



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

September 6, 2012

MEMORANDUM TO: ACRS Members

FROM: Christopher L. Brown, Senior Staff Engineer /RA/
 Reactor Safety Branch, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS ESBWR
 SUBCOMMITTEE MEETING, AUGUST 16, 2012, ROCKVILLE,
 MARYLAND

The minutes of the subject meeting were certified on August 30, 2012, as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: Certification Letter
 Minutes
 Meeting Transcript

cc w/o Attachment: E. Hackett
 C. Santos

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF ACRS ESBWR SUBCOMMITTEE MEETING**

AUGUST 16, 2012
ROCKVILLE, MARYLAND

INTRODUCTION

The Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on the ESBWR met in room T-2B1 at the Headquarters of the U.S. Nuclear Regulatory Commission (NRC), located at 11545 Rockville Pike, Rockville, Maryland, on August 16, 2012. The Subcommittee was briefed by representatives of NRC's Office of New Reactor Licensing (NRO) and Detroit Edison Company (DTE); the applicant for Fermi Unit 3, on SER Chapters associated with the Fermi RCOLA. The Chapters were as follows: Chapter 2 "Site Characteristics," Chapter 3 "Design of Structures, Components, Equipment, and Systems," Chapter 10 "Steam and Power Conversion System," and Chapter 14 "ITAAC."

ATTENDEES:

The following list of Individuals (and their affiliations) attending this meeting was compiled using both the sign-in sheets and the Subcommittee meeting transcript.

ACRS Members/Consultants

M. Corradini, Subcommittee Chairman	J. Stetkar, Member
W. Hinze, Consultant	J. S. Armijo, Member
D. Skillman, Member	C. Brown, Member
T. Kress, Consultant	G. Wallis, Consultant
M. Ryan, Member	

ACRS Staff

C. L. Brown, Designated Federal Official

NRC Staff

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		

OTHER ATTENDEES

P. Campbell, GEH	Mike Brandon, DTE
A. Liebergen, Black & Veatch	E. Meyer III, Black & Veatch

Peter Smith, DTE
 Ryan Pratt, DTE

Bryce Weinand, DTE

SUMMARY OF CHAPTER PRESENTATION DISCUSSION TOPICS and ISSUES:

SIGNIFICANT ISSUES	
Fermi Unit 3 significant issues	Reference Pages in Transcript
Clarification on aircraft routes and nearby airport and airbase locations.	23-25, 26, 213-226
Discussion was held concerning external flooding of the plant by nearby rivers, such as, Swan Creek. The applicant described the considerations used to determine the Probable Maximum Flood (PMF) for the site and shows that safety related facilities are located above the worst potential flood consideration. Due to its proximity to the site, Lake Erie is the primary surface-water body to potentially impact Fermi 3. The Fermi site is located outside the realm of significant impact due to the flooding of local streams and rivers. ACRS members expressed some concern that analyses although following established protocols is not physically reasonable. This was determined to be a Generic Issue that is being considered in RG 1.59.	25-27, 61-69, 76-83, 99, 176-179, 256-259
Discussion concerning the local meteorological conditions at the site.	30-32, 40-43, 55-56, 187-195
Discussion focused on snow loads plus water on the roof. Analysis was OK	23-37, 144-146
Discussion focused on the possible effects of fog deposition on the Unit 3 switch yard from Unit 2 or 3 cooling tower. Staff felt issue was resolved.	45-47, 56-60
Groundwater monitoring program for tritium used the EPRI guidance for accidental releases. Staff confirmed that this approach was appropriate.	100-103
The possibility of shale gas exploration or production was discussed. The lack of drilling within 10 miles of a site needs to be verified. The Michigan Basin is a select target for shale gas expiration. The staff later verified with the applicant the closest drilling site is 75 mi away and there are no issues.	125-127
Discussion focused on the seismic classification of SSCs and RTNSS equipment that must be Seismic Category 2.	239-242, 260
A major portion of SER Chapter 10 covers turbine rotors. Turbine rotors utilize integral forgings (mono-blocks) to minimize the probability of missile generation. Discussions focused on the turbine missiles acceptance criteria and various inspections and testing and turbine protection system. Also turbine missile probability analysis is to be provided and reviewed.	253-280, 296
Clarification concerning the pre-operational cooling tower test.	301-303

No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION DISPOSITION
August 16, 2012 Subcommittee Meeting						
1	8/16/2012	Committee Member Wallis has requested that the staff provide him with the reports and/or calculations that justify the results of PMF due to Local Intense Precipitation.	Chapter 2.4	SER	Henry Jones (RHMB)	
2	8/16/2012	Committee Member Stetkar would like the staff to identify where they evaluated flood protection of RTNSS in the SER.	Chapter 2.4	SER	H. Jones (RHMB)	
3	8/16/2012	Committee Member Hinze requested the staff to provide the Perch Water Table that was used in their safety evaluation.	Chapter 2.4	SER	H. Jones (RHMB)	
4	8/16/2012	Committee Member Stetkar requested that the NRC staff explain the close-out of North Anna's Open Item 03.02.01-3 in Fermi 3 SER. Stetkar said that the SER was not clear how the RAI response, which discussed RTNSS equipment, resolved the request for the SSC list.	Chapter 3.2	SER	Sardar Ahmed (EMB)	
5	8/16/2012	Committee will review the applicant's Turbine Missile Analysis report (ST-56834/P Rev. 4) regarding details for testing of overspeed controllers and sensors	Chapter 10.2	SER		
6	8/16/2012	Committee Member Stetkar requested that the NRC staff provide confirmatory analysis for Aircraft Airway Crash Frequency	Chapter 2.2	SER	Rao Tammara (RDAT)	Confirmatory analysis w/ C. Brown via email on 8/16/12. Awaiting status of Action closure from ACRS.

7

8/16/2012

Committee Member Stetkar requested that the staff reiterate the License Condition for acceptable testing in the area of Squid Valves

Chapter 3.9.5

SER

Thomas
Scarborough
(CIB)

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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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

SUBCOMMITTEE ON FERMI 3

+ + + + +

THURSDAY

AUGUST 16, 2012

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

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

1 ACRS CONSULTANTS PRESENT:

2 WILLIAM HINZE

3 THOMAS S. KRESS

4 GRAHAM B. WALLIS

5 NRC STAFF PRESENT:

6 CHRISTOPHER BROWN, Designated Federal Official

7 MANAS CHAKRAVORTY

8 MICHAEL EUDY

9 JOHN FROST

10 TEKIA GOVAN

11 CRAIG HARBUCK

12 RAUL HERNANDEZ

13 BRAD HARVEY

14 KIM HAWKINS

15 JOHN HONCHARIK

16 REBECCA KARAS

17 KERRI KAVANAGH

18 ANDREA KEIM

19 GREG MAKAR

20 MICHAEL MCCOPIN

21 EILEEN McKENNA

22 ADRIAN MUNIZ

23 BRUCE OLSON

24 DEVENDER REDDY

25 KEN SEE

1 THOMAS SCARBROUGH

2 ANGELO STUBBS

3 FRANK TALBOT

4 SESHAGIRI RAO TAMMARA

5 DINESH TANEJA

6 DAVID TERAQ

7 ZUHAN XI

8 ALSO PRESENT:

9 MIKE BRANDON, DTE

10 PATRICIA CAMPBELL, GEH

11 JIM HARRELL, DTE B&V Consultant

12 DAVID HARWOOD, DTE

13 DAVID HINDS, GEH

14 JOE LAPRAD, DTE

15 RON MAY, DTE

16 GERRY MILLER, DTE B&V

17 RYAN PRATT, DTE

18 BETH QUINLAN, DTE B&V

19 JOHN QUINN, Argonne National Lab

20 WALTER SCHUMITSCH, GEH

21 PETER SMITH, DTE

22 STEVE THOMAS, DTE B&V

23 JAMES THORTON, Duke Energy

24 BRYCE WEINAND, DTE B&V

25 BILL ZIEGLER, DTE B&V Consultant

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

PAGE

Opening Remarks and Objectives

 by Dr. Michael L. Corradini, ACRS 5

Staff Opening Remarks

 by Mr. Adrian Muniz, NRO 7

Chapter 2 - Site Characteristics

 by Detroit Edison Company Peter Smith 8

 by NRO - Tekia Govan 104

Chapter 3 - Design of Structures, Components
Equipment and Systems

 by Detroit Edison Company - Joe LaPrad 208

 by NRO - Tekia Govan 210

Chapter 10 - Steam and Power Conversion System

 by Detroit Edison Company - Ryan Pratt 242

 by NRO - Michael Eudy 252

Chapter 14 - ITACC

 by Detroit Edison Company - Mike Brandon 282

 by NRO - Michael Eudy 297

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

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1 participation in today's meeting have been announced
2 as part of the notice of the meeting previously
3 published in the Federal Register on August 1st, of
4 2012.

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

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

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

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

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

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

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

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

23 And Chapter 3, we have open items relating
24 to the review of the soil structure interaction and
25 analysis, as well as an open item related to the

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1 review of topical reports associated with the steam
2 drive design. As stated in the SE, this topical
3 report is related to a steam design are being reviewed
4 as part of the ESBWR certification review.

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

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

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

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

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

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

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

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

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

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

23 And the exclusionary boundary is in the
24 kind of brownish color circle that surrounds the
25 plant. That's probably within our owner controlled

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1 area, with the exception --

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

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

5 DR. WALLIS: Where is it measured from?

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

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

10 MR. SMITH: The center of the building.

11 DR. WALLIS: The building.

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

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

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

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

25 DR. WALLIS: You warn them. But suppose

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1 they have malicious intent?

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

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

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

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

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

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

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

17 MR. SMITH: Yes.

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

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

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

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

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

4 DR. WALLIS: Do they have --

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

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

10 CHAIRMAN CORRADINI: All right.

11 DR. WALLIS: That doesn't mean anything.

12 MR. SMITH: Well, I --

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

15 MR. SMITH: I don't recall more than one
16 a year. Okay. Next slide. This slide represents the
17 population distribution, and the year projected for is
18 2018.

19 And basically this table shows that the
20 population density at different radii to the year
21 2018, that are projected. And they demonstrate that,
22 and are compared with the criteria of Reg Guide 4.7,
23 demonstrate that --

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

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1 MR. SMITH: That's correct. And the
2 population density averaged at a radius of 20 miles is
3 less than 500 persons per square mile. And we're also
4 located about 5.5 miles to the closest higher density
5 population, which is the City of Monroe, population
6 32,000. And then when you get out into the 30 mile
7 range, you're starting to encroach on the City of
8 Detroit.

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

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

14 MEMBER ARMIJO: Yes, yes.

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

21 MR. SMITH: In what regard from --

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

25 MR. THOMAS: There are slight differences

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1 in how Canada does their census. They do it on a
2 different year frame, which is described in Section
3 2.1 But that was accounted for in the population
4 distribution.

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

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

13 DR. HINZE: And you adjusted for that
14 then?

15 MR. THOMAS: Correct.

16 DR. HINZE: Okay. Thank you.

17 DR. KRESS: How far is Detroit?

18 MR. SMITH: I'm sorry?

19 DR. KRESS: How far is Detroit?

20 MR. SMITH: Roughly 25 miles.

21 DR. KRESS: Southwest?

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

24 DR. WALLIS: Can we go back to this
25 exclusionary? You said it's a radius from the center

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1 of the reactor building. But there are several
2 reactors there. You know, the different
3 exclusionaries, the different --

4 MR. THOMAS: Yes. And they overlap.

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

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

9 DR. WALLIS: You add them up. For actual
10 exclusionaries, presuming the sum of the three
11 exclusionaries.

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

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

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

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

20 MR. SMITH: For us, no. Because there's
21 --

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

24 DR. WALLIS: There's another circle there.

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

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1 circle.

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

4 DR. KRESS: You only have one other plant
5 --

6 MR. SMITH: That's operating, correct.

7 DR. WALLIS: In this one spot.

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

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

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

18 MEMBER ARMIJO: I got to ask you.

19 MR. SMITH: Okay.

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

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

2 MEMBER ARMIJO: -- a figure detail?

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

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

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

10 MEMBER ARMIJO: Yes, okay.

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

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

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

23 DR. WALLIS: What do you do about
24 shipping? I mean, all kinds of stuff is shipped on
25 the lake. And presumably there could be hurricanes or

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1 something that blow ships ashore on your facility?

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

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

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

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

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

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

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

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

23 MR. SMITH: No.

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

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

4 DR. WALLIS: Yes, something like that.

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

7 DR. WALLIS: Okay.

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

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

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

15 MR. SMITH: Okay.

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

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

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

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

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

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

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

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

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

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

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

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1 be the larger --

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

5 DR. WALLIS: They go all the way to Duluth
6 --

7 MR. SMITH: -- vault carriers.

8 DR. WALLIS: Yes.

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

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

14 MR. SMITH: No.

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

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

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

24 MR. SMITH: Right.

25 MEMBER ARMIJO: Would that be under your

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1 control?

2 MR. SMITH: Correct.

3 MEMBER ARMIJO: Okay.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

25 DR. WALLIS: But if you take the center of

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

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

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

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

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

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

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

24 MR. SMITH: There is a turf flying field
25 --

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1 CHAIRMAN CORRADINI: Oh.

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

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

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

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

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

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

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

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

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

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

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

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

19 MEMBER STETKAR: One more question on
20 locations of facilities. And this one might be easy.
21 When you talk about military facilities, you said the
22 nearest **military facilities are Camp Perry Military**
23 Reservation, **about 30 miles away,** and Selfridge
24 Michigan Air National Guard Base, about 50 miles to
25 the northeast. Did you look over in Canada? Are

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1 there any Canadian air bases, or military facilities
2 within that 50 mile radius?

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

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

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

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

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

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

25 And as we move to construction has the

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

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

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

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

22 But as you can see that we continue to be
23 bounded the DCD requirements. In addition our site
24 specific tornado's based on the Reg Guide 1.76,
25 Revision 1. And we were asked questions earlier this

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1 year regarding changes that were made in Rev 1, and as
2 related to hurricanes.

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

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

10 MR. SMITH: I'm sorry.

11 MEMBER RYAN: Is the hurricane wind and
12 water?

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

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

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

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

23 MEMBER RYAN: Okay.

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

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

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

8 MEMBER RYAN: Okay.

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

14 MR. SMITH: Chris.

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

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

23 But we also did look at actual wind data
24 in a five county area surrounding the site to see how
25 those compare to actual wind gusts that have occurred,

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1 based on the NCDC storm data base. And we found a
2 gust around 103 mph, which is a little higher than the
3 ASE guidance, but still bounded by the DCD value.

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

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

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

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

12 DR. HINZE: Yes.

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

17 DR. HINZE: Okay. Thank you.

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

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

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1 value of 6.2 inches in five minutes.

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

4 MR. SMITH: Yes.

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

7 CHAIRMAN CORRADINI: I was waiting for him
8 to --

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

17 MR. SMITH: Okay.

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

21 MR. SMITH: Yes.

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

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

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

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

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

13 MEMBER STETKAR: Pretty poor design --

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

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

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

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

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

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

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

4 DR. WALLIS: It's completely flat?

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

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

9 MR. HINDS: Yes.

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

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

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

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

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

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

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

4 DR. WALLIS: Well, I had trouble --

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

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

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

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

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

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

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1 --

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

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

6 CHAIRMAN CORRADINI: Right.

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

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

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

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

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

21 MR. HARVEY: Which I think is somewhat
22 unlikely.

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

25 MR. HARVEY: That's correct.

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1 CHAIRMAN CORRADINI: Thank you.

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

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

10 And then this is just a comparison of the
11 control room habitability temperatures. And the DCD
12 values. Our site characteristic values and the DCD
13 site parameter values. And we have monitored them to
14 them all. And I'm not going to try to go through the
15 --

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

19 MR. SMITH: Yes.

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

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

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1 MEMBER STETKAR: Oh, there you go.

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

4 MR. SMITH: Next slide, please. So
5 talking about local meteorology. Local meteorology
6 was characterized using data from our on site
7 meteorological tower. The location of the existing on
8 site meteorological tower is in the vicinity of FERMI
9 3, and --

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

12 MR. SMITH: It doesn't.

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

16 MEMBER STETKAR: Somebody picked it up.

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

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

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

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

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

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

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

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

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

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1 periods.

