you say look, you know, instead of saying that it was saturated or rubber sheeting, I'm going to say that it has infiltration --

DR. WALLIS: That's right.

MR. JONES: -- you start adding all the realism in, as much as you can like in oceanography, more, better bathymetry, more high accurate models until you can see if you can reduce it. It may not happen but you try to reduce it as low as possible.

DR. WALLIS: I understand that but it doesn't, it seems a little bit, one gets a little bit of an awkward feeling when one makes a, they make a calculation and they keep nibbling away at things until they meet the regulations.

That, it would be good if there'd be a process whereby you do it and you meet the regulations, you don't have this awkward thing of keeping nibbling away at your assumptions until you do. That gives one a little bit of an uneasy feeling.

CHAIRMAN CORRADINI: I think, I mean, my way of looking at this is no different than LOCA many years ago and peak clad temperature, except they don't have the ability to build a test and test it.

DR. WALLIS: LOCA is much more specific though. LOCA says thou shalt do this, this, and this.

CHAIRMAN CORRADINI: Right but originally you --

DR. WALLIS: And don't let them nibble away at the assumption.

CHAIRMAN CORRADINI: Well --

DR. WALLIS: Appendix K is very specific.

CHAIRMAN CORRADINI: Before Appendix, yes, but before Appendix K there was a lot of nibbling.

MEMBER ARMIJO: They sharpened their pencils on it.

CHAIRMAN CORRADINI: Not anymore.

MEMBER ARMIJO: On Appendix K.

CHAIRMAN CORRADINI: But I guess my --

DR. WALLIS: Like I said it, that's okay. I think it's okay, it's just a little bit awkward they nibble that.

MR. JONES: Any other questions or comments?

DR. HINZE: It just seems to be that you need to comment on the perched water tables.

MR. JONES: Oh sure, we can reject that.

DR. HINZE: I think that will be a question that should be raised. And it would be better, excellent if you covered talk on that.

MR. JONES: Okay, we'll take that for action.

MS. GOVAN: And what was the name, perched water?

MR. JONES: Perched water, yes.

MS. GOVAN: Okay.

MR. JONES: And was another --

CHAIRMAN CORRADINI: I don't appreciate, I guess you guys have totally communicated but I'm lost.

DR. HINZE: What you have are you have very impermeable zones within the glacial drift.

CHAIRMAN CORRADINI: Oh.

DR. HINZE: And as a result, it develops a water table that's above the groundwater table. And that's called a perched water table.

CHAIRMAN CORRADINI: Oh, okay.

DR. HINZE: So you actually end up with a permanent water supply above the water table, and all the problems that go along with that. And so the FSAR does refer to perched tables so it's important that we make certain that they have been considered.

CHAIRMAN CORRADINI: Okay, okay. So it's more a matter of documenting --

MR. JONES: Exactly.

CHAIRMAN CORRADINI: -- your review of it.

MR. JONES: And we have this, there was another question, right?

MS. GOVAN: There were two.

MR. JONES: Two?

MS. GOVAN: Send a report, Committee Member Wallace --

MR. JONES: Okay he --

MS. GOVAN: -- send a report of the confirmation --

MR. JONES: -- the HMRs, he wanted those.

MS. GOVAN: Right. And the flood protectional statements for Committee Member Stetkar.

MR. JONES: Okay, that's all I have.

CHAIRMAN CORRADINI: Questions from the committee? Okay, so this round we thank the staff. And now we'll go on to Chapter 3, from DTE, is that correct?

MS. GOVAN: Yes.

CHAIRMAN CORRADINI: Before you lose Henry, this could be your chance, Dr. Wallace.

DR. WALLIS: He's going to disappear?

CHAIRMAN CORRADINI: No, I mean he may disappear. He just, I know he's thrilled about Fermi but he may not stay for Chapter 3. So this is your chance to get him offline.

DR. WALLIS: Where did he go?

CHAIRMAN CORRADINI: He's right back there.

DR. WALLIS: Hiding behind the pillar?

MALE PARTICIPANT: He's hiding behind there.

CHAIRMAN CORRADINI: He's hiding behind the pillar.

MR. JONES: No he's not.

CHAIRMAN CORRADINI: So if you want to talk to him, you'd better talk to him now.

DR. WALLIS: But the doors, you know --

MR. JONES: You want to get me out of the way, huh?

CHAIRMAN CORRADINI: I didn't say that. I just wanted to make sure you were --

MALE PARTICIPANT: Were happy.

CHAIRMAN CORRADINI: -- you're happy, thank you.

MR. LAPRAD: So we're all set?

CHAIRMAN CORRADINI: Joe, are you going to kick it off?

MR. LAPRAD: Yes.

CHAIRMAN CORRADINI: Okay.

MR. LAPRAD: Yes, my name is Joe LaPrad, I'm a licensing engineer with Detroit Edison and I'll be presenting Chapter 3, Design of Structures, Components, Equipment and Systems.

So our presentation today on Chapter 3 is going to cover Chapter 3 Sections that incorporate COL information, supplemental or conceptual design information. Those Sections include 2, 5, 9, 10, 11, 12, and 13.

There are several Chapter 3 Sections that incorporate the DCD with no departures for supplements. And those won't be addressed in the following slides. Also there are several Chapter 3

Sections that will be covered in a later ACRS Subcommittee meeting and they won't be presented today.

So Section 2, classification and SSCs, this section contains conceptual design information that specifies parts of the Fermi 3 plant specific design, contains no safety related or RTNSS systems. Also the Fermi 3 design includes the hydrogen water chemistry system but not zinc injection.

Section 5, missile protection contains supplemental information that refers back to FSAR Chapter 2 for site specific missile sources and aircraft hazard analysis.

Section 9, mechanical systems and components, incorporates several COL information items. The first describes reactor internals vibration assessment program and the program implementation schedule based on prototype and non-prototype scenarios.

Additional Section 9 COL information items describe pipe stress report milestones, snubber pre-service and in-service examination and testing, PST and IST for pumps and valves, and specific squib valve requirements. Also, you know, included in the SER for Section 9 is license condition that describes further squib valve requirements.

Section 10 contains a COL information item that includes a commitment to make qualification records available and the commitment to submit and update a schedule for competing qualification activities. There's also a supplemental item that refers to FSAR Section 17.5 for QA requirements related to qualification records.

Section 11 contains one COL information item that describes the environmental qualification program for Fermi 3 including qual documentation, procedural requirements, design control, testing, surveillance, and maintenance requirements.

Sections 12 and 13 of Chapter 3 are essentially DCD incorporate by reference sections that refer to multiple DCD chapters and sections. These sections were added to the SRP after GE submitted their PCV but prior to Fermi 3 submitting the COLA so, but sections were added to the FSAR to address the SRP. And that's it for Chapter 3.

CHAIRMAN CORRADINI: Questions by the committee? Okay, the staff will come up and give us their rendition.

MS. GOVAN: Okay, good afternoon again, my name is Tekia Govan. I'm the NRC Project Manager for

Chapter 3 on the Fermi 3 COL application review. This presentation is being made to the ACRS Subcommittee and it will describe the NRC staff's review findings of the Fermi 3 COL application. It more or less explains the conclusions of their safety findings.

The review team consisted of Adrian Muniz, a Lead Project Manager, myself, Tekia Govan, Balance of Plant and Fire Protection Branch, Eileen McKenna is the Branch Chief, Component Integrity Branch with David Terao as the Branch Chief, Electrical Engineering Branch with James Anderson as Branch Chief, Engineering Mechanics Branch with Joe Colaccino as Branch Chief, Radiation Dose Assessment Team, with Michael McCoppin as Branch Chief, and the Structural Integrity Branch with Brian Thomas as Branch Chief.

Chapter 3 entitled Design of Structures, Components, Equipment, and Systems incorporates by reference many of the sections in the Chapter 3 Fermi COL application.

In instances where the sections were completely incorporated by reference, the NRC staff reviewed the application, checked the reference ESBWR DCD to ensure that no issues relating to those sections remained open for the Fermi 3 review.

In instances where the section is

incorporated by reference with supplemental information and/or a COL item, the staff compared the additional COLA information to the relevant NRC regulations and guidance. And concluded that Fermi 3 COL FSAR is acceptable and meets NRC regulatory requirements and acceptance criteria.

As noted by Adrian in his opening remarks, the staff has open items that are still under review for Sections 3.7 and 3.8 relating to soil structure interaction, and 3.9 relating to the ESBWR steam dryer topical report review. Aside from these three sections, the NSR staff review is complete with no open items.

This afternoon the staff will discuss their review findings for Sections 3.5, missile protection, which will be presented by Rao Tammara, and 3.9.6, functional design qualification and in-service testing which will be presented by Thomas Scarbrough.

At this time I will turn it over to Rao Tammara.

MR. TAMMARA: My name is Seshagiri Rao Tammara. And my technical review will cover site proximity missiles and also aircraft hazards.

First, you see the action item 3.0-1,

which deals with the site-specific information pertaining to the site proximity missiles. These sites proximity missiles are due to any of the potential accidents that are evaluated in Chapter 2.

And there are no design basis accidents identified, based upon the analysis carried out and also presented this morning. Therefore, there are no site proximity missiles from these potential accidents.

Only thing is the existing plans from Unit 2 there might be a potential for the turbine missile, which was not included in the FSAR. Therefore as time pass there'll be additional information.

In response to the RAI 3, Part 151, the applicant provided the analysis and showed that the proximity missiles have not posed a problem or a threat to the Unit 3.

Staff reviewed the applicant's information pertaining to this site, the turbine missile FX site-specific information, and since it is within the accordance with the 0800 and also the Guide 1.115, it satisfied the GDC 4 criterion, therefore it is acceptable.

Next slide. As a part of aircraft hazards, the Informational Item 3.52 is evaluated.

Staff reviewed the applicant's information pertaining to the site-specific aircraft analysis, aircraft hazards, and found it to be acceptable as it satisfies the guidance, NUREG-0800, and also SRP Section 3.5.16.

And the aircraft crash probability is within the acceptance criteria of target of magnitude of 1 X 10 minus 7 per year.

Actually, in this case, staff has made a confirmational analysis obtaining the real aircraft flight numbers from 2004 to 2009. We requested FAA to furnish the annual data within the five miles of the site and also within the ten miles of the site, all the aircrafts going in either direction.

They furnished by year from 2004 to 2009. We analyzed that data and came up with a total number of flights, irrespective of what flight it is.

Actually the data contains what type of aircraft it is, what type of mission it is, from where it is originated and where it is going. But all the data is really in the data file. But, however, we did not distinguish as it first occurred.

We looked at all the data, which is within the five miles, and took that all flights, and calculated the probability. And that probability also satisfies the requirement 1 X 10 to the core minus six, eight actually to be precise.

MEMBER STETKAR: Six?

MR. TAMMARA: Eight, yes.

MEMBER STETKAR: I'm sorry, the criterion is one minus seven. So that's a factor.

MR. TAMMARA: 10 X 4 minus 7, however, if they are realistic assumptions and the data can be provided, it can go as high as 10 to the core minus six. That is the guidance provided in the SAR.

MEMBER STETKAR: And I'd like to see your analysis. So if you could give me a copy of the confirmatory analysis that you did, I'd love to see that.

MR. TAMMARA: Yes.

MEMBER STETKAR: Because my experience, having done several aircraft crash analyses for an adjusted area like this site, 10 to the minus 6, maybe. When somebody tells me it's on the order of magnitude of 1 X 10 to the minus 7 I think perhaps a factor of two or three either way from that.

I don't think that it's a factor of ten higher than that. That's kind of like saying I'm going to deliver a report in 2013 and sort of say that's 2014.

MR. TAMMARA: However, you have to

understand, the very confirmatory analysis was met.

MEMBER STETKAR: I'd like to see that confirmatory analysis.

MR. TAMMARA: You are assuming all the flights within five miles of the site.

MEMBER STETKAR: I understand that.

MR. TAMMARA: So it is a very high conservatism built into the calculation.

MEMBER STETKAR: I understand that. I'd like to see the calculation. The reason I'd like to see that is that the applicant cited some number, some air traffic density in a particular airway.

And that airway is V383. And that works out to be, get my notes here, bear with me here. I've lost my notes. I think it was 165, or thereabout, flights per day. Yes, 165.

They assumed that the same number of flights are in airway V10, 176, 188. Now they're very different airways. Because 383 is an approach airway into DTW and 10, 176, 188 is an east/west transit airway. So you're going to have different traffic that's using those airways.

They've not addressed any of the other four airways that are approach airways into DTW, 133, 426, 26, and 467.

If you just do the stylistic calculation according to the regulatory guidance, you would get greater than ten to the minus seven crash frequency at the site from those airways with traffic densities that range from about 135 to about 180 flights per day.

That sounds like a lot. But when you start looking at the number of flights into and out of DTW on a daily basis, I don't know where the rest of them are coming from.

So that's why I'd like to see the number of flights that you got within five miles of the site, from the FAA. I mean that's where you get them. You didn't have them by airway? You just asked them for --

MR. TAMMARA: No, that is a very longer --

MEMBER STETKAR: It's hard to get. I know, I've tried.

MR. TAMMARA: We negotiated this one to have a conservative --

MEMBER STETKAR: I've done similar negotiations with plans. I know. It's hard to get. So you just have, you drew a circle and they gave you a number of --

MR. TAMMARA: Right, if we can accommodate all the flights within the five miles we are making a really, irrespective of what airway it is, you are accommodating much more than what it would have gone. So that is the basis for our thinking.

MEMBER STETKAR: Now, so I'd like to see that. Because the airway stuff is what's giving, in the FSAR, it's giving them a frequency of slightly higher than 10 to the minus 7. They calculate 1.6 X 17 to minus 7 from each of the two airways that they looked at. So it's about three time ten to the minus seven.

MR. TAMMARA: That's correct.

MEMBER STETKAR: What I'm curious is what did you do with Detroit Metro Airport accidents? Because in the FSAR, it just simply says, "an evaluation of the probability of an aircraft accident affecting Fermi 3 from Mills Field Airport or Detroit Metropolitan Wayne County was performed.

The probability for an accident from the Detroit Metropolitan Wayne County airport is less than ten to the minus seven per year." In the FSAR you just repeat that number. I don't see any analysis that was done on that.

MR. TAMMARA: In the aircraft analysis, if you go to the SRB, there are three criterion you have.

First you'll see, if it is within five miles, the airport is within five miles, you have an equation. The total number of flights should be 50 times that distance --

MEMBER STETKAR: And they'd all meet from Mills Field.

MR. TAMMARA: So if it is ten miles it is 1,000 times. So as those go the number of those flights is less than the specified number, then it is that the airport is cleaned out.

MEMBER STETKAR: That's right.

MR. TAMMARA: You don't consider. That accident is considered to be lower than ten to the four minus six. So for those airports which have the volume higher than that criteria, then you will look into the calculation of determination of probability.

MEMBER STETKAR: Okay.

MR. TAMMARA: The other looking is, if it is a military, then you have to address a different way. And if you did the airway then it should be within the two miles from the edge of the airport, I mean central, the middle of the airway should be two miles from the edge of the airport --

MEMBER STETKAR: So it's half the width of the airway plus twice the distance of the site.

MR. TAMMARA: Right. So if these criterion are not met, then the accident is cleaned out. So therefore, based upon that one, the number of flights for that airport are lower, I think.

MEMBER STETKAR: No, that's not true, wrong. The number of flights from, don't do this, I can be this way. According to the FSAR, if I take 1,000 times the square of the distance to Detroit Metro I get 361,000 flights.

And, according to data, the annual number of operations, at least for whatever year they looked at, was 481,435, which is greater than the 1,000 D-squared criterion.

So they couldn't screen out Detroit Metro. Then there's a simple sentence that says we did an analysis. It came out less than ten to the minus seven.

Your conclusion says they did an analysis, it came out less than ten to the minus seven. I'm asking for what analysis was done. I'd like to see that analysis. And if you did a confirmatory analysis, I'd like to see that one.

MR. TAMMARA: Yes. I did confirmatory analysis on the --

MEMBER STETKAR: On the airport also.

MR. TAMMARA: I did not consider the airport.

MEMBER STETKAR: That's what I'm asking about. Because my experience, if you look at NTSB data for crash frequencies on the flight operations that would affect this site would be climb and descent, coming in from cruise down to what they call approach. So it's the descent phase and the climb-out phase.

I think you're hard-pressed to get anything less than ten to the minus six. And it might be higher, depending on the orientation of the airport or --

MR. TAMMARA: I have to take a look at it again.

MEMBER STETKAR: -- the approach paths, and things like that. So I'm curious what analysis was done. I was going to ask the applicant. But since we said we're going to address it this afternoon and the applicant breezed through Section 3, I figured I'd see what the staff had done.

MR. TAMMARA: Yes the independent analysis I have performed is based upon the --

MEMBER STETKAR: On the airways.

MR. TAMMARA: -- real data.

MEMBER STETKAR: But that's only in the airways. That's cruise operations.

MR. TAMMARA: It is not airways. It is all the aircrafts within five miles. So even though the aircraft is from that airport, if it falls in that route, within that area, it has been included in that analysis.

MEMBER STETKAR: The Reg Guide gives you an artificial crash frequency of four times ten to the minus ten, crash per aircraft, year, square mile. That indeed is lower than actual NTSB statistics today for cruise altitude, which comes out for, I've forgotten which, 10 CF, 14 CFR, 150. I know it was 135 and 150.

For the 150s, the commercial aircraft, the crash frequencies are on the order of about three times ten to the minus nine. For the 145, which are the air taxis and commuter, small aircraft, it's about a factor of two times higher. It's about seven times ten to minus nine, per flight, per square mile.

So the NUREG and Reg Guide numbers are out of date. They're way to low. But you have to use those numbers. But that's for cruise flights. That's for flights in airways. That's not for near airport operations.

MR. TAMMARA: I think we answered that question two years ago by writing a letter to ACRS.

MEMBER STETKAR: Did you? Okay.

MR. TAMMARA: And we compared that to ten to the fourth, ten to the four minus ten versus the other crash rates, which are documented in DOE --

MEMBER STETKAR: You don't want to use DOE. You want to use NTSB.

MR. TAMMARA: Yes. I cannot give all the information. But I think we compared and we concluded the crash rates were almost comparable, or whatever. So that middle was around two years ago.

MEMBER STETKAR: Now back to the near airport operations --

CHAIRMAN CORRADINI: So you're having so much fun, I want to make sure what their, you wanted to get the analysis from both the --

MEMBER STETKAR: I'd like to see the confirmatory analysis. I know what DTE did for the two airways that they looked at. I know what they did. I can reproduce your numbers. I don't know why you didn't look at the other four airways. But the staff said they looked at everything.

CHAIRMAN CORRADINI: And you'd like to see that analysis.

MEMBER STETKAR: So I'd like to see that analysis. Because I don't know why DTE didn't look at the other four airways. But I don't care as long as the staff has a confirmatory analysis that justifies something that's acceptable.

So that's one issue, is the airway crash frequency. The other issue is what is the technical justification for the statement in the FSAR, and the staff's confirmation of that statement, that aircraft crashes from Detroit Metropolitan Airport, in other words airport operations, are less than ten to the minus seven? Because you can't screen it out. You can't screen it out based on the air traffic.

MR. TAMMARA: And we'll take another look at it.

MR. THOMAS: If I could make just one quick comment to that for what's in the FSAR? I'm sorry this is Steve Thomas, from Black and Veatch.

CHAIRMAN CORRADINI: Thanks, Steve.

MR. THOMAS: And we had a RAI response that dealt with this a little bit. The crash probabilities that are used for the Mills Field, because it is so close, come out of the SRP, which uses the values from the DOE standard 3014.

And that table only goes to ten miles

from, there's ten miles difference between the airport and the locations, in this case Fermi 3.

And there's a statement in the DOE standard that says if a facility's coordinate falls outside the boundaries of any of the tables, or falls in a bin where no value is given, the corresponding probability value is assumed to be zero. So that's the basis for why that's less than ten to minus seven.

CHAIRMAN CORRADINI: So basically you're saying it's far away out, you just default to zero?

MR. THOMAS: For the probability related to taking off or landing it's far enough out. So you're focused in on the crash probability related to the airways. So that's the basis for that.

CHAIRMAN CORRADINI: Okay.

MEMBER STETKAR: Okay.

CHAIRMAN CORRADINI: That answers the question. It may not satisfy you.

MEMBER STETKAR: That's in the RAI response, is it?

MR. THOMAS: Yes, it is --

MEMBER STETKAR: We'll get --

MR. THOMAS: RAI 03.05.

CHAIRMAN CORRADINI: That's fine. We don't necessarily get all the RAI responses. But that's fine.

MEMBER STETKAR: Yes, but Steve had the number. So that would help us.

MR. THOMAS: 03.05.01.06-1.

CHAIRMAN CORRADINI: You talk to Chris. If you've got it. Chris, did you get it?

MR. BROWN: Yes, I'll get it from Steve.

CHAIRMAN CORRADINI: Okay, thank you.

MEMBER STETKAR: I'd like to see that.

MS. GOVAN: And that answers your second question.

CHAIRMAN CORRADINI: Hum?

MS. GOVAN: Then that answers your second question for Rao --

MEMBER STETKAR: Yes, not happily but I know what they did now.

MR. SCARBROUGH: I'm Tom Scarbrough. I'm in the component integrity branch. And I'm going to update you on the Section 3.9.6, functional design qualification in-service testing for Fermi Unit 3.

As an introduction, just to update you, 10 CFR 52.79A-11 requires that the applicant describe the programs and their implementation necessary to ensure that systems and components meet ASME boiler pressure filter code and the code for operation and maintenance, the LOM code, per 10 CFR 50.55A, and according to how we categorize programs, in-service testing programs, and the motor operated valve program, our operational programs.

So we finalized the review. We do review as part of the design certification but we finalize it as part of the COL application review.

And that's described in Commission Paper SECY 05-0197, which talks about the applicant fully describing, and they indicate what fully describe means, in terms of operational programs so that they do not need to have a programmatic ITAAC for those programs.

So the FSAR, the Fermi 3 FSAR, in Section 3.9.6, incorporates by reference the ESBWR design control document of DCD provisions for functional design qualification in-service testing programs for valves and dynamic restraints.

And basically, a summary of what's in there, in that DCD, is it references QME 1-2007, the ASME standard for qualification of mechanical equipment.

It specifies that the code of record, the OM code, for IC program is 2001 edition, 2003 addenda. It indicates there are no safety related or motor operated valves, or safety related pumps, in the ESBWR. And it references a couple of other aspects there, the FSAR supplements, that general description that was in the DCD, by describing some overall IC provisions such as reference values and pre-conditioning.

It talks abut pre-service testing in terms of setting it up so it's as near as practicable to in-service testing. It talks about power operative valve testing.

And there's no safety related motor operated valve. It talks about safety related air operated valves and the reactor issue summary, 2000-03, in the incorporation of those lessons learned.

It talks about check valve testing, the acceptance criteria for open and close, and describes the snubber examination and testing program. And that's OM subsection.

DR. WALLIS: Does it talk about the vacuum breaker? Aren't there vacuum breakers in this thing?

MR. SCARBROUGH: The vacuum breakers would be handled by, it's a valve.

DR. WALLIS: It's a valve. It's like a check valve, in a way.

MR. SCARBROUGH: Yes. So it would have to be qualified per ASME --

DR. WALLIS: Those are something really new in the ESBWR.

MR. SCARBROUGH: Right, so they would have to be qualified per that standard.

CHAIRMAN CORRADINI: But I think where Graham is going with this, I actually had a note to myself about this. At least under the DCD a test plan is still to be, excuse me, a series of tests is still to be done for the vacuum breakers.

If they go beyond excessive leakage there's an isolation valve that has to be tested, and the associated detection, or I would call it instrumentation.

DR. WALLIS: Which is still being conducted.

CHAIRMAN CORRADINI: Has to be done before fuel load. I think what we both want to do is verify that we're on the same page with that.

DR. WALLIS: I didn't see it listed here.

CHAIRMAN CORRADINI: But it is in the program plan. It is in the SER because I found it also in the testing for the ITAAC.

MR. SCARBROUGH: They're going to have to have ITAAC for that. And the DCD specified the use of

QME-1-2007 for all new designs. And so this would be a new design they would have to qualify to. And then, as I mentioned, there's no safety related pump. So there's none in the IFC program.

Next I wanted to update you on the squib valve. So we talked quite a bit about squib valves for the AP1000. And the ESBWR has some squib valves also. There are squib valves in the stand-by liquid control system very similar to what's in the current boiling water reactors.

There're automatic de-pressurization systems, the ADS system has some squib valves. The gravity driven cooling system, GDCS, has some squib valves. And there are also a couple of back-up squib valves in the equipment pool for the isolation condenser system, that they use in parallel with some AOVs.

And as I mentioned, the ESBWR DCD specifies for new valve designs they be qualified per ASME standard QME-1-2007, which we accepted in Revision 3, Direct Guide 1.100. And so they will need to address that.

The FSAR includes a provision that the in-service testing program for squib valves incorporates the lessons learned from the design qualification process. Because they have not completed the design of the squib valve. So they'll have to incorporate those design aspects, just like they're going to do for AP1000, into the surveillance program for that.

In the SER for Fermi 3, we included a license condition for surveillance activities for the ADS and EDCS squib valves. And they're very similar to the Vogtle license condition, which addresses the ADS valves and the injection reserve valves that are squibs in AP1000.

And basically what that license condition does, it talks about pre-service. They have to verify all the circuitry that works properly. They have to sample 20 percent of the charges to make sure they have enough explosive power.

For in-service activities, they have to, every two years, do an external and remote internal inspection. They have to check the circuitry of the sample valves. And every two years they have to sample 20 percent of the charges.

They also have to do the circuitry. And every ten years they have to do a disassembly of those valves. So very similar to what we saw in the Vogtle license condition.

And now ASME, in the 2012 edition, it

should, it's already been approved and gone through the process, they'll be updating the IST program for squib valves, for new reactors.

And the provisions will be very consistent with the Vogtle license condition and the Fermi 3 license condition because we had all the same people working.

I was on that committee and then we also shared information. So the requirements were very similar to what we see for those. So that's what's happening with ESBWR squib valves.

MEMBER STETKAR: I wasn't party to the Vogtle discussion so I don't know whether I should have known this. In the license condition for both the pre-service testing and the operational surveillance, the way it's written, it says confirm the capability of each sample pyrotechnic charge to provide the necessary motive force to operate the valve to perform its intended function.

Is that going to be what I would call a functional test? In other words, I think the DPVs are what you call the ADS valves. They may need to open under conditions to de-pressurize the primary system for transient, where you have a fairly high DP across the plug, at rated system temperature.

Are those tests going to be done under those conditions, in other words, with the differential pressures and perhaps any temperature effects on the plug? I know it's not a simple plug, but rather than getting into the details --

MR. SCARBROUGH: Right, exactly. They actually do the explosive test. They're actually going to remove the charge from the valve and put it in a test fixture, which I call a bomb. But they don't like me to say it.

MEMBER STETKAR: You don't like to use that word.

MR. SCARBROUGH: Yes, but we always called it a bomb before. And so you put it in a test fixture. And we actually, when we were at Wyle Laboratories observing their AP1000 qualification for these valves, there was review of their data from that.

And what they do is they look at the pressure and the time traces. And it has to reach a certain amount of pressure inside that test fixture to show that it has enough explosive capability to open that valve. And they're doing actual testing of a full actual valve to show that amount of charge is the right amount of charge for that.

MEMBER STETKAR: The concern I have is that, I mean, I can hear all of those things, but you're painfully familiar of motor operated valve torque problems and things like that, where perhaps analysis doesn't necessarily get you the real finding of mechanical interferences that the real world presents.

And there've been instances of check valves not opening in plants. And we don't need to go into all of that.

And perhaps the second thing that you mentioned would solve my concern about whether or not just measuring the explosive force and saying, well, I've done an analysis that given that explosive force I'll actually, whether it's a plug that moves out of the way or the configuration that they have -- at least one of them that I've seen -- will actually work, can be two different things.

MR. SCARBROUGH: Right, exactly.

MEMBER STETKAR: And that's why I was curious when I heard test rig. I thought, well, maybe they're going to have a simulated valve body and put a DP across it and actually demonstrate it.

MR. SCARBROUGH: Not during the in-service testing. But during the qualification testing on the

TME-1, that's what they're doing. They're doing actual valve tests, they have multiple valve tests they're doing.

In the design phase they did many different tests with different parameters, different amounts of charges, different amount of thicknesses. They varied quite a different number of parameters to be able to show that, yes, this is the right amount of charge that we need before the explosive force.

And from that, now what they're doing is they're setting up their limit curves that they'll have to check every two years to verify that they work properly. And if they don't have one work properly, they'll have to take corrective action for it.

And that was something that, with the current ASME code, before it was going to be updated, you just had to fire the charge. You took it out and fired it. And if it fired you're good. But that's not acceptable for these new valves. And so that's what we've had here.

MEMBER STETKAR: Okay, that helps, thank you.

MEMBER SCHULTZ: Thomas, on the last bullet there, with respect to the ASME code for the squib valves, is that a point of interest, there's conformity, or is the licensee, the applicant, going to be committed to the ASME code going forward?

MR. SCARBROUGH: Right. Actually, and I didn't mention this, but there's a sunset clause in the license condition where the license condition will expire if you incorporate into the IFC program the license condition as written, or you incorporate the new OM code as incorporated by reference in 55A. And so either one would satisfy it.

MEMBER STETKAR: That's where I thought you were going, thank you.

MR. SCARBROUGH: Now way down the road, there's also the regulation that says 12 months before fuel load you need to update your program to the latest ASME OM code, incorporate that reference.

So they're going to have to address that. But we've already been in discussions with plants that, as long as they make sure that they're up to date, they may request an alternative to use the older version. But they still are captured by that regulation to make sure that they use the latest version of the OM code, or something that we consider to be equivalent.

MEMBER STETKAR: And to you it looks like the setup here is going forward in a way that will make that tractable for them.

MR. SCARBROUGH: Yes. And in the ASME committee there were industry individuals representing Westinghouse and GE and such. And so they were aware of these provisions and such. And they understand what they need to do to address them.

MEMBER STETKAR: Thank you very much.

MR. SCARBROUGH: Thank you. All right, now just to give you a status of where we are with Section 3.9.6, Detroit Edison adopted the RAI responses from the previous R-COLA. And that included the OM code, the AOV provisions and that sort of thing.

And then the staff found those RAIs and some additional RAIs, additional RAIs on squib valves. And we found those to be resolved, based on the FSAR modifications and the clarifications that are present.

We also performed an audit of the procurement specifications at the GEH facility in Wilmington to confirm compliance with 10 CFR 52.47 and 52.79A11 back in July of 2009.

And we looked at where the procurement specifications incorporating the QME-1-2007 requirements, we verified that. We looked at valve factor assumptions of that sort of thing, in terms of the calculations for the valves. We looked at flow induced vibration. We made sure that the DCD provisions were being incorporated into the procurement specs. And so that was the purpose of that audit. A

And as a result of that, we concluded that the FSAR, together with the DCD, fully described the functional design qualification in IST programs for valves and dynamic restraints, consistent with the SECY paper. And we have no open items or confirmatory items in this section. That's where we are.

CHAIRMAN CORRADINI: Questions by the committee? John?

MEMBER STETKAR: I hate to do this but I had one. But it doesn't have anything to do with anything that we've discussed.

CHAIRMAN CORRADINI: Then you're out of order.

MEMBER STETKAR: Okay. And it's a point of clarification. This is seismic, but it's a classification of SLCs.

CHAIRMAN CORRADINI: But if I might, seismic is going to be covered in a subsequent meeting.

MEMBER STETKAR: Okay.

CHAIRMAN CORRADINI: So if you could hold that.

MEMBER STETKAR: No, I can do it. It's not a seismic analysis.

CHAIRMAN CORRADINI: But I think if it connects up to those sections I would hold off on that.

MEMBER STETKAR: It actually doesn't connect up to the sections that are postponed.

CHAIRMAN CORRADINI: Should I give you another shot?

MEMBER STETKAR: It's in Section 3.2, rather than seven and eight that were postponed.

CHAIRMAN CORRADINI: Go ahead, I'm sorry.

MEMBER STETKAR: That's why.

CHAIRMAN CORRADINI: I'm sorry.

MEMBER STETKAR: I thought it might be fair game.

CHAIRMAN CORRADINI: It's fair game, give it a shot.

MEMBER STETKAR: In the classification of SSCs, the seismic classification of SSCs, most of it is extracted from the North Anna review. Because Fermi just incorporated all of that stuff by reference.

In the North Anna review there was an issue. It says they set the operating basis earthquake at one third of the safe shutdown earthquake acceleration.

And from the North Anna review, there's a quote that says, "Since the COL applicant has not deviated from the DCD, which sets the OBE ground motion equal to one third of the SSE ground motion, the applicant shouldn't submit a list of SSCs -- I'm doing this for the benefit of our recorder -- necessary for continued operation either in this section or in the operational programs for pre-earthquake planning and COL FASR Section 3.7.4."

In other words, there was a request for a list. "Therefore, resolution of this issue is pending as Open Item 03.02.01-3."

In the Fermi SER there was a question regarding are there any additional site-specific RTNSS components in addition to RTNSS components in the DCD. Answer, no, there're not.

So essentially the list of RTNSS equipment in the DCD is the list of RTNSS equipment for Fermi. SER cites that response, that there are no new RTNSS equipment, as justification to close out that open item from North Anna. Follow that logic?

CHAIRMAN CORRADINI: Yes.

MEMBER STETKAR: Now my question is, there are RTNSS equipment that must be Seismic Category 2. And there's a lot of RTNSS equipment that is non-seismic.

And what I don't know is what the concern is about survivability of an OBE versus the population of RTNSS equipment, some of which cannot survive an OBE, some of which certainly can, to close out the open item from the North Anna review. Because I don't know really what the concern was.

CHAIRMAN CORRADINI: Right.

MEMBER STETKAR: But just simply saying that there are no new RTNSS components, I don't think there were any new RTNSS components in North Anna either, but there was an open item.

MR. SCARBROUGH: Right, how does that close that open item, right.

MEMBER STETKAR: How did just that assertion that there isn't anything new close out that open item? If somebody can answer that today that's fine, but maybe the right people aren't here.

MR. SCARBROUGH: Right, we'll have to track down the right people.

MEMBER STETKAR: And if that's the case we can bring it up again when we address it. But you may want to have somebody look at that and come prepared at least to answer that.

CHAIRMAN CORRADINI: Okay, got it. We both captured it.

MR. SCARBROUGH: Yes.

CHAIRMAN CORRADINI: We've got it. Anything else with the staff?

MR. SCARBROUGH: No, we're good.

CHAIRMAN CORRADINI: Okay, let's move on. I'll thank the current set of staff. We'll come back to DTE and start up with Chapter 10.

(Off the record comments)

CHAIRMAN CORRADINI: Steve, or Ryan, or whomever?

MR. PRATT: My name is Ryan Pratt and I will be presenting Chapter 10, Steam and Power Conversion System. In Chapter 10 there are two sections that are incorporated by reference, that's 10.1 and 10.3.

And I will be discussing Section 10.2, turbine generator, and Section 10.4, other features of the steam and power conversion system. In Section 10.2 we incorporate by reference and we add two COL items and one standard supplemental item.

Just for some history on this section, these items were initially covered as COL holder items. And subsequently ODC set forth a position that the COL holder items were not appropriate. And then these became COL information items.

As a result, Dominion started the actions for the turbine missile probability analysis report as part of the North Anna application. And now, as we have transferred ourselves to the R-COLA, we have taken responsibility of turbine missile probability analysis.

The turbine missile report was submitted as on the Fermi 3 docket, the most recent revisions are, and we are not on Revision 4 of that report.

Still on Section 10.2, GE manufactures the turbine and the generator. It is the model N3R-6F52 turbine from GE. We added testing requirements for the rotor dovetails and extraction non-return valves because testing for these components was not addressed on the DCD. That was a standard COLA Item 10.2-1-A.

And then in standard COLA Item 10.2-2-A, we referenced the turbine missile probability analysis report. And for the most part, that report takes care of all of the COL information items requested in Section 10.2.

Next slide. Section 10.4, Other Features of the Steam and Tower Conversion System. The FSAR provides site-specific conceptual design information for the CIRC system, including the following.

A natural draft cooling tower, four CIRC pumps, sides for condenser cooling requirements, station water makeup capabilities provided for evaporation, drift and blowdown, control of water chemistry as provided through chemical addition and blowdown, and the inner connection is provided with the plant service water system during normal operation.

Continuing in Section 10.4, we provided further conceptual design information. CIRC failures are considered and evaluated, including potential flooding considerations external to the power block.

The DCD evaluates internal flooding considerations and structural failure of the natural draft cooling tower, which is located at least its height away from the power block to ensure that there's no adverse impact from failure of the natural draft cooling tower.

In Table 10.4-201, we summarize recommended threshold values of key water chemistry parameters. And finally, supplemental item, we include design provisions for the condensate purification system and condensate feed water system to accommodate 100 percent feed water flow to support a cascade configuration. And that concludes my presentation of Chapter 10. Are there any questions?

DR. KRESS: On your turbine missile?

MR. PRATT: Yes.

DR. KRESS: Of probability. May occur when you get a turbine overspeed event?

MR. PRATT: Yes, we have ductile fracture from a turbine overspeed as well as stress corrosion cracking.

DR. KRESS: And you somehow have a frequency of turbine overspeeds. Does that come from data to other plants or --

MR. PRATT: Yes. Does GE want to address this?

MR. SCHUMITSCH: Yes. This is Skip Schumitsch from GE Hitachi. Yes, the turbine missile report looked at the information from the GE fleet in developing the analysis that was performed.

CHAIRMAN CORRADINI: But if I might just, I'm trying to remember, and you may want to repeat this a little bit louder, this is not just the nuclear fleet. This is all the steam turbine fleet, if I remember from the DCD questions we had on this. That's a question. That's my memory. It's more than just the nuclear fleet?

MR. SCHUMITSCH: That's correct.

DR. KRESS: What causes turbine overspeeds anyway? What are the causes for those?

MR. SCHUMITSCH: One cause would be a control system failure.

DR. KRESS: And a valve failure, you get too much steam in?

MR. SCHUMITSCH: All those are analyzed in the report.

DR. KRESS: Are those systems all basically the same from this database that you used to turbine overspeed frequency? Are all those things basically pretty much the same?

DR. KRESS: Does the turbine system at Fermi look like all the other turbine systems or is it different?

MR. SCHUMITSCH: The control system is a state of the art control system. Is that your question?

DR. KRESS: Yes, I guess that's it. But if you have an overspeed, in order for the turbine motor to tell, does it have to have a flaw in it or something?

MR. SCHUMITSCH: Part of the analysis includes a preventive maintenance program that expects certain parts of the turbine to look for flaws.

DR. KRESS: I guess my question --

MR. SCHUMITSCH: So the probability is based on the fact that the flaw, if it does exist, has a propagate, yes.

DR. KRESS: Yes, my question about that, I guess, are there flaws that you can't detect? Are there flaws that might be there that you don't know about by the maintenance and inspection?

MR. SCHUMITSCH: I think that would be the only way you'd have the failure. But can we just --

DR. KRESS: If you detect the flaw you correct it. So you're looking for the probability of an undetected flaw?

MR. HINDS: Just a couple of more comments, David Hinds from GEH. So you're concerned about things that might influence failure and things that might influence a turbine overspeed.

There are state of the art controls on this turbine generator, the latest generation, an evolution of digital control systems. We also have the redundant turbine overspeed protection system to ensure that a failure of the overspeed protection system wouldn't potentially cause the event.

And additionally, there's periodic inspections similar to what you were questioning. There are periodic inspections, disassembled inspections of the turbine, to detect potential flaws.

So there's prevention of overspeed and detection of flaws through periodic inspections. And both build upon each other for minimizing the probability.

And then additionally then, we favorably orient the turbine such that even if all those things fail, then the turbine blade ejection wouldn't cause a hazard to a safety related component or structure.

DR. KRESS: Does your inspection look at all the blades in the turbine?

MR. HINDS: I'm sorry?

DR. KRESS: Do these inspections look at all the blades in the turbine?

CHAIRMAN CORRADINI: I don't think it's the blades. It's the root, isn't it?

(Simultaneous speaking.)

MEMBER BROWN: It's where they connect into the basic rotors, where the blades connect --

(Simultaneous speaking.)

DR. KRESS: A lot of those blades, I was just wondering how they inspected them.

CHAIRMAN CORRADINI: You really worry about the rotor coming apart.

MEMBER BROWN: Yes, the rotor coming apart.

DR. KRESS: My question is how do they inspect all those?

MEMBER BROWN: You can't. If somebody tells you they do they really can't. You've got to take it apart to do it.

DR. KRESS: That's what I was worried about. I was wondering what the inspection process does.

MEMBER BROWN: Do the best you can and then you keep your fingers crossed. And you have the things oriented so it won't take anything out. And then you hope that your overspeed trip system will trip it before it goes fast enough that it exceeds the stresses that you have in the rotors.

DR. KRESS: Right.

MEMBER BROWN: So the problem with their design is that they've got magnetic trips, magnetic sensors, on the shaft, which while it had redundant sets, three for the overspeed trip, the electronic switch system, and three for the normal speed control system, they're all magnetic trips.

And they're sort of contiguously located on the same shaft, in the same location. There's so little information at the DCD to describe that it's difficult to understand what they did.

CHAIRMAN CORRADINI: So a little --

MEMBER BROWN: No, let me finish, just let me finish.

CHAIRMAN CORRADINI: Well, you haven't spoken so I'll give you another 30 seconds.

MEMBER BROWN: I'm awake now, so that's going to help out. But the problem is those magnetic sensors could be susceptible to interference or noise from a common source, and then take out both the control system and the trip system.

CHAIRMAN CORRADINI: I've actually had that happen before, Tom, and it was saved by an operator before it exceeded 150 percent rated speed.

DR. KRESS: Well, given all this, I guess if I were going to calculate the probability of one of these missiles, I would just assume there's a flaw there.

CHAIRMAN CORRADINI: Let me ask, did Mr. Stetkar have a question?

MR. ARMIJO: The flaws are assumed in the design analysis.

DR. KRESS: So you don't have to rely on the inspection.

MR. HINDS: There is a flaw size assumed in the probability, assume the flaw size and therefore, and then a growth --

DR. KRESS: My concern was I was worried about --

MR. HINDS: -- with a growth calculation.

DR. KRESS: -- them relying on the inspection. But if you assume it's there I don't --

MR. HINDS: You assume a flaw size in a growth. So there's defense in depth here.

DR. KRESS: Okay, that takes care of my issue.

CHAIRMAN CORRADINI: I was about to ask something but I think Mr. Stetkar is next. Mr. Stetkar?

MEMBER STETKAR: Well, all I would like is a copy of Report, write it down, ST-56834/P, Revision 4. Please could you send that to us?

MS. CAMPBELL: That has already been submitted.

MEMBER STETKAR: I'm sorry. This one, I

want Revision 4. I don't want a previous revision. I don't want the 1984 GE analysis. I'd like the Revision 4.

MS. CAMPBELL: Revision 4 has been submitted.

MEMBER STETKAR: To the staff.

MS. CAMPBELL: Yes.

MEMBER STETKAR: Okay, I'd like whoever can get me that copy I would like that.

CHAIRMAN CORRADINI: Just to remind parts of the committee that forgot this, John reminded me. The reason this was pushed from the DCD to the R-COLA was that analysis was not available at that time because it wasn't clear whose turbine would be acquired. So under the assumption this is a GE turbine, we have an analysis.

MEMBER STETKAR: Okay, I've got it. I've got hard copy but we'll need to get it for the record for the subcommittee. The staff has it because it was submitted last October.

CHAIRMAN CORRADINI: Okay, other questions for our speaker? Ryan, thank you.

MR. PRATT: Thank you.

CHAIRMAN CORRADINI: We'll let the NRC staff come up now and have their shot at it. Okay, who will lead us?

MR. EUDY: Good afternoon.

CHAIRMAN CORRADINI: Mike, you will?

MR. EUDY: Yes, I'm Mike Eudy, the project manager for Chapter 10. And we're going to go through the staff's evaluation for the Fermi COL application review for Chapter 10, the steam and power conversion system.

We decided that we were just going to focus on what we thought would be the topic of interest in this chapter. It would be 10.2, turbine rotor integrity.

And we have Greg Makar and John Honcharik here, our technical experts. And they will be talking about the turbine maintenance and inspection program, turbine missile probability analysis, and the turbine design. So turn it over to Greg Makar.

MR. MAKAR: Okay, this slide is showing what information is required from the COL applicant. So this is what we're looking for to review. There are two items, as you heard Mr. Pratt explain.

One is for the maintenance and inspection program. And that needs to address the SRP 3513 turbine missiles acceptance criteria and various inspection and testing.

And then there's the turbine missile probability analysis, is the second item. Many of the details of these two things are addressed in the DCD. So there's a lot of overlap between what's there and what we'll describe.

But these items are needed to address the remaining details that were not in the DCD. So again, these are requirements for the applicant.

Next slide, please. And then quickly, this is what we received to review. We have the maintenance and inspection program, the probability analysis, and a supplement identifying the turbine model.

Now if you've seen in the FASR, the applicant's FSAR, there's not a lot of words in there. They chose not to repeat a lot of information that's already in the DCD. And so a lot of this COL information is accomplished by pointing at where the information is in the DCD and the missile analysis.

Now all three of these items are submitted as standards so they could apply to all ESBWR COL applicants. Our plan is that I will describe our review of the maintenance and inspection program and then John will present our review of the missile probability analysis report.

Now, I'll just quickly cover the supplement now. That is only to provide the turbine model number. And we found that acceptable because it meets the description in the DCD and it is the model covered in the turbine missile analysis report.

MEMBER STETKAR: But any COL applicant who might decide not to use that GE turbine would have to do another analysis, right?

MR. MAKAR: Correct.

MEMBER STETKAR: Okay.

MR. MAKAR: Okay, next slide please. So for our review, we're looking for the applicant to meet the acceptance criteria in SRP Section 3513 for this maintenance and inspection program.

I just want to quickly review what they are, GDC 4 for environmental and dynamic effects, P-Sub-1, which is defined as the probability of the turbine failure resulting in the injection of a turbine rotor or internal structure fragments through the turbine casing.

So it's that parameter that's identified in our acceptance criteria. And so the missile generation probability needs to be related to the design and the control system maintenance testing, a variety of things. And there has to be a commitment from the applicant to visual surface and body metric inspections.

And I'll review what the staff says in that SRP. "Staff believes that maintaining an acceptably low missile generation probability, P-1, by means of a suitable program of periodic testing and inspection, is a reliable method for ensuring that the objective of precluding generation of turbine missiles can be met."

So that's why we're looking for all this. And of course that includes, as you can see, the missile probability analysis is important. So this why these two things are intertwined. Next slide please.

MEMBER STETKAR: Greg, can I ask you a question before we get into what may be more details. And it's something I just thought about. I looked at the DCD Table 1984 for RTNSS structures.

And I brought it up earlier with external flooding because there are external flooding requirements in the DCD for RTNSS structure. Well, what it says in the DCD for internal missiles, it says there are no credible sources of internal missiles per Section 3.5.

How are RTNSS structures treated from the perspective of, for example, turbine missiles? Because this turbine is not favorably oriented to the electrical building, which is a RTNSS structure. It contains RTNSS equipment. My question is how is that treated in this process?

MR. MAKAR: Well, I'm not sure. I know we didn't do a separate evaluation. I'm not aware of the applicant doing one for RTNSS. Do you know, John?

MR. HONCHARIK: I don't remember looking at that. Because I was basically looking at the turbine missile analysis. But I guess you're saying that it's unfavorable for Fermi 3?

MEMBER STETKAR: The Fermi 3 turbine is unfavorable for the Fermi 3 electrical building. Now the electrical building is not a safety related building. It is, however, identified as a RTNSS structure.

MR. HONCHARIK: Okay, it's a RTNSS structure and it's required for a safe shutdown?

MEMBER STETKAR: No, it's Category C, I think, no, B, no C, I think. I think it's all C. There are too many entries and too many different tables for me to do it in real time here.

So don't hold me to whether it's a B, which would be long-term cooling, or C, which is basically risk reduction. I don't know the answer to that right at the moment. I do know that it is a RTNSS structure.

MR. HONCHARIK: Right, but I think if it's

RTNSS for a certain category where it may be important for a safe shutdown --

MEMBER STETKAR: That's the one that you care about, or in principal? Well, anyway, if you could put it on your notes there to make sure that we're okay from a regulatory perspective, that we're not missing something, that ought to be considered.

I know it's kind of strange area. But as I said, in Chapter 19 of the DCD, it's not addressed explicitly in Chapter 19 because the column in Chapter 19 just says internal missiles.

And it says, well, there aren't any credible internal missiles. But they do address other external hazards, such as high winds, external flooding, internal flooding. So I don't know how this area of turbine missiles relates to that topic.