2 CHAIRMAN CORRADINI: You mean the six
3 percent?

4 MR. WEINAND: Yes.

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

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

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

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

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

23 For instance, the meteorological tower is
24 designed for dispersion data collecting. So it's an
25 average wind speed over 15 minutes or an hour, which

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1 is different than the extreme three second gust.

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

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

11 MR. HARVEY: Yes.

12 MEMBER SCHULTZ: Thank you.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5 DR. KRESS: How high is the tower?

6 MR. SMITH: They're some 60 meters.

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

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

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

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

19 CHAIRMAN CORRADINI: Okay.

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

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1 using the SACTI code. Next slide.

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

6 But basically where the existing tower is
7 is under the footprint of the FERMI 3 cooling tower
8 would be located, just slightly southwest of the FERMI
9 2 tower block and southwest of FERMI 2. We have
10 descriptions of the instrumentation and data recording
11 equipment, and data acquisition and processing. Next
12 slide.

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

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

22 And some of the trees were in locations
23 that did not meet the current height and distance
24 requirements. So we had a series of requests for
25 additional information that we addressed the issues

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1 associated with that. Next slide.

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

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

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

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

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

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

23 So now it just so happens that over the
24 period of time since this photo was taken that there's
25 been weather events at the site that have taken out

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1 some of the trees. So it ultimately kind of became to
2 some degree a self limiting issue. But if we -- And
3 these are mature trees now. You know, they were at a
4 mature -- I wouldn't expect them to continue their,
5 to continue growing.

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

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

10 MEMBER SCHULTZ: The red dot.

11 MR. SMITH: Yes.

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

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

16 MEMBER SCHULTZ: It's on the other side?

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

19 MEMBER SCHULTZ: Okay.

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

24 MEMBER SCHULTZ: Thank you.

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

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

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

8 MR. SMITH: Yes. Or it could be.

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

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

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

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

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

20 DR. HINZE: No, the new location.

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

23 DR. WALLIS: It's on Slide 3.

24 DR. HINZE: Well, FERMI 2 and 3 are about
25 three times the distance from the shoreline than the

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1 new tower will be.

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

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

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

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

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

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

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1 purposes. Just wondering what the differences were.

2 MR. THOMAS: Well, first let's speak to
3 the differences between the results from the '85 to
4 '89 data, to the 2000 data.

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

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

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

12 When we analyzed the 2000s data and the
13 1980s data there were differences. There was not a
14 uniform trend that these particular release receptor
15 pairs were more limiting in the 2000s, or in the
16 1980s. There was a mixture.

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

23 The differences were not large. The first
24 decimal place after the decimal point was as large a
25 number that we saw in terms of a difference. Usually

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1 it was the second decimal place after the decimal
2 point. there were no orders of magnitude differences
3 between the two.

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

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

11 MEMBER ARMIJO: It changed.

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

14 MEMBER ARMIJO: Yes.

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

20 MEMBER ARMIJO: Yes.

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

25 CHAIRMAN CORRADINI: Does that, Steve, you

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1 had a follow on though.

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

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

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

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

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

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

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

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

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

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

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

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1 and the source receptor pairs.

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

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

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

21 MEMBER SCHULTZ: Which we've already
22 looked at.

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

25 CHAIRMAN CORRADINI: Questions by the

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1 committee?

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

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

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

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

22 MR. SMITH: Okay.

23 MEMBER STETKAR: So I guess the larger
24 question is what's your experience been on Unit 2 with
25 either fog related or cooling tower plume deposition

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1 related contamination of your switch yard on Unit 2?
2 Did you have operating experience there?

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

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

11 MR. SMITH: No.

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

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

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

24 MEMBER STETKAR: Okay.

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

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1 MEMBER STETKAR: It's --

2 MR. SMITH: -- from a similarity --

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

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

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

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

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

18 MR. SMITH: Right.

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

24 MR. WEINAND: We didn't. I mean the salt
25 deposition that was predicted from the FERMI 3 cooling

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1 tower was by .02 kilograms per kilometer square per
2 month. And the longest dry period, dry stretch that
3 we analyzed from Detroit Metro airport is
4 approximately one month.

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

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

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

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

19 MEMBER STETKAR: Okay.

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

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

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

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

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

17 CHAIRMAN CORRADINI: So can I --

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

23 CHAIRMAN CORRADINI: So can I just follow
24 up on your kind of quick, off the cuff? So I take it
25 you're going to come back to us and -- Because you,

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1 the way at least I understood your explanation is that
2 if we just looked at 3 alone, the time scale that it
3 would take to essentially have that accumulation is
4 the order of years.

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

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

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

15 MR. SMITH: Okay.

16 CHAIRMAN CORRADINI: That would help us.
17 Okay.

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

20 CHAIRMAN CORRADINI: Go ahead.

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

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1 please.

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

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

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

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

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

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

25 CHAIRMAN CORRADINI: Are you asking him or

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1 the staff? You're asking him about his 30 --

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

3 CHAIRMAN CORRADINI: -- time one.

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

10 MR. SMITH: That's a good thing.

11 MEMBER STETKAR: That's a big lake.

12 CHAIRMAN CORRADINI: So you want him to --

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

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

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

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

25 MEMBER STETKAR: -- those numbers come

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1 from?

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

6 DR. WALLIS: Cubic feet per second --

7 MS. QUINLAN: Yes.

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

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

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

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

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

22 DR. WALLIS: But if it does occur then
23 it's going to wash down all kinds of stuff, as we had
24 in Hurricane Irene, as I was saying, propane tanks and
25 things. You get all kinds of stuff in that kind of a

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1 flood. If you have storage tanks for propane on a big
2 thing, not little things.

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

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

12 DR. WALLIS: But --

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

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

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

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

24 You look at, if you plot the statistical
25 curve for flooding on the, actually something

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1 developed by Dartmouth College in the 1800s or
2 something.

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

5 MS. QUINLAN: I agree.

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

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

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

17 MEMBER ARMIJO: Get rid of it.

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

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

23 MEMBER STETKAR: No, I'm waiting for
24 everybody to finish. You guys all ought to come to
25 our subcommittee meetings on Reg Guide 1.59. That's

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1 the whole basis for this nonsense. The whole basis
2 for the nonsense of design basis flooding is that's
3 what the staff says you ought to do.

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

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

12 DR. WALLIS: But if this happened --

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

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

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

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

22 MEMBER STETKAR: It's not a probabilistic
23 --

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

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

5 MEMBER STETKAR: Well, we're frustrated.

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

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

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

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

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

22 CHAIRMAN CORRADINI: I don't think we
23 disagree with you. I just don't think we're going to
24 --

25 MEMBER STETKAR: It's a generic issue for

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1 all flooding analyses that are --

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

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

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

15 DR. KRESS: Well, usually the design basis
16 --

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

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

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

22 CHAIRMAN CORRADINI: They got you there,
23 Graham.

24 DR. HINZE: No, come on --

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

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1 the LOCA again.

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

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

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

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

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

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

15 MEMBER STETKAR: They do a stylized
16 analysis --

17 DR. WALLIS: If it's an --

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

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

25 CHAIRMAN CORRADINI: I think you're right

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1 though. Because yesterday, just to put the point
2 forward, in Steve's committee relative to seismic, I
3 asked a similar question on the phone about, if the
4 seismic --

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

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

12 CHAIRMAN CORRADINI: Correct.

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

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

20 MEMBER STETKAR: Yes.

21 CHAIRMAN CORRADINI: Let's move on.

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

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1 it up.

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

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

6 CHAIRMAN CORRADINI: Yes, in Vermont --

7 DR. WALLIS: It goes down into Lake Erie.

8 MEMBER STETKAR: Okay. Well, we --

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

11 MR. SMITH: Absolutely.

12 CHAIRMAN CORRADINI: Keep it in mind.

13 DR. WALLIS: What are you going to do?

14 MEMBER STETKAR: Nothing.

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

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

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

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

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

4 CHAIRMAN CORRADINI: Okay.

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

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

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

10 CHAIRMAN CORRADINI: Let's move.

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

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

22 MR. SMITH: Yes.

23 DR. WALLIS: That's what I read.

24 MS. QUINLAN: The reason that Swan Creek
25 flooding doesn't really have much of an effect is

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1 because that model run was made with Lake Erie at the
2 100 year level, and with the surge.

3 DR. WALLIS: That's right.

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

6 DR. WALLIS: It really goes up the river.

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

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

11 MR. SMITH: Next slide.

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

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

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

21 MR. SMITH: Okay.

22 DR. WALLIS: Local tsunami thing with the
23 --

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

25 MR. SMITH: All the situated structures

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

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

5 MR. THOMAS: Yes.

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

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

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

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

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

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1 know, the elevated areas.

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

4 MS. QUINLAN: That's correct.

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

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

9 DR. HINZE: Okay.

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

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

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

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

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

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

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

18 DR. WALLIS: So it breaks offshore.

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

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

24 DR. WALLIS: So these 100 mile an hour
25 winds don't produce barge impacts and things like

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1 that? Things that float on the lake in a 100 mile an
2 hour wind are not going to --

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

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

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

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

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

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

23 And the maximum calculated flood elevation
24 is 3.4 feet below the FERMI plant grade, which is 2.4
25 feet below the design flood elevation for safety

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1 related and RTNNS structures.

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

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

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

15 It found that the period from 1970 through
16 2007 include the highest water levels from the state
17 itself. The averages of the monthly water levels for
18 the period from 1970 through 2007 were also higher
19 than the averages for the entire period of record,
20 1918 through 2007.

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

25 MR. MILLER: This is Gerry Miller from

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

3 MEMBER STETKAR: Yes.

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

6 MEMBER STETKAR: Because it's just --

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

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

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

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

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

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

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1 And --

2 DR. WALLIS: How are they protected
3 against debris?

4 MR. SMITH: I'm sorry.

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

11 MR. SMITH: There are screens on the
12 intakes.

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

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

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

18 MR. SMITH: No the ultimate -- This is
19 not the ultimate heat sink. So and it isn't for FERMI
20 2 either.

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

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

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

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

6 DR. WALLIS: This is not in the
7 regulations?

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

11 MR. SMITH: No.

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

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

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

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

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1 just raising the level.

2 MR. SMITH: I don't disagree.

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

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

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

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

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

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

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

23 FERMI 3 plant grade is at 590 feet. And
24 the historic height groundwater level is 577.3 feet,
25 which is approximately 13 feet below grade. So both

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1 the maximum historic high groundwater, and the
2 probable maximum groundwater elevations are more than
3 two feet below plant grade. And therefore, the DCD
4 requirements are satisfied.

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

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

15 DR. WALLIS: Still satisfies it, right.

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

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

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

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

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

3 MEMBER ARMIJO: You would think,
4 hydraulics being hydraulics.

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

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

10 MEMBER STETKAR: Actually not.

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

13 MEMBER ARMIJO: Fine.

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

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

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

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

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

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

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

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

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

22 MR. SMITH: No, but it's a good point from
23 the operating experience standpoint. That when we get
24 to the detailed design. Because right now we're going
25 through a program at FERMI 2 where we are upgrading

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1 all of the bus ducts and --

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

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

11 And this is something that when we did our
12 studies for FERMI 3 that there was a change from what
13 we experienced when the original studies were done
14 from FERMI 2. Because now with de-watering of inland
15 quarries in the vicinity of or in Monroe County, that
16 the predominant flow of groundwater is from the lake
17 --

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

21 MR. SMITH: No.

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

24 MEMBER STETKAR: It just goes back from
25 the plant to the lake, to the groundwater. A thousand

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1 years or a hundred years?

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

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

7 DR. WALLIS: Okay.

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

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

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

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

16 DR. HINZE: No

17 MEMBER RYAN: No?

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

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

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

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1 very rapidly.

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

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

6 MEMBER RYAN: Please.

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

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

16 MEMBER RYAN: Sure.

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

21 MEMBER RYAN: Between one and 40.

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

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

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1 Plus 20, minus --

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

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

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

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

9 MR. SMITH: It does.

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

11 MR. SMITH: Correct. Next slide, please.

12 So this, we'll start talking about our accidental
13 release of liquid effluents to groundwater. And so
14 the ESBWR design includes provisions to preclude
15 accidental release of radioactive liquids.

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

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

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

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

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

11 So the, as far as hydraulic connectivity,
12 that was an average value. We used a limiting
13 gradient. We used a low value for our factor of
14 porosity, which significantly increased the velocity
15 --

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

18 MR. THOMAS: Right. You know --

19 MEMBER RYAN: -- all those kinds of
20 things.

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

25 MEMBER RYAN: Did you do any uncertainty

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

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

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

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

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

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

22 MR. HARRELL: Yes.

23 MEMBER RYAN: Okay. Thanks.

24 DR. WALLIS: Are you following a Reg Guide
25 or something when you do this? Or does each plant

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1 choose its own method?

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

4 (Simultaneous speakers.)

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

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

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

15 MEMBER RYAN: What code did you use?

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

19 DR. WALLIS: And the radionuclides follow
20 the water?

21 MR. HARRELL: Yes.

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

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

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1 DR. WALLIS: Or some nuclides --

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

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

9 DR. WALLIS: So there is a regulatory
10 position.

11 MEMBER RYAN: Thank you.

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

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

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

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

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1 decay.

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

6 MEMBER RYAN: You did testing for Kds?

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

12 MEMBER RYAN: Yttrium.

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

16 MEMBER RYAN: Yes.

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

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

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

7 MEMBER RYAN: Was the dispersion
8 assumption based on measurements?

9 MR. HARRELL: Yes.

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

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

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

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

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

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

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1 or something?

2 MR. HARRELL: Right.

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

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

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

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

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

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

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

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

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1 discussion.

2 MEMBER RYAN: Yes, okay.

3 CHAIRMAN CORRADINI: And let's keep on
4 going.

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

9 MEMBER RYAN: Well, there are limits to --

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

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

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

16 CHAIRMAN CORRADINI: Like beautiful
17 Vermont.

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

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

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

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1 modeling was.

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

5 DR. WALLIS: Okay.

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

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

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

20 MEMBER SCHULTZ: Okay.

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

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

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

6 MEMBER RYAN: Hit the train.

7 MR. SMITH: So that's a --

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

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

12 MEMBER RYAN: Even with that little bit --

13 MR. SMITH: Well, I remember taking my
14 water samples down to the chem lab. And waiting an
15 hour while they would count. And they would get like
16 --

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

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

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

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

25 MEMBER RYAN: Thank you.

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

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

7 MEMBER SCHULTZ: -- or because of the
8 tritium?

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

12 MEMBER SCHULTZ: Okay.

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

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

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

24 MR. SMITH: Yes.

25 MEMBER SCHULTZ: Thank you.

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

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

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

17 DR. HINZE: Anything more. Thank you.

18 MR. SMITH: Or anything different.

19 DR. HINZE: Thanks.

20 MR. SMITH: That's all I have.

21 CHAIRMAN CORRADINI: Okay. Any other
22 questions from the committee? Okay. We're a bit
23 behind, but let's take a break until, for ten minutes,
24 until about 10:35 a.m., please, so we can get back and
25 hear the staff with Chapter 2. And Graham had a

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1 couple of questions he would ask the staff at that
2 point.

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

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

10 MS. GOVAN: Yes.

11 CHAIRMAN CORRADINI: Okay.

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

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

25 Chapter 2 entitled Site Characteristics

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

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

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

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

21 Aside from Section 2.5, the NRC staff
22 review is complete with no open items. This morning
23 the staff will discuss their review findings for 2.1
24 and 2.2, geography and demography, and nearby
25 industrial transportation and military facilities,

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1 presented by Rao Tammara, 2.3, meteorology, presented
2 by Brad Harvey and 2.4 hydrology will be presented by
3 Henry Jones. At this time I would like to turn the
4 presentation over to Rao Tammara.

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

12 Our plan, next page, 2.1, most of the
13 information is referenced by DTE, is incorporated by
14 reference. And the site specific information is
15 addressed for the site location as a part of COL item
16 2.0-2-A, exclusion area boundary as a part of COL item
17 2.0-3-A. And population distribution as a part of COL
18 item 2.0-4-A.

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

23 Site location and description, staff
24 reviewed the applicant information pertaining to the
25 site location and description based on the independent

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1 verification of the UTM coordinates which have been
2 derived from the latitude and the longitude to
3 determine the site location, and also the description
4 of the area obtaining the information from the
5 publicly available data and sources.