MR. HONCHARIK: Okay. I've got that.

MEMBER STETKAR: And it's certainly not favorably oriented. Now, on the other hand, if the turbine missile analysis indeed confirms that it's less than ten to the minus five, I think we're okay, which I think they claim they did. But I was just curious how you folks, during your reviews, think about that.

MR. MAKAR: It's a challenging area, RTNSS.

MEMBER STETKAR: It is. And we're plowing some new ground here. And it's something I've been trying to follow as a member of the subcommittee, how that's treated in the transition from design certification through COL, and in principal out into operation where we don't get involved. But at least at this snapshot, I was trying to follow.

MR. MAKAR: Thank you. Next slide please. All right, as I said, there's not a lot in the FSAR. So we're looking at four sections where there is some description. And mostly there is pointers to where the appropriate information is found.

These four sections are from the COLA FSAR. Now, two of them are from Section 10.2.2, which is more related to turbine design and overspeed protection. And 10.2.3 is where the turbine rotor integrity resides. That's our branch's main interest.

But these are all reviewed as one package because the information from the maintenance inspection program, the missile probability analysis, is where turbine rotor integrity information is. So we're reviewing all of these together.

And so because there's not a lot of information, our review is really based on looking at whether what the applicant provided affirms what's in the DCD that we've already approved, and supplements those adequately with the turbine missile probability analysis. So that's really how we're reviewing this. Okay, next slide please.

MEMBER STETKAR: Greg, before you get to the next slide, just so we have it on the record, a point of clarification, I found the right table. It's 19A-3. And indeed the electrical building is not listed as a RTNSS criterion B structure.

MR. MAKAR: Okay, so it's not RTNSS.

MEMBER STETKAR: So apparently it's not something that you need to worry about. It does indeed house a lot of equipment that's classified as RTNSS equipment. But it's all apparently under Category C, which is risk reduction.

MR. MAKAR: 19A-3?

MEMBER STETKAR: It's 19A-3 is the table that actually lists the structures. And all of the structures that are listed in that table are classified under Criterion B. And the electrical building does not appear in that list. So that's probably the answer.

MR. MAKAR: Thank you.

MR. EUDY: You want us to X-out that question?

MEMBER STETKAR: Just cross it off.

MR. EUDY: Okay, thank you.

MR. MAKAR: Slide 7 please.

MEMBER BROWN: The next slides, are you going to talk about 10.2.2.7 referring to the testing?

MR. MAKAR: Yes. Probably not every detail that's in there.

MEMBER BROWN: In that case, I'll wait until you talk before I ask something.

MR. MAKAR: 10.2.2.7, in this application --

MEMBER BROWN: Well, there's only one thing. It just says they made one change. A standard called 10.2-1-A talked about non-return valves are inspected. And it's discussed in 10.2.3.7, which is one of your later --

MR. MAKAR: Right.

MEMBER BROWN: So that's it.

MR. MAKAR: You're doing a lot of pointing here and we will address what's actually done under 10.2.3.7 in the turbine missile probability analysis. But if we don't --

MEMBER BROWN: But not relative to actual testing of the turbine protection system or anything else. The DCD is kind of sparse. And that's why I asked the question.

There's a Paragraph 10.2.2.7 in the DCD. I guess it's Rev 9. And it's kind of the same in the earlier revs. But it just says, "Operation of the overspeed protection devices under controlled speed conditions is checked at startup and after each refueling or maintenance outage."

But in other places it says, well, we don't really need to test these in operation because we can insert electronic signals to check that the circuits work.

That means that the sensors themselves are never tested up in the range in which they're expected to operate. In other words, they're only tested at low speeds and/or up to rated.

And there's nothing that ever addresses or evaluates the characteristics of these magnetic sensors to ensure that they don't saturate. I mean, iron is iron. And depending on what you do and how you do it, you may not have a design that does that.

And there was no evidence in the DCD, under qualification testing, where you would validate the performance of the sensors at speeds of 120 percent rated, or whatever the numbers are, or even above 110 or even above 101 or 102. Because that's where you would logically expect to see them actually perform.

MR. MAKAR: Well, I can tell we're not going to address your concerns adequately in our presentation. But we do have a 10.2.2. reviewer, Devender Reddy, here from the Balance of Plant branch. And their branch reviewed, they're more of the design and controls reviewers. So I'll ask him to --

MR. REDDY: Yes, Mr. Brown, this is Devender Reddy. I'm BOP branch. Especially for your question, the inspection of the spring assisted monitor welds will be inspected in accordance with the recommendations and will include seal to disc contact --

MEMBER BROWN: No, not the I'm talking about the magnetic feed sensors.

MR. REDDY: Actually, Mr. Brown, to the extent I know of, there is not much testing about the magnetic sensors.

MEMBER BROWN: That's my question. I read through the valve stuff. You take valves apart, you put them back together. You look at this, you look at seals, you do all kinds of nifty stuff.

But it doesn't do anything else relative to actually testing to ensure that the system actually picks up within the range based on actual signals from the sensors themselves.

And since it was absent, I'm not sure I was on the committee at the time this was reviewed at the DCD. I remember when that was done.

CHAIRMAN CORRADINI: You were there.

MEMBER BROWN: For Chapter 10? I might have been. But I wasn't smart enough to ask the question then.

CHAIRMAN CORRADINI: Okay, is that on the record?

MEMBER BROWN: It is now.

(Laughter)

MR. REDDY: Mr. Brown, you are correct in that you know there is not much in the DCD regarding the magnetic sensors, or even testing of. I want you to know that not much details are in the DCD.

MEMBER BROWN: Well, there's nothing in here either, in the SRE.

MR. REDDY: I'm sorry. It is not there. I'm sorry, go ahead.

CHAIRMAN CORRADINI: No, I just wanted to make sure I understand your point. So your concern is it's not being appropriately tested?

MEMBER BROWN: Yes. There's two problems here. Number one, this has got both an electrical control and electronic software based control system and it's got electronic software based overspeed protections.

They say they're diverse but there's no definition in either the DCD or the FSARs as to what makes them diverse. There's one FPGAs and the other one's microprocessors. There's one of them solid state transistors or integrated circuits and the other one's, there's nothing in there. So it's just the magic word diverse. What does that mean?

MR. REDDY: Well --

MEMBER BROWN: Let me finish. The second part is there's nothing any place in here relative to testing, at least I didn't find it, that says how they are actually tested at some point, the design actually tested, to ensure that it actually responds properly within the speed range at which it's operational.

So that's fundamentally the question. If you had a mechanical, centrifugal overspeed switch and you had the electronics, the only way to test that is to run it up.

And then you'd get a verification that both of them worked, or at least you had the proper outputs from the other one. But here you don't. It's all based on, well gee, we can test them with input signals on the input to the circuits. And everybody assumes the magnetic speed sensors work just fine.

MR. REDDY: This is Devender Reddy again. Mr. Brown, you are right. As far as the testing is concerned, the process, there is not much in the DCD, neither in the FSAR affirming. But they did differentiate between the two electric overspeed systems, how they are related, how they are diverse. It is in the DCD.

MEMBER BROWN: Well, how are they diverse?

MR. REDDY: Under the seal. This is from the DCD.

MEMBER BROWN: Yes, I read the whole thing and I didn't see where it said where one is one design and stuff. They just said they were diverse.

MR. REDDY: Diversity is provided by separate sets of physically isolated primary and emergency overspeed protection controllers. The primary overspeed trip and emergency overspeed trip controllers are independent and diverse by providing unique hardware and logic design and implementation.

MEMBER BROWN: That doesn't mean they're not both not software controlled.

CHAIRMAN CORRADINI: So I just want to bring this to a close. So what your concern is, you're still concerned about the diversity question.

MEMBER BROWN: Diversity because those words don't segregate a hardware based design by a software controlled design, that's all. If they're both software controlled designs, and you had diverse processors, there's got to be some testing or something to show that something's different enough in there.

CHAIRMAN CORRADINI: Okay.

MEMBER BROWN: That's not a good idea. The second piece is it says diverse but it doesn't say are the sensors diverse. It just says they're magnetic speed sensors.

And during the design phase, or at some point, you would expect the sensors to be tested to confirm that their outputs are linear and run up through the design range.

But there's no testing, once the design is complete, to show that it does that. I like testing. It's a bent. Stuff that's designed doesn't always work the way you design it.

CHAIRMAN CORRADINI: Okay, I've captured it.

MEMBER BROWN: Okay, and that's my only point.

CHAIRMAN CORRADINI: Okay.

MEMBER BROWN: I'm done.

MR. REDDY: So what is --

MEMBER BROWN: I have no idea what we're doing with that yet, but we've got it captured.

CHAIRMAN CORRADINI: I'll capture it and let's move on here.

MR. ARMIJO: Is there general agreement that these aren't tested. It's hard to believe that they aren't tested.

MEMBER BROWN: In the other projects we've discussed, I have asked this question in the later ones. And I don't remember the answers.

MR. ARMIJO: We should have GE here. Can they answer that question, that these sensors are tested and the overspeed is tested in some --

MEMBER BROWN: Actual sensor output.

MR. ARMIJO: -- actual, yes, these turbines are out there.

MEMBER BROWN: At regular overspeed conditions, that's all.

MR. HINDS: Hi, this is David Hinds from GEH. Yes, there is testing for overspeed testing. And it's actually described in the report that I think you were just requesting a copy of previously.

CHAIRMAN CORRADINI: That's was I was guessing.

MEMBER BROWN: Once we get that I'll take a look at it.

MR. HINDS: Yes, they are tested at or above rated speed by means of controls in the main control room. So there is an overspeed testing as --

MEMBER BROWN: Say that again.

MR. HINDS: It's tested during either shutdown or startup with an overspeed condition to verify that we have the overspeed. It's in Section 2.4 of the missile generation probability analysis report.

CHAIRMAN CORRADINI: So we just got that. We'll have to look at it and come back. Okay?

MEMBER BROWN: Well, you don't have to do it right this minute, Chris. I'm not going to read it right this minute.

CHAIRMAN CORRADINI: Go ahead.

MEMBER BROWN: That's fine. We can go on.

MR. MAKAR: Okay, so for these two sections in the FSAR turbine overspeed and testing, since they mostly are pointing to the two other sections in turbine rotor integrity, they way we viewed these is these are affirming information in the DCD. And they're pointing to other information that we're reviewing.

So for these two sections, what's in the

COL FSAR, it's not a technical review of technical information. It's a review that it's referencing the right source and consistent with the DCD.

So we can move on then to the next slide, please, in the actual maintenance and inspection program. So in 10.2.3.6, it again references certain DCD sections. So, in that sense, it's getting consistent with what the DCD said.

But only affirming what's in the DCD would not be sufficient. As we said, there was some missing information. So the overlap here is some of the volumetric and service and visual inspections, a combination of them. And the overlap is both in the DCD and the missile probability analysis.

But the new information is that there's a requirement for rotor dovetail inspections, not in the DCD. And this is a variety of ultrasonic testing and magnetic particle testing. And then there's also the necessary inspection interval, which is 12 years maximum for each low pressure rotor section.

And there are a variety of techniques that are included in those inspections, which consist of visual magnetic particle, ultrasonic testing, of various parts. This includes the accessible rotor services, turbine blades, couplings and coupling bolts.

And as I said, different places on dovetail inspection, dovetails with two different approaches, depending on whether they are axial entry or circumferential entry, tangential entry I should say.

Next slide please. And Section 10.2.3.7 is in-service inspection of turbine valves. So we're adding here to what's in the DCD, the reference to the probability analysis, which includes now valve and control system maintenance inspection and testing details.

And so that's what's new here. There is a categorization of extraction non-return valves and daily or monthly testing, depending on how they're categorized.

There is the valve testing interval, which is needed and not in the DCD, 120 days. And that's connected to the missile probability analysis. It includes main stop, main control, intermediate stop, and intercept valves.

And then the valve inspection intervals, every valve at least once within a six year period, looking for conditions such as wear and erosion, deposits and distortions.

Next slide please. So for this COL item, the maintenance and inspection program, we concluded that the information provided is acceptable because it affirms the information in the DCD, supplements it with the turbine missile probability analysis report.

And again, those criteria are that they have an ISI, an in-service inspection and in-service testing to maintain P-1 at ten to the minus four. They've related the missile generation probability to the design materials, valves, et cetera.

The other commitment to different inspection techniques and the missile generation is provided to the staff for review and approval. So when we're ready to go to the next slide, John will describe our review of that report.

DR. WALLIS: Do these blades creep outwards as they get older, creep outwards? Are there any dimensional change as they get older, like they creep outwards?

MR. HONCHARIK: I don't think they, they're really not subject to, I guess --

DR. WALLIS: Uptakes or anything like that?

MR. HONCHARIK: Right. Because it's not a high enough temperature.

DR. WALLIS: Not high enough.

CHAIRMAN CORRADINI: Go ahead, John.

MR. HONCHARIK: Thank you, great. My name is John Honcharik and I want to talk about the turbine missile probability analysis. And that was submitted to address the standard COL Item 10.2.2-A. And this would be for the GE turbine design for that specific model number.

So the applicant uses the report, the ST-56834, Revision 4, as the bounding turbine missile analysis. And this would determine the inspection and test intervals and any augmented inspection requirements, as Greg has discussed already.

The analysis uses the guidance in Reg Guide 1.115 to determine the probability of generating turbine missile due to several mechanisms. This includes failure due to brittle fracture, due to fatigue and stress corrosion cracking, and also ductile failure due to destructive overspeed of the turbine. The destructive overspeed is due to the failure of the overspeed protection system.

Next slide. As previously mentioned, the analysis used to provide the inspection intervals, so this analysis basically calculates the probability of generating a turbine missile that meets the requirements of less than ten to the minus five.

And it should be noted that ten to the minus five is for an unfavorable turbine orientation, which was a specific statement or requirement in the ESBWR DCD.

So even though the standard ESBWR design, which is user Fermi, is a favorable orientation, the DCD set that criteria to be for unfavorable turbine for conservatism.

The turbine missile analysis uses bounding material properties of the rotor since the as-built material properties will not be available until the turbine is manufactured. In addition, the analysis uses a methodology that was previously approved by the NRC.

The next slide please. I'll now discuss the material that's used for the turbine rotor. The rotor material is a nickel, chromium, molybdenum and vanadium alloy steel that's under a GE-specific material specification.

The material is similar to other turbine rotor materials, such as ASTM A470, and has specific requirements to ensure toughness. This includes vacuum treatment and restrictions on sulphur and phosphorus to minimize these alloy impurity elements and to improve toughness.

This material is also similar to material that was used in the past but has a more restrictive nickel content, which is a specific requirement in order to achieve the desired material properties for this nuclear monoblock and integral rotor.

The toughness of the as-built rotor is verified by the fracture appearance transition temperature, or what is called FATT. And for this rotor it's plus 30 degrees Fahrenheit, as required by the material specification and also the DCD.

The as-built rotor will be tested by removing impact test specimens from the radial trepans between the rotor wheels to ensure that the deep-seated FATT, which is basically FATT value closest to the bore, center of the integral rotor.

And that's done in order to ensure that the toughness value used in this analysis is bounded by the actual as-built material values specifically within the inner region of the monoblock rotor.

Next slide. The bounding material properties specified in the GE materials specification was used in the analysis. And it included the toughness, or the FATT value of plus 30 degrees Fahrenheit, and also the minimal tensile strength.

And the analysis also referenced the GE material specification, which is the material spec that would be used for the Fermi turbine rotor. This ensures that the turbine missile analysis is only applicable for this GE designed turbine with this GE material specification.

Next slide please. To determine the inspection interval of the rotor, analysis consisted of determining probability of rotor burst and the probability of a turbine rotor fragment penetrating the casing.

The failure modes assumed include ductile bursts due to overspeed and brittle fracture of assumed mis-flaw growing to critical size due to cyclic fatigue and stress corrosion cracking at the rotor dovetails.

The ductile tensile burst was performed using the tangential stresses of each rotor stage and a minimal tensile strength of the material. The cyclic fatigue evaluation was performed assuming mechanical and thermal loading of propagating of an internal forging defect, which was an assumed assumption.

The stress corrosion cracking failure mode was also performed by assuming the crack growth in the slot bottoms of the rotor dovetails that would propagate through the rotor and thereby generating a missile.

The probabilities of a rotor rupturing for each of the failure modes was combined with the probability of the ruptured rotor fragment penetrating the turbine casing.

So the resulting probabilities in the analysis demonstrated that the probability of generating turbine missile was much less than ten to the minus five for an inspection interval of greater than ten years.

DR. KRESS: Let me ask you a question about that. I was under the assumption that you use an undetectable flaw as a start for determining whether you get a blade, for example, converted into a missile due to an overspeed. That undetectable flaw must grow to some critical size. Is that where the cyclic fatigue, given SCC and stuff enters it?

MR. HONCHARIK: Right.

DR. KRESS: Well, somehow you have a cyclic fatigue that's based on time and you grow this undetectable flaw. And after 12 years it's reached a failure particular to that? And I'm asking this just for information.

MR. HONCHARIK: Yes. I think basically what they do is you assume a certain size flaw, right.

DR. KRESS: But the size is assumed.

MR. HONCHARIK: Right. And you're assuming this because you may have missed it during inspection, okay, whether it's smaller, but you typically have a larger size flaw that you assume.

And in that you assume it proves different failure modes to set the fatigue and stress corrosion cracking. And then you do each one separately and then they combine them. But what they do is they grow it out, but what this is saying is --

DR. KRESS: So you have equations for the rates of growth of this due to these failure modes?

MR. HONCHARIK: Correct. And they plug that in. But what the results of this analysis showed, was that it was well beyond 12 years that you would have any indications of growing this flaw to a critical size. It was way, way out, 12 years is very --

DR. KRESS: And these models for the effects of these growth mechanisms, I assume they're fairly conservative so that you don't have to worry about the --

MR. HONCHARIK: Yes, they're pretty much conservative and pretty much what was used for other designs and even operating plants.

DR. KRESS: Thank you, that's clear.

MR. ARMIJO: But they're backed up by tests too, Tom. They do crack growth tests based on fatigue loading of these initial flaws. And they also do crack growth testing due to the environmental effects. So it's a lot of testing.

DR. KRESS: Well, that helps.

MR. HONCHARIK: So basically, the analysis confirmed that 12 years is acceptable. Also, since the stress corrosion cracking failure mechanism and the dovetail slot bottoms controls the probability of generating a missile after 20 years, the turbine manufacturer recommended that the rotor dovetails be inspected every 12 years, which was discussed in the COL item.

The next slide. To determine the test interval of the turbine control system, the destructive overspeed probability was performed. The analysis used previous failure rate models that had the same functional design and component requirements as for the ESBWR turbine generator.

The ESBWR turbine Mark VIe control system uses previous components that have had improvements made based on past operating experience.

Also valve failure rates were updated to include failure rate assessments collected in 1993 and 2008. And they identified certain common failure modes throughout that time period after 1984 and were corrected, and therefore were included in some of these failure rate assessments in '93 and 2008. These corrective actions were incorporated into the current Mark VIe control system.

The overspeed probability analysis therefore demonstrated that the valve test interval of 120 days was well within the criteria of ten to the minus five per year and meets the guidance in Reg Guide 1.115.

Next slide. So in conclusion, the staff finds that the turbine missile probability analysis was acceptable because it meets the annual missile probability criteria of ten to the minus five per year in Reg Guide 1.115 for unfavorable orientation. And this would ensure that turbine rotor integrity is maintained.

Also, the associated turbine rotor inspection interval of ten years, and the turbine manufacturer's recommendation for inspection of the turbine, meets the requirements of the Reg Guide.

And the associated turbine valve test interval of 120 days, and the manufacturer's recommendation for testing the valves, meets the criteria in the Reg Guide 1.115. And that concludes my presentation.

MR. EUDY: Are there any other questions or comments from this area?

CHAIRMAN CORRADINI: From the committee? Okay, thank you very much.

MR. EUDY: And I'm going to go ahead and wrap up a couple of the whatever it is, action items for you. We're supposed to get you the Rev 4 of the missile probability report.

CHAIRMAN CORRADINI: We have it.

MR. EUDY: You do have it.

CHAIRMAN CORRADINI: We have it.

MR. EUDY: Okay, great. That's done.

CHAIRMAN CORRADINI: Everybody's got it electronically.

MR. EUDY: Has Member Brown got it? He had concerns about the testing, the overspeed protection systems and the related sensors that maybe in this report.

MEMBER BROWN: If it's in the report I'll read it.

MR. EUDY: Okay, that's what I need to hear. Great, thank you.

CHAIRMAN CORRADINI: Thank you. Okay why don't we take a ten minute break until 3:15. Do you want a 15 minute break?

CHAIRMAN CORRADINI: Okay, let's take a

break until 3:20.

(Whereupon, the above-mentioned matter went off the record at 3:05 p.m. and resumed at 3:19 p.m.)

CHAIRMAN CORRADINI: Why don't we get started. And we'll start with DTE presenting Chapter 14. Steve, I guess you're the kick-off speaker.

MR. THOMAS: I'm the kick-off speaker until Mike Brandon is here.

MR. BRANDON: Okay, I'm Mike Brandon, leading the discussion on Chapter 14. There's basically five sections on Chapter 14. One is incorporated by reference annals. I'll speak some to the other four.

This is Section 14.2, the initial plant test program. It's Appendix 14, Alpha, Alpha, provides a detailed description of the test program. And that gets to more detail on the subsequent slide.

The COLA Part 10 includes a license condition to provide approved test procedures to the onsite NRC inspector only 60 days prior to their intended use.

And the detailed test program including schedule will be made available for review at least 60 days prior to the first pre-op test, or pre-operational test program, and 60 days prior to the start of the initial fuel load for the startup test program. And these milestones are provided in Table 13.4-201 in Section 13.4 of our FSAR.

Next slide. Also on Section 14.2, there's four supplemental items, and this is for site-specific testing. For the AC power distribution we've committed to perform pre-operational tests.

And we've added testing to confirm proper operation of the automatic transfer capability of the normal preferred power source to the alternate preferred power source, relative to the plant service water.

We have per-operational tests to basically confirm proper operation of the various components, fans, motors, valves. We've added testing to confirm proper operation of the automatic transfer between the plant service water trains in components in response to AOOs.

We've added testing to confirm proper operation of water hammer mitigating design features, and also for the heat exchanger and the auxiliary heatsink performance verification. But those two functions are actually deferred until the plant's in startup phase so systems are heated to perform those tests.

And then for the service water system we'll do pre-operational testing. We've added testing to confirm proper operation of individual components in the system in integrating matter.

And lastly, for the natural draft cooling towers, we have a pre-operational test to confirm proper operation of pumps, valves, motors, logic and interlocks.

And then last two, we'll do a performance test to verify proper performance of the cooling tower. And that will be under operating load conditions.

MEMBER STETKAR: Mike?

MR. BRANDON: Yes, sir?

MEMBER STETKAR: Under the plant service water system performance testing, this might be covered somewhere else so bear with me.

MR. BRANDON: Okay.

MEMBER STETKAR: It says what you've added is the objective of the test is to verify performance of the PSWS, including the auxiliary heatsink along with reactor closed cooling water system.

Under expected reactor power operation load conditions, I can see how that will take care of TCCW and AHS. Isn't the maximum load on our CCW shutdown conditions? Are you going to do an integrated functional test for just after shutdown, RHR cooling?

MR. BRANDON: Oh, like after your first cycle and you have sufficient decay heat build-up.

MEMBER STETKAR: Isn't that the peak load for that part of the lead?

MR. BRANDON: Correct.

MEMBER STETKAR: The load RCCW is pretty small during power up.

MR. BRANDON: Right, I agree, yes.

MEMBER STETKAR: You are --

MR. BRANDON: Yes, we would do some sort of shutdown test to verify the capability of the system with those heat loads on the system.

MEMBER STETKAR: Okay. I didn't read that but --

MR. BRANDON: Yes, I'm not sure --

MEMBER STETKAR: The only thing that tripped over, it says during reactor power operation load conditions, which isn't verifying the heat removal of RCCW, in the sense.

MR. BRANDON: The other piece of that is when we have, there will be more heat transfer from the RCCWs during operation than prior to operation.

MEMBER STETKAR: Certainly, yes. It's clear you can't do it pre-start.

MR. BRANDON: So with that higher heat we can use that heat load, plus the Delta Ts, to verify the system performance during the operation.

MEMBER STETKAR: Yes, I guess you could do heat --

MR. BRANDON: And then you can extrapolate that to your shutdown conditions.

MEMBER STETKAR: Yes, yes.

MR. HINDS: Yes, and just one comment, David Hinds from GH. You're correct that as far as the actual heat loads should be higher on RCCW during shutdown conditions during decay removal from the reactors here, correct there. But also correct that you can do performance testing.

MEMBER STETKAR: Yes, I mean you can infer heat transfer across the heat exchangers that way.

MR. HINDS: Sure.

MEMBER STETKAR: Okay, thanks.

MR. BRANDON: Okay, 14.3 is inspection test analysis and acceptance criteria for the standard COL item, a number of ITAAC that we've included.

Design certification ITAAC, physical security, emergency planning, site-specific ITAACs, we've identified and committed to for concrete backfill under Seismic Category 1 structures, requirement for backfill adjacent to Seismic Category 1 structures. The requirements on the plant service water basin water, as far as the volume and its ability to remove heat for a period of seven days and also to maintain the net positive suction head for those pumps after that water's existed for seven days.

For offsite power, there's a number of ITAAC that basically verifies the minimum two independent offsite power supplies ready to supply the necessary load requirements during design basis operating modes.

During normal operation, an offsite power supply is capable of supplying required voltage and frequency to the interface in the onsite portions of the preferred power system.

And then the fault current contribution is compatible with the interrupting capability of the onsite short circuit interrupting devices.

And the next slide. This is for Section 14.3 Alpha. Let's see, Design Acceptance Criteria Closure Process. And we have a Fermi 3 item that basically addresses committments for design acceptance criteria and the OPEC closure schedule.

And this will address the sector-related piping, manufacturers, engineering, and I&C procedures and test program. And that testing will be done basically using the NEI 0801 closure process that's endorsed by Reg Guide 1.215 by the NRC.

And then lastly, this talks about a description of the initial test program administration, just like the other COLs will have a startup administrative manual.

And that manual will address the bookability of the initial test program to systems, structures and components, the bond of the different testing program phases, the organizational staffing and responsibilities that will conduct and manage those tests, the test procedure development and review process, the conduct of the test program, the review and approval of the test results, legalization of operating experiencing, developing those procedures, they way you fight procedures during the initial test program for operator training purposes to extend practical, and will identify the prerequisites and procedures that are required for fuel loading. Because basically you don't need administrative aspects of developing and implementing test procedures.

CHAIRMAN CORRADINI: Just as a verification though, but what we had discussed, I think previously, under Chapter 3, part of that will be the test program in the ITAAC for the vacuum breakers and the associated isolation valve systems --

MR. BRANDON: That's correct.

CHAIRMAN CORRADINI: -- and sensing.

MR. BRANDON: Okay, correct.

CHAIRMAN CORRADINI: And this is a clarification. I guess I should know this but I can't remember. This is not the chapter, because we had a discussion, I don't remember what chapter it was. I think it was under Chapter 6 on engineered features, about periodic testing of the passive safety systems, where you've committed to every ten years.

And we wanted to see some sort of rotating testing. For example, the isolation and density of multiple banks, that you would test each one on some sort of rotating basis.

MR. BRANDON: Correct, yes, got a lot of discussion at the ACRS meeting back in 2010 with GEH.

CHAIRMAN CORRADINI: I can't remember. It's all a mystery to me now. Between the DCD and the COLA we got commitment that you would test on some sort of every two year basis. So you would run through, over ten years, all the various modules of your passive systems.

MR. BRANDON: Right. We anticipated that.

CHAIRMAN CORRADINI: Yes, as well as the isolation condenser.

MR. BRANDON: Okay. And we anticipated that as a possible question you would ask. And I think GEH has a good answer they can provide.

MR. HINDS: Yes, this is David Hinds from GEH. So, yes, you're correct that there's, in the TexFlex surveillance requirement, there's a staggered test basis --

MR. BRANDON: Right, that's what I was trying to get at.

MR. HINDS: -- 24 month cycle, at least for those four training systems, on a 24 month cycle, staggered test basis. So we rotate through the four trains.

And then there's additionally one for the exhaust ventilation, or moisture separator, from the boil-off where there's two trains there. And it's a four year staggered test basis there.

And additionally, on the vacuum breaker question, we did do a test program for the vacuum breaker itself. The backup valve that you were referring to a minute ago, the butterfly valve --

MR. BRANDON: I guess I called it an isolation valve but --

MR. HINDS: It is not going through a test program. And so that's a test program yet to be done, which you were referring to a minute ago.

MR. BRANDON: Right, but that's committed to because --

MR. HINDS: Yes.

MR. BRANDON: Okay.

MR. HINDS: And the sensing circuit, the leakage sensing circuit you referred to and also the backup isolation valve. Both are committed for testing.

We did an analysis and put in a topical report. And that was reviewed. And then for the vacuum breaker itself though, it was actually a physical test done there and also a test report went out for that.

CHAIRMAN CORRADINI: All right, thank you. I just wanted to check.

MEMBER BROWN: Part of that discussion two years ago also involved the squib valves, that they were supposed to be tested in --

CHAIRMAN CORRADINI: But the testing sequence though, there was --

MEMBER BROWN: I mean the whole valve.

CHAIRMAN CORRADINI: Only upon

manufacturing QA acceptance of the valve. What we agreed to was essentially testing of the charge as it was brought out.

MEMBER BROWN: No, I never agreed to that.

CHAIRMAN CORRADINI: Well, okay. You were absent during that week.

(Simultaneous speaking.)

MEMBER BROWN: No, I was not absent during that meeting. And I remember all this very clearly because I got excoriated. But that's a big word.

(Laughter)

CHAIRMAN CORRADINI: I can think of a smaller word but we came to a final result.

MEMBER BROWN: No, we came to a consensus. I remember on the qualification that I talked about was we were not testing the squib valve after it was shock tested. That's what I made my additional comments on.

But for in-service testing, this is my memory. It was to be included on an every couple, whatever, not every one but a staggered basis, where the squib valves were supposed to be removed to see that, hey, yes, would the squib valve actually operate.

And you would go through all the sequences and then you would test them, just like these other ones, in every two years. So you covered all the whole range, all the valves over a ten year period or something like that. But you were supposed to take a squib and test it, blow it up, and make sure it worked.

CHAIRMAN CORRADINI: That was not agreed to, as far as I know.

MEMBER BROWN: That's my memory.

CHAIRMAN CORRADINI: I'm going to look to the staff but my memory is that the chemical --

MEMBER BROWN: Well, the staff didn't like that either at the time. But I thought that's what we all agreed to at that time. I don't know, Sam, do you remember any of that?

MR. ARMIJO: I remember the discussion. And I know what we didn't agree to and that was --

MEMBER BROWN: The qualification test, I got shot down, okay. But the blood running out of my body --

MR. ARMIJO: I don't remember what the objection was to --

CHAIRMAN CORRADINI: Other than the fact you'd have to take apart the valve and then reassemble it and test it and then reassemble it back on the thing, I think that was the objection.

MR. ARMIJO: Yes.

MEMBER BROWN: Well, you've got to take

part of it apart --

CHAIRMAN CORRADINI: We will find out and get you the commitment.

(Off the record comments)

MEMBER BROWN: What, John?

MEMBER STETKAR: What you're talking about is the license condition that we just talked about for Chapter 3.

MR. BRANDON: Were you here for that discussion?

MEMBER BROWN: I got here in May of 2008.

MEMBER STETKAR: This would have been about two hours ago.

MEMBER BROWN: Oh, yes, I was here for that.

Okay.

(Simultaneous speaking.)

MEMBER BROWN: That one whipped right by me.

MEMBER STETKAR: That's when I was talking, where Tom said he doesn't like to use the word bomb. And I talked to him about how they were going to --

MEMBER BROWN: Oh, yes. But I didn't put that in the context of the ITAAC because we hadn't gotten there yet.

MEMBER STETKAR: Okay.

CHAIRMAN CORRADINI: Just so we're not misinforming you, Charlie, that's not taking the whole valve out and testing it. It's taking out --

MEMBER BROWN: Well, you can test it in place if you want to, and then replace the whole valve or rebuild it inside. That's what they said they had to do.

If one of them activates you had to take the internals out and replace them. That's at least what people were talking about at the time. Otherwise, these just sit there for 30 or 40 years.

MR. ARMIJO: Testing little charges.

MEMBER BROWN: Testing the little charge. That's insane.

CHAIRMAN CORRADINI: We will get back to you. My impression is what Tom explained to us earlier this afternoon is exactly what we agreed. And I will get it for you in black and white so you can review it again. Okay?

MEMBER BROWN: I actually listened to that. I didn't get that flavor at all.

CHAIRMAN CORRADINI: Okay.

MEMBER BROWN: I remember the word bomb very clearly.

CHAIRMAN CORRADINI: All right, that's all for the staff.

MR. BRANDON: That's all for my presentation.

(Off microphone comments)

MEMBER BROWN: While we're waiting, can I ask the GEH guy that talked about, that gentleman on the missile report? Is that talk about diversity between the sensors for the emergency trip system and the primary, or the normal speed control primary oversee, assigned to two different systems?

MR. HINDS: Yes, this is David Hinds, GEH. It does state that they are diverse.

MEMBER BROWN: The sensors, not the electronics, cabinets, and all that kind of stuff.

MR. HINDS: Certainly the electronics. I'll look in the report and verify the sensors.

MEMBER BROWN: I just wondered if it was going to be covered.

MR. HINDS: But certainly the electronics are diverse and one --

MEMBER BROWN: Does it talk about how they're supposed to be diverse?

MR. HINDS: One is software and the other is firmware. But it's --

MEMBER BROWN: Firmware, you mean like FPGAs or something like that?

MR. HINDS: I believe so.

MEMBER BROWN: Programmable field data rays or whatever?

MR. HINDS: I think that's correct. I can verify.

MEMBER BROWN: The PLDs or something, whatever.

MR. HINDS: But you were asking also on the sensors. I'll have to --

MEMBER BROWN: The sensors is the other --

MR. HINDS: I'll have to look up the sensors. But I know there're separate sensors and they operate independently.

MEMBER BROWN: I got that but they're both in the same standard front-bearing standard as the design description talks about them, in terms of their location. They're located in the same, right next to each other.

MR. HINDS: Yes, same general location, yes. I'll check the diversity of the sensor design though.

MEMBER BROWN: Thanks, excuse me, Mike.

MR. EUDY: Okay, Mike Eudy, the Chapter PM.

And we're going to go over the status evaluation in Chapter 14 for the Ferramine 3 application for the initial test program.

We have our expert, Andrea Kein, is going to go over the initial test program, Section 14.2. And then I'm going to give a high level review description for 14.3, site-specific ITAAC.

MS. KEIM: Hi, I'm Andrea Keim. I've worked for the NRC since 1996. I've been in NRO for the past three years. I have a bachelor's degree, a masters degree in materials and metallurgical engineering.

I'll be addressing the staff review of the Fermi 3 final safety analysis report, Section 14.2, initial plant test program.

What we did was we addressed the enhancements to the ESBWR DCD for the startup tests. There were three that were addressed for the AC power distribution system, the pre-operational test. It's 14.2.8.1.36.

They've provided supplemental information that was added to address the need to verify proper operation of the automatic transfer capability of the normal preferred power source to the ultimate preferred power source.

Some of this review was also done in Chapter 8 in Section 8.2.1.2 for plant service water system. The pre-operational test was also addressed in Chapter 9 in Section 9.2.1, but the addition for the testing was they added to the purpose.

The objective is to verify proper operation of the plant service water system, including the alternate heatsink. So they added portions about the alternate heatsink to the purpose, and its ability to supply the design quantities of cooling water to the reactor component cooling water system, and to the turbine component cooling water system heat exchangers.

And they added some subs to the general acceptance criteria. I think they already talked about that. And then they also added, to the last paragraph of the DCD, that these tests are delayed due to the insufficient heat loads during the pre-operational test phase.

And so the heat exchanger and alternate heatsink verification is deferred until the startup phase. And the staff found those acceptable.

And also with the plant service water system test, performance test now, they added to the purpose, again.

The objective of the test was to verify the performance of the plant service water system, including the alternate heatsink along with the reactor component cooling water and the turbine component cooling water under expected reactor power operation load conditions. And we had the discussion earlier. And the staff found their additions acceptable.

There were also three site-specific pre-operational startup tests. So these were tests that weren't reviewed in the DCD and were reviewed by the technical staff.

One was the station water system pre-operational test, which was addressed in Chapter 9, Section 9.2.10. And the technical reviewers found the test adequate, or the test abstract adequate.

And then they added cooling tower pre-operational tests and the cooling tower performance test. These were addressed in Chapter 10 and the staff found that the information provided in the test abstracts in Chapter 14.2 provided adequate information that they can develop procedures to implement the test to verify.

Next slide. The staff identified post-licensing activities to be addressed through license conditions. The license conditions provide for the milestones for the startup --

DR. WALLIS: How do you test a cooling tower pre-operational? Don't you have to have a big source of steam and stuff like that from somewhere?

MS. KEIM: Do we have the guy who reviewed this?

MR. ARMIJO: I have never tested a cooling tower.

(Off the record comments)

MS. KEIM: Is Chung-Li here? We might have to get back to you with that one.

CHAIRMAN CORRADINI: Could you re-clarify the question for us?

DR. WALLIS: Well, I'm not quite sure what's involved in this pre-operational performance test of the cooling tower. But a cooling tower has to have all the steam going through it in order to work. You can't produce the steam unless you have a reactor running. So I'm not sure how you test the cooling tower.

CHAIRMAN CORRADINI: I think there's an answer for you.

MR. THOMAS: Excuse me, it's Steve Thomas from Black and Veatch. In the FSAR we identify the pre-operational testing, which is testing of the basic components in the system, except for the cooling tower.

Obviously we can't test the cooling tower unless we have large heat load. And then we identify that there's the performance testing of the cooling tower, which is done when we have the heat load.

DR. WALLIS: When you do have a heat load?

MR. THOMAS: Right.

DR. WALLIS: So it's after you've started up?

MR. THOMAS: Correct.

DR. WALLIS: Okay, so that's not pre-operation?

MR. THOMAS: Right, that's the performance testing --

MS. KEIM: The pre-operational tests the system --

MR. THOMAS: It's like the service water system.

DR. WALLIS: Pre-operational test is just to check that everything's there, really.

MEMBER STETKAR: Well, there's spray distribution and things like that, that you can check.

DR. WALLIS: You do the water side.

MR. THOMAS: While the distribution pumps are running.

CHAIRMAN CORRADINI: You can put in

temporary components that test pieces of the system.

DR. WALLIS: Okay, that's all right.

CHAIRMAN CORRADINI: Go ahead.

MS. KEIM: Okay. So the staff identified the post-license activities to be addressed by license conditions. The license conditions provide for milestones for the startup administrative manual, which is 60 days prior to use, the pre-operational and startup test procedures, which is 60 days prior to their intended use, power ascension test phase reports, and milestones with updates for the operational program implementation, which includes the initial test program.

In addition, there's also one license condition for the evaluation reporting of test changes. Now, I'll hand it back over to Mike to address 14.3.

MR. EUDY: Any questions on 14.2?

(Off the record comments)

CHAIRMAN CORRADINI: Sorry, we were having a side conversation, I apologize. Go ahead.

MR. EUDY: Okay, I'm going to give a high level overview of the staff's review of 14.3, which consists of the ITAAC. The entire set of ITAAC has been provided in Part 10 of the application and consists of four parts.

We have the design certification ITAAC, which contains Tier 1 ITAAC incorporated by reference, emergency planning ITAAC, which has been provided and reviewed by the staff in their Chapter 13 SER, physical security ITAAC, which includes Tier 1 physical security ITAAC within the scope of the DCD, along with site-specific physical security ITAAC and have been identified to applicant and have been reviewed accordingly in the staff's Chapter 13 SER.

And then there's the fourth component, which is site-specific ITAAC for site-specific systems, not evaluated in the DCD and have been identified by the applicant and reviewed accordingly in various sections of the staff's safety evaluations.

In FSAR, Section 14.3, the applicant provided the following COL items. Standard COL 14.3-1-A, emergency planning ITAAC, standard COL 14.3-2-A, site-specific ITAAC, and site-specific COL item 14.3A-1-1, which is the schedule for design acceptance criteria, ITACC closure.

For emergency planning ITAAC, this COL item requires for the applicant to provide emergency planning ITAAC. The emergency planning ITAAC provided were reviewed accordingly by the staff and our Chapter 13 SER and were found to be acceptable. For the purposes of Chapter 14, the applicant has addressed this COL item.

Site-specific ITAAC, this COL item requires for the applicant to provide site-specific ITAAC for systems not evaluated in the DCD.

In FSAR Subsection 14.3.9, the applicant states that the selection criteria and methodology provided in Subsection 14.3 of the referenced DCD were utilized to identify site-specific ITAAC for systems not evaluated as part of the DCD.

Based on a site-specific systems safety significance, ITAAC were proposed by the applicant. Or if a site-specific system described in the FSAR does not meet an ITAAC selection criteria, then the applicant would indicate that there would simply be no entry for that system, no ITAAC entry.

For the following site-specific systems, the applicant proposed site-specific ITAAC. We have a 2.4.1 backfill under Seismic Category 1 structures. And that will be presented at a later time in the staff's evaluation in SER Subsection 2.5.4. The indications I have are what they have is acceptable.

Backfill for the second part is the backfill surrounding Seismic Category 1 structures. Again, that will be discussed later when the staff presents their Chapter 2, 0.5.4 SER.

Plant service water system includes the portion outside the scope of the DCD. It was reviewed in the Chapter 9, SER Subsection 9.2.1. Off site power systems were reviewed by the staff in Chapter 8, SER Section 8.2. And the communication systems, the emergency notification system, was reviewed in Chapter 13, SER Section 13.3.

DR. WALLIS: This is just a physical system or is it also the procedures, or just a physical system?

MR. EUDY: The communication system?

DR. WALLIS: Yes.

MR. EUDY: I don't know if I have, who's the communication system technical expert? I'd have to get back to you on a description of the communication systems.

DR. WALLIS: Well, it's the emergency part I was interested in. Is it the whole process or is it just some physical gadgets?

MR. SMITH: No, this is Peter Smith. This relates to the physical equipment that's installed.

DR. WALLIS: Just the physical equipment, that's all.

MR. SMITH: All of the functioning of the emergency operations organization is under the emergency planning ITAAC. So all of the procedures associated with --

DR. WALLIS: It's all being done, that's okay, thank you.

MR. EUDY: Right, their entry inside Part 10 was basically go see the ITAAC. So based on the staff's evaluation and the respective SER sections for the above ITAAC, and site-specific ITAAC entries, staff found the applicant had adequately addressed the site-specific ITAAC requirements for those systems.

For the remainder of the site-specific systems listed by the applicant in Part 10 as having no entries, the staff reviewed these systems and agreed with the applicant that the site-specific ITAACs are not required for those systems.

In summary, the staff has found the applicant has adequately addressed the COL item for site-specific ITAAC.

MEMBER BROWN: Are you done with this page?

MR. EUDY: No, I'm still on this page. Maybe I'm a little too verbose. Next is the site-specific COL item 14.3A-1-1, which discusses the schedule for design for DAC ITAAC closure, DAC ITAAC under a special type of ITAAC that consists of a set of pre-prescribed limits, parameters, procedures, and attributes upon which the NRC may rely in making a final safety determination.

The ESBWR design includes DAC in the areas of piping, digital instrumentation and controls, along with human factors engineering. This COL item requires for the applicant to choose one of three options for closing the specified DAC ITAAC.

They can have resolution through an amendment to the DCD, the COL application process, or through DAC ITAAC closure after COL issuance. The applicant chose to resolve this item in DAC ITAAC closure after COL issuance and provided a closure schedule.

Essentially, the closure schedule is that the applicant provided a commitment 3.10-003, which specifies that no later than one year after the issuance of the combined license or at the start of construction, whichever is later, the implementation schedules for the following DAC ITAACs identified in the referenced DCD, shall be submitted to NRC.

In addition, updates to the schedule will be submitted every six months and within one year of initial fuel load, with updates every 30 days. And those DAC are the piping DAC, digital I&C DAC, and the human factors engineering DAC. The staff has found that the applicant has adequately addressed this site-specific COL item.

DR. WALLIS: These are things that have not yet been finalized?

MR. EUDY: Right.

DR. WALLIS: And so they've done it all right so far. What matters really is how well they do it a few years from now, when they've really got the whole thing designed.

MR. EUDY: Right. It's Tier 2 starting information inside the DCD. So they can't change it.

DR. WALLIS: That's right.

MR. EUDY: They'd have to change it with a departure or an amendment. So basically, they've incorporated what's in the DCD. The only thing they had to do for this was just give us a schedule for closing those.

MEMBER BROWN: And they don't have to give that to you yet?

MR. EUDY: Well, they've told us how they're going to do it. And it's essentially what's in 21 CFR 5299, inspection and construction for ITAAC closure.

MEMBER BROWN: So all this Section, Table

2.2.7-4 and all the 2.2.13 safeguards, that's the protection system, the safeguard stuff, all of those pages and tables worth of stuff --

MR. EUDY: Is that in Part 10 of the application?

MEMBER BROWN: That's in Tier 1 of the DCD. You won't be told how they're going to be addressed for another year, two years, whatever it is, based on whatever this hypothetical schedule time is going to be?

MR. EUDY: They've incorporated all the Tier 1 ITAAC. I don't know if that's part of the DAC.

MEMBER BROWN: Where?

MR. EUDY: I'm not sure what table you're referring to.

MEMBER BROWN: I'm looking at Table 2.2-7-4 of the DCD Rev 9, Tier 1. It's the Rev protection system ITAAC. And that was defined as DAC in those days. It was an acceptance criteria. I'm just trying to figure out --

CHAIRMAN CORRADINI: They're all called ITAAC.

MEMBER BROWN: I know. They're all ITAAC but they were --

CHAIRMAN CORRADINI: Special ITAACs.

MEMBER BROWN: Special ITAACs. I agree with that. And they're very vague and I was just wondering how --

CHAIRMAN CORRADINI: I don't believe it was ever --

MEMBER BROWN: I was just asking questions, how they were going to get addressed. I had found Appendix 14.3A-1-1, which was just a little paragraph, which said we'll see it later. I'm trying to see how the DAC and stuff that we dealt with back during the design phase is going to get factored in to the test program. And right now it's still empty.

CHAIRMAN CORRADINI: Other than a commitment to give you a schedule.

MEMBER BROWN: And if that's the case then that's the case.

MR. ARMIJO: It all has to be finished before fuel load.

CHAIRMAN CORRADINI: I think he's trying to answer.

MR. EUDY: I don't think it's the sub-set of what you brought up. I don't think they're considering that DAC in this section. This section is just for the piping design in HFE. That is Tier 1 ITAAC, which has been fully incorporated by reference.

So it should be prescriptive enough.

MR. MUNIZ: This is Adrian. What he's referring to here is this special category of ITAAC being DAC here, which is limited to piping, neatol (phonetic) and the HFE design areas.

So what the applicant chose to do is they're going to close these DACs after the issuance of the license. And that will be rolling to the inspection process.

So when they are sending their letters indicating the DAC has been closed, the inspection process will take over. And for this special set of ITAACs, I think the inspection process will probably use some of the experts from headquarters in determining whether the DAC was closed properly.

CHAIRMAN CORRADINI: Does that answer your question, Charlie?

MEMBER BROWN: Not really. I mean the whole section is in there. I think those are the DACs that we were talking about back in those days. And there's a bunch of items in there.

And they fundamentally say we'll take the description and the various sections and we'll go run a test. And that was the acceptance criteria. We'll go test it to see that it meets stuff, kind of vague.

We'll make sure something's not done by software and something is. And all the software has to be done and reviewed by regional, hopefully some senior qualified NRC folks.

I don't think this has been cranked in. That sounds like this is still under the 14.3A-1-1, those parts of Tier 1. Correct me if I'm wrong, John. Am I fuzzy on this?

I thought those were the DACS we talked about back in those days, tables of stuff and also the human factors get thrown in there as well, human factors engineering.

CHAIRMAN CORRADINI: Did you have a question, John?

MEMBER STETKAR: I do. But I want to make sure Charlie's got --

MEMBER BROWN: I'm done, finished. Go ahead.

MEMBER STETKAR: I don't know whether it's Mike or Adrian. Adrian was a good straight man. But I'll address it to the people up front.

Back in November of last year we had a briefing, it was under a different subcommittee. But under the topic we've been trying to follow a bit, in our subcommittees, the staff's progress on preparing for these, in particular the DAC ITAAC close outs.

And at one time I thought there were going to be, I hate the term, but a set of table-top exercises done to kind of test that process, in particular for the digital I&C, which is obviously a pretty challenging process.