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

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

13 MR. TAMMARA: I will address that one.
14 This is just this part of 2.2 is location where it is
15 --

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

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

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

23 MR. TAMMARA: Right. Exclusion area
24 authority and control as a part of COL Item 2.0-3-A,
25 staff reviewed the applicant information pertaining to

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1 the Exclusion Area Authority and Control. Staff also
2 independently verified the ownership of property in
3 EAB, description of EAB and applicant's authority and
4 control using the publicly available data and
5 resources. And found the information to be acceptable
6 as it satisfies the guidance provided in NUREG-0800
7 2.1.2

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

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

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

24 MEMBER STETKAR: Seshagiri, if I look at
25 the site I notice that, and draw a circle with a

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1 radius of about 20 miles around the center of the
2 site, I notice that roughly about a third, and I
3 didn't try to be very precise, about a third of that
4 area is Lake Erie. I wouldn't expect a lot of people
5 to live on Lake Erie.

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

11 MR. TAMMARA: Right.

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

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

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

22 MR. TAMMARA: Right.

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

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

4 MEMBER STETKAR: Okay, well --

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

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

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

22 MEMBER STETKAR: Well, I guess that's my
23 question is, is that rational? If for example, I had
24 a plant sited on the center of a peninsula that was
25 surrounded on 90 percent by water and I had population

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1 of 100,000 people on that peninsula, I could probably
2 say that within a 20 mile radius I have less than 500
3 people per square mile out over that water. I mean,
4 I haven't done that math but --

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

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

10 CHAIRMAN CORRADINI: But I think you get
11 his point.

12 MEMBER STETKAR: Yes.

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

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

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

25 MEMBER STETKAR: Okay.

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

8 MEMBER STETKAR: Okay.

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

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

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

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

25 MR. TAMMARA: The problem is we have to

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

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

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

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

13 DR. KRESS: I can't resist --

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

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

18 CHAIRMAN CORRADINI: Did you get your
19 question answered?

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

22 DR. KRESS: These rules were put in to
23 deal with societal risk. And we don't have good
24 acceptance criteria for societal risk. And therefore
25 we had to just rely on what we thought was reasonable

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1 assumptions back when we put these rules in. And we
2 need to rethink the whole question of societal risk as
3 to what I've been harping on for a long time. So I
4 just have to bring that up.

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

9 MALE PARTICIPANT: How can you get them
10 out?

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

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

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

24 MEMBER RYAN: All that outside data.

25 MR. TAMMARA: -- looking at the different

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1 points of view, evacuation times they are calculating
2 and they are looking at them. So this is one part we
3 are looking in Chapter 2. But in addition, they are
4 looking in Chapter 13, different way also.

5 MEMBER STETKAR: Thanks. And, you know,
6 I understand all of that. The reason I raised the
7 question was, I also understand that if the population
8 density, take a site without the lake, is higher than
9 500 people per square mile, there is this need to look
10 at alternative siting possibilities and to justify why
11 this site is reasonable.

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

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

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

23 MR. TAMMARA: Right.

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

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1 MR. TAMMARA: Right, that's correct.

2 CHAIRMAN CORRADINI: John?

3 MS. HAWKINS: Can I just clarify?

4 MEMBER STETKAR: No I understand what was
5 done.

6 MS. HAWKINS: Is the mic on?

7 CHAIRMAN CORRADINI: Yes, go ahead.

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

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

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

21 CHAIRMAN CORRADINI: Okay. All right, go.

22 MR. TAMMARA: Next slide, please. Section
23 2.2 deals with the identification of nearby industrial
24 and transportation and military facilities. And
25 further it will be assessing or evaluating the

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1 potential hazards from these facilities on the
2 proposed plant.

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

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

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

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

24 But if there's a boat on the lake and
25 there's a barge on the lake in a storm, it can be

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1 blown ashore. There's a much vaguer definition of
2 where it's going to be. What do you do about that
3 sort of thing?

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

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

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

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

16 DR. WALLIS: So you looked at --

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

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

21 MR. TAMMARA: Yes.

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

25 MR. TAMMARA: No, if it is released, what

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1 is the impact? That's all that we --

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

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

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

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

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

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

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

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

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

25 CHAIRMAN CORRADINI: Well, I think what,

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1 let me just nail it down this way so the system may be
2 clear. The licensee assumed the distance based on
3 essentially normal travel paths.

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

9 DR. WALLIS: Well, but release is most
10 likely it seems to be in some major storm, like this
11 100 mile an hour wind we were talking, that's when a
12 release is most likely. It's also the time when the
13 ship is most likely to be off course. So does the
14 regulation address this at all? Apparently not.

15 CHAIRMAN CORRADINI: I think not.

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

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

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

22 DR. WALLIS: How do you calculate that?

23 MR. TAMMARA: With the --

24 DR. WALLIS: Look at the maximum height of
25 the lake and the draft of the boat or something? What

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1 do you, how do you come up with the minimum distance?

2 CHAIRMAN CORRADINI: But I think --

3 MALE PARTICIPANT: You could do it that
4 way.

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

11 MR. TAMMARA: Right, that's correct.

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

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

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

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

22 DR. WALLIS: Yes.

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

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

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

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

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

11 (Simultaneous speakers.)

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

14 MEMBER ARMIJO: And it's less than.

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

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

19 DR. WALLIS: Yes.

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

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1 lower exposure limit distance?

2 DR. WALLIS: This is, explosions I
3 understand.

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

7 DR. WALLIS: How do you know?

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

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

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

17 MR. TAMMARA: That, all those scenarios we
18 --

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

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

23 MEMBER ARMIJO: Within the channel.

24 MR. TAMMARA: -- within the one distance,
25 yes. And if that I mean, one distance is satisfied,

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1 even that accident happened to your unsafe side --

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

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

9 MR. TAMMARA: All right.

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

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

17 DR. KRESS: And often do you have --

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

20 DR. KRESS: And that's the --

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

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

25 MR. TAMMARA: -- and then that probability

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1 has to be compared. If it is less than ten to the
2 four minus six, then it is acceptable. Otherwise it
3 is not so --

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

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

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

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

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

17 DR. WALLIS: Is this fracking?

18 MALE PARTICIPANT: Fracking, we had
19 thought of that.

20 CHAIRMAN CORRADINI: I guess I was going
21 to ask the question, that's a good one. I hadn't
22 thought of this one.

23 DR. HINZE: Well --

24 CHAIRMAN CORRADINI: But I guess, is there
25 active fracking along that region? I thought it was

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1 on the eastern side of Lake Erie but not on this
2 western side.

3 DR. HINZE: No, the Michigan Basin
4 includes a number of shales, particularly the Antrim
5 shale, which is, which is more centrally located. I
6 mean, the question can be answered very simply because
7 it's not located well for the shale gas. But, you
8 know, this is a consideration.

9 CHAIRMAN CORRADINI: Okay.

10 MR. TAMMARA: Yes, I have to get back to
11 you, how far it is out. If it is within, if it is
12 about five miles, these facilities are mainly within
13 five miles.

14 And if it is greater than five miles, then
15 we have to see whether they have any potential to
16 impact. So if it is greater than ten miles it is a
17 little bit different story. But if that is within the
18 ten miles, then I don't, I didn't see but I have to go
19 and double check.

20 CHAIRMAN CORRADINI: Okay, so you'll get
21 back to us.

22 MR. TAMMARA: Right.

23 DR. HINZE: Understandably.

24 CHAIRMAN CORRADINI: Thank you.

25 MR. TAMMARA: The analysis is within five

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1 miles, all the facilities.

2 Next slide, please. This slide deals with
3 the evaluation of all the potential accidents from
4 those identified facilities. The potential accidents
5 includes, next slide, explosions, fires, aircraft
6 hazards, collision with intake structures, liquid
7 spills, and toxic chemicals.

8 DR. WALLIS: How do you deal with liquid
9 spills on the lake?

10 MR. TAMMARA: We look at what, if the
11 spill is there, it is mostly chemical and it will
12 usually float on the surface of the water. And it
13 will not really disperse that --

14 DR. WALLIS: Though it would be blown by
15 the winds along the surface?

16 MR. TAMMARA: Winds and then it will be
17 collected probably by the screens into the intake, in
18 the intake. But that's, I don't think it is going to,
19 you know, cloud on water, the impact is minimal.
20 That's what we evaluated.

21 MALE PARTICIPANT: Depends what the liquid
22 is.

23 MEMBER STETKAR: I want to go back, before
24 you leave that I have some questions.

25 MR. TAMMARA: I haven't finished, I have

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1 one more.

2 MEMBER STETKAR: Oh you haven't? Okay,
3 I'll let you finish.

4 CHAIRMAN CORRADINI: Then he'll ask you
5 his question.

6 MR. TAMMARA: Staff have reviewed the
7 applicant sides specific evaluation of potential
8 accidents. Staff also performed the independent
9 confirmatory calculations in confirming the
10 applicant's conclusions.

11 Based on the review of applicant provided
12 information, the responses to the RAIs, staff
13 evaluations and staff independent conformity analyses,
14 the staff found the applicant conclusions to be
15 acceptable as the evaluations are in accordance with
16 the guidance provided in NUREG 0800 Section 2.2.3,
17 except for one issue.

18 In response to the RAI 2.2-3-4 and 2.2.3-
19 5, the applicant provided responses stating that the
20 current site of propane storage tanks are located due
21 to the construction of Fermi 3. Based on the maximum
22 allowable volumes determined using the meteorology in
23 Reg. Guide 1.78, Appendix A, prior to the operation of
24 Fermi 3.

25 Since they are relocating they stated that

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1 they will put the tanks at the location based upon
2 that Reg. Guide. However, in addition to 1.78, they
3 have to also look at the explosion scenario from Reg.
4 Guide 1.91 also. Because it is an explosive.

5 So therefore, staff considers a license
6 condition is imposed to look at both explosion as well
7 as a control room habitability issue in placing those
8 relocated tanks.

9 Therefore, staff proposed, or imposed a
10 license condition which states, "The applicant shall
11 use tanks with a maximum capacity of 1000 gallons for
12 onsite storage of propane. No more than 1000 gallons
13 of propane will be stored in any single location, and
14 no storage location will be located closer than the
15 minimum safe distance of 854 meters, that is 2800
16 feet, from any Fermi 3 safety-related structure and
17 main control room."

18 So this is the additional license
19 condition.

20 MEMBER ARMIJO: Is this a standard
21 requirement for propane storage at all nuclear sites?

22 MR. TAMMARA: Since --

23 MEMBER ARMIJO: Or is this unique to this
24 particular site?

25 MR. TAMMARA: No, unique in the sense yes,

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1 it is unique. Previous applications where they have
2 onsite storage of chemicals, they have the volume and
3 they know at what location they are placing that tank,
4 or cylinder, or whatever it may be.

5 But in this case the applicant has said
6 they have presently 20 tanks with various locations.
7 And due to the construction they have to relocate the
8 tanks. So they neither give the volume nor the
9 distance.

10 And they made statements saying that we
11 will place, based upon the Guide 1.78, so whether that
12 is the limiting case or 1.91 is limiting case, it is
13 very difficult to judge. And there is no way staff
14 has the, I mean, I do not know. Once the approval is
15 given, what is the vehicle.

16 Therefore, what we have seen, what we have
17 taken a look is what are the commercial tanks
18 available in the market? So we researched into that
19 one and we came up with a different, we have four
20 kinds of tanks available commercially, 150 gallon, 250
21 gallon, 500 gallon, and 1000 gallons.

22 So looking at that one we talked, we will
23 take a maximum 1000 gallon take and we calculated what
24 would be the distance they have to put it in order to
25 meet both explosion and fire and control room

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1 habitability distance.

2 So we calculated that one and then
3 prescribe you should not use more than 1000 gallons
4 and you should be --

5 MALE PARTICIPANT: Any closer than that.

6 MR. TAMMARA: -- be to that distance.

7 That is the way we told them, you know, you have to
8 abide by this.

9 MEMBER ARMIJO: But it's not, it's not
10 consistent. Other plants in the country could have
11 2000 gallon tanks right now. I'm just wondering.

12 MR. TAMMARA: If they have 2000 gallon
13 tank, they have to demonstrate that they have to put
14 some, you know, much further than 2800 feet.

15 MEMBER ARMIJO: Okay, well --

16 CHAIRMAN CORRADINI: I think my impression
17 is they limited it based on the condition that they
18 wanted to put it this close, that's all.

19 MEMBER ARMIJO: Okay.

20 MEMBER SCHULTZ: These tanks are
21 associated with Fermi 2, the tanks that are being
22 moved at least.

23 MR. TAMMARA: I think so.

24 MEMBER ARMIJO: They're already there.

25 MEMBER SCHULTZ: So is there a license

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1 condition that's going to be applied for Fermi 2?

2 MR. TAMMARA: Not that, that is a
3 operational plant so when they locate probably, that
4 plan has to, you know, show that they maintained the
5 original license distance or whatever it is. I'm not
6 sure, William. I am looking at only the part, from
7 the prospect of Unit 3.

8 MEMBER SCHULTZ: I don't know whether the
9 regulation analysis is more constraining than it might
10 have been for Unit 2 but one would think that it ought
11 to be --

12 MR. TAMMARA: If they look at, I'm pretty
13 sure that --

14 MEMBER SCHULTZ: -- done the same.

15 MR. TAMMARA: I'm not sure, I mean, I
16 cannot answer that.

17 MR. SMITH: So, this is Peter Smith. I
18 just wanted, let me describe what these propane tanks
19 are associated with. They were, they're associated
20 with buildings that were built during the construction
21 of Fermi 2 outbuildings that were used as warehouses
22 and they migrated into being used as shops.

23 And they're all in the vicinity and
24 they're heated by propane because they were, you know,
25 kind of fabricated quickly. They weren't, you know,

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1 I think originally intended to be permanent buildings
2 but they, you know, over time they became that way.
3 And they were heated with propane. They're all in the
4 footprint of the Fermi 3 Plan. So all of the, you
5 know, and they're used as warehouses, et cetera that
6 support Fermi 2 operation.

7 All of that infrastructure is going to be
8 relocated, not necessarily with propane heat or
9 anything else. And to, you know, purposefully design
10 warehouses and other shop facilities and et cetera,
11 they're showing in our site layout plan that we have
12 displayed in the environmental report.

13 So the, in all likelihood these propane
14 tanks are going to be, are going to disappear because
15 that's not --

16 MEMBER ARMIJO: Okay, that's even better.

17 MR. SMITH: -- what they're doing in the
18 building so.

19 CHAIRMAN CORRADINI: Thank you, Peter,
20 that's helpful. John, I think you had a question.

21 MEMBER STETKAR: I do, on two areas. One
22 is the toxic chemical releases, in particular from the
23 rail lines. If I read the FSAR it just cites NUREG CR
24 2650 and it says, "Frequent shipments are defined as
25 exceeding 30 per year for rail shipments."

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1 Now I'll keep focused on railways because
2 of time. And there's a sentence that says,
3 "Potentially toxic chemicals are transported on the
4 Canadian National Railway Lines based on the criteria
5 in NUREG CR 2650, potential releases of toxic
6 chemicals from railway traffic does not require
7 further analysis."

8 Now I didn't study the New Reg, I didn't
9 have enough time, but I did read bits and pieces of
10 it. It's based on keeping toxic releases that affect
11 control room operations less than ten to the minus
12 five per year, I don't care and I don't want to know
13 where that number came from.

14 But it does say, "Unless a transport
15 survey assures shipping frequencies within eight
16 kilometers to the plant on the order of, or lower than
17 four per week for rail or 35 per week for truck, the
18 control room should be isolatable and the shipping
19 frequency then determines the degree of isolation
20 needed."

21 I have no information about the frequency
22 of toxic chemical shipments on the Canadian National
23 Railway Line. Did the staff look at that?

24 MR. TAMMARA: We looked at the, not the
25 shipments but we looked at the release and see whether

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1 it would pose a problem.

2 MEMBER STETKAR: I'm sorry, the guidance
3 in the NUREG is not a single release, it's a
4 frequency. So if you didn't look at the frequency of
5 toxic chemical releases, and you only looked at a
6 single release, are you saying that a single release
7 from the worst possible toxic chemical that's on a
8 rail car still wouldn't cause a problem for the main
9 control room?