Just looking at my notes from November and it said well, basically, that seemed to have fallen apart because of additional resource constraints because of responding into Fukushima.

Nobody quite knew where it was headed. Could you quickly give us an update on where the staff is, in terms of that process? Are you gearing up? And what is the plan?

(Off the record comments)

MR. TANEJA: This is Dinish Taneja from the Energy Branch. The phase 1 of the pilot at that time, with STP, I think there was an attachment to that procedure. Attachment 1 was the initial phase of the life cycle development.

We piloted that portion of it. And after that STP fell apart, basically, that Fukushima happened, so that pilot was going to continue over the next phase, which never happened. Now I believe we're already doing the DAC inspections for AP1000.

MEMBER STETKAR: That's what I wanted to hear. But those are real --

MR. TANEJA: Those are real.

MEMBER STETKAR: Those are real inspections.

MR. TANEJA: Those are real inspections. So I believe there was an inspection among the requirement phase. There were significant findings during that.

MEMBER STETKAR: We may want to schedule. I mean it's not a USAPWR. That's why I wanted to wait until the end.

MR. TANEJA: No. That's AP1000.

MEMBER STETKAR: Yes. But I mean it's not pertinent to this particular subcommittee.

(Off the record comments)

MEMBER STETKAR: But we may want to schedule a subcommittee to get --

CHAIRMAN CORRADINI: But your point is the generic process --

MEMBER STETKAR: The generic process, if it's in progress for AP1000 --

MR. TANEJA: The volunteer was South Texas for that one, right?

MEMBER STETKAR: Yes, I know.

MR. TANEJA: And so they are no longer in that stage. So we actually are proceeding, the actual licensees are handling it now.

MEMBER BROWN: Do you actually have a plan, since you're into it, do you actually have a plan for completion as to what you would be doing at each stage, or each phase, to get to the end point? That would be --

MEMBER STETKAR: We will take care of this offline. If that's in progress then --

MR. TANEJA: That is in progress and there is a plan that's taking shape on that one already.

MEMBER BROWN: Do you want to do that under the digital I&C or under AP1000?

CHAIRMAN CORRADINI: Can we pull ourselves back Ferramine Unit 3? I'll let you guys discuss this privately. So anything else for our Chapter 14 team up in front of us? Okay, hearing none, I'll thank them and go around the table, starting with our consultants. Dr. Wallis?

DR. WALLIS: Well, I think I'll have to write something about these extreme events. This is --

CHAIRMAN CORRADINI: I had a funny feeling you might.

DR. WALLIS: -- unbelievable floods and 100 mile and hour winds and things. And I think this is more a generic thing, when they seem to postulate things which are almost impossible.

But they only just look at one aspect of it, like what's the water level? What are all the other things they tell us? And so I'm going to write something. But I think it's more generic than applying to this particular --

CHAIRMAN CORRADINI: Well, I think Mr. Stetkar is waiting for your contribution. No, I think he wants your active contribution. Anything else, though, about today?

DR. WALLIS: I'm puzzled by some of that. But otherwise I think this is okay.

DR. KRESS: I don't have a lot to say. I think they did a good job with answering the questions I had before I came here. I may have to say some words about societal risk.

CHAIRMAN CORRADINI: That'd be good.

DR. KRESS: And I'm not sure I'm still satisfied on the missile, turbine missile.

CHAIRMAN CORRADINI: Well, I think the takeaway for the committee, the subcommittee, and all the other residual members of the subcommittee, is we just got electronically the report. I just downloaded it. So I think we all should look at it. And when things pop up there we should hear about them when we get together next.

DR. WALLIS: Missiles popping up, do you think anyone?

(Laughter)

CHAIRMAN CORRADINI: Tom, anything else? I'm going to let your compatriot over there, I'm ignoring him.

DR. KRESS: No, I'm through.

DR. HINZE: I'll let Tom talk about societal risk. But I had concerns coming in regarding some of the meteorological issues and some of the ground water issues. And they've been well answered. And so I'm satisfied with where we are.

CHAIRMAN CORRADINI: Okay. Steve?

MEMBER SCHULTZ: Some of the design specific information was new to me, just being with the opportunity for the first discussion with the subcommittee.

CHAIRMAN CORRADINI: And you can come back a lot.

MEMBER SCHULTZ: Well, thank you. I appreciate the quality of the presentations, both by the applicant and by the staff reviews that have been done. As it turned out, the level of information was very well organized and presented today. And I appreciate that. Thank you.

CHAIRMAN CORRADINI: Sam?

MR. ARMIJO: I have no problems. Looking forward to reading the turbine report.

CHAIRMAN CORRADINI: John?

MEMBER STETKAR: I've got a couple of things. I've been chomping at the bit so I'll --

CHAIRMAN CORRADINI: He's dying to get something on the record.

MEMBER STETKAR: This is a quote from Section 1.3 of HMR 51, one of the seminal references, definition of PMP. I'll read the second paragraph. "Another definition of PMP, more operational in concept, is 'the steps followed by hydro meteorologists in arriving at the answers supplied to engineers for hydrological design purposes' WMO, World Meteorological Organization, 1973.

"This definition leads to answers deemed adequate by competent meteorologists and engineers and judged as meeting the requirements of a design criteria." That what it is. Okay.

Now, a couple of other things. One, I will note that prior to fuel load, according to Part 52, Fermi Unit 3 must have in place a site-specific probabilistic risk assessment that indeed evaluates all external events according to consensus standards in place one year prior to fuel load.

So in principal, they will have an evaluation of high winds, flooding, all of those things, in a probabilistic sense. How those compared to what I just read is anybody's guess.

DR. WALLIS: All of the effects? I mean if the flood picks up propane tanks --

MEMBER STETKAR: It's a risk assessment, so in principle, yes. How they do that, I don't know. I just wanted to get that. As far as other comments, I'd like to say one thing. I really appreciated the --

(Off the record comments)

MEMBER STETKAR: I really like the level of detail that this particular applicant, and the staff, went into in the meteorological analyses. It's actually a lot more than I've seen in terms of scope and comparative analyses and confirmatory analyses done by the staff.

It's a lot better than I've seen in other applications. And I think you both deserve credit in that area in particular. Other than that, nothing to say.

CHAIRMAN CORRADINI: Mike?

MEMBER RYAN: Nothing new to add. But I second John's last comments, and Steve Schultz's comments as well, on the quality of the presentations and the type of material. Thank you.

CHAIRMAN CORRADINI: Charlie?

MEMBER BROWN: I've said my piece.

CHAIRMAN CORRADINI: And I've noted it.

MEMBER BROWN: Yes, hopefully you'll take some action on it.

CHAIRMAN CORRADINI: I noted it. Okay, let me thank the staff and DTE for their presentations. I think the way John said it is probably best, which is I think this has been a fairly complete description, particularly in Chapter 2, where we knew this would be where the substantive discussions would be relative to Fermi 3, where a lot of it before was essentially included by reference.

I wanted to review what I had listed as, I'm not going to call them even open items, I'm just going to call them things that we're still keeping on the books to note.

One was DTE is, or I should say the staff, promised to get back and double-check Bill's suggestion, or reminder of shale gas exploration to make sure it's within the affected areas of five miles or less or ten miles or less. And staff was going to double-check that. They didn't think that was an issue but they were going to check it.

MEMBER RYAN: That answers mine. Do you want a response or not?

CHAIRMAN CORRADINI: Do you have a response to that?

MR. SMITH: Yes, this is Peter Smith. We did check. There's two areas in Michigan. The closest one is 75 miles away, Utica shale development.

CHAIRMAN CORRADINI: Cross that one off. Okay. And staff has checked it and trusts you?

MR. TAMMARA: I honestly checked. I didn't find anything.

CHAIRMAN CORRADINI: You have to come to a microphone.

MR. TAMMARA: My name is Rao Tammara. I looked at within five miles and ten miles. I didn't find anything. So that's why I came back and asked them whether they have any information.

CHAIRMAN CORRADINI: Okay, thank you. The second one I have here is flood levels for RTNSS structures, same as the safety structure. Staff should verify this, since DTE essentially came on the record they did that, and verify they've checked that and verified it.

And then I probably wrote this wrong. The perched water table, staff should verify the review of what DTE presented.

Aircraft, airway crash frequency, we want to see the staff's confirmatory analysis. And then we're all supposed to look at and review the turbine missile analysis, which we've gotten.

And then finally, I'll get a clarification for Mr. Brown as to what the Chapter 3 discussion was in terms of the condition for testing the squib valves. And that's what I've got.

I also sent to the committee -- well, at least the people that were listed as coming to the meeting, I'm not sure if all of you have it but I think I sent it to all the ACRS and the consultants -- basically my summary of the past three subcommittee meetings as what was essentially a carry forward of anything.

And we didn't really have any open things to discuss. I just tried to summarize it. If people can remember that I did send that out and look at it, if there's something there that looks incorrect, please let me know.

But I tried to summarize essentially the last three meetings for 9 months ago, 14 months ago, and longer than that ago. I tried to at least put it all together so we get on the same page.

Other than that, I think we're all set with the committee. Are there any public, I should ask Chris, did anybody, we had checked earlier and nobody was on the line from the public to make comments. Can we check again?

(Off the record comments)

CHAIRMAN CORRADINI: Is anybody out there that's from the public that wants to make a comment? Okay, I hear a lot of clicking so I think we're set. So with that we'll adjourn. And we will get back to you all about the next subcommittee meeting.

(Whereupon, the above-mentioned matter was concluded at 4:10 p.m.)

DTE Energy®

Fermi 3 COLA
Presentation to ACRS Subcommittee
Section 2.1

Section 2.1,
Geography and Demography

DTE Energy

Section 2.1 Addresses the Following Topics:

- Site Location and Description
- Exclusion Area Boundary, Authority and Control
- Population Distribution

Section 2.1,
Geography and Demography

DTE Energy

Site Layout

- Exclusion Area Boundary (EAB) – 892 meters
- Low Population Zone (LPZ) – 4828 meters (3 miles)

Section 2.1, Geography and Demography

DTE Energy

Population Distribution:

Radius	0-5 miles	0-10 miles	0-20 miles	0-30 miles	0-40 miles	0-50 miles
Density (year 2018)	242	390	377	813	891	773

- Regulatory Guide 4.7 is satisfied in that the population density averaged over any radial distance out to 20 miles is less than 500 persons per square mile.
- 10 CFR Part 100.21(b) is satisfied in that population center of 25,000 persons is farther than 1-1/3 times LPZ distance.
- ESBWR PRA assumed population density for offsite consequence goals is 790 persons per square mile out to a radial distance of 10 miles. Fermi 3 density is less than this value.

DTE Energy

Fermi 3 COLA
Presentation to ACRS Subcommittee
Section 2.2

Section 2.2, Nearby Industrial, Transportation, and Military Facilities

DTE Energy

Section 2.2 Addresses the Following Topics:

- Description of nearby industrial facilities.
- Description of nearby transportation routes.
- Evaluation of potential accidents.
  - Explosions and Flammable Vapor Cloud,
  - Aircraft Hazards,
  - Toxic Chemicals,
  - Fire and Smoke,
  - Impacts to the Intake (Collisions or Nearby Liquid Spill).

Section 2.2, Nearby Industrial, Transportation, and Military Facilities

DTE Energy

Facilities and Transportation Routes:

- Description of industrial facilities within five miles of the site that use, store, or transport hazardous materials; including projections for industrial growth.
- Description of nearby waterways.
- Description of nearby highways.
- Description of nearby rail lines.
- Description of nearby airports.

Section 2.2, Nearby Industrial, Transportation, and Military Facilities

DTE Energy

Evaluation of Potential Accidents:

The evaluation for potential accidents (off-site and on-site) considers the following scenarios:

- Explosions and Flammable Vapor Clouds,
- Aircraft Hazards,
- Toxic Chemicals – previously addressed in conjunction with Section 6.4,
- Fire and Smoke,
- Collisions with Intake Structure,
- Liquid Spills near Intake.

Conclusion – No adverse impact to Fermi 3 from these postulated scenarios.

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Fermi 3 COLA
Presentation to ACRS Subcommittee
Section 2.3

Section 2.3, Meteorology
Section Topics

The following topics are addressed in Section 2.3

- Regional Meteorology
- Local Meteorology
- Meteorological Monitoring Program
- Short Term Atmospheric Dispersion Factors
- Long Term Atmospheric Dispersion Factors

Section 2.3, Meteorology
2.3.1 Regional Meteorology

DTE Energy

Fermi 3 site characteristic values are compared to the corresponding DCD Table 2.0-1 site parameters:

- –Extreme Wind Values
- –Tornado Values
- –Precipitation Values
- –Ambient Design Temperature Values

In summary, the Fermi 3 site characteristic values are bounded by the corresponding DCD site parameters.

Section 2.3, Meteorology:
2.3.1 Regional Meteorology

DTE Energy

Extreme Wind

- The site specific 100 year three second gust is 96 mph compared to a DCD value of 150 mph.
- The site specific 50 year three second gust is 90 mph compared to a DCD value of 130 mph.

Tornado

- Fermi 3 site is located in Region I per Regulatory Guide 1.76, "Design Basis Tornado and Tornado Missiles," Revision 1.
- Site specific tornado and missile characteristics are selected based on Regulatory Guide 1.76.
- Tornado site characteristics are bounded by DCD tornado site parameters.

Hurricane

- Fermi 3 site is located inland from areas impacted by hurricanes.

Section 2.3, Meteorology:
2.3.1 Regional Meteorology

DTE Energy

Precipitation

- The Fermi 3 site maximum rainfall rate is 17.3 in/hr compared to a DCD value of 19.4 in/hr.
- The Fermi 3 site maximum short term rain fall rate of 5.8 inches in five minutes compared to a DCD value of 6.2 inches in five minutes.
- The Fermi 3 site characteristic maximum ground snow loads are less than the corresponding DCD site parameter ground snow loads.
  - Normal Winter Precipitation Event: 32.4 lb/ft^2 vs. 50 lb/ft^2 in the DCD.
  - Extreme Winter Precipitation Event: 51.5 lb/ft^2 vs. 162 lb/ft^2 in the DCD.

Section 2.3, Meteorology:
2.3.1 Regional Meteorology

Ambient Temperature

- Maximum and minimum ambient temperature exceedance site characteristic values are bounded by the DCD site parameter values.
- Site characteristic values are bounded by the DCD site parameter values used as inputs to the Control Room Habitability Area (CRHA) transient room temperature analysis.

Control Room Habitability

Summary of CRHA Temperatures

Subject	Fermi 3 Site Characteristic Value	DCD Site Parameter Value
Maximum Average Dry Bulb Temperature for 0% Exceedance Maximum Temperature Day	85.1°F (29.48°C)	103.5°F (39.7°C)
Minimum Average Dry Bulb Temperature for 0% Exceedance Minimum Temperature Day	-15.4°F (-26.35°C)	-26.5°F (-32.5°C)
Maximum High Humidity Average Wet Bulb Globe Temperature Index for 0% Exceedance Maximum Wet Bulb Temperature Day	83.8°F (28.78°C)	86.6°F (30.3°C)

Section 2.3, Meteorology: 2.3.2 Local Meteorology

Local (site) meteorology was characterized using data from the onsite meteorological tower.

- Location of existing onsite meteorological tower is in vicinity of the proposed location for Fermi 3.
- Hourly data collected for at least five years.
- Data recovery rates were greater than 94 percent.
- Section 2.3.2 provides detailed discussion of the meteorological data.

Section 2.3, Meteorology:
2.3.2 Local Meteorology

Data from the onsite meteorological tower was used:

- In the toxic chemical analyses discussed in Section 2.2 and the atmospheric dispersion analyses that are described in subsequent slides.
- In the evaluation of the cooling tower-induced effects on temperature, moisture, and salt deposition using EPRI Seasonal/Annual Cooling Tower Plume Impact (SACTI) model. No adverse impacts identified due to operation of the natural draft cooling tower.

Section 2.3, Meteorology:
2.3.3 Meteorological Monitoring

Section 2.3.3 provides a description of the current meteorological tower, including the following information:

- Tower location
- Instrumentation and Data Recording Equipment
- Data Acquisition and Processing

Section 2.3, Meteorology:
2.3.3 Meteorological Monitoring Program

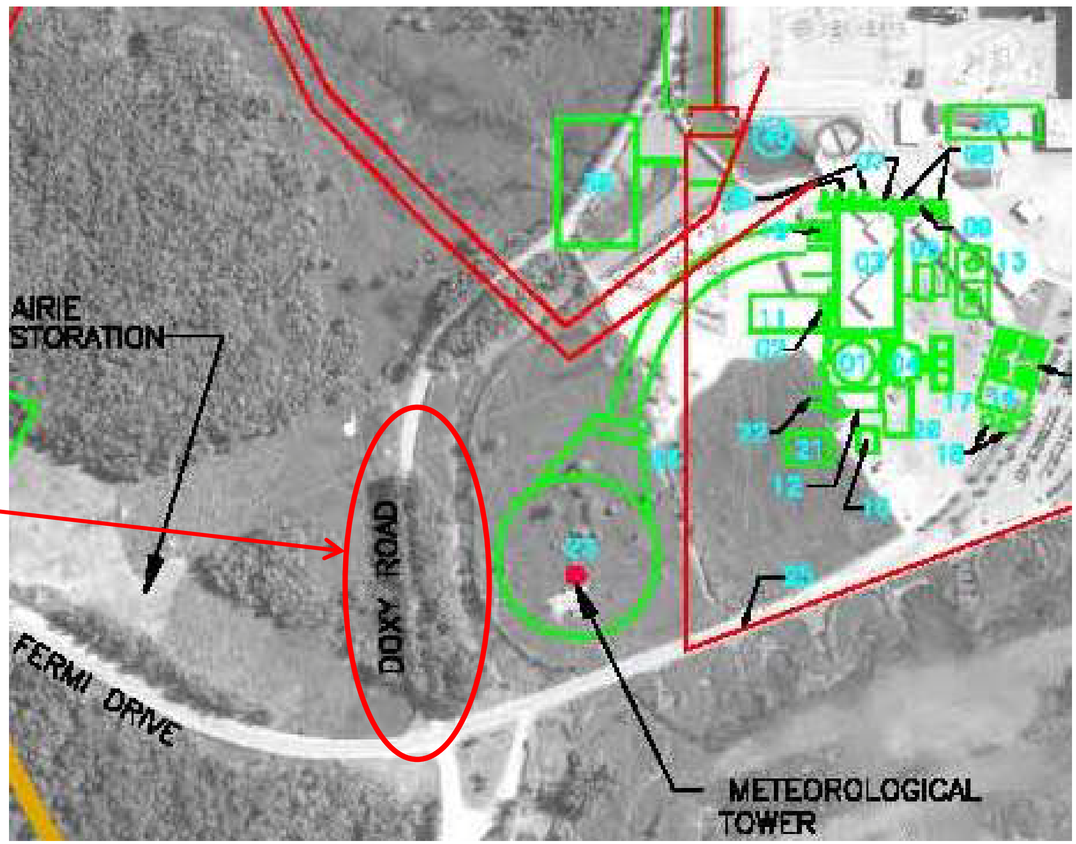
DTE Energy

The potential impact from the proximity of a grove of trees near the existing meteorological tower was addressed in the responses to the following RAIs:

- RAI 02.03.03-1, Proximity of Trees to Meteorological Tower
- RAI 02.03.04-5, Impact of Trees to Short Term Atmospheric Dispersion Analysis
- RAI 02.03.05-3, Impact of Trees to Long Term Atmospheric Dispersion Analysis

Meteorological Tower Location

Trees of Concern

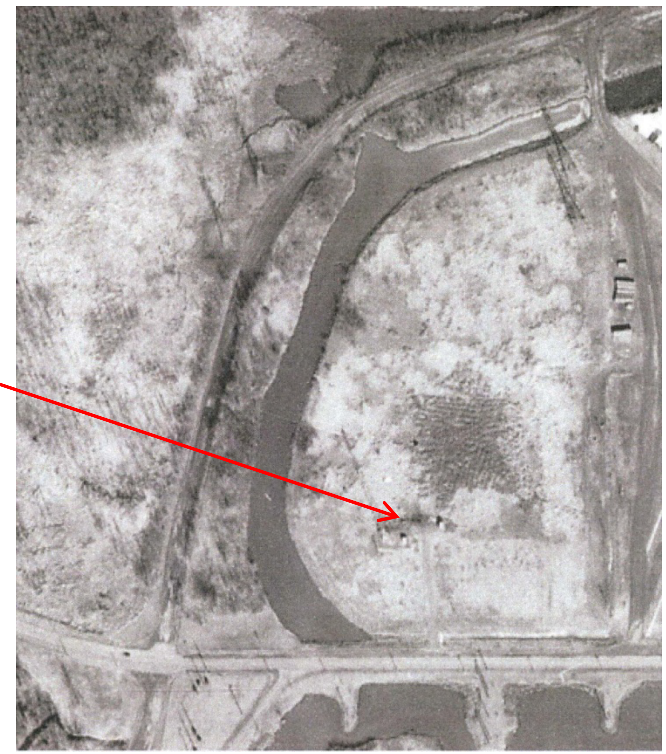


Section 2.3, Meteorology:
2.3.3 Meteorological Monitoring

Impact from Trees (Continued):

1981 Aerial Photo

1991 Aerial Photo



Tower

Impact from Trees (Continued):

- Performed analyses using meteorological data from 1985-1989 and 2002-2007 (2001-2007 for ARCON96).
- Included results using both sets of inputs in the FSAR.
- Compared limiting results to DCD site parameter values to demonstrate that the DCD is bounding.

Section 2.3, Meteorology: 2.3.3 Meteorological Monitoring

DTE Energy

- Current meteorological tower is located at the proposed location for Fermi 3.
- A new meteorological tower will be erected in the southeast corner of the site and will replace the existing tower.
  - The new meteorological tower system will be sited and installed in accordance with Regulatory Guide 1.23, Rev. 1, March 2007.
  - The new tower will be operated for at least one year prior to decommissioning the existing tower.

Section 2.3, Meteorology:
2.3.4 Short Term Atmospheric Dispersion Factors

DTE Energy

Atmospheric dispersion factors are determined for both on-site and off-site locations for comparison to the values assumed in DCD accident analyses.

The following on-site receptors are considered:

- Control Room
- Technical Support Center

The following off-site receptors are considered:

- Exclusion Area Boundary
- Low Population Zone

Section 2.3, Meteorology:
2.3.4 Short Term Atmospheric Dispersion Factors

DTE Energy

On-Site analyses results:

- Analysis accounts for potential impact from proximity of trees to the meteorological tower.
- Site specific results bounded by the values assumed in the DCD.

Off-Site analyses results:

- Power block envelope approach used to bound possible release locations.
- Site specific results bounded by the values assumed in the DCD.

Section 2.3, Meteorology:
2.3.5 Long Term Atmospheric Dispersion Factors

Annual average atmospheric dispersion and deposition factors were determined for comparison to the values in the DCD.

- Power block envelope approach used to bound possible release locations.
- Receptor locations were determined based on land use census data.
- Analysis accounts for potential impact from proximity of trees to the meteorological tower.
- Analysis accounts for long distance transport over Lake Erie (in affected directions) prior to reaching populations.

Section 2.3, Meteorology:
2.3.5 Long Term Atmospheric Dispersion Factors

Long Term Atmospheric Dispersion Results:

The site specific long term atmospheric and deposition factors for all locations are not bounded by the corresponding values in the DCD.

To account for site specific conditions not bounded by the DCD, site specific long term atmospheric dispersion and deposition factors are used in the normal effluent radiological release analysis in Chapter 12.