10 MR. TAMMARA: If the release doesn't give
11 a concentration exceeding the IDLH of the control room
12 intake, I think it is --

13 MEMBER STETKAR: Did you do that analysis?

14 MR. TAMMARA: Yes.

15 MEMBER STETKAR: You did. What's the
16 worst chemical that's transported on that railway?

17 MR. TAMMARA: I have to go back and take
18 a look, I don't know.

19 MEMBER STETKAR: Okay, in the interest of
20 time --

21 MR. TAMMARA: Yes.

22 MEMBER STETKAR: -- as long, I'd be
23 interested if you can follow up on that --

24 MR. TAMMARA: I'll look that, yes.

25 MEMBER STETKAR: -- maybe after lunch.

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1 CHAIRMAN CORRADINI: But I guess, if I
2 might just interject, I thought we went over this, not
3 the frequency, this is something new I guess that --

4 MEMBER STETKAR: Well, I didn't, I wasn't
5 --

6 CHAIRMAN CORRADINI: I thought had we gone
7 over this relative to, on the rail line and what was
8 the release in a prior meeting. And I have to dig
9 back.

10 MEMBER ARMIJO: I think it was on, U.S.
11 rails but I thought your question was related to the
12 Canadian Rail Lines or was that addressed or not?

13 MEMBER STETKAR: There are a couple of
14 rail lines there, one happens to be owned, Canadian
15 National Railway. The other one is, somebody else
16 owns it.

17 MEMBER ARMIJO: As long as all the rail
18 lines were treated then it's okay.

19 MEMBER STETKAR: If we went over it before
20 I apologize.

21 CHAIRMAN CORRADINI: No, no, I, we did --

22 MEMBER STETKAR: I looked back in my
23 notes, I could find it.

24 CHAIRMAN CORRADINI: -- but not the
25 frequency issue. We did go over the magnitude because

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1 --

2 MEMBER STETKAR: Well, but, I mean, if
3 they looked at the worst chemical that's transported
4 on the rail line and even if it blew up everyday, they
5 don't get the concentration at the control room. I
6 don't care what the frequency --

7 MEMBER ARMIJO: And that should be
8 sufficient.

9 MEMBER STETKAR: That should be
10 sufficient.

11 MEMBER ARMIJO: Even though the regulation
12 says you have to calculate the frequency you don't
13 care.

14 MEMBER STETKAR: I don't care. If they
15 looked at the worst that could be transported and the
16 concentration, that's --

17 MR. TAMMARA: Yes, I have to get back to
18 you on that, yes, I will.

19 MEMBER STETKAR: -- and that's fine.

20 CHAIRMAN CORRADINI: What's the added
21 confirmation number?

22 MEMBER STETKAR: Let me ask you about the,
23 and remind me if we went over this before too because
24 I'm obviously not keeping good notes.

25 CHAIRMAN CORRADINI: Well, I'm not sure if

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1 you were at the meeting I guess.

2 MEMBER STETKAR: I may not have been.

3 Aircraft crash --

4 MR. TAMMARA: That we will address in
5 Chapter 3 this afternoon.

6 MEMBER STETKAR: Okay, I'll wait.

7 MR. TAMMARA: Yes. That is a part of 3.1.

8 MEMBER STETKAR: That was quick. That's
9 fine, I'll wait.

10 MS. GOVAN: Okay, at this time Brad Harvey
11 will present Meteorology and Air Quality.

12 MR. HARVEY: Hello, my name is Brad.

13 CHAIRMAN CORRADINI: Brad --

14 MR. HARVEY: I'm sorry.

15 CHAIRMAN CORRADINI: I'm just looking at
16 my notes, I apologize. I want to make sure the
17 Committee's all on the same page. As I have it, on
18 the October 21, 2011 meeting, something I'm sure is
19 just stuck in your brain, when we went over Chapter 6,
20 there was an offsite rail accident limiting case.

21 And as I have it in my notes, basically we
22 came to the conclusion that the committee would prefer
23 that the licensee volunteer to have a, what I'll call
24 a noxious gas detection system.

25 But all the calculations both by staff and

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1 by licensee showed that they were within the bounding
2 analyses, therefore it wasn't an issue from a,
3 essentially from a bounding calculation of a effluent.
4 But that's, it was Chapter 6 that we went over then,
5 sorry. I'm sorry, Brad, go ahead.

6 MR. HARVEY: Okay. Again, my name is Brad
7 Harvey. I'm a Senior Physical Scientist in the
8 Hydrology and Meteorology Branch within the Division
9 of Site Safety and Environmental Analysis.

10 And I'll be discussing the staff review of
11 the Fermi 3 COL FSAR Section 2.3, Meteorology and Air
12 Quality. There are five subsections in Fermi 3 FSAR
13 Section 2.3 related to meteorology and air quality.
14 2.3.1 is general climate, 2.3.2, local meteorology,
15 2.3.3, meteorological monitoring, 2.3.4, short-term or
16 accident diffusion estimates, and 2.3.5, long-term or
17 routine diffusion estimates.

18 SER Section 2.3 also discusses the staff's
19 review of Chapter 2 Appendices to the Fermi 3 FSAR,
20 Appendix 2A which provides inputs to the ARCON96
21 computer code, which is the atmospheric dispersion
22 model used to evaluate design basis acts and airborne
23 releases through the control room, and Appendix 2B
24 which provides the ventilation stack pathway
25 information for modeling routine releases to the

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1 atmosphere.

2 The status of SER Section 2.3 is that
3 there are no open items. However, there is one
4 confirmatory item related to Regulatory Guide 1.221,
5 which is design-basis hurricane and hurricane missiles
6 for nuclear power points.

7 Reg. Guide 1.221 was issued in October
8 2011 to address NRC staff's concerns that the design
9 basis tornado wind and missile specified Reg. Guide
10 1.27, excuse me, 1.76, were not found in all areas of
11 the United States.

12 The staff subsequently issued an RAI
13 asking the applicant to include new site
14 characteristics in FSAR called hurricane wind speed
15 and hurricane missile spectra, or provide a
16 justification as to why the FSAR should not be updated
17 to include these new site characteristics.

18 And as response to this RAI, the applicant
19 stated that the Fermi 3 is located well inland from
20 areas impacted by hurricanes and concluded that the
21 Fermi 3 tornado site characteristics are bounding.

22 The NRC staff found the applicant's
23 assessment acceptable and notes that the applicant has
24 committed to providing this information in a future
25 revision of the FSAR. This commitment is Confirmatory

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1 Item 02.03.01-20.

2 This next slide presents the staff's
3 review of COL Item 2.0-7-A. This COL Item requires
4 the COL applicant to supply site-specific information
5 in accordance with SRP Section 2.3.1, that is the
6 applicant should describe averages and extremes of
7 climatic conditions and regional meteorological
8 phenomenon that could affect the safe design and
9 siting of the plant. The applicant presented this
10 information in Section 2.3.1 of the FSAR.

11 FSAR Section 2.3.1 includes information on
12 a general climate of the Fermi 3 site such as long
13 term means and historic extremes for temperature,
14 water vapor, precipitation, and wind.

15 This FSAR section also includes
16 frequencies of severe weather phenomenon in this site
17 that could affect plant operations such as
18 thunderstorms and lightning, strong winds, tornadoes
19 and water spouts, hail, drought, dust and sandstorms,
20 and freezing rain and ice storms.

21 On most instances, staff in this review
22 FSAR Section 2.3.1, is the applicant's consideration
23 of Fermi 3's climatic site characteristic values that
24 correlate to ESBWR climatic site parameter values.

25 The ESBWR site parameters are the

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1 postulated environmental features of an assumed site
2 that the General Electric-Hitachi used to design the
3 ESBWR.

4 And 10CFR5279D1 states the COL FSAR,
5 "Should contain information sufficient to demonstrate
6 that the Fermi 3 site characteristics fall within the
7 site parameters specified in the ESBWR design
8 certification.

9 The ESBWR climatic site parameters include
10 the following, extreme wind, which is defined as 100
11 year return period, three second gust value, which is
12 applied to seismic category 1-2 in radwaste building
13 structures, and a 50 year return period, three second
14 gust value, which is applied to other seismic category
15 NS standard plant structures.

16 The NRC staff reviewed the basic wind
17 speed map in the American Society of Civil Engineers
18 Design Load Standard ASCE 705 for the portion of the
19 United States that includes the Fermi 3 site and
20 obtained the same 50 year return period value as the
21 applicant.

22 The applicant used the conversion factor
23 from ASCE 705 to convert the 50 year return period to
24 100 year return period value. Because the applicant's
25 extreme wind site catches values are consistent with

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1 ASCE 705, the staff finds the applicant's extreme wind
2 site characteristic values to be acceptable.

3 Another set of ESBWR climatic site
4 parameters associated with design basis tornado, which
5 includes a maximum tornado wind speed, pressure drop,
6 and rate of pressure drop.

7 The applicant shows this tornado site
8 characteristics faced on Revision 1 to Regulatory
9 Guide 1.76. The proposed Fermi 3 site is located in
10 Tornado Intensity Region 1, which is where the most
11 severe tornadoes frequently occur.

12 The most severe design basis tornado
13 characteristics apply to COL sites located in Region
14 1. Because the applicant's design basis tornado site
15 characteristic values are based on Regulatory Guide
16 1.76, the NRC staff concludes that the applicant has
17 chosen a set of acceptable tornado site characteristic
18 values.

19 The third set of site parameters on a
20 maximum ground-level weight of the normal and extreme
21 winter precipitation events, for use in a winter roof
22 load design.

23 In accordance to an interim staff guidance
24 staff document ISG-7, the applicant chose the maximum
25 recorded snow cover value recorded in the site region

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1 to derive its maximum ground-level weight for a normal
2 winter precipitation event.

3 Also in accordance with ISG-7, the
4 applicant chose the sum of the weight of the maximum
5 recorded snow cover and weight of the historic maximum
6 two day snowfall event to derive the maximum ground
7 level weight with extreme winter precipitation event.

8 DR. WALLIS: But that, what really
9 dominates it is this two feet of water that's assumed
10 on the roof.

11 MR. HARVEY: That's a worse case.

12 DR. WALLIS: That's far bigger than the
13 snow load.

14 MR. HARVEY: That's the point, that's the
15 design basis and --

16 DR. WALLIS: But it doesn't say here,
17 you're talking about normal and extreme winter events
18 then, it's two feet which really dominates everything.
19 That's not an event, I mean, that's just a bounding
20 assumption.

21 MR. HARVEY: Yes. NRC, the NRC staff
22 found the applicant's winter precipitation site
23 characteristic values to be acceptable because they
24 were derived based on the guides provided ISG-7.

25 MEMBER STETKAR: But Brad, I mean,

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1 answering, if they still showed that the ground level
2 accumulation was greater than the DCD they'd still
3 have a problem, right?

4 MR. HARVEY: In theory, you, I don't see
5 --

6 MEMBER STETKAR: Because they do the, you
7 know, the snow pack plus incident precipitation at
8 ground level --

9 MR. HARVEY: Yes.

10 MEMBER STETKAR: -- in addition to the
11 roof bearing stuff.

12 MR. HARVEY: Yes, yes.

13 MEMBER STETKAR: And they were okay on
14 that, too, that's fine.

15 MR. HARVEY: I think one third of the site
16 parameter value.

17 MEMBER STETKAR: Yes. Just for Graham's
18 but I mean, you know, if you were in a place where you
19 got a huge amounts of snow, despite the artificiality
20 of the --

21 DR. WALLIS: What do they do with the
22 falling icicles and things like that?

23 MEMBER STETKAR: -- two feet of water, you
24 could still have other, other --

25 DR. WALLIS: You get huge icicles

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1 sometimes in the winter, that weighs hundreds of
2 pounds. Is there any problem with them, I mean, they
3 fall on any kind of equipment or anything --

4 MR. HARVEY: I suspect they might be
5 bounded by the --

6 DR. WALLIS: -- or something --

7 MR. HARVEY: -- they are design basis
8 tornado missiles.

9 CHAIRMAN CORRADINI: They're 1000 feet
10 away, they're not going to fall on a propane tank.

11 DR. WALLIS: Well, they're not going to
12 fall on the propane tank, thank you.

13 MR. HARVEY: But you have design basis
14 tornado missiles, which is a car and a pipe. That --

15 DR. WALLIS: And that probably covers all
16 this stuff.

17 MR. HARVEY: I would assume that would
18 cover an icicle.

19 The last set of climatic site parameters
20 I will be discussing are related to ambient design
21 temperatures. The ESBWR has site parameter values for
22 2 percent, 1 percent, and 0 percent annual exceedance
23 maximum dry bulb, the mean points in a wet bulb
24 temperatures, as well as non points in a wet bulb
25 temperatures.

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1 DR. WALLIS: How do you define 2 percent
2 exceedance of a temperature?

3 MR. HARVEY: That's the, that temperature
4 is exceeded no more than 2 percent of the hours.

5 DR. WALLIS: It's under the time, okay.

6 MR. HARVEY: So there's 8760 --

7 DR. WALLIS: Zero percent is very difficult
8 to ever establish.

9 MR. HARVEY: Say what?

10 DR. WALLIS: You never get to the exact
11 tail of a distribution. So zero percent is really a
12 phantom.

13 MR. HARVEY: It's been interpreted as a
14 historic maximum.

15 DR. WALLIS: Really means something like
16 0.001 or something. Zero is impossible to get to and
17 it, you know?

18 MR. HARVEY: Yes. The applicant's 2
19 percent and 1 percent exceedance temperature values
20 were based on data published by ASHRAE for Detroit
21 Metropolitan Airport.

22 The applicant's 0 percent exceedance
23 temperature values were based on a hundred year return
24 period values that were also derived from the Detroit
25 Metropolitan Airport data.

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1 The Detroit Metropolitan Airport is the
2 closest first order National Weather Service climatic
3 observation station to the Fermi 3 site. And in order
4 to confirm that the Detroit Airport data are general
5 represent of the Fermi 3 site conditions, the staff
6 generated dry bulb and dew point statistics from the
7 Detroit Airport 2001, 2007 data and compared these
8 statistics to data recorded by the Fermi 3 onsite
9 meteorological program for this same time period.

10 The staff found that some of the high
11 temperature and humidity statistics, such as the
12 maximum 1 percent exceedance values, the Detroit
13 Airport data tended to be higher or more conservative
14 than the Fermi 3 data.

15 The staff attributes this to the Fermi 3
16 site being located closer to Lake Erie and the lake's
17 moderating effects on temperature during the summer.
18 The staff therefore concludes that the Detroit
19 Metropolitan Airport temperature and humidity data are
20 appropriate for use in determining ambient design
21 temperature site characteristic values for the Fermi
22 3 site.

23 ESBWR also has a unique set of three site
24 parameters related to its control and habitability
25 area transient temperature analysis. The staff

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1 performed independent assessments and came up with
2 similar values as the applicant. Therefore the staff
3 finds the applicant's ambient design temperate site
4 characteristic values to be acceptable.

5 New slide. The next slide presents the
6 staff's review of COL Item 2.0-8-A. This COL Item
7 requires the COL applicants to supply site specific
8 information in accordance with SRP Section 2.3.2, that
9 is, the COL applicant should provide summaries of the
10 local or site onsite meteorological data, an
11 assessment of potential influence of the proposed
12 plant in this facility on local meteorological
13 conditions, a description of the impact of these
14 modifications on plant design and operation, and a
15 topographical description of the site and its
16 environs.

17 The applicant presented his information in
18 SCR Section 2.3.2 of the FSAR. The applicant provided
19 summaries of dry bulb and dew point temperatures, wind
20 roses, wind direction persistence, atmospheric
21 stability, and inversions in FSAR Section 2.3.2 from
22 the data collected onsite during the five year period
23 2003 to 2007.

24 The applicant also provided the staff a
25 copy of its hourly meteorological database for this

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1 period of record. After responding to a set of RAIs
2 on the hourly database and resulting data summaries to
3 be presented in the FSAR, the staff was able to
4 conclude that the applicant has adequately described
5 local meteorological conditions at the site.

6 The applicant also provided data on
7 precipitation, fog and smog, vertical mixing layer
8 heights, and wind roses from nearby climatic data
9 stations. The staff evaluated and independently
10 confirmed these data as presented in the FSAR.