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Fermi 3 COLA
Presentation to ACRS Subcommittee
Section 2.4

Section 2.4, Hydrology:
Section Topics

DTE Energy

Topics addressed in Section 2.4 include:

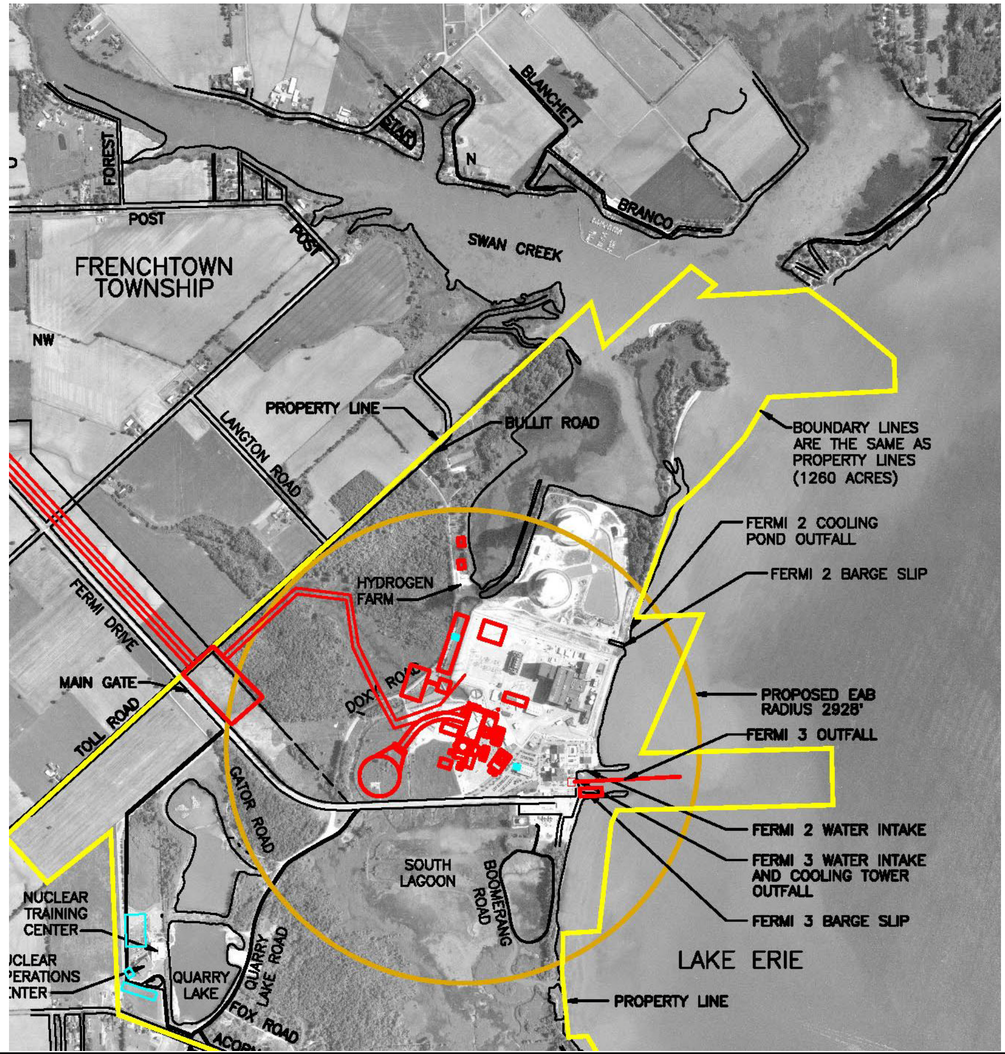
- Overview of Hydrology in Site Vicinity
- Flooding due to Local Intense Precipitation
- Flooding from Swan Creek
- Flooding from Lake Erie
- Minimum Lake Levels
- Groundwater
- Radionuclide Transport in Groundwater

Section 2.4, Hydrology: Specific Topics

DTE Energy

Overview of Hydrology in Site Vicinity

- Located on Western Shore of Lake Erie.
- Swan creek runs along the north edge of the site. Swan creek watershed is approximately 106 square miles.
- The western basin of Lake Erie is relatively shallow.
- Existing Fermi site grade elevation is 583 feet.
- Fermi 3 safety related and RTNSS structures are at 590.5 feet.
- Fermi 3 plant grade elevation for safety related and RTNSS structures is 590 feet.
- Maximum predicted flood level is below 590 feet.



Flood Analysis Results Summary

Flood Scenario	Maximum Predicted Water Level Below Plant Grade
Local Intense Precipitation	4.1 feet
Probable Maximum Flood from Swan Creek	3.4 feet
Wind Driven Surge from Lake Erie	3.4 feet

The design flood level for safety related and RTNSS structures is a maximum water level of one foot below plant grade. Thus, there is substantial margin between design flood level and maximum predicted flood levels at the Fermi site.

DTE Energy

Flooding due to Local Intense Probable Maximum Precipitation (Local PMP)

- Inputs and Assumptions
  - Probable maximum precipitation rate is 5.8 inches in five minutes.
  - Snow melt is included in the analysis.
  - Drains from elevated area are assumed to be blocked.
  - Only one flow path from the elevated area is credited.
- Results and Conclusions
  - Maximum calculated water level is 4.1 ft below Fermi 3 plant grade; which is 3.1 feet below the design flood elevation for safety related and RTNSS structures.

Section 2.4, Hydrology: Specific Topics

DTE Energy

Probable Maximum Flood (PMF) due to Watershed Precipitation (Swan Creek)

- Inputs and Assumptions
  - Probable maximum precipitation rate in the watershed is used in the analysis
  - Snow melt is included in the analysis.
  - Water losses due to infiltration are not credited in the analysis.
  - Maximum water level is calculated for the case with maximum Lake Erie water level for coincident Surge (surge analysis is discussed later).
- Results and Conclusions
  - Maximum calculated water level is 3.4 ft below Fermi 3 plant grade; which is 2.4 feet below the design flood elevation for safety related and RTNSS structures.

Section 2.4, Hydrology: Specific Topics

DTE Energy

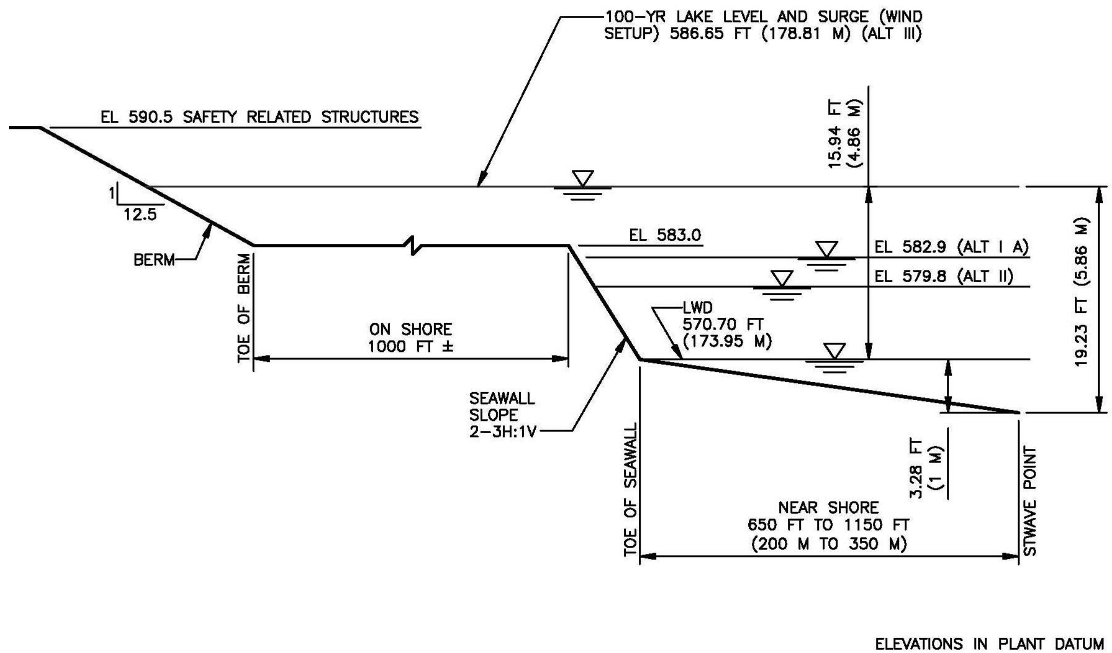
Flooding from Lake Erie (Probable Maximum Surge and Seiche)

- Inputs and Assumptions
  - 100 yr maximum lake water level (576.4 feet).
  - 100 mph wind used to calculate maximum storm surge.
  - Wave run-up considerations included in the analysis.
  - Alternatives considered per ANSI/ANS-2.8-1992, “Determining Design Basis Flooding at Power Reactor Sites,” to determine flood level based on different combinations of flooding on Swan Creek, Surge and Seiche on Lake Erie, and initial lake water level.

Section 2.4, Hydrology: Specific Topics

DTE Energy

Probable Maximum Surge and Seiche Predicted Water Levels



Results and Conclusions

- Calculated storm surge is 10.3 ft.
- Maximum calculated water level is 3.4 ft below Fermi 3 plant grade; which is 2.4 feet below the design flood elevation for safety related and RTNSS structures.

DTE Energy

Minimum Lake Levels

- Normal lake water level is approximately 571 feet.
- Historical low lake water level is 565.1 feet.
- Suction for the Station Water System pumps and the backup Fire Protection pumps is located to ensure that adequate submergence is provided during low water conditions.
- Ultimate Heat Sink is included within the ESBWR design.
- Ultimate Heat Sink does not rely on Lake Erie.

DTE Energy

Groundwater

Design Basis for Subsurface Hydrostatic Loadings

- The ESBWR design is based on a maximum groundwater level of 0.61 m (2 feet) below plant grade.
- Fermi 3 plant grade is 590 feet.
- Maximum historic groundwater level is 577.3 feet.
- Therefore, the DCD requirement for maximum groundwater level is satisfied.

DTE Energy

Groundwater (continued)

Groundwater Flow in Bass Islands Aquifer at Fermi 3 Site:

- Prior to development of the area west of the Fermi site, groundwater flow was to the east toward Lake Erie.
- Dewatering at quarries in Monroe County caused groundwater flow direction reversal, with flow toward the west, away from Lake Erie.
- If quarry dewatering were to cease, groundwater flow may revert back toward Lake Erie (to the east).
- Both flow directions are accounted for in the radionuclide transport analysis.

Accidental Release of Liquid Effluents to Groundwater

- The ESBWR design provides features to preclude the accidental release of liquid effluents.
- The elevations of the liquid effluent tanks are below groundwater elevation. A postulated breach in the building would allow groundwater to flow into the building in lieu of effluents exiting the building.

Accidental Release of Liquid Effluents to Groundwater (continued)

Analysis of accidental release to groundwater assume:

- As previously described, two possible flow paths are considered in the analysis.
- Minimum distances from source to the postulated receptor.
- Entire contents of the tank are assumed to be released.
- Analysis uses conservative values for hydraulic conductivity, gradient, effective porosity and distribution coefficients (Kd values).

DTE Energy

Accidental Release of Liquid Effluents to Groundwater (continued)

Analysis results – predicted radionuclide concentrations at either receptor are less than the limits in 10 CFR 20.

- Concentration of each radionuclide is less than associated limit in 10 CFR 20.
- Sum of the ratios (predicted concentration vs. 10 CFR 20 limit) for all radionuclides in the mixture is less than unity.

Section 2.4, Hydrology:
Section Topics

DTE Energy

Groundwater Monitoring

- The monitoring program will adhere to guidance outlined in the following documents:
  - NUREG/CR-6948 "Integrated Ground-Water Monitoring Strategy for NRC-Licensed facilities and Sites: Logic, Strategic Approach and Discussion."
  - NEI 08-08A "Generic FSAR Template Guidance for Life Cycle Minimization of Contamination."
- The groundwater monitoring program will make use of existing wells to the extent practicable.
- The groundwater monitoring program will be implemented both during construction and during operation.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Presentation to the ACRS Subcommittee

Fermi Unit 3
COL Application Review

Advanced Final SER
Chapter 2,
"Site Characteristics"

August 16, 2012

ACRS Subcommittee Presentation
SER Chapter 2 – with the exception of Section 2.5

Staff Review Team

- **Project Managers**
  - Adrian Muniz
  - Tekia Govan

- **Technical Staff**
  - RHMB, Chief, Jill Caverly
  - RDAT, Chief, Michael McCoppin

Summary of Staff Review

- 2.1 – Geography and Demography
- 2.2 – Nearby Industrial, Transportation, and Military Facilities
- 2.3 – Meteorology and Air Quality
- 2.4 - Hydrology

Fermi 3 COL Chapter 2.1
Geography and Demography
And
Chapter 2.2
Nearby Industrial, Transportation and Military Facilities

NRC Reviewer/Presenter:

Seshagiri Rao Tammara

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Section 2.1 Geography and Demography

- **Summary of FSAR Section:**
  - **ESBWR DCD Incorporated By Reference**
  - **Site Specific Information Addressed**
    - Site Location (EF3 COL Item 2.0-2-A)
    - Exclusion Area Boundary (EF3 COL Item 2.0-3-A)
    - Population Distribution (EF3 COL Item 2.0-4-A)
      - Population Center Distance
      - Population Density
- **Status of SER Section:**
  - No open items

Section 2.1
Geography and Demography

- **Staff's Review of COL Item 2.0-2-A:**

COL Item 2.0-2-A: Site Location and Description

Staff reviewed the applicant information pertaining to Site Location and Description. Based on the independent verification of UTM coordinates for the location and description of the area by obtaining the information from the publicly available data and sources, Staff found the applicant addressed information acceptable as it satisfies the guidance provided in

NUREG-0800 Section 2.1.1.

Section 2.1
Geography and Demography

- **Staff's Review of COL Item 2.0-3-A:**

  COL Item 2.0-3-A: Exclusion Area Authority and Control

  Staff reviewed the applicant information pertaining to Exclusion Area Authority and Control. Staff independently verified the ownership of property in EAB, description of EAB and applicant's authority and of control using publicly available data and resources, and found the information to be acceptable as it satisfies the guidance provided in NUREG-0800 Section 2.1.2.

Section 2.1
Geography and Demography

- **Staff's Review of COL Item 2.0-4-A:**

  COL Item 2.0-4-A: Population Distribution

  Staff reviewed the applicant information pertaining to Population Distribution including Population Center Distance and Population Density. Using the growth rates from the U.S. Census, and state census data, staff independently verified the applicant's population projections, checked the population center distance, and population density. Based on the review and confirmatory evaluation, staff found the applicant's information to be acceptable as it meets the requirements of 10 CFR 100.20, and guidance provided in NUREG-800 Section 2.1.3.

Section 2.2
Nearby Industrial, Transportation and Military Facilities

- **Summary of FSAR Section : 2.2.1-2.2.2 Location and Description**

  - **Site specific information**
    - Nearby Industrial, Transportation and Military facilities (EF3 COL Item 2.0-5-A)
    - Pipelines (EF3 COL Item 2.0-5-A)

- **Status of SER Section :**

  - No open items

Section 2.2
Nearby Industrial, Transportation and Military Facilities

- **Staff's Review of COL Item 2.0-5-A:**
  - COL Item 2.0-5-A: Location and Description of Nearby Industrial, Transportation and Military Facilities

    Staff reviewed the applicant information pertaining to the location and description of Nearby Industrial, Transportation and Military Facilities for the evaluation of potential hazards for the safe operation of the proposed plant. Staff independently verified the locations and descriptions of the facilities, including transportation routes and pipelines from the data available in public domain, and found it to be acceptable as the information meets the guidance provided in NUREG-0800 Section 2.2.1-2.2.2.

Section 2.2
Nearby Industrial, Transportation and Military Facilities

- **Summary of FSAR Section: 2.2.3 Evaluation of Potential Accidents**

ESBWR DCD Incorporated by Reference

- **Site specific information**
  - Potential Hazards from Nearby Industrial, Transportation and Military facilities (EF3 COL Item 2.0-5-A)
  - Potential Toxic chemical releases from nearby, facilities, transportation routes, and onsite storage for control room habitability

    (EF3 COL Item 2.0-5-A)

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Section 2.2
Nearby Industrial, Transportation and Military Facilities

- **Summary of FSAR Section : 2.2.3 Evaluation of Potential Accidents**

  ESBWR DCD Incorporated by Reference

  - **Site specific Evaluations: EF3 COL Item** 2.0-5-A
    - Explosions
    - Fires
    - Aircraft hazards
    - Collision with intake structures
    - Liquid Spills
    - Toxic Chemicals (MCR habitability)

- **Status of SER Section :**
  - No open items

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Section 2.2 Nearby Industrial, Transportation and Military Facilities

- **Staff's Review of COL Item 2.0-5-A:**

  COL Item 2.0-5-A: Evaluation of Potential Accidents

  Staff reviewed the applicant site specific Evaluations of Potential Accidents. Staff also performed independent confirmatory calculations in confirming the applicant's conclusions. Based on the review of the applicant provided information, responses to the RAIs, staff evaluations and staff's independent confirmatory analyses, the staff found the applicant's conclusions to be acceptable as the evaluations are in accordance with the guidance provided in NUREG-0800 Section 2.2.3.

Section 2.2
Nearby Industrial, Transportation and Military Facilities

- **Staff's Review of COL Item 2.0-5-A:**
  COL Item 2.0-5-A: Evaluation of Potential Accidents

<u>LICENSE CONDITION 2.2.3-1</u>

The applicant shall use tanks with a maximum capacity of 1000 gallons for on-site storage of propane. No more than 1000 gallons of propane will be stored in any single location, and no storage location will be located closer than the minimum safe distance of 845 meters (2800 ft) from any Fermi 3 safety-related structure and Main Control Room.

Fermi 3 COL Chapter 2.3 Meteorology and Air Quality

NRC Reviewer/Presenter:

Brad Harvey

Section 2.3
Meteorology and Air Quality

- **Summary of FSAR Section:**
  - 2.3.1: General Regional Climate
  - 2.3.2: Local Meteorology
  - 2.3.3: Meteorological Monitoring
  - 2.3.4: Short-Term (Accident) Diffusion Estimates
  - 2.3.5: Long-Term (Routine) Diffusion Estimates
  - Appendix 2A: ARCON96 Source/Receptor Inputs
  - Appendix 2B: Ventilation Stack Pathway Information for Long-Term X/Q Values
- **Status of SER Section:**
  - No open items
  - One confirmatory item
    - **02.03.01-20**: Update FSAR to address design-basis hurricane winds and missiles presented in RG 1.221

Section 2.3.1
General Regional Climate

- **Staff's Review of COL Item 2.0-7-A:**
  - COL Item 2.0-7-A: Regional Climatology (SRP 2.3.1)
- **Staff's Review included:**
  - General climate of the region
  - Severe weather phenomena
  - Site characteristic values
    - Extreme Wind
      - 50-yr and 100-yr return period values
    - Tornado
      - Wind speed, pressure drop, rate of pressure drop
    - Winter Precipitation (for winter roof load design)
      - Maximum ground-level weight of the normal and extreme winter precipitation events
    - Ambient Design Temperature
      - 2%, 1%,and 0% exceedance values
      - Control room habitability area values

Section 2.3.2
Local Meteorology

- **Staff's Review of COL Item 2.0-8-A:**
  - COL Item 2.0-8-A: Local Meteorology (SRP 2.3.2)

- **Staff's Review included:**
  - Local meteorological data summaries
    - Data from onsite monitoring
      - Dry bulb and dew point temperatures, wind roses, wind direction persistence, atmospheric stability, inversions
    - Data from offsite sources
      - Precipitation, fog and smog, wind roses, mixing heights
  - Influence of Fermi 3 on local meteorology
    - NDCT plume shadowing and salt deposition

Section 2.3.3
Meteorological Monitoring

- **Staff's Review of COL Item 2.0-9-A:**
  - COL Item 2.0-9-A: Onsite Meteorological Measurement Programs (SRP 2.3.3)
- **Staff's Review included:**
  - Pre-application monitoring program
    - Reviewed tower siting; instrument specification, calibration, service and maintenance; data acquisition, reduction, and processing
    - Found discrepancies in wind speed and stability class distributions between 1985-1989 and 2002-2007 data
    - Both sets of data (1985-1989 and 2002-2007) to be used in atmospheric dispersion analyses
  - Operational monitoring program
    - Met tower being relocated because of the NDCT
    - Old tower and new tower to be operated concurrently for 1 yr

Section 2.3.4 Short-Term (Accident) Diffusion Estimates

- **Staff's Review of COL Items Related to DBA Dispersion**
  - **COL Item 2.0-10-A**: Short-Term Dispersion Estimates for Accidental Atmospheric Releases (SRP 2.3.4)
  - **COL Item 2A.2-1-A**: Confirmation of the ESBWR X/Q Values
  - **COL Item 2A.2-2-A**: Confirmation of the Reactor Building X/Q Values
- **Staff's Review included:**
  - Offsite (EAB and LPZ) X/Q values
    - Reran PAVAN model using 1985-1989 and 2002-2007 data
  - Onsite (control room and TSC) X/Q values
    - Reviewed ARCON96 runs using 1985-1989 and 2001-2007 data
  - Doors on the east sides of the reactor building and fuel building to remain closed during refueling

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Section 2.3.5 Long-Term (Routine) Diffusion Estimates

- **Staff's Review of COL Item 2.0-11-A:**
  - COL Item 2.0-11-A: Long-Term Diffusion Estimates (SRP 2.3.5)

- **Staff's Review included:**
  - Offsite (site boundary and special receptors of interest) X/Q and D/Q values
    - Reran XOQDOQ model using 1985-1989 and 2002-2007 data

Section 2.3
Meteorology and Air Quality

- **Conclusions and Status of SER Section 2.3**
  - FSAR met regulatory requirements
  - All COL items adequately addressed
  - No open items
  - One confirmatory item
    - Update FSAR to address design-basis hurricane winds and missiles presented in RG 1.221

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Fermi 3 COL Chapter 2.4 Hydrology

NRC Reviewer/Presenter:

Henry Jones

Section 2.4.2
Floods

- **Summary of FSAR Section:**
  - EF3 COL Item 2.0-13-A - Floods
    - Historical flooding
    - Individual types of flood-producing phenomena
    - Combinations of flood-producing phenomena
    - Factors affecting potential runoff (such as urbanization, forest fire, changes in agricultural use, erosion, and sediment deposition)
    - Local intense precipitation and site characteristic used in site grading design.
- **Status of SER Section:**
  - No open items

Section 2.4.2
Floods

- **Staff's Review included:**
  - Effects of Local Intense Precipitation
    - Performed independent evaluation of local intense precipitation based on methods from NWS HMR 51 and 52
  - Verified PMF due to Local Intense Precipitation
    - Verified that PMP was correctly translated to flood runoff
  - Verified Site Drainage
    - Verified that runoff from local intense precipitation would not exceed site grade plant parameter

Section 2.4.3
Probable Maximum Flood on Streams and Rivers

- **Summary of FSAR Section:**
  - EF3 COL Item 2.0-14-A   Probable Maximum Flood
    - Probable maximum flood on streams and rivers effecting site.

- **Status of SER Section:**
  - No open items

Section 2.4.3
Probable Maximum Flood on Streams and Rivers

- **Staff's Review included:**
  - Confirmatory analysis of PMP for the Swan Creek watershed and PMF model.
  - Independently calculated the PMF for Swan Creek using the SCS unit hydrograph method and HEC-HMS.
  - Verified water levels in Swan Creek determined by applicant using HEC-RAS
  - Verified conditions of Lake Erie, snow melt and wind effects (coincident wind wave activity) were accounted for in modeling of water surface elevation.
  - Combined Events
    - Verified the plant site flooding against three alternatives presented in ANSI/ANS 2.8-1992

Section 2.4.5
Probable Maximum Surge and Seiche Flooding

- **Summary of FSAR Section:**
  - EF3 COL Item 2.0-16-A Probable Maximum Surge and Seiche Flooding
    - The applicant concluded that the maximum probable storm surge (10.3 ft) developed on the 100-year lake level (575.1 ft NAVD 88) defines the maximum postulated still-water level on Lake Erie (585.4 ft NAVD 88).
    - Based on a breaking wave calculated at the toe of the berm, the breaking wave developed on the probable maximum surge (585.4 ft NAVD 88) resulted in a water level of 587.6 ft NAVD 88, which is 1.7 ft below the nominal Fermi 3 plant grade of safety-related structures (589.3 ft NAVD 88). Thus, no breaking waves would impact safety-related structures.
    - The applicant states that the Fermi site location next to the open water of Lake Erie “results in a natural period of oscillation (29-124 s) of the flooded area that is much greater than that of the incident shallow-water storm waves (11 s). Consequently, resonance is not a problem at the site during PMWS occurrence.”

- **Status of SER Section:**
  - No open items

Section 2.4.5
Probable Maximum Surge and Seiche Flooding

- **Staff's Review included:**
  - Review of historical data seiche in Lake Erie and confirmed its effect is less than impact of surge under PMWS in the site area.
  - Verified the bathymetric data for Lake Erie submitted by the applicant and its conversion to input format for STWAVE.
  - Reviewed the input files for the STWAVE model used to determine the wind-induce wave and its characteristics (wave height and period) . Independently ran all simulations using the given input files and examined all output files, including the wave parameters at 197 locations.
  - Verified the approach to determine the maximum postulated still-water level at the site area boundary by combining the storm surge with antecedent water level (Lake Erie 100-year lake level).
  - The staff finds that the applicant has considered the appropriate site phenomena in establishing the design bases for SSCs important to safety. The staff accepts the methodologies used to determine the probable maximum storm surge and its wave actions. Accordingly, the staff concludes that the use of these methodologies results in design bases containing a sufficient margin for the limited accuracy, quantity, and period of time in which the data have been accumulated.