11 The applicant also evaluated the influence
12 of Fermi 3 and its facilities on local meteorology,
13 the logic potential influence on local meteorology
14 from the construction operation of Fermi 3 will be
15 plumes from the 600 foot tall natural draft cooling
16 tower, which will be the primary means of heat
17 dissipation for the plant.

18 The most likely impacts in the operation
19 to cooling tower are plume shadowing and salt
20 deposition. The use of drift eliminators along with
21 good dispersion resulting from the height of the tower
22 and buoyant plume rise will result in minimum ground
23 level concentrations of particulate matter that should
24 not adversely impact outdoor, electrical --

25 DR. WALLIS: What?

1 MR. HARVEY: It's design particulate
2 matter in the water, in the cooling water.

3 DR. WALLIS: In the cooling tower water?

4 MR. HARVEY: You're correct.

5 DR. WALLIS: Where does it come from?

6 MR. HARVEY: Well I don't think it's,
7 they're using purified water so wherever their source
8 of their --

9 MR. SMITH: The source, this is Peter
10 Smith, the source of cooling tower make up water is
11 Lake Erie.

12 DR. WALLIS: And Lake Erie is notoriously
13 salty.

14 MR. SMITH: It's a fresh water lake but it
15 has dissolved solids in it.

16 DR. WALLIS: There are some solids. So
17 it's whatever, it's not the usual kind of salt.

18 MEMBER STETKAR: It doesn't have to be
19 NaCl, it can be --

20 DR. WALLIS: Whatever happens, the mineral
21 deposits.

22 MR. HARVEY: It's just whatever you've
23 sunk in Lake Erie.

24 CHAIRMAN CORRADINI: Mineral deposits.

25 DR. WALLIS: Mineral deposits, right.

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1 CHAIRMAN CORRADINI: Hard water.

2 DR. WALLIS: Okay, that's right, thank
3 you.

4 DR. HINZE: Brad, you assume that the data
5 from the onsite monitoring is representative of the
6 Fermi 3 conditions?

7 MR. HARVEY: For atmospheric dispersion
8 primarily.

9 DR. HINZE: Right, for this local
10 meteorological data semblance. The data from the
11 onsite monitoring is representative of Fermi 3 then.

12 MR. HARVEY: Within reasonable limits,
13 yes.

14 DR. HINZE: How do you justify that?

15 MR. HARVEY: Proximity of the tower to the
16 site.

17 DR. HINZE: And you are considering that
18 the offshore, onshore breezes are not going to be
19 affected at all?

20 MR. HARVEY: I don't think the offshore
21 breezes will. The onshore breezes, probably. The
22 only thing we use the data for, at least in this
23 section of 2.3.1, we did a comparison of the Detroit
24 Metro Airport with the temperature recorded onsite.

25 And you would expect for the onshore case,

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1 that Detroit, Edison would have the more severe
2 climatic conditions. And that's what they based their
3 climatic site characteristics on.

4 DR. HINZE: Well you'll find out once you
5 get the overlap of the new tower, I guess.

6 MR. HARVEY: That's correct.

7 DR. HINZE: And then you may have to
8 reconsider?

9 MR. HARVEY: Well, that's up to the
10 applicant, I guess, if they choose to share that
11 information with us but, yes. Locating a
12 meteorological tower is a set of compromises in terms
13 of physical structures, wetlands --

14 DR. HINZE: I'm sure.

15 MR. HARVEY: -- so there is, there's
16 always not really an ideal location so the applicant
17 is doing the best they can with what they have to deal
18 with.

19 DR. HINZE: Thank you.

20 MR. HARVEY: Sure. Okay, I think we're
21 on, we finished local so we're on Slide 19, okay?

22 This next slide presents the staff's
23 review of COL Item 2.0-9-A. This COL item requires
24 the COL applicants to supply site-specific information
25 in accordance with SRP Section 2.3.3, that is the COL

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1 applicant should describe its onsite meteorological
2 emissions program and provide a copy of the resulting
3 meteorological data.

4 FSAR Section 2.3.3.1, discusses a pre-
5 application meteorological monitoring program for
6 Fermi 3. The pre-application monitoring program is
7 based on the pre-existing operational meteorological
8 monitoring program equipment used for Fermi 2.

9 Information presented in the FSAR includes
10 tower and instrument siting, instrumentation accuracy
11 and thresholds, instrumentation calibration, service,
12 and maintenance, and data acquisition, reduction, and
13 processing. The applicant also provided the staff
14 with a copy of its hourly onsite meteorological
15 database for the seven year period 2001 through 2007.

16 The visual inspection of the
17 meteorological monitoring program by the staff during
18 a site audit revealed that the distance from the
19 meteorological tower to a wooded area located west of
20 the tower did not meet the distance offset criteria
21 specified in Regulatory Guide 1.23.

22 The staff compared the lower or ten meter
23 onsite wind speeds recorded in 1985, 1994, and 2003,
24 2005 periods and found an increased frequency of slow
25 wind speeds as time went on.

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1 The applicant eventually conceded that the
2 potential exists for the wind speed measure at the ten
3 meter level during the 2001 to 2007 period to be lower
4 than the actual wind speed at the ten meter level.

5 In response to these concerns, the
6 applicant provided the staff a copy of the 1985
7 through 1989 onsite meteorological database and stated
8 that the aerial photographs of this site, the area
9 surrounding the Fermi 3 meteorological tower confirmed
10 the absence of significant air flow obstructions to
11 wind measurements during this earlier time period.

12 The staff also performed a comparison of
13 stability class frequency distributions based on a
14 difference in temperature measure between the 60 meter
15 and ten meter levels on the onsite meteorological
16 tower because the '85, '89 period and 2002, 2007
17 period of record and found the frequency of extremely
18 unstable conditions more than doubled during the more
19 recent time period.

20 Discrepancies in wind speed and stability
21 class frequency distributions between the 1980s and
22 2000 databases, created uncertainty as to which
23 meteorological data set is more representative of
24 long-term dispersion conditions.

25 Given the uncertainty in the data, the

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1 staff asked the applicant to evaluate the dispersion
2 analyses presented in FSAR Sections 2.3.4 and 2.3.5
3 using both sets of data and using more conservative or
4 bounding dispersion estimates in the subsequent dose
5 assessments.

6 MEMBER SCHULTZ: Brad, we just talked a
7 bit about the tower replacement. The one year overlap
8 period, I recall is typical when towers are replaced.
9 Is that, just wanted to confirm that.

10 MR. HARVEY: The staff has no specific
11 guidance on that. But it sounds reasonable because
12 you get a whole annual cycle. And I think the intent
13 would be to compare during that annual cycle what you
14 see between the two towers.

15 MEMBER SCHULTZ: That's been done before
16 but something you mentioned, suggested that this
17 comparison is not going to be provided to the staff
18 once the one year is completion, is there an
19 expectation by the staff that the information will be
20 provided in terms of the comparison?

21 MR. HARVEY: That's a good question. I
22 guess the answer would be yes. But there's no
23 regulatory hook at the moment for them to do that.
24 It's a commitment that they've made in their FSAR but
25 the applicant can maybe speak to that.

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1 MEMBER SCHULTZ: Is that a commitment that
2 has been made?

3 MR. SMITH: We made a commitment to do the
4 comparison but we didn't make a commitment to --

5 MR. HARVEY: To share it with us.

6 MR. SMITH: -- to report on the results of
7 that.

8 MEMBER SCHULTZ: Have you set criteria
9 that will determine for you whether there's a
10 difference between our A and B?

11 MR. SMITH: No, I think as I said earlier,
12 I think when we see the data we'll know what we need
13 to do and can handle it through the existing
14 processes, typically into our corrective action
15 program --

16 MEMBER SCHULTZ: Corrective action
17 program.

18 MR. SMITH: -- and then evaluation of the
19 differences and taking the appropriate actions that
20 are necessary based on that.

21 MEMBER SCHULTZ: Thank you.

22 MR. HARVEY: FSAR Section 2.3.3.2
23 discusses the operational meteorological monitoring
24 program for Fermi 3. Because of the natural draft
25 cooling tower for Fermi 3 will be built in the

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1 approximate location of the existing onsite
2 meteorological tower, the applicant has committed to
3 erecting a new meteorological tower prior to the
4 construction of Fermi 3.

5 This new meteorological tower will be
6 located far enough away from the proposed Fermi 3
7 natural draft cooling tower so the measurements on the
8 new meteorological tower should not be adversely
9 affected by the new cooling tower.

10 The applicant has made a commitment that
11 the new meteorological tower will be operational for
12 at least one year prior to decommissioning of the
13 existing meteorological tower to ensure that the
14 meteorological parameters measured at the new
15 meteorological tower are representative of the
16 atmospheric conditions at the Fermi site. The staff
17 finds this commitment acceptable.

18 The next slide presents the staff's review
19 of three COL items related to performing atmospheric
20 dispersion analysis supporting design basis accident
21 assessments presented in FSAR Chapter 15.

22 COL Item 2.0-10-A requires the COL
23 applicant to supply site specific information in
24 accordance with SRP Section 2.3.4 to show that the
25 site's offsite and onsite dispersion values as

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1 calculated in accordance with Regulatory Guides 1.145
2 and 1.194 and compare to dispersion values in Chapter
3 15, result in doses less than those stipulated in 10
4 CFR 5279 and the applicable portions of SRP Sections
5 11 and 15.

6 The applicant used the computer code PAVAN
7 to estimate atmospheric dispersion estimates or X over
8 Q values, at the exclusionary boundary and at the
9 outer boundary of the low population zone for
10 potential accident releases of radioactive material.
11 The PAVAN model implements the methodology outlined in
12 Regulatory Guide 1.145.

13 The staff independently ran a PAVAN code
14 using both the '85, '89 and 2002, 2007 meteorological
15 data sets. The staff finds the applicant has
16 identified appropriate EAB and LPZ atmospheric
17 dispersion site characteristics values using the 2002-
18 2007 data set, which is bounding.

19 MEMBER SCHULTZ: Is the door closure
20 during refueling, is that for the whole outage period
21 or just during that refueling window or movement of
22 fuel?

23 MR. HARVEY: Actually, I'm going to come
24 to that in a couple slides, Steve, if we can wait.

25 MEMBER SCHULTZ: Okay, thank you.

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1 MR. HARVEY: COL Item 2A.2-1-A, requires
2 the applicant to run ARCON96 atmospheric dispersion
3 model for all the design basis accident source and
4 onsite receptor combinations listed in ESBWR DCD Tier
5 2 Appendix 2A using site specific meteorological data.

6 The applicant used the computer code
7 ARCON96 to estimate X over Q values at the control
8 room and TSC for potential design basis accident
9 releases of radioactive material.

10 The ARCON96 model implements the
11 methodology outlined in Regulatory Guide 1.194. The
12 applicant provided the results from both the '80's
13 data and the 2000 data sets in the FSAR.

14 The staff reviewed the applicant's ARCON96
15 input and output files for both the 1980s and 2000
16 meteorological data sets and found the inputs to be
17 consistent with the information presented in Appendix
18 2A of Tier 2 to the ESBWR DCD.

19 Because the FSAR included the X over Q
20 values calculated with both the 1985, '89 and the 2001
21 to 2007 data sets, the staff accepts the control room
22 and TSC X over Q values presented by the applicant.

23 COL Item 2A.2-2-A requires the COL
24 applicant to have the doors and personnel airlocks
25 located on the sides of the reactor building and fuel

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1 building closest to the control room closed during the
2 movement of irradiated fuel bundles if the X over Q
3 values and therefore the doses from these release
4 points could be higher than those calculated for the
5 fuel handling accident which assumes these doors are
6 closed.

7 The applicant responded to this COL
8 information item by stating that the doors and
9 personal airlocks on the east side of the reactor
10 building and fuel building will be administratively
11 controlled, administratively controlled to remain
12 closed during refueling. The staff finds the
13 applicant's response to the COL item to be acceptable.
14 That answers your question.

15 MEMBER SCHULTZ: Thank you.

16 MR. HARVEY: New slide. The next slide
17 presents the staff's review of COL Item 2.0-11-A.
18 This COL item requires the COL applicant to supply
19 site specific information in accordance with SRP
20 Section 2.3.5.

21 That is the COL applicant should provide
22 X over Q values in atmospheric dispersion estimates
23 for D over Q values by calculating concentrations in
24 the air and the amount of material deposited on the
25 ground as a result of routine releases of radiological

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1 effluence into the atmosphere during normal plan
2 operation.

3 The applicant used the XOQDOQ computer
4 code to estimate X over Q and D over Q values
5 resulting from routine releases. The XOQDOQ model
6 implements the constant mean wind direction model
7 methodology outline Regulatory Guide 1.111.

8 The staff reviewed, performed an
9 independent evaluation of the applicant's XOQDOQ
10 results by executing the XOQDOQ model using both the
11 1985, '89 and 2002, 2007 onsite meteorological
12 databases. The staff obtained similar results for the
13 site boundary and special receptors of interest.

14 The applicant used a higher value '85, '89
15 or 2002, 2007 X over Q and D over Q values in its
16 offsite airborne dose evaluation presented in FSR
17 Section 12.2.

18 The staff finds the applicant's approach
19 at using the higher or more conservative of either the
20 1980s or 2000s X over Q and D over Q values in its
21 offsite airborne dosing evaluations to be acceptable.

22 This last slide in my presentation
23 summarizes the conclusions and status of SER Section
24 2.3. The FSAR met the regulatory requirements,
25 addressed regional and local climatic information

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1 including climatic extremes and severe weather
2 occurrences that may affect the design and siting of
3 a nuclear power plant.

4 The FSAR also presents appropriate
5 information on the atmospheric dispersion characters
6 of the site to determine that the radiological
7 effluence of postulated accidental releases as well as
8 routine operational releases are within the commission
9 guidelines.

10 All COL guidelines were adequately
11 addressed by the applicant. There are no open items.
12 There is one confirmatory item relating to updating
13 the FSAR to address the design-basis hurricane winds
14 and missiles presented in Regulatory Guide 1.221.

15 DR. WALLIS: Why are you worried about
16 hurricanes in Detroit?

17 MR. HARVEY: We're particularly not but we
18 had this NUREG Guide on --

19 DR. WALLIS: Does the Reg. Guide design
20 basis says a hurricane can occur anywhere, including
21 Nevada or somewhere?

22 MR. HARVEY: No actually, no it does not,
23 no.

24 DR. WALLIS: So what is this design basis
25 hurricane wind do about Detroit? How does it

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1 calculate hurricanes in Detroit?

2 MR. HARVEY: Based --

3 DR. WALLIS: I think that normal storms
4 are probably equivalent to --

5 MR. HARVEY: And you're correct and that's
6 basically what the applicant told us.

7 DR. WALLIS: Yes. So what's the problem?

8 MR. HARVEY: There is no problem. There
9 is no problem.

10 DR. WALLIS: But there's a confirmatory
11 item.

12 MR. HARVEY: They have committed to update
13 their FSAR to include information on hurricanes.
14 That's the confirmatory item.

15 DR. WALLIS: But it's not important.

16 MR. HARVEY: It's not important. But it
17 is a confirmatory item so I felt obligated to point
18 that out. Any other questions?

19 CHAIRMAN CORRADINI: Other questions by
20 the committee? Okay. I wanted to thank Brad for
21 that. Now I, it's more of a, some of us including
22 particularly me, have a side meeting in about ten
23 minutes. So my question is for Henry, do you have
24 something you want to go over now or can we break now
25 and come back a bit early to catch up on Section 2.4?

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1 MR. JONES: That's up to you, what you
2 want to do.

3 CHAIRMAN CORRADINI: You're, we're not
4 going to, the staff is at the ready regardless of
5 either approach?

6 FEMALE PARTICIPANT: Let's break right
7 now.

8 CHAIRMAN CORRADINI: Okay.

9 DR. WALLIS: You heard the discussion
10 earlier?

11 CHAIRMAN CORRADINI: Right, so my
12 suggestion, if I, I'm sorry?

13 DR. WALLIS: I just wondered if he's going
14 to get into this --

15 CHAIRMAN CORRADINI: Well I'm sure he's
16 going to get into something you're going to ask a
17 question about so that's why I'm anticipating, okay?
18 So my suggestion, my suggestion is that we break now,
19 come back and do 2.4. The only thing we might take a
20 few minutes before we start 2.4 is if the licensee has
21 some information they were going to look up.