Section 2.4.6
Probable Maximum Tsunami Hazards

- **Summary of FSAR Section:**
  - EF3 COL Item 2.0-17-A Probable Maximum Tsunami Hazards

    Based on the history of the area, the applicant determined that local seismic disturbances would result only in minor excitations in the lake. No tsunami has been recorded in Lake Erie; the only remotely similar phenomena observed have been low-amplitude seiches resulting from sudden barometric pressure differences."

- **Status of SER Section:**
  - No open items

Section 2.4.6
Probable Maximum Tsunami Hazards

- **Staff's Review included:**
  - The NRC staff's independent review of historic data confirmed that the applicant's analysis is complete and accurate and no potential tsunamis or tsunami-like waves which could affect safety-related structures or components at Fermi 3.

Section 2.4.12
Groundwater

- **Summary of FSAR Section:**
  - EF3 COL Item 2.0-23-A Groundwater
    - Hydrogeological characteristics
    - Effects of groundwater on plant foundations
    - Reliability of safety-related water supply and dewatering systems.

- **Status of SER Section:**
  - No open items

Section 2.4.12
Groundwater

- **Staff's Review included:**
  - Reviewed publicly available information on regional and local ground water aquifer characteristics and site specific parameter tests.
  - Reviewed the geologic layers and sequence of Formations comprising the aquifers.
  - Reviewed the groundwater sources and sinks surrounding the site.
  - Verified that operations and safety-related systems do not rely on dewatering.

Section 2.4.13
Accidental Releases of Liquid Effluents in Ground and Surface Waters

- **Summary of FSAR Section:**
  - EF3 COL Item 2.0-24-A Accidental Releases of Liquid Effluents in Ground and Surface Waters
    - Considers potential effects of relatively large accidental releases from systems that handle liquid effluents generated during normal plant operations.

- **Status of SER Section:**
  - No open items

Section 2.4.13
Accidental Releases of Liquid Effluents in Ground and Surface Waters

- **Staff's Review included:**
  - Confirmed groundwater pathways and velocity calculations from a postulated source to receptor were reasonable.
  - Evaluated plausible combinations of ground and surface water characteristics that would delay, disperse, dilute, or concentrate liquid effluents, as related to existing or potential future water users.
  - Evaluated and verified radionuclide release simulations were adequately conservative.
  - Confirmed radionuclide levels would be below required levels at fictitious (well and Lake Erie) receptors.

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Chapter 2
"Site Characteristics"

Questions/Comments

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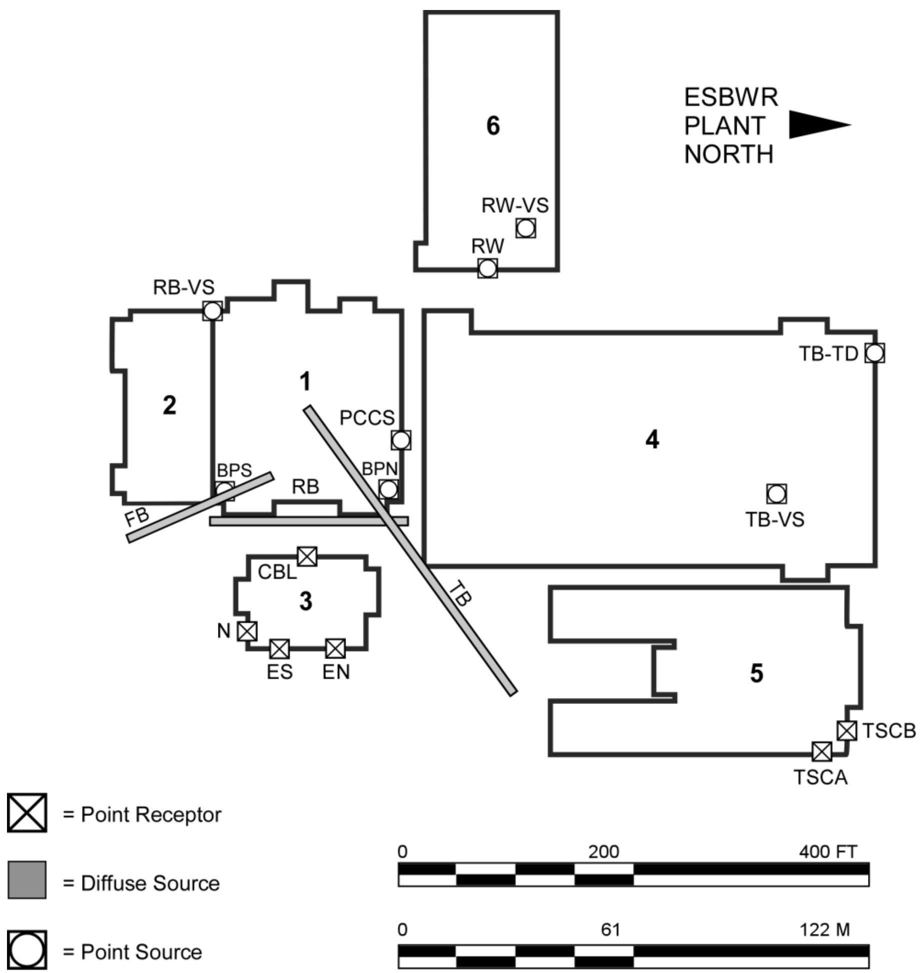
Backup Slides

Section 2.3
Meteorology and Air Quality

ESBWR Airborne Release Points and Receptors



Plant Structures

- 1 Reactor Building
- 2 Fuel Building
- 3 Control Building
- 4 Turbine Building
- 5 Electrical Building
- 6 Radwaste Building

Backup Slides

Section 2.4
Hydrology

Surface Water

- Fermi 2 and proposed Fermi 3 rely on Lake Erie for makeup water, and discharge blowdown to Lake Erie
- Frenchtown Township municipal water system for potable needs
- Swan Creek is one mile north of the main site area
- Four datums are represented by available information; elevations of key site aspects are tabulated in all four systems
- Planned Fermi 3 elevations (NAVD 88):
  - Plant grade 588.8 ft
  - Safety structures 589.3 ft
- Average elevation of Lake Erie: 571.6 ft
- Probable maximum flood elevation: 586.3 ft

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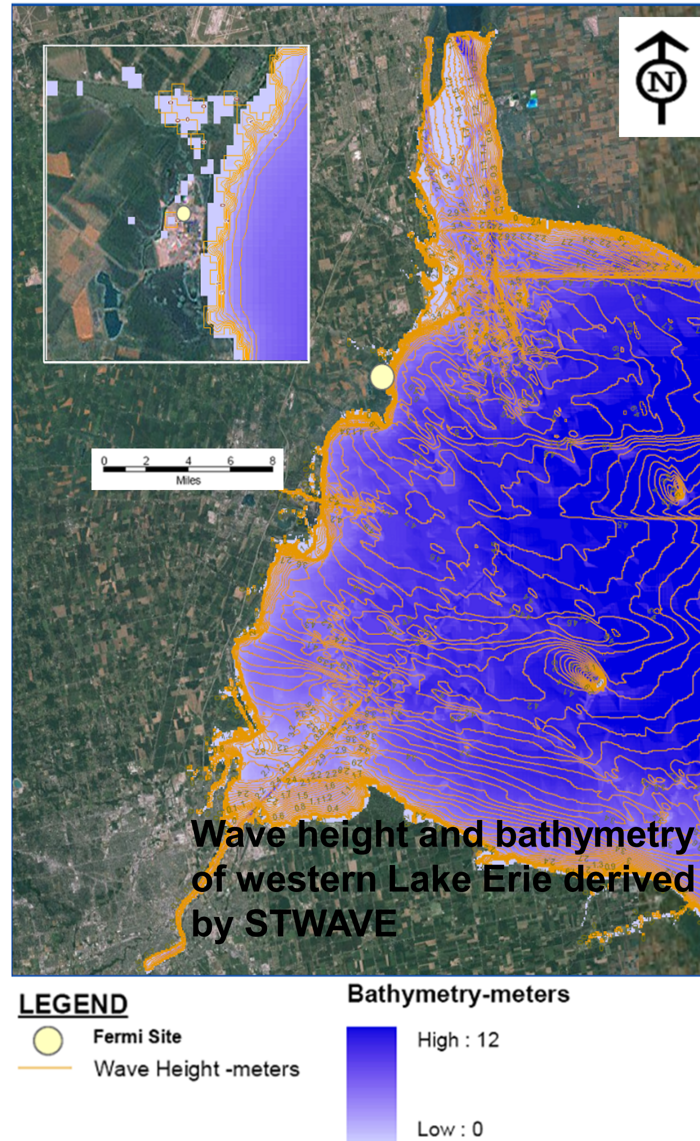
Flood Analyses

- Local Intense Precipitation
  - Conservative assumptions: all storm drains blocked, all surfaces. completely impervious, Probable Maximum Precipitation, snowmelt, 100-year occurrence dew point temperature.
  - Results: Flood elevation 584.8 ft < Fermi 3 plant grade. No impact to Fermi 3 safety structures.

- Flooding in Swan Creek and Lake Erie
  - Conservative assumptions: combination of Probable Maximum Flood in Swan Creek plus snowmelt, 100-year lake level, probable maximum surge and seiche in Lake Erie.
  - Results: Flood elevation 586.3 ft < Fermi 3 plant grade. No impact to Fermi 3 safety structures.

Surge Analyses

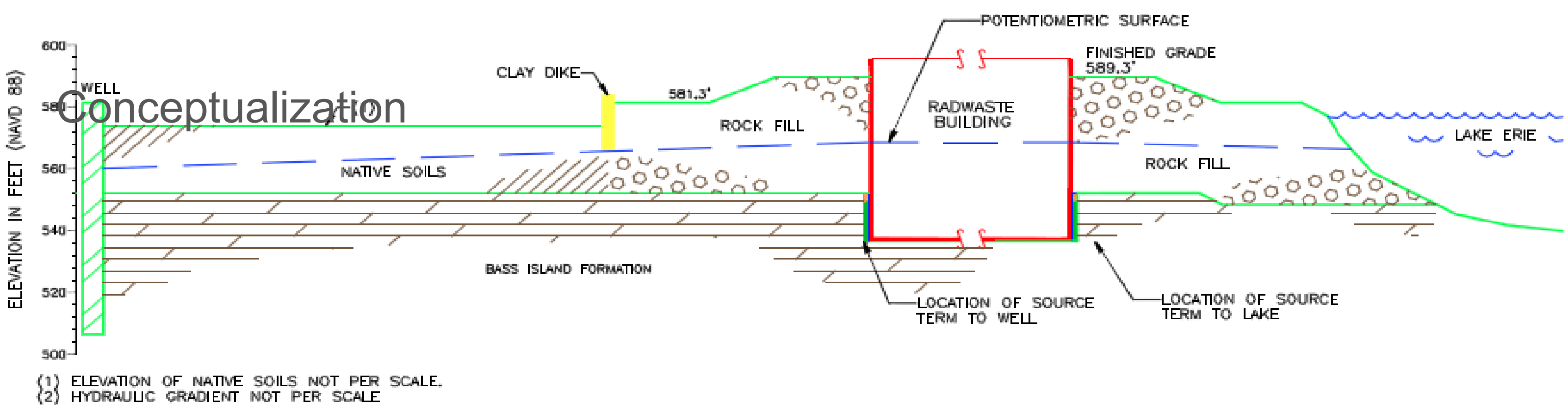
- Probable Maximum Surge and Seiche:
  - PMS predicted by Bretschneider method developed on 100-year lake level.
  - PMS elevation 585.4 < Fermi 3 plant grade. No impact to Fermi 3 safety structures.
- Wind Wave Activity:
  - Assumption: combined 100-year lake level, probable maximum surge, wind set-up, and wave run-up.
  - Waves determined to break at a maximum elevation of 587.63 ft at the toe of the berm and run up to 588.41 ft along the berm < Fermi 3 plant grade. No impact to Fermi 3 safety structures.



Hydrostratigraphy

- Shallow overburden
  - Generally low-permeability native soils [lacustrine (muck) and glacial till] and clay fill
  - Relatively high permeability construction (rock) fill
  - 18 monitoring wells
  - Complex flowpaths due to low-permeability materials and high-permeability rock fill
- Bass Islands Aquifer (bedrock)
  - Dolomitic limestone, primary flow through fractures
  - 13 monitoring wells
  - Low to moderate permeability

Conceptualization



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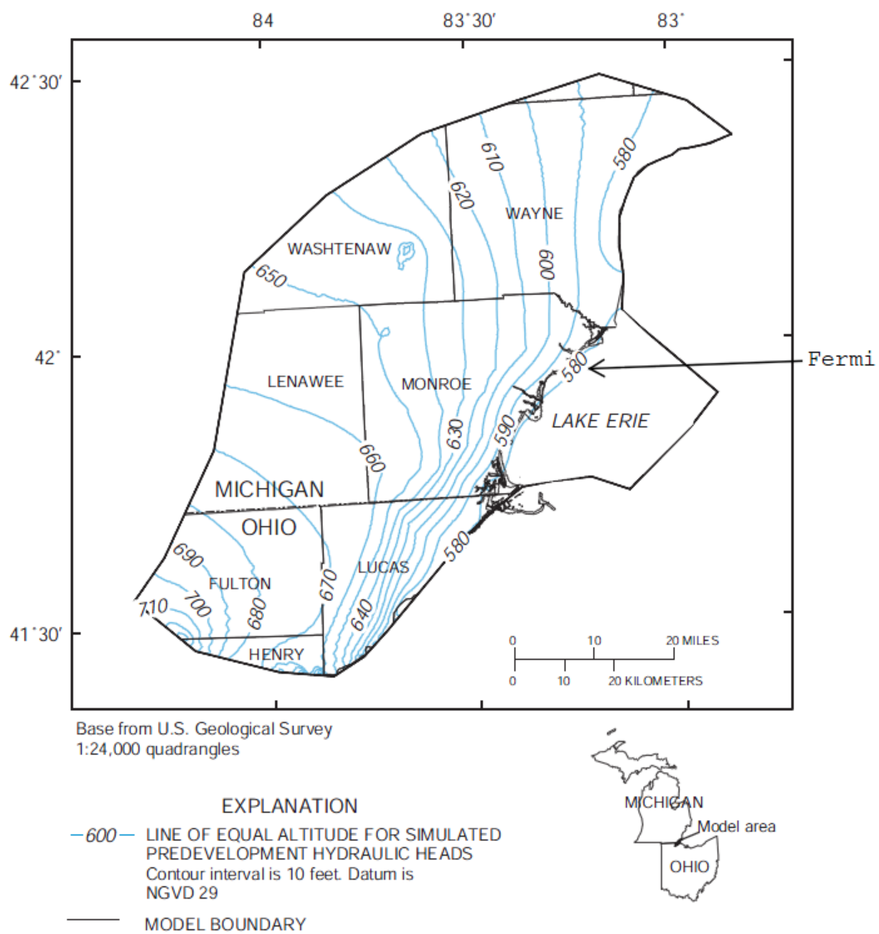
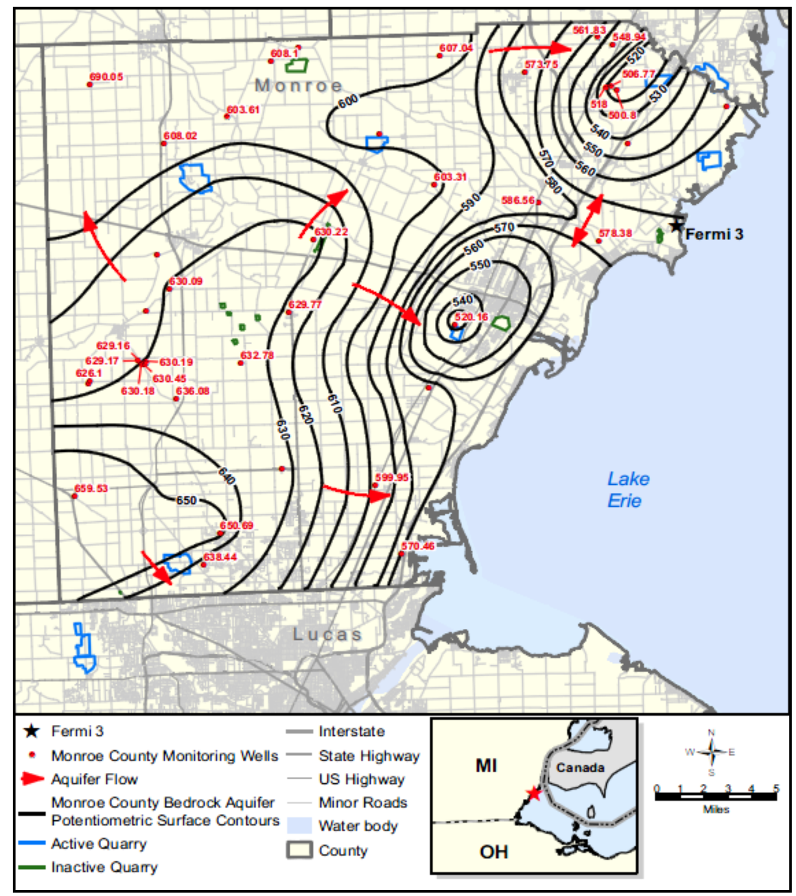
Ground Water Flow - Regional

Pre-development: toward Lake Erie

Post development: varying directions due to quarry dewatering





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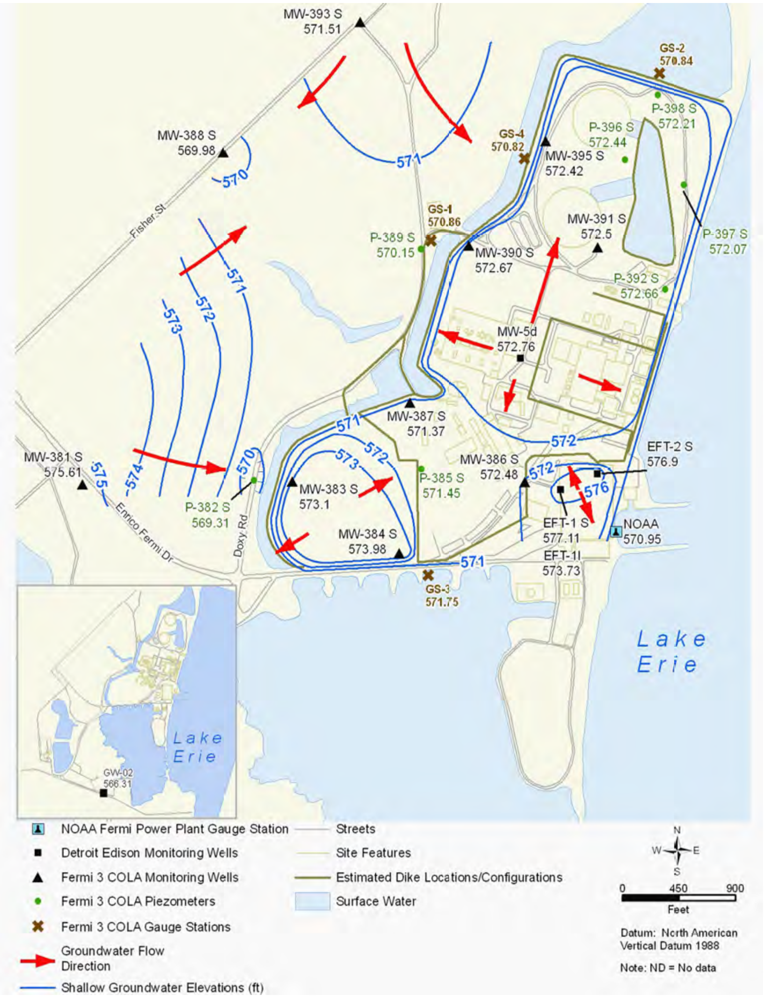
Ground Water Flow - Local

- Site patterns in shallow overburden dependent on material
  - General downward flow from the overburden to the bedrock
    - Water levels recorded at monitoring well pairs in shallow and bedrock monitoring.
  - Steep gradients in lacustrine muck, shallow gradients in rock fill
  - Downward gradient into Bass Islands Aquifer
  - Drains from site into Lake Erie and adjacent canals
  - Localized influence of Lake Erie pool elevation

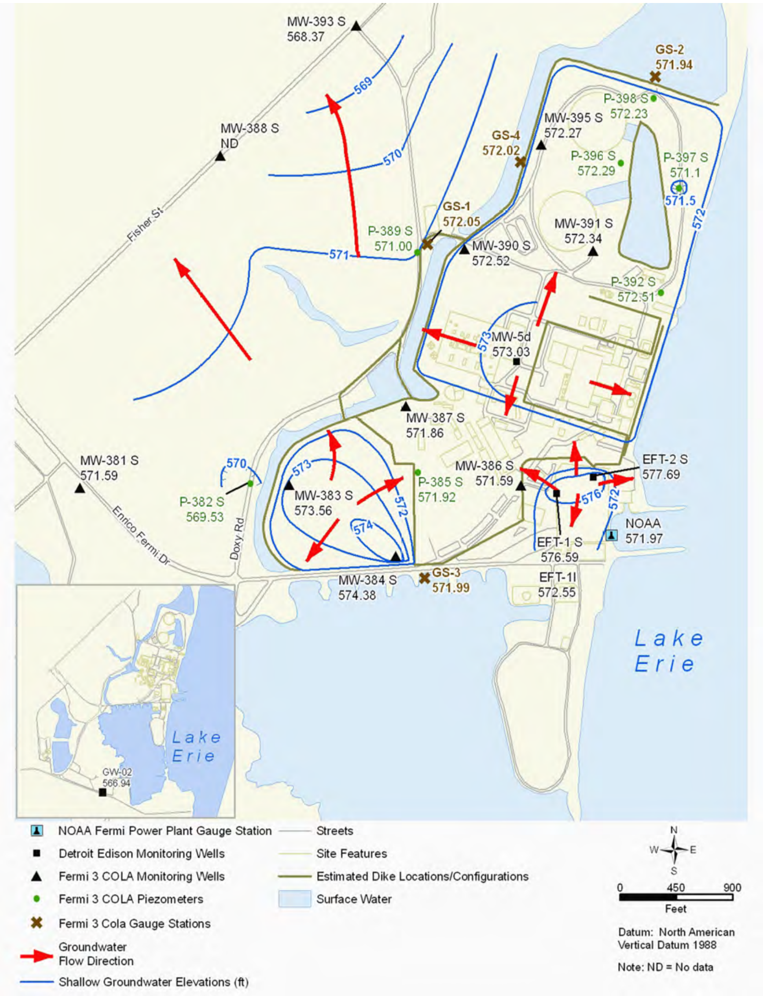
- Site patterns in Bass Islands
  - Regionally towards sinks (wells, dewatered quarries) and Lake Erie
  - General downward gradient before eventually discharging into Lake Erie
  - Influenced by Lake Erie elevation

Ground Water Flow - Local

Overburden, September 2007



Overburden, June 2007



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Transport Analyses

- Source:
  - Equipment drain collection tank in basement of radwaste building, assume failure of tank and steel liner, assume cracking of basemat and/or exterior walls, assume instantaneous release to bedrock aquifer.
- Pathway:
  - Decay of source radionuclides
  - Conservative assumptions (promoting rapid transport and high concentrations): Low end of ranges of site-specific effective porosity and sorption values. Direct pathway to nearest private well assumed.
- Results:
  - Effect of longitudinal and transverse dispersion reduced radionuclide concentrations at the nearest private well below their Effluent Concentration Limits (ECLs) and satisfied the sum of fractions. Additional conservative effects (vertical dispersion, cone of depression drawing clean groundwater from cross-gradient portions of the aquifer) ignored.
  - Analysis of a secondary pathway to Lake Erie (assuming cessation of all regional quarry pumping and a return to the pre-development flow field) conservatively assuming only a minor amount of lake dilution resulted in concentrations below ECLs and satisfying the sum of fractions.
- Conclusion
  - Highly conservative (promoting rapid transport and high concentrations) assumptions regarding the source and two potential pathways yielded calculated radionuclide concentrations below ECLs and satisfying the sums of fractions.