22 We lost Mr. Stetkar already to a side
23 meeting. He wanted to make sure I thanked the staff
24 and the licensee at this point, he may not be back in
25 time, on how detailed the site information was and the

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1 review was.

2 He said in comparison to others this was
3 excellent. So, for Stetkar that was an unusual
4 comment so I thought at least I'd put that one on the
5 record.

6 MALE PARTICIPANT: Yes, I agree with that.

7 CHAIRMAN CORRADINI: All right? So at
8 this point, let's take a break for lunch, we'll try to
9 come back at quarter to 1 and we'll see whether
10 licensee has some things to give us on details or
11 we'll jump right in to what Henry's going to talk
12 about in 2.4, okay? Thank you.

13 (Whereupon, the above-mentioned matter
14 went off the record at 11:50 a.m. and resumed at 12:45
15 p.m.)

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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 --

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1 MR. THOMAS: Yes, right but that's --

2 MEMBER STETKAR: -- in your list based on
3 that criteria.

4 MR. THOMAS: -- right, but that's the
5 reason why that one's on there.

6 MEMBER STETKAR: That's, okay, okay.

7 MR. THOMAS: The second item, and Mr.
8 Armijo is not here but dealt with the normal or like
9 the current floodwater level as a FYI-type issue, and
10 went back and looked at our contour maps that we have
11 and it's approximately 567 feet, you know, it varies
12 a little bit during the year but it's approximately --

13 CHAIRMAN CORRADINI: Oh, this is the
14 ground, this is what Sam had asked?

15 MR. THOMAS: Correct.

16 CHAIRMAN CORRADINI: So about ten feet
17 below --

18 MR. THOMAS: Right, about ten feet below
19 the historical high.

20 CHAIRMAN CORRADINI: -- the historical
21 high, okay.

22 MR. HERRELL: All right, the other, there
23 was a question about the hydrodynamic dispersity and
24 what parameters were used, what measured parameters
25 were used and how they were biased.

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1 CHAIRMAN CORRADINI: This was for the
2 groundwater liquid effluent accident calculations?

3 MR. HERRELL: That's correct.

4 CHAIRMAN CORRADINI: Okay.

5 MR. HERRELL: Oh, my name is Jim Herrell,
6 sorry. The parameters were calculated based on EPRI
7 document estimation of hydrodynamic dispersivity in
8 selected sub-surface materials. And that document
9 includes several inputs, the inputs are hydraulic
10 conductivity, hydraulic gradient, effective porosity,
11 and distance.

12 And those, all of those inputs were biased
13 in a conservative direction. For example, as we were
14 talking about the time to get to the lake being from
15 one to 18 years kind of a number, we would have used
16 the load velocity end, or the load conductivity end to
17 provide the most conservative result for the
18 dispersivity.

19 MEMBER RYAN: So you always pick the most
20 conservative one in the range?

21 MR. HERRELL: That's right, that's
22 correct.

23 MEMBER RYAN: Yes, okay great, thanks.

24 DR. WALLIS: You would have used the high
25 conductivity wouldn't you, when you were interested in

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1 the shortest time.

2 MR. HERRELL: Well for the shortest time
3 we would use high. But for dispersivity --

4 DR. WALLIS: You'd use the other one.

5 MR. HERRELL: That's right, that's
6 correct.

7 DR. WALLIS: Do you actually have
8 measurement to these things or do you just have a big
9 distribution of assumptions?

10 MR. THOMAS: For --

11 MR. HERRELL: Go ahead.

12 MR. THOMAS: We have measured values for
13 those but it's a range because you're taking
14 measurements from several different locations onsite.

15 DR. WALLIS: So the conductivity of the
16 soil varies by that big a factor?

17 MR. THOMAS: The measured conductivity
18 varied based on the locations.

19 MEMBER RYAN: The first rule of geo-
20 hydrology, Graham, is just one more quote, please.

21 MR. THOMAS: That's right.

22 DR. WALLIS: Only one?

23 MEMBER RYAN: So I submit, it is a good
24 observation but I sympathize that it's very difficult
25 to say, I mean you're going to get a pretty

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1 significant range of datas in most regions, so I
2 appreciate the comment. But, thank you.

3 CHAIRMAN CORRADINI: Okay, I don't have
4 anything else listed that we were asking you on
5 specific information. So I think we've caught up on
6 all the little facts we were asking of you. Or did I
7 miss one? You guys want to consult on that?

8 MR. HERRELL: Yes, there was, there was a
9 question about the Fermi 2 cooling tower salt
10 deposition.

11 CHAIRMAN CORRADINI: That's right, I have
12 that down. I apologize.

13 MR. HERRELL: Okay.

14 CHAIRMAN CORRADINI: In terms of the
15 bounding analysis in terms of the cross analysis
16 between Unit 2 and 3.

17 MR. HERRELL: Yes. And what I did was I
18 tried to envelope how much salt would need to be, come
19 out of all three, you know, Fermi 2 cooling towers
20 plus the Fermi 3 cooling tower in the month period to
21 cause contamination that would be harmful to the
22 bushings.

23 What a calculation comes out to be is
24 about 300 kilograms per kilometer squared per month
25 which, versus our model predicted impact for the Fermi

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1 3 is 0.02 kilograms per kilometers squared per month.

2 So there is unrealistically that a cooling
3 tower could probably reach that type of salt
4 deposition rate based on the salt composition of the
5 water that we are using.

6 CHAIRMAN CORRADINI: I heard what you just
7 said. I don't appreciate it. What you said to us
8 before that I kind of appreciated was that if you
9 looked at only Unit 3 and the switch yard with Unit 3,
10 it was in the order of years of no precipitation to
11 wash out the stuff.

12 And then I was expecting you were going to
13 give us some sort of --

14 MR. HERRELL: Well --

15 CHAIRMAN CORRADINI: -- seat of the pants
16 of the compare.

17 MR. HERRELL: Yes, I mean, if you just do
18 take the Fermi 3 --

19 CHAIRMAN CORRADINI: Oh, so you're just
20 thinking of doing the division of the two and that
21 will give me an idea?

22 MR. HERRELL: Yes.

23 CHAIRMAN CORRADINI: Okay.

24 MR. HERRELL: I mean, if you take the
25 Fermi 3, base some Fermi 3 cooling tower of that 0.02

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1 --

2 CHAIRMAN CORRADINI: Oh, 0.02.

3 MR. HERRELL: -- that's the kilograms per
4 kilometer squared per month.

5 CHAIRMAN CORRADINI: Okay.

6 MR. HERRELL: And that's what the SACTI
7 model predicts, as the seasonal maximum. Now if you,
8 within a, we're taking, using that based on the 300
9 kilograms per kilometer squared per month
10 concentration for bushings, that would take 15,000
11 months of a dry period, which is --

12 CHAIRMAN CORRADINI: Okay so even longer
13 than what you --

14 MR. HERRELL: That's 1,250 years.

15 CHAIRMAN CORRADINI: Yes, I got that part.

16 MR. HERRELL: So --

17 CHAIRMAN CORRADINI: I didn't think I was
18 just going to, I didn't think I was just going to
19 divide the two but that's what you're telling me?

20 MR. HERRELL: Yes.

21 CHAIRMAN CORRADINI: Okay, fine. Thanks.

22 MR. HERRELL: Thank you.

23 CHAIRMAN CORRADINI: Okay, now we've
24 caught up. Henry?

25 MS. GOVAN: Okay, before we begin --

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1 CHAIRMAN CORRADINI: Oh, yes.

2 MS. GOVAN: -- Section 2.4, there was one
3 look up of the NRC staff to identify the worse
4 chemical that could be released from the railways and
5 extending the --

6 CHAIRMAN CORRADINI: Right, in terms of
7 the bounding calculations.

8 MS. GOVAN: Correct.

9 MR. TAMMARA: Right, yes, what the FSAR
10 says, if you go to that section railways, then they
11 identify the railways are to 3.5 miles of it. And
12 they say that, you know, they did not identify any
13 specific chemical because of confidentiality or
14 whatever.

15 So what I tried to do myself as a
16 confirmatory calculation is take, they have calculated
17 in response to my RAI, some propane tanks of 99,000
18 gallons, four and a half miles away from the
19 facilities.

20 I assumed the maximum train car load of
21 132,000 pounds as prescribed by Reg. Guide 1.91. And
22 then I calculated what would be the minimum explosion
23 distance at 3.5 miles of railway, whether it would be
24 the minimum safe distance. I calculated for the
25 explosion.

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1 And then I modeled the ALOHA calculation,
2 if it is open and released, what would be the plume
3 transport to get me to the ideal concentration in the
4 control room of 2100 ppm. So I based it upon that
5 one, I made that considerative calculation and they
6 happened to be within one mile. The minimum distance
7 I calculated was one mile.

8 CHAIRMAN CORRADINI: So three and a half
9 miles is what's car be --

10 MR. TAMMARA: Therefore what I said, okay,
11 even, you know, if I take that highly explosive,
12 hazardous chemical, it will meet both criteria.
13 Therefore, I'm all right. I mean, that was the
14 confirmatory analysis I have performed. And then, you
15 know, it is okay I thought.

16 DR. WALLIS: Can I ask you where these
17 tanks are? Are they beside the Swan Creek?

18 MR. TAMMARA: Pardon?

19 MALE PARTICIPANT: This is the railway.

20 DR. WALLIS: These 3000 gallons of
21 propane, are they beside the Swan Creek somewhere?

22 CHAIRMAN CORRADINI: I think they're
23 traveling on the railway.

24 DR. WALLIS: Are they on the railway?

25 MR. TAMMARA: Yes, right, that's what --

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1 DR. WALLIS: So, they're going to stay
2 there. They're not going to get washed away at all in
3 the flood?

4 MR. TAMMARA: That I did not, if that full
5 amount is released, in respect of what accident that
6 is, I didn't --

7 DR. WALLIS: Is that on the railroad
8 bridge over this creek and there's this 199,000 cubic
9 feet per second flowing in the Creek?

10 MR. TAMMARA: 199,000 --

11 CHAIRMAN CORRADINI: I think he's looking
12 for the intersection of your --

13 DR. WALLIS: Propane.

14 CHAIRMAN CORRADINI: -- very large flood
15 and propane tanks going through on the railway.

16 DR. WALLIS: Because in Hurricane Irene in
17 Vermont, there were instances where many propane tanks
18 were washed down rivers. That river became full of
19 propane tanks.

20 MR. TAMMARA: That's a scenario I did not
21 look at.

22 DR. WALLIS: And you've got a flood here
23 which is unbelievable that I'm going to hear about in
24 five minutes. And I just worry about the intersection
25 of the two, that's all.

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1 MR. TAMMARA: I did not specifically
2 address each scenario. What I said is irrespective of
3 what the accident scenario was --

4 DR. WALLIS: Right.

5 MR. TAMMARA: -- if the whole amount is
6 released --

7 DR. WALLIS: Yes, I understand, I
8 understand that.

9 MR. TAMMARA: -- what would, but so I
10 cannot answer that question.

11 DR. WALLIS: I'm just saying that if you
12 consider this unbelievable flood and propane tanks are
13 buoyant under some circumstances, and they might wash
14 up somewhere near the plant and then have their
15 explosion.

16 And I'm not saying this is utterly
17 fantastic, because it happened in Vermont. So it goes
18 back to another question I have. And I understand
19 that there --

20 CHAIRMAN CORRADINI: I think you're
21 looking for the intersection of these two. I think
22 there's some help, there's some discussion here?

23 MS. HAWKINS: Well the only, this is Kim
24 Hawkins. The only thing that I would add is his
25 review responsibility is to look at the consequence of

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1 those tanks collectively, you know --

2 DR. WALLIS: That's right.

3 MS. HAWKINS: -- exploding and --

4 DR. WALLIS: That's right.

5 MS. HAWKINS: -- I don't think the
6 scenario that you're talking about is something that
7 our guidance supports.

8 DR. WALLIS: I don't care what the
9 guidance says. I'm talking about reality.

10 CHAIRMAN CORRADINI: Or your version of
11 reality.

12 MS. HAWKINS: Right.

13 CHAIRMAN CORRADINI: Excuse my English.

14 DR. WALLIS: About what can and does
15 happen sometimes. And if the guidance doesn't have it
16 in it, maybe the guidance should be more modified.

17 MS. HAWKINS: Perhaps the --

18 DR. WALLIS: I understand that you follow
19 the guidance and the guidance often is wise, but
20 sometimes there are things missing. And it's those
21 things that are missing which, they sometimes create
22 events, that's all.

23 MS. HAWKINS: But I'm not sure, I just
24 want to explore your, the scenario you're proposing
25 because I'm not sure that I understand. The scenario

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1 is that if one of these tanks were to somehow get into
2 a high rate of water flowing, it would carry the tank
3 somewhere else.

4 DR. WALLIS: Yes.

5 MS. HAWKINS: And is your concern that it
6 might carry the tank close to the plant and then what
7 would happen next?

8 DR. WALLIS: Yes, the Swan Creek is
9 something over about a mile from the plant.

10 MS. HAWKINS: Right.

11 DR. WALLIS: And the Swan Creek in flood
12 state is bigger than that. I'm not sure if it's, you
13 know, I'm just, I don't know, I haven't, I don't know
14 all about its shape and everything. I'm just saying
15 this is the kind of thing that I've known to happen
16 and I just don't see it being considered, that's all.

17 MS. HAWKINS: Did you want to address that
18 at all, Rao?

19 MR. TAMMARA: One thing I can say is --

20 CHAIRMAN CORRADINI: I don't think it's
21 addressable.

22 MR. TAMMARA: -- what is the probability
23 of that happening?

24 DR. WALLIS: I haven't the slightest idea.

25 MR. TAMMARA: So that, if the probability,

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1 there is another guidance --

2 DR. WALLIS: It's happened in the state of
3 Vermont. Maybe it can't happen near Detroit, I don't
4 know.

5 MR. TAMMARA: Because there are soil
6 scenarios, it has to float --

7 DR. WALLIS: It has happened, so.

8 MR. TAMMARA: No, no, it has to float, it
9 has to --

10 DR. WALLIS: Yes and --

11 MR. TAMMARA: -- explode, it has to
12 release and --

13 DR. WALLIS: Yes.

14 MR. TAMMARA: -- there are so many, it is
15 like a PRA event.

16 DR. WALLIS: But there are so many other
17 improbable events which are in the guidance.

18 CHAIRMAN CORRADINI: So if I might just
19 intervene, I think we've established that this is
20 something that was not considered --

21 DR. WALLIS: That's fine.

22 CHAIRMAN CORRADINI: -- and they don't
23 feel the guidance requires them to consider it.

24 And what I also hear, I'm just
25 interpreting, I'll let staff correct me. And what I

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1 also hear is that if it were to be considered it would
2 be from a risk perspective not from a bounding
3 perspective.

4 MS. HAWKINS: Yes.

5 DR. WALLIS: But we don't know yet because
6 it hasn't been done.

7 CHAIRMAN CORRADINI: Yes, that's right,
8 that's correct. Are you done?

9 DR. WALLIS: Yes.

10 MR. TAMMARA: There were two questions
11 asked --

12 CHAIRMAN CORRADINI: Oh, I'm sorry. I
13 thought you were done.

14 MR. TAMMARA: -- one is this one. The
15 other one I tried to find where is the shale fracking,
16 how far it is away from. But I could not locate that
17 facility within five miles. I went and looked the
18 search for it so I don't know.

19 I will still search for it but whether it
20 is within the five miles or not, I cannot give a
21 definitive answer at this time. If it is was within
22 the five miles and if we missed, probably we should
23 include. If it is beyond five miles we are only
24 concentrating the facilities within five miles of the
25 plant. So the brief time I had, I could not locate.

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1 CHAIRMAN CORRADINI: Sure.

2 MR. TAMMARA: If anybody knows exactly
3 where it is located --

4 CHAIRMAN CORRADINI: I think you'd turn to
5 the licensee to help you.

6 MS. HAWKINS: Yes.

7 MR. TAMMARA: So.

8 MS. GOVAN: Well we'll take it as a
9 confirmatory item.

10 MR. TAMMARA: Confirmatory item, we will
11 look into it.

12 MS. GOVAN: Or action item.

13 MR. TAMMARA: Yes, action item, that's
14 right.

15 CHAIRMAN CORRADINI: But, all right.

16 MS. GOVAN: Henry will now present
17 hydrology for the staff.

18 MR. JONES: Good afternoon. The hydrology
19 today, I will present the Sections of 2.4.2 which are
20 floods, 2.4.3 which is the probable maximum flooding
21 on streams and rivers, 2.4.5, which is surge and
22 seiche flooding, 2.4.6 tsunami, and 2.4.12,
23 groundwater, and 2.4.13, accidental release of liquid
24 effluents in ground and surface water.

25 First, Section 2.4.2, Action COL Item

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1 floods. And what we're looking at here are the
2 historical floods for the site, the whole watershed.
3 Then you look at the individual type of flooding which
4 includes the other sections which I mentioned.

5 You look at the combination possible,
6 maybe like surge and a river flooding, et cetera.
7 Then you look at factors affecting potential run off.
8 And then specifically, this is the section that
9 handles the local intense precipitation for the site.

10 DR. WALLIS: Now you don't give us any
11 numbers here but I think in the table, you have
12 historical flooding that the 500 year flood, probably
13 not records over that long of a time but --

14 MR. JONES: Exactly.

15 DR. WALLIS: -- was 5000 cubic feet per
16 second, 5000 cubic feet per second.

17 MEMBER ARMIJO: Now in the historical
18 flooding, you know, you've got documentation --

19 MR. JONES: Exactly.

20 MEMBER ARMIJO: -- and then you're
21 guessing about 500 years because there's no
22 documentation there.

23 MR. JONES: Exactly, it's --

24 MEMBER ARMIJO: But, you know, at
25 Fukushima there was a lot of work done either before

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1 the fact or after the fact on geological evidence of
2 major tsunamis. And there is, they found evidence of
3 --

4 MR. JONES: But that was their, they over,
5 the decided not to include that in their evaluation.

6 MEMBER ARMIJO: Well, you know, it was a
7 work in progress. But you can get evidence of
8 historical flooding from geological evidence if you
9 look for it.

10 MR. JONES: Paleo floods, that's what's
11 you're talking about, paleo flooding.

12 MEMBER ARMIJO: Right, yes, paleo flood,
13 yes, right. And the question is for, when you have a
14 flood of the type that Graham was talking about, these
15 massive, horrendous floods, there would be, if it ever
16 had happened in that area there would be geological
17 evidence, somehow, if somebody looked for it. Is that
18 the --

19 MR. JONES: Well in this case --

20 MEMBER ARMIJO: -- staff doesn't require
21 that now.

22 MR. JONES: Well in this case you have to
23 also be careful because you have the Ice Ages, you
24 know, a lot of the Great Lakes were formed so it's a
25 whole different --

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1 MEMBER ARMIJO: Right.

2 MR. JONES: -- scenario that we're in,
3 we're in between Ice Ages.

4 So a paleo flood may happen under a
5 totally different circumstances that would be occur in
6 the lifetime of the planet now so it may not have any
7 relevance whatsoever.

8 MEMBER ARMIJO: It may be a totally
9 different basic type of flood. So I guess it's really
10 getting to, it's when you get to these horrendously
11 huge floods, is it really valuable to put that into
12 the regulations of the probable maximum flood?

13 MR. JONES: Well, the problem that goes
14 back to when we had the debate about what's, the
15 probable is no statistical, what happened, they used
16 to call them maximum and then people said well how can
17 you call them maximum? How do you know they're
18 bounding? Someone said well, they're probably the
19 maximum, so it has nothing to do with statistics.

20 And what it does, it follows the
21 hierarchal approach in which you try to use something
22 outrageous, sometimes unphysical. And if you're able
23 to show something is so conservative that it's out of
24 the bounds of something that's in reality and it still
25 doesn't flood the site, then they don't have to do any

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1 detail analysis.

2 MEMBER ARMIJO: That's fair enough. If it
3 was called a deterministic flood, you know, out of the
4 air then --

5 MR. JONES: We do that in tsunami.

6 MEMBER ARMIJO: I'd believe that.

7 MR. JONES: We do 1D, no friction, and
8 it's so unrealistic, we do not start, the slide starts
9 instantaneously.

10 MEMBER ARMIJO: Yes.

11 MR. JONES: We do all of that and the
12 site, if you only get 18 feet and your site's 51 feet.

13 DR. WALLIS: This is dangerous because
14 then, in this example you came up with 199,000 cubic
15 feet per second as your maximum flood, in the SER,
16 which is 40 times this 500 year flood.

17 MR. JONES: Yes.

18 DR. WALLIS: Forty times.

19 MR. JONES: Yes.

20 DR. WALLIS: It seems absolutely
21 incredible.

22 MR. JONES: It is.

23 DR. WALLIS: And 500's almost incredible
24 itself.

25 MR. JONES: I concur.

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1 DR. WALLIS: All right, okay, for this
2 site it's okay because the river spreads out over a
3 mile and it's not very bad. But if you applied this
4 kind of thing to some other sites --

5 MR. JONES: It would be different then.

6 DR. WALLIS: -- you would have a, you
7 would have a real problem.

8 MR. JONES: But it's different. Every
9 site --

10 DR. WALLIS: No, but if you used the same
11 assumptions on another site --

12 MR. JONES: We have. And you get
13 different results for every site because the PMP is
14 not the same, the meteorological conditions are not
15 the same for every site.

16 DR. WALLIS: Well you mean it can rain, it
17 can rain near Detroit 100 times harder than it can
18 rain in Vermont? I don't believe you.

19 MEMBER STETKAR: You don't know, what's
20 the PMP or the PMF for your site in Vermont? You
21 don't know what it is.

22 DR. WALLIS: Well that's what I was going
23 to raise. I mean this, this maximum flood --

24 MEMBER STETKAR: It's much higher than
25 anything you've ever seen.

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1 DR. WALLIS: This maximum flood, if
2 200,000 CFS --

3 MEMBER STETKAR: It's not the same as
4 Detroit.

5 DR. WALLIS: -- is bigger than it's ever
6 been recorded at Vermont Yankee.

7 MEMBER STETKAR: That's right.

8 DR. WALLIS: And --

9 CHAIRMAN CORRADINI: But I think, Graham,
10 though, if I just might intercede because we're going
11 to have to move on. What I think I'm hearing is
12 they've followed the guidance, the guidance is not
13 risk informed --

14 DR. WALLIS: Yes but let's go, let me
15 finish my thing. The drainage, the watershed is 106
16 square miles for this thing, right? At the Vermont
17 Yankee it's about 100 times or more bigger.

18 So am I going to take your number and
19 multiply it by 100 times for Vermont Yankee and get
20 100, get something like 200 times the historical
21 highest water flow rate? That's absolutely
22 preposterous.

23 MR. JONES: You can't take one site and
24 project at the other. You have to do --

25 DR. WALLIS: But the rain, the rain isn't

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1 going to be 100 times more intense in Detroit than it
2 is in Vermont.

3 MR. JONES: It's not just the rain. What
4 you do is you take --

5 DR. WALLIS: We've got more snow than you
6 do.

7 MR. JONES: -- you take the physics of the
8 meteorology for the area --

9 DR. WALLIS: Doesn't make sense.

10 MR. JONES: You take the meteorology for
11 the area, you take the storm, you orient it for the
12 watershed, it's for the whole wide watershed --

13 DR. WALLIS: You don't, we get more water
14 than you do, I mean it doesn't make sense.

15 CHAIRMAN CORRADINI: Can I, I'm going to
16 stop this so we can go on.

17 DR. WALLIS: Okay.

18 CHAIRMAN CORRADINI: But at break, you two
19 can caucus.

20 DR. WALLIS: Yes we can.

21 CHAIRMAN CORRADINI: And we'll see who
22 wins.

23 DR. WALLIS: Well you see, I'm thinking,
24 no, no, no, it's not a question of who wins --

25 MALE PARTICIPANT: It doesn't make sense.

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1 DR. WALLIS: -- it's a question is if you
2 take these numbers, somebody wise take --

3 CHAIRMAN CORRADINI: No, but I think --

4 DR. WALLIS: -- and then starts looking at
5 other sites, there's going to be a problem.

6 CHAIRMAN CORRADINI: But I think what
7 Henry is saying, unless, he can correct me if I'm
8 wrong but at this point I'm going to try to have the
9 last word on this is, it's much location, location,
10 location, almost like real estate.

11 DR. WALLIS: It's not. It doesn't rain,
12 it doesn't rain 100 times harder than --

13 MEMBER STETKAR: Graham, you can't say
14 that.

15 DR. WALLIS: Why not?

16 MEMBER STETKAR: Because it is different
17 in their analyses.

18 DR. WALLIS: Not by that margin.

19 MEMBER STETKAR: How do you know?

20 DR. WALLIS: Not by that margin.

21 MEMBER STETKAR: Did you do the analysis
22 for your location?

23 DR. WALLIS: It can't be, it can't be. I
24 don't believe it.

25 MR. JONES: We've done it.

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1 MEMBER STETKAR: Graham, okay --

2 CHAIRMAN CORRADINI: That's why I think we

3 --

4 MEMBER STETKAR: -- believability is one
5 thing.

6 DR. WALLIS: We have a foot of rain from
7 Hurricane Irene, they have 100 feet of rain in this
8 area? Come on.

9 MEMBER STETKAR: You know, I know what
10 they do. I don't support what they do because it's
11 silly. But I know what they do and you can't do that
12 extrapolation from your experience --

13 DR. WALLIS: How?

14 MEMBER STETKAR: -- in the Vermont back
15 hills to Detroit, Michigan because the meteorology is
16 different, the topography is different, the hydrology
17 is different.

18 DR. WALLIS: Worse, all our topology is
19 worse.

20 MEMBER STETKAR: How do you know it's
21 worse? How do you know it's worse?

22 DR. WALLIS: Because it runs off from the
23 rocks and doesn't get --

24 MEMBER STETKAR: How do you know it's
25 worse?

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1 DR. WALLIS: And because they've got a
2 flat plain for it to spread on --

3 MEMBER STETKAR: I have much easier
4 transport.

5 DR. WALLIS: -- and we have a valley.
6 Come on, no. I don't know want to push up but
7 obviously something is really crackers about this,
8 right?

9 MEMBER STETKAR: The whole deterministic
10 flooding analysis doesn't make any sense.

11 DR. WALLIS: Thank you.

12 MEMBER STETKAR: But at least it's done
13 consistently.

14 DR. WALLIS: But if it were done, I'm very
15 worried about it being done consistently this way for
16 my area.

17 MEMBER STETKAR: Well they must have done
18 it for Vermont Yankee.

19 DR. WALLIS: And they get a rain --

20 MEMBER STETKAR: Then in fact, they will
21 be doing it and redoing it.

22 DR. WALLIS: To get these kind of numbers,
23 we have a drainage area 100 times as big as theirs.
24 We're going to have roughly 100 times as much water.

25 CHAIRMAN CORRADINI: So let's take this

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1 off line.

2 DR. WALLIS: Okay so let's leave it, let's
3 leave it.

4 CHAIRMAN CORRADINI: Henry.

5 MR. JONES: Okay so, to continue --

6 DR. WALLIS: But the staff take note, this
7 is a problem.

8 MR. JONES: To continue, the staff
9 reviewed included the effects of local intense
10 precipitation, we've performed independent evaluation
11 based on the methods from the National Weather
12 Service, Hydro Meteorological Reports 51 and 52 which
13 are applicable for this area. We verified the PMF due
14 to local intense precipitation, verified that the
15 problem maximum --

16 DR. WALLIS: Are these numbers somehow,
17 can you send me this derivation and the method that
18 you used?

19 MR. JONES: Oh yes, this is since 1970.
20 This HMR's been around since, and their standard, even
21 the other agencies use these, Bureau of Rec and also
22 the Corps.

23 DR. WALLIS: Then something must be wrong.
24 Could you send me the --

25 MR. JONES: Sure.

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1 DR. WALLIS: -- whole report then?

2 MR. JONES: I have them. And verified,
3 and said we verified the site drainage and verified
4 that the runoff from the local intense precipitation
5 would not exceed the site grade parameter. Any
6 questions, further questions on this section?

7 MEMBER STETKAR: Henry, the only question
8 I have --

9 MR. JONES: Yes.

10 MEMBER STETKAR: -- and this is, I think
11 I now know the answer, but what I'd personally
12 recommend is the entire section pays very close
13 attention to flooding of safety related structures.

14 In Tables 19A4, I think it is, in the DCD,
15 there are external flooding requirements for RTNSS
16 structures. So I hope that you thought about flooding
17 a RTNSS structures because RTNSS structures must also
18 be protected against external flooding, or have
19 appropriately high entrance points or whatever.

20 And I couldn't find any mention of the
21 staff's evaluation of potential flooding of RTNSS.
22 And that I believe is something that --

23 MR. HARVEY: We could check on that.

24 MEMBER STETKAR: -- that is within the
25 site specific, because there are requirements in the

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1 certified design for external flooding protection of
2 RTNSS, so --

3 MR. JONES: No, we can check on that.
4 Might be an answer to another chapter.

5 MEMBER STETKAR: That's why I asked the
6 staff, or that's why I asked the applicant this
7 morning about whether or not everything in RTNSS, is
8 up, you know, at the same elevation as the safety
9 related.

10 CHAIRMAN CORRADINI: Their answer was to
11 the affirmative.

12 MEMBER STETKAR: Their answer was to the
13 affirmative.

14 MR. JONES: That's right, so that means
15 that they, so they would be safe under the same
16 scenario.

17 MEMBER STETKAR: But in terms of the
18 staff's review, I think it's something that needs to
19 be --

20 CHAIRMAN CORRADINI: Double check that.

21 MEMBER STETKAR: -- confirmed, because if
22 there is something, you know, downslope between the
23 lake and the higher plateau, I'm going to call it
24 that, it could be susceptible to that lake flood.

25 MR. JONES: The next section is probable

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1 maximum flood on streams and rivers. There were no
2 open items and the staff's review, you can go to, you
3 got that? Okay, good, confirmatory analysis of the
4 PMP on Swan Creek watershed, we discussed this
5 extensively already.

6 We independently calculated the probable
7 maximum flood on Swan Creek using the hydrographic,
8 SCS hydrographic method and using some of the models
9 from the Army Corps of Engineer.

10 And what we did is we verified the
11 conditions of Lake Erie and concluding snow melt and
12 wind effects and coincident wave activity were
13 accounted for in the modeling of the water surface
14 elevation.

15 And we also looked at the combined events
16 using ANSI 2.8-1992, which is what we use for our
17 guidance for combined events. And we found that the
18 flood level did not exceed the grade level or the
19 level for the safety structures. Any questions on
20 2.4.3?

21 CHAIRMAN CORRADINI: No.

22 MR. JONES: Okay. Section 2.4.5, probable
23 maximum surge and seiche flooding, we came to the same
24 conclusion as the applicant and agreed with their
25 conclusion, that there was about a 586.4 feet NAVD 88,

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1 and that with wind wave breaking, that you'd get
2 another foot or so for a total of 586.7, which is
3 below the site grade for the Fermi site.

4 Actually what you have mostly in the Great
5 Lakes, you have a seiching, but what you do is you
6 look at the period using a simplified equation. And
7 if your waves don't match the period that you do for
8 resonance than you are, actually don't have a seiching
9 effect, cannot go into, be applied.

10 So what we did is we looking at the Fermi
11 site location and they came to the conclusion that
12 their natural period of oscillation was 29 to 124
13 seconds.

14 But the wave activity that would produced
15 by any storms on the lake would be only 11 seconds,
16 and so that you don't meet the resonance for seiching
17 to occur. And usually the maximum amount of seiching
18 that you would ever occur would be a maximum of seven
19 feet anywhere in the Great Lakes.

20 And so how do we verify this? We looked
21 at the historical data of seiching in Lake Erie. They
22 ran a state of the art model STWAVE, which was created
23 by the Corps of Engineers. And they looked at the
24 wave inducements and simulations over the entire area
25 of the plant.

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1 We looked at the input and output files of
2 the applicant. And then considering everything in the
3 Lake Erie 100 year lake level, we determined that they
4 did, met the requirements that the seiching or the
5 surge flood does not reach the site grade or the
6 safety structures. Any questions on surge?

7 Okay, tsunami, Section 2.4.6. Simply,
8 there is no history in this area of tsunamis actually
9 seiching, which some people call kind of a tsunami for
10 the lakes is what you get in this area.