DTE Energy®

Fermi 3 COLA
Presentation to ACRS Subcommittee
Chapter 3

Chapter 3, Design of Structures, Components, Equipment, and Systems: Chapter Topics

DTE Energy

FSAR Section		Presenter
3.1	Conformance with NRC General Design Criteria	IBR
3.2	Classification of Structures, Systems, and Components	J. Laprad
3.3	Wind and Tornado Loadings	IBR
3.4	Water Level (Flood Design)	IBR
3.5	Missile Protection	J. Laprad
3.6	Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping	IBR
3.7	Seismic Design	Next ACRS
3.8	Seismic Category I Structures	Next ACRS
3.9	Mechanical Systems and Components	J. Laprad
3.10	Seismic and Dynamic Qualification of Mechanical and Electrical Equipment	J. Laprad
3.11	Environmental Qualification of Mechanical and Electrical Equipment	J. Laprad
3.12	Piping Design Review	J. Laprad
3.13	Threaded Fasteners – ASME Code Class 1, 2, and 3	J. Laprad
App. 3A	Seismic Soil-Structure Interaction Analysis	Next ACRS
App. 3B – 3L	Various Topics	IBR

3.2 Classification of Structures, Systems and Components

STD CDI No site specific safety-related or RTNSS systems beyond the scope of the DCD.

Fermi 3 includes the Hydrogen Water Chemistry System.

Fermi 3 does not include the Zinc Injection System.

3.5 Missile Protection

STD SUP Refers to Section 2.2 for addressing site specific missile sources.

STD SUP Refers to Section 2.2 for addressing the site specific aircraft hazard analysis.

DTE Energy

3.9 Mechanical Systems and Components

EF3 COL Describes Reactor Internals Vibration Assessment Program schedule in accordance with RG 1.20 for two scenarios:

- Fermi 3 reactor internals are classified as prototype, or
- Fermi 3 reactor internals are classified as non-prototype.

STD COL Provides milestone for completing ASME piping stress reports.

STD COL Describes snubber pre-service and in-service examination and testing programs.

STD COL Describes ASME in-service testing for pumps and valves.

STD COL Describes testing requirements for explosively actuated valves (Squib Valves).

- License Conditions pertaining to squib valve surveillance requirements included in the NRC SER.

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

STD COL Includes a commitment to submit the initial implementation schedule and updates to the NRC for completing ITAACs for seismic and dynamic qualification of mechanical and electrical equipment.

Includes a commitment to make seismic and dynamic qualification documentation available for NRC review.

STD SUP Refers to Section 17.5 for a description of the quality assurance requirements for Equipment Qualification files.

3.11 Environmental Qualification of Mechanical and Electrical Equipment

STD COL Describes Environmental Qualification Program, including:

- Equipment qualification documentation requirements,
- Equipment master list attributes,
- Procedural requirements,
- Design control processes for changes to the EQ files,
- Required testing, surveillance and maintenance.

3.12 Piping Design Review

STD SUP Provides cross-references to DCD Sections for description related to seismic and non-seismic piping and supports.

3.13 Threaded Fasteners

STD SUP Provides cross-references to DCD Sections for description of criteria for material selection, design, inspection, and testing of threaded fasteners.

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Presentation to the ACRS Subcommittee

Fermi Unit 3
COL Application Review

SE with OIs
Chapter 3
"Design of Structures, Components, Equipment and Systems"

August 16, 2012

ACRS Subcommittee Presentation
SE with OIs Chapter 3

Staff Review Team

- **Project Managers**
  - Adrian Muñiz
  - Tekia Govan
- **Technical Staff**
  - BPFP, Chief, Eileen McKenna
  - CIB, Chief, David Terao
  - EEEB, Chief, James Andersen
  - EMB, Chief, Joseph Colaccino
  - RDAT, Chief, Michael McCoppin
  - SEB, Chief, Brian Thomas

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Summary of Staff Review

- 3.1 - Conformance with NRC General Design Criteria (Incorporated By Reference [IBR])
- 3.2 - Classification of Structure, Systems and Components (IBR – with supplemental information)
- 3.3 - Wind and Tornado Loadings (IBR)
- 3.4 - Water Level (Flood) Design (IBR)
- 3.5 - Missile Protection (IBR – with supplemental information)
- 3.6 - Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping (IBR)
- 3.7 - Seismic Design - Open Items
- 3.8 - Seismic Category I Structures – Open Items
- 3.9 - Mechanical Systems and Components – Open Items
- 3.10 - Seismic and Dynamic Qualification of Mechanical and Electrical Equipment (Post COL Action Item)
- 3.11 - Environmental Qualification of Mechanical and Electrical Equipment (IBR)
- 3.12 - Piping Design Review (IBR in various sections within Chapter 3 of the DCD)
- 3.13 - Threaded Fasteners – ASME Code Class 1, 2, and 3 (IBR in various sections within Chapter 3 of the DCD)

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Fermi 3 COL Chapter 3.5
Missile Protection

NRC Reviewer/Presenter:

Seshagiri Rao Tammara

Section 3.5
Missile Protection

- **Summary of FSAR Section:**
  - **ESBWR DCD Incorporated By Reference**
  - **Site Specific Information Addressed**
    - Site-Specific Missile sources (Site Proximity Missiles (EF3 STD SUP 3.5-1)
    - Site-Specific Aircraft Analysis (Aircraft Hazards) (EF3 STD SUP 3.5-2)
- **Status of SER Section:**
  - No open items

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Section 3.5
Missile Protection

- **Staff's Review of STD SUP 3.5-1:**

STD SUP 3.5-1: Site-Specific Missile Sources
(Site Proximity Missiles)

Staff reviewed the applicant's information pertaining to site-specific sources and found to be acceptable as it satisfies the guidance provided in NUREG-0800 Section 3.5.1.5, RG 1.115 and GDC 4 Criteria.

Section 3.5
Missile Protection

- **Staff's Review of STD SUP 3.5-2:**

STD SUP 3.5-2: Site-Specific Aircraft Analysis (Aircraft Hazards)

Staff reviewed the applicant's information pertaining to site-specific aircraft analysis (aircraft hazards) and found to be acceptable as it satisfies the guidance provided in NUREG-0800 Section 3.5.1.6 and the aircraft crash probability is within the acceptable criterion of on the order of magnitude of 1×10^{-7} per year.

Fermi 3 COL Chapter 3.9.6 Functional Design, Qualification, and Inservice Testing

NRC Reviewer/Presenter:

Thomas Scarbrough

Section 3.9.6 Functional Design, Qualification, and Inservice Testing

- **Introduction**
  - 10 CFR 52.79(a)(11) requires the COL applicant to describe programs and implementation necessary to ensure systems and components meet ASME BPV Code and OM Code per 10 CFR 50.55a
  - Inservice Testing (IST) and Motor-Operated Valve (MOV) Testing are operational programs.
  - SECY-05-0197 states that the COL applicant should fully describe operational programs to avoid the need for program ITAAC.

Section 3.9.6 Functional Design, Qualification, and Inservice Testing

- **Summary of FSAR Section 3.9.6:**
  - FSAR incorporates by reference ESBWR DCD provisions for functional design, qualification, and IST programs for valves and dynamic restraints.
  - FSAR supplements IST program description in ESBWR DCD for overall IST provisions, preservice testing, power-operated valve testing, check valve testing, and snubber examination and testing program.
  - No safety-related pumps in ESBWR passive design.

ESBWR Squib Valves

- ESBWR includes squib valves in Standby Liquid Control System (SLCS), Automatic Depressurization System (ADS), and Gravity Driven Cooling System (GDCS).
- ESBWR DCD specifies that new valve designs will be qualified in accordance with ASME Standard QME-1-2007.
- Fermi-3 FSAR states that IST surveillance activities for squib valves will incorporate lessons learned from design and qualification process.
- Fermi-3 SER includes a license condition for surveillance activities for ADS and GDCS squib valves similar to Vogtle license condition.
- ASME OM Code (2012 Edition) planning to include updated IST provisions for squib valves in new reactors consistent with license condition provisions.

Section 3.9.6 Functional Design, Qualification, and Inservice Testing

- **Status of SER Section 3.9.6:**
  - Detroit Edison adopted RAI responses from previous R-COLA.
  - Staff found RAIs for previous R-COLA and Fermi-3 to be resolved based on FSAR modifications and clarifications.
  - Staff performed audit of procurement specifications at GEH facility in Wilmington, NC to confirm compliance with10 CFR 52.47 and 52.79(a)(11).
  - Staff concludes that Fermi-3 FSAR and ESBWR DCD fully describe the functional design, qualification, and IST programs for valves and dynamic restraints consistent with SECY-05-0197.
  - No open items or confirmatory items.

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Chapter 3 - Design of Structures, Components, Equipment and Systems

Questions/Comments

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Fermi 3 COLA
Presentation to ACRS Subcommittee
Chapter 10

Chapter 10, Steam and Power Conversion: Chapter Topics

	FSAR Section	Presenter
10.1	Summary Description	IBR Section
10.2	Turbine Generator	R. Pratt
10.3	Turbine Main Steam System	IBR Section
10.4	Other Features of Steam and Power Conversion System	R. Pratt

10.2 Turbine Generator

COL Standard Supplemental Information:

- STD SUP 10.2-1 Turbine Design

COL Information Items:

- STD COL 10.2-1-A Turbine Maintenance and Inspection Program
- STD COL 10.2-2-A Turbine Missile Probability Analysis

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10.2 Turbine Generator (continued)

- STD SUP 10.2-1. GE Company manufactures the turbine and generator.
- Results of GE Turbine Missile Probability Report for bounding material properties referenced in FSAR:
  - STD COL 10.2-1-A. Adds rotor dovetail and extraction non-return valve testing to maintenance and inspections identified in the DCD.
  - STD COL 10.2-2-A. The missile probability analysis results meet the criteria in SRP 3.5.1.3 for a favorably-oriented turbine.

10.4 Other Features of Steam and Power Conversion System

EF3 CDI Describes plant specific portions of Circulating Water System (CIRC), including arrangement, components, operation, and instrumentation.

- One Natural Draft Cooling Tower (NDCT).
- Four CIRC Pumps.
- Station Water System provides makeup to Cooling Tower basin.
- Water chemistry is controlled with chemical injection and utilizing blowdown.
- System interconnection is provided with the Plant Service Water System.

10.4 Other Features of Steam and Power Conversion System (continued)

EF3 CDI CIRC piping or component failure evaluation is described.

EF3 CDI Table 10.4-201 summarizes recommended threshold values of key water chemistry parameters and associated operator response.

EF3 SUP Includes design provisions for the Condensate Purification System and the Condensate and Feedwater System to accommodate 100% feedwater flow to support a cascade configuration.

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Presentation to the ACRS Subcommittee

Fermi Unit 3 COL Application Review

SER Chapter 10 with No Open Items "Steam and Power Conversion System"

August 16, 2012

Summary of Technical Discussion Points for Fermi 3 COL Chapter 10

	Discussion Topic	Presenter/Description
	Introduction	M. Eudy
10.2	Turbine Rotor Integrity	G. Makar, J. Honcharik (Standard COL, SUP)
	Conclusions/Questions	M. Eudy

10.2 – Turbine Generator

Required COL Information for Staff Review

- **COL 10.2-1-A: Turbine Maintenance and Inspection Program**
  Provide a description of the plant-specific program required to satisfy the manufacturer's turbine missile probability calculation. Includes SRP 3.5.1.3 Section II criteria and necessary valve and control system maintenance, inspection, and tests.

- **COL 10.2-2-A: Turbine Missile Probability Analysis**
  Provide an evaluation of the probability of turbine missile generation using criteria in accordance with NRC requirements. Can be based on bounding material property values.

10.2 – Turbine Generator

COL and Supplemental Items Provided in the COLA:

- **STD COL 10.2-1-A: Turbine Maintenance and Inspection Program**
  The applicant identified the key DCD sections that describe maintenance and inspection. The applicant also referenced the missile probability analysis report, which addresses certain inspections and valve tests not addressed in the DCD.

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**
  The applicant submitted a bounding ESBWR turbine missile probability analysis report produced by General Electric.

- **STD SUP 10.2-1: Turbine Design**
  The applicant identified the turbine model as N3R-6F52 from the GE nuclear steam turbine series.

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10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-1-A: Turbine Maintenance and Inspection Program**
  - **SRP Section 3.5.1.3 Acceptance Criteria**
    - GDC 4
    - Suitable program of periodic inservice testing and inspection to meet the acceptable missile generation probability value

      $P_1 < 10^{-4}$ for the ESBWR turbine (favorably oriented)
    - Relate the missile generation probability to rotor design, material properties, inspection intervals, speed control and overspeed protection systems, and valve design, arrangement, inspection, and testing
    - Commit to visual, surface, and volumetric examinations
    - Provide a missile generation probability report to the NRC for review and approval, including missile generation probability as a function of time

10.2 – Turbine Generator

Staff’s Review of COL and Supplemental Items:

- **STD COL 10.2-1-A: Turbine Maintenance and Inspection Program**

  - **Distributed over four subsections in the COLA FSAR**
    - 10.2.2.4 – Turbine Overspeed Protection System
    - 10.2.2.7 – Testing
    - 10.2.3.6 – Inservice Maintenance and Inspection of Turbine Rotors
    - 10.2.3.7 – Inservice Inspection of Turbine Valves

  - **To review STD COL 10.2-1-A, the staff assessed whether the applicant’s program affirms the requirements in the DCD and supplements those requirements with the turbine missile probability analysis**

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-1-A: Turbine Maintenance and Inspection Program**
  - **FSAR Sections 10.2.2.4 (Turbine Overspeed Protection System) and 10.2.2.7 (Testing)**
    - Refer to COLA FSAR Sections 10.2.3.6 and 10.2.3.7 on inservice maintenance and inspection of rotors and valves
    - Affirm the use of the inservice maintenance and inspection program elements already described in the DCD
    - COLA FSAR Sections 10.2.3.6 and 10.2.3.7 add to the DCD the requirements of the missile probability analysis (ST-56834)

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10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-1-A: Turbine Maintenance and Inspection Program**

  COLA FSAR Section 10.2.3.6 Requirements (Inservice Maintenance and Inspection of Turbine Rotors)
  - Includes DCD requirements:
    - Visual, magnetic particle, and ultrasonic examination of all accessible surfaces of the rotors
    - Visual and magnetic particle or liquid penetrant examination of all turbine blades
    - Visual and magnetic particle examination of couplings and coupling bolts
  - Reference to the turbine missile probability analysis adds:
    - Rotor dovetail inspections
    - Inspection interval 12 years maximum

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-1-A: Turbine Maintenance and Inspection Program**
  - **COLA FSAR Section 10.2.3.7 Requirements (Inservice Inspection of Turbine Valves)**
    - DCD includes many valve testing requirements
    - Reference to the turbine missile probability analysis adds valve and control system maintenance, inspection, and testing details:
      - Extraction non-return valve requirements
      - Valve testing interval (120 days)
      - Valve inspection/maintenance interval (every valve at least once in six years)

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-1-A: Turbine Maintenance and Inspection Program**

  - **Conclusion**

    The staff finds the information in the application acceptable because it affirms the DCD requirements and provides information from the turbine manufacturer to maintain the missile probability according to NRC requirements described in SRP Section 3.5.1.3.

    - 10.2.2.4 – Turbine Overspeed Protection System
    - 10.2.2.7 – Testing
    - 10.2.3.6 – Inservice Maintenance and Inspection of Turbine Rotors
    - 10.2.3.7 – Inservice Inspection of Turbine Valves

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**

  - Report ST-56834/P, Revision 4, turbine missile probability analysis assesses the potential for:

    - Brittle fracture (including undetectable flaws reaching critical crack size) due to:

      - Fatigue (cyclic) crack growth
      - Stress corrosion cracking (SCC)

    - Ductile failure due to destructive overspeed of the tubine due to the failure of overspeed protection system (valves, controls, etc.)

  - Uses criteria in RG 1.115 and SRP Sections 3.5.1.3 and 10.2.3

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**

  - Report ST-56834/P, Revision 4
    - Provides inspection intervals for the turbine rotor that meet the guidance in RG 1.115 for annual turbine missile probability less than 10^{-5}
    - Provides valve test interval that meets the guidance in RG 1.115 for a destructive overspeed probability of less than 10^{-5}
    - ESBWR DCD states that turbine missile analysis would meet the requirements for an unfavorable turbine orientation (annual turbine missile probability less than 10^{-5})
    - Uses bounding material properties since as-built turbine material properties are not available
    - Uses methodology previously approved

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**
  - GE material specification (B50A373B12) for Nickel-Chromium-Molybdenum-Vanadium alloy
    - Vacuum treated with restrictions on sulfur and phosphorus
    - Similar to past material but with more restrictive nickel content
    - Assurance that the specified fracture appearance transition temperature (FATT) value in the internal rotor region is met and is bounded by the turbine missile analysis
      - Impact testing on site-specific rotor forging material using specimens from radial trepans between the rotor wheels

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10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**
  - Use of bounding material properties in ST Report ST-56834/P, Revision 4
    - Minimum tensile strength in the material specification
    - The bounding FATT value of +30 F described in the ESBWR DCD and the applicable GE material specification B50A373B12
    - The applicable GE material specification B50A373B12 was included in Revision 4 of the analysis

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**

  - To determine the inspection interval of the rotor, the applicant evaluated the three failure modes (cyclic fatigue, SCC, and ductile tensile burst) to calculate the probability of rupturing the rotor

  - The final probability for rupturing a turbine rotor included:

    - Combining the probabilities of rupturing a rotor for each failure mode with the probability of the ruptured rotor fragment penetrating the turbine casing

    - Final probability of generating a turbine missile with an inspection interval of 12 years was well within the criterion of 10^{-5}

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10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**

  - To determine the valve test interval of the turbine control system, the applicant determined the destructive overspeed probability
  - The destructive overspeed probability included:

    - Conservative use of previous failure-rate models
    - Evaluation of past operating experience and corrective actions, including updated failure rates
    - Control system similarities to past systems and modifications made for current Mark VIe control system
    - Overspeed probability for a valve test interval of 120 days was well within the criterion of 10^{-5} per year specified in RG 1.115

10.2 – Turbine Generator

Staff's Review of COL and Supplemental Items:

- **STD COL 10.2-2-A: Turbine Missile Probability Analysis**
  - **Conclusion**
    The staff finds the turbine missile probability analysis acceptable because:
    - It meets the annual missile probability criterion of 10^{-5} per year in RG 1.115 and as specified in the guidelines in SRP Sections 3.5.1.3 and 10.2.3 to ensure that the turbine rotor integrity is maintained to preclude the generation of missiles
    - Associated turbine rotor inspection interval of 12 years and the turbine manufacturer's recommendations for inspecting the turbine rotor meet the criteria in RG 1.115
    - Associated turbine valve test interval of 120 days and the manufacturer's recommendations for testing the valves in the control system meet the criteria in RG 1.115

SER with No Open Items Chapter 10
"Steam and Power Conversion Systems"

Questions/Comments

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Presentation to ACRS Subcommittee
Chapter 14

Chapter 14, Initial Test Program: Chapter Topics

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	FSAR Section	Presenter
14.1	Initial Test Program for Preliminary Safety Analysis Reports	IBR
14.2	Initial Test Program for Final Safety Analysis Reports	M. Brandon
14.3	Inspections, Tests, Analyses, and Acceptance Criteria	M. Brandon
Appendix 14.3A	Design Acceptance Criteria ITAAC Closure Process	M. Brandon
Appendix 14AA	Description of Initial Test Program Administration	M. Brandon

14.2 Initial Plant Test Program for Final Safety Analysis Reports

STD COL Appendix 14AA describes the administration of the initial test program. Part 10 includes a license condition to provide the site specific startup administration manual to the on-site NRC inspectors 60 days prior to intended use.

STD COL Schedule provided for development of preoperational and startup test procedures. Part 10 includes a license condition to provide procedures to on-site NRC inspectors 60 days prior to intended use.

STD COL These implementation milestones for the initial test program are included in Section 13.4, Table 13.4-201.

14.2 Initial Plant Test Program for Final Safety Analysis Reports (continued)

Added the following site specific testing:

STD SUP AC power system preoperational tests include automatic transfer capability of the normal preferred power source to the alternate preferred power source.

EF3 SUP Identified additional testing for Plant Service Water System (PSWS), including the Auxiliary Heat Sink (AHS).

EF3 SUP Defined testing for the Station Water System.

EF3 SUP Defined testing for the Natural Draft Cooling Tower.

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14.3 Inspections, Tests, Analysis and Acceptance Criteria (ITAAC)

STD COL ITAAC are specified in COLA Part 10. The entire set of ITAAC includes:

- Design Certification (DC)-ITAAC
- Physical Security (PS)-ITAAC
- Emergency Planning (EP)-ITAAC
- Site-Specific ITAAC specific for:
  - Concrete backfill under Seismic Category I structures.
  - Backfill adjacent to Seismic Category I structures.
  - PSWS reserve water storage capacity.
  - Offsite power systems.

14.3A Design Acceptance Criteria ITAAC Closure Process

EF3 COL

Commitments for Design Acceptance Criteria (DAC) ITAAC closure schedule.

– Safety-related piping ASME Code design reports and as-built pipe break analysis report.
– Human Factors Engineering reports.
– Instrumentation and Controls procedures and test programs.

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14.AA Description of Initial Test Program (ITP) Administration

STD COL Specifies requirements for the Startup Administrative Manual:

- Applicability of the ITP to Systems, Structures, and Components.
- Testing program phases.
- Organization, staffing and responsibilities.
- Test procedure development and review.
- Conduct of the test program.
- Review and approval of test results.
- Utilization of operating experience.
- Use of plant procedures during ITP
- Identifies the prerequisites and procedure requirements for fuel loading.

Presentation to the ACRS Subcommittee

Fermi Unit 3 COL Application Review

SER Chapter 14 with No Open Items "Initial Test Program"

August 16, 2012

Summary of Technical Discussion Points for Fermi 3 COLA Section 14.2

Discussion Topic	Presenter/Description
Introduction	M. Eudy
14.2 Initial Test Program	A. Keim (Site Specific Testing, Supplemental Items, COL Items and License Conditions)
14.3 Site Specific ITAAC	M. Eudy

14.2 Initial Test Program

List of NRC Evaluated Fermi Unit 3 Preoperational and Power Ascension Tests

- The NRC staff reviewed the following enhancements to ESBWR preoperational and startup tests at Fermi Unit 3:
  - FSAR Section 14.2.8.1.36, AC Power Distribution System Preoperational Test
  - FSAR Section 14.2.8.1.51, Plant Service Water System Preoperational Test
  - FSAR Section 14.2.8.2.18, Plant Service Water System Performance Test

- The NRC staff also reviewed the following Fermi Unit 3 Combined License (COL) site specific preoperational and startup tests:
  - FSAR Section 14.2.9.1.1, Station Water System Preoperational Test
  - FSAR Section 14.2.9.1.2, Cooling Tower Preoperational Test
  - FSAR Section 14.2.9.2.1, Cooling Tower Performance Test

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14.2 Initial Test Program Cont.

License Conditions

The NRC staff issued three requests for additional information (RAIs) that resulted in COL applicant changes to site specific tests, supplemental items and COL items. The NRC staff evaluated these site specific tests, supplemental items and COL items and found them acceptable. In addition, there are six license conditions identified by the staff and applicant in the staff's SER and the Fermi Unit 3 Initial Test Program.

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14.3 ITAAC

- Entire Set of ITAAC consists of 4 parts:
  - Design Certification ITAAC
  - Emergency Planning ITAAC
  - Physical Security ITAAC
  - Site-Specific ITAAC outside DCD scope
- COL Items:
  - STD COL14.3-1-A Emergency Planning ITAAC
  - STD COL 14.3-2-A Site-Specific ITAAC
  - EF3 COL 14.3A-1-1Schedule for Design Acceptance Criteria (DAC) ITAAC Closure

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14.3 ITAAC cont.

- STD COL14.3-1-A Emergency Planning ITAAC
  - Reviewed and found acceptable in staff's Chapter 13 SER

- STD COL 14.3-2-A Site-Specific ITAAC
  - 2.4.1 ITAAC for Backfill Under Seismic Category 1 Structures
  - 2.4.2 ITAAC for Backfill Surrounding Seismic Category 1 Structures
  - 2.4.3 ITAAC for Plant Service Water System (portion outside DCD scope)
  - 2.4.8 Offsite Power Systems
  - 2.4.9 Communications Systems (Emergency Notification System)

- EF3 COL 14.3A-1-1 Schedule for DAC ITAAC Closure
  - COM 3.10-003
  - Piping DAC
  - Digital I&C DAC
  - HFE DAC

SER with No Open Items Chapter 14 "Initial Test Program"

Questions/Comments