11 There is no subduction zones, no strikes,
12 no faults, no volcanoes. The area there, there's no
13 chance of a landslide with rocks, it's shallow.
14 You're never going to get the volume of water to
15 create a near shore tsunami. And we actually modeled
16 this for another site, actually hypothetically and
17 dropped something in the water and it didn't reach the
18 site, so.

19 MEMBER ARMIJO: Didn't do much.

20 MR. JONES: Yes.

21 DR. HINZE: But the symmetry is such that
22 you won't get submarine slides so.

23 MEMBER ARMIJO: You can't, yes.

24 MR. JONES: So this isn't, so you, you
25 know, that rules it out for the Great Lakes. Any

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1 questions on this section?

2 Okay, let's go to groundwater, Section
3 2.4.12. Here we looked at the hydrogeological
4 characteristics of the area, the effects of
5 groundwater on plant foundations, and the reliability
6 of safety-related water supply and dewatering systems.

7 The review, the staff included the
8 publicly available information on the regional, local
9 groundwater aquifer characteristics and site specific
10 parameter tests.

11 We also looked at the geological layering and
12 the sequence of formations in the area. And we
13 reviewed the groundwater sources and sinks surrounding
14 the site. And we verified the operations and safety-
15 related systems that do not rely on dewatering.

16 And another side is that, you know,
17 Section 2.5 actually corresponds to this in that, you
18 know, it shows extensive detail on the geology. And
19 a lot of time when we look at tsunami or anything like
20 that we actually look at Section 2.5 to verify for
21 slopes stability, any chance of landslide, and the
22 characteristics of the area.

23 DR. HINZE: Perched water tables are
24 common in this type of glacial drift. Is there any
25 evidence of that in this area?

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1 MR. QUINN: We have some maps that we can
2 show you in the back of this packet, for some details.
3 Yes, I believe there could be perching but it seems
4 that in the lacustrine sediments and the glacial drift
5 and the rock fill that comprise the unconsolidated
6 upper portion of the site, it seems fairly continuous
7 in terms of water levels.

8 DR. HINZE: Are there any specific
9 locations, locales that give rise to these perched?
10 And how close to the surface are they?

11 MR. QUINN: I don't know what the depth
12 below grade is for high water levels. And your
13 initial question was?

14 DR. HINZE: Well, are there locales for
15 the lacustrine sediments, for example, that would
16 suggest that you would have perched water tables in
17 this specific area of the plant?

18 MR. QUINN: There's not any evidence of a
19 local high of significance.

20 MALE PARTICIPANT: What does "of
21 significance" mean?

22 MR. QUINN: Well, that you do have
23 variability, you have variable flow directions if you
24 consider the unconsolidated monitoring wells and their
25 water levels.

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1 DR. HINZE: Are these, are the perched
2 tables, are these ephemeral?

3 MR. QUINN: No, I believe they're --

4 DR. HINZE: They're continuous.

5 MR. QUINN: -- they're continuously run,
6 yes.

7 MR. JONES: Are there any other questions
8 on groundwater?

9 Okay, I'll go on to the next one, please.
10 Section 2.4.13, the accidental releases of liquid
11 effluents on ground and surface waters, considers all
12 the potential effects of a relatively large accidental
13 release from the systems that handle liquid effluents
14 generated during the normal plan operation.

15 Normally I think in the guidance they put
16 80 percent release. And I think the applicant did 100
17 percent release in this case which is even more
18 conservative.

19 The staff reviewed a confirmed ground
20 water levels pathways and velocity calculations from
21 a postulated source to a receptor, which would be
22 offsite, and evaluated plausible combination of the
23 ground and surface water characteristics.

24 And a lot of this is based on the previous
25 section where we characterized the groundwater and we

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1 look at how it's going to be dispersed, dilute, the
2 concentrated liquid effluents as related to the
3 existing potential for future water uses.

4 We evaluated and verified radionuclide
5 release simulations were adequately conservative. and
6 we confirmed that the radionuclide levels would be
7 below the required levels for the receptors.

8 DR. WALLIS: Could I ask you about this?

9 MR. JONES: Sure.

10 DR. WALLIS: When the applicant described
11 what they did, they made a lot of these conservative
12 assumptions, so the tail of distribution. And then
13 they said they didn't meet the requirements. So they
14 had to start taking credit for things, so they nibbled
15 away at some things --

16 MR. JONES: Exactly.

17 DR. WALLIS: -- until they met the
18 regulations. Is this the usual way or isn't --

19 MR. JONES: Yes.

20 DR. WALLIS: -- there some kind of
21 guidance which says --

22 MR. JONES: Yes.

23 DR. WALLIS: -- you should assume various
24 things and get on?

25 MR. JONES: But what happens is what we

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1 did discuss here was that what we use in hydrology
2 especially as a, what we call, they've been using here
3 the hierarchal approach.

4 DR. WALLIS: Right.

5 MR. JONES: And that's why we get such
6 extremes like you said, that it's not plausible. And
7 what you do is, if you're okay with the unpalusible
8 and outrageous --

9 DR. WALLIS: Then you stop.

10 MR. JONES: -- you stop. But on the other
11 hand, if you're impacted by it --

12 DR. WALLIS: Right.

13 MR. JONES: -- then you say look, you
14 know, instead of saying that it was saturated or
15 rubber sheeting, I'm going to say that it has
16 infiltration --

17 DR. WALLIS: That's right.

18 MR. JONES: -- you start adding all the
19 realism in, as much as you can like in oceanography,
20 more, better bathymetry, more high accurate models
21 until you can see if you can reduce it. It may not
22 happen but you try to reduce it as low as possible.

23 DR. WALLIS: I understand that but it
24 doesn't, it seems a little bit, one gets a little bit
25 of an awkward feeling when one makes a, they make a

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1 calculation and they keep nibbling away at things
2 until they meet the regulations.

3 That, it would be good if there'd be a
4 process whereby you do it and you meet the
5 regulations, you don't have this awkward thing of
6 keeping nibbling away at your assumptions until you
7 do. That gives one a little bit of an uneasy feeling.

8 CHAIRMAN CORRADINI: I think, I mean, my
9 way of looking at this is no different than LOCA many
10 years ago and peak clad temperature, except they don't
11 have the ability to build a test and test it.

12 DR. WALLIS: LOCA is much more specific
13 though. LOCA says thou shalt do this, this, and this.

14 CHAIRMAN CORRADINI: Right but originally
15 you --

16 DR. WALLIS: And don't let them nibble
17 away at the assumption.

18 CHAIRMAN CORRADINI: Well --

19 DR. WALLIS: Appendix K is very specific.

20 CHAIRMAN CORRADINI: Before Appendix, yes,
21 but before Appendix K there was a lot of nibbling.

22 MEMBER ARMIJO: They sharpened their
23 pencils on it.

24 CHAIRMAN CORRADINI: Not anymore.

25 MEMBER ARMIJO: On Appendix K.

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1 CHAIRMAN CORRADINI: But I guess my --

2 DR. WALLIS: Like I said it, that's okay.

3 I think it's okay, it's just a little bit awkward they
4 nibble that.

5 MR. JONES: Any other questions or
6 comments?

7 DR. HINZE: It just seems to be that you
8 need to comment on the perched water tables.

9 MR. JONES: Oh sure, we can reject that.

10 DR. HINZE: I think that will be a
11 question that should be raised. And it would be
12 better, excellent if you covered talk on that.

13 MR. JONES: Okay, we'll take that for
14 action.

15 MS. GOVAN: And what was the name, perched
16 water?

17 MR. JONES: Perched water, yes.

18 MS. GOVAN: Okay.

19 MR. JONES: And was another --

20 CHAIRMAN CORRADINI: I don't appreciate,
21 I guess you guys have totally communicated but I'm
22 lost.

23 DR. HINZE: What you have are you have
24 very impermeable zones within the glacial drift.

25 CHAIRMAN CORRADINI: Oh.

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1 DR. HINZE: And as a result, it develops
2 a water table that's above the groundwater table. And
3 that's called a perched water table.

4 CHAIRMAN CORRADINI: Oh, okay.

5 DR. HINZE: So you actually end up with a
6 permanent water supply above the water table, and all
7 the problems that go along with that. And so the FSAR
8 does refer to perched tables so it's important that we
9 make certain that they have been considered.

10 CHAIRMAN CORRADINI: Okay, okay. So it's
11 more a matter of documenting --

12 MR. JONES: Exactly.

13 CHAIRMAN CORRADINI: -- your review of it.

14 MR. JONES: And we have this, there was
15 another question, right?

16 MS. GOVAN: There were two.

17 MR. JONES: Two?

18 MS. GOVAN: Send a report, Committee
19 Member Wallace --

20 MR. JONES: Okay he --

21 MS. GOVAN: -- send a report of the
22 confirmation --

23 MR. JONES: -- the HMRs, he wanted those.

24 MS. GOVAN: Right. And the flood
25 protectional statements for Committee Member Stetkar.

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1 MR. JONES: Okay, that's all I have.

2 CHAIRMAN CORRADINI: Questions from the
3 committee? Okay, so this round we thank the staff.
4 And now we'll go on to Chapter 3, from DTE, is that
5 correct?

6 MS. GOVAN: Yes.

7 CHAIRMAN CORRADINI: Before you lose
8 Henry, this could be your chance, Dr. Wallace.

9 DR. WALLIS: He's going to disappear?

10 CHAIRMAN CORRADINI: No, I mean he may
11 disappear. He just, I know he's thrilled about Fermi
12 but he may not stay for Chapter 3. So this is your
13 chance to get him offline.

14 DR. WALLIS: Where did he go?

15 CHAIRMAN CORRADINI: He's right back
16 there.

17 DR. WALLIS: Hiding behind the pillar?

18 MALE PARTICIPANT: He's hiding behind
19 there.

20 CHAIRMAN CORRADINI: He's hiding behind
21 the pillar.

22 MR. JONES: No he's not.

23 CHAIRMAN CORRADINI: So if you want to
24 talk to him, you'd better talk to him now.

25 DR. WALLIS: But the doors, you know --

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1 MR. JONES: You want to get me out of the
2 way, huh?

3 CHAIRMAN CORRADINI: I didn't say that.
4 I just wanted to make sure you were --

5 MALE PARTICIPANT: Were happy.

6 CHAIRMAN CORRADINI: -- you're happy,
7 thank you.

8 MR. LAPRAD: So we're all set?

9 CHAIRMAN CORRADINI: Joe, are you going to
10 kick it off?

11 MR. LAPRAD: Yes.

12 CHAIRMAN CORRADINI: Okay.

13 MR. LAPRAD: Yes, my name is Joe LaPrad,
14 I'm a licensing engineer with Detroit Edison and I'll
15 be presenting Chapter 3, Design of Structures,
16 Components, Equipment and Systems.

17 So our presentation today on Chapter 3 is
18 going to cover Chapter 3 Sections that incorporate COL
19 information, supplemental or conceptual design
20 information. Those Sections include 2, 5, 9, 10, 11,
21 12, and 13.

22 There are several Chapter 3 Sections that
23 incorporate the DCD with no departures for
24 supplements. And those won't be addressed in the
25 following slides. Also there are several Chapter 3

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1 Sections that will be covered in a later ACRS
2 Subcommittee meeting and they won't be presented
3 today.

4 So Section 2, classification and SSCs,
5 this section contains conceptual design information
6 that specifies parts of the Fermi 3 plant specific
7 design, contains no safety related or RTNSS systems.
8 Also the Fermi 3 design includes the hydrogen water
9 chemistry system but not zinc injection.

10 Section 5, missile protection contains
11 supplemental information that refers back to FSAR
12 Chapter 2 for site specific missile sources and
13 aircraft hazard analysis.

14 Section 9, mechanical systems and
15 components, incorporates several COL information
16 items. The first describes reactor internals
17 vibration assessment program and the program
18 implementation schedule based on prototype and non-
19 prototype scenarios.

20 Additional Section 9 COL information items
21 describe pipe stress report milestones, snubber pre-
22 service and in-service examination and testing, PST
23 and IST for pumps and valves, and specific squib valve
24 requirements. Also, you know, included in the SER for
25 Section 9 is license condition that describes further

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1 squib valve requirements.

2 Section 10 contains a COL information item
3 that includes a commitment to make qualification
4 records available and the commitment to submit and
5 update a schedule for competing qualification
6 activities. There's also a supplemental item that
7 refers to FSAR Section 17.5 for QA requirements
8 related to qualification records.

9 Section 11 contains one COL information
10 item that describes the environmental qualification
11 program for Fermi 3 including qual documentation,
12 procedural requirements, design control, testing,
13 surveillance, and maintenance requirements.

14 Sections 12 and 13 of Chapter 3 are
15 essentially DCD incorporate by reference sections that
16 refer to multiple DCD chapters and sections. These
17 sections were added to the SRP after GE submitted
18 their PCV but prior to Fermi 3 submitting the COLA so,
19 but sections were added to the FSAR to address the
20 SRP. And that's it for Chapter 3.

21 CHAIRMAN CORRADINI: Questions by the
22 committee? Okay, the staff will come up and give us
23 their rendition.

24 MS. GOVAN: Okay, good afternoon again, my
25 name is Tekia Govan. I'm the NRC Project Manager for

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1 Chapter 3 on the Fermi 3 COL application review. This
2 presentation is being made to the ACRS Subcommittee
3 and it will describe the NRC staff's review findings
4 of the Fermi 3 COL application. It more or less
5 explains the conclusions of their safety findings.

6 The review team consisted of Adrian Muniz,
7 a Lead Project Manager, myself, Tekia Govan, Balance
8 of Plant and Fire Protection Branch, Eileen McKenna is
9 the Branch Chief, Component Integrity Branch with
10 David Terao as the Branch Chief, Electrical
11 Engineering Branch with James Anderson as Branch
12 Chief, Engineering Mechanics Branch with Joe Colaccino
13 as Branch Chief, Radiation Dose Assessment Team, with
14 Michael McCoppin as Branch Chief, and the Structural
15 Integrity Branch with Brian Thomas as Branch Chief.

16 Chapter 3 entitled Design of Structures,
17 Components, Equipment, and Systems incorporates by
18 reference many of the sections in the Chapter 3 Fermi
19 COL application.

20 In instances where the sections were
21 completely incorporated by reference, the NRC staff
22 reviewed the application, checked the reference ESBWR
23 DCD to ensure that no issues relating to those
24 sections remained open for the Fermi 3 review.

25 In instances where the section is

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1 incorporated by reference with supplemental
2 information and/or a COL item, the staff compared the
3 additional COLA information to the relevant NRC
4 regulations and guidance. And concluded that Fermi 3
5 COL FSAR is acceptable and meets NRC regulatory
6 requirements and acceptance criteria.

7 As noted by Adrian in his opening remarks,
8 the staff has open items that are still under review
9 for Sections 3.7 and 3.8 relating to soil structure
10 interaction, and 3.9 relating to the ESBWR steam dryer
11 topical report review. Aside from these three
12 sections, the NSR staff review is complete with no
13 open items.

14 This afternoon the staff will discuss
15 their review findings for Sections 3.5, missile
16 protection, which will be presented by Rao Tammara,
17 and 3.9.6, functional design qualification and in-
18 service testing which will be presented by Thomas
19 Scarbrough.

20 At this time I will turn it over to Rao
21 Tammara.

22 MR. TAMMARA: My name is Seshagiri Rao
23 Tammara. And my technical review will cover site
24 proximity missiles and also aircraft hazards.

25 First, you see the action item 3.0-1,

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1 which deals with the site-specific information
2 pertaining to the site proximity missiles. These
3 sites proximity missiles are due to any of the
4 potential accidents that are evaluated in Chapter 2.

5 And there are no design basis accidents
6 identified, based upon the analysis carried out and
7 also presented this morning. Therefore, there are no
8 site proximity missiles from these potential
9 accidents.

10 Only thing is the existing plans from Unit
11 2 there might be a potential for the turbine missile,
12 which was not included in the FSAR. Therefore as time
13 pass there'll be additional information.

14 In response to the RAI 3, Part 151, the
15 applicant provided the analysis and showed that the
16 proximity missiles have not posed a problem or a
17 threat to the Unit 3.

18 Staff reviewed the applicant's information
19 pertaining to this site, the turbine missile FX site-
20 specific information, and since it is within the
21 accordance with the 0800 and also the Guide 1.115, it
22 satisfied the GDC 4 criterion, therefore it is
23 acceptable.

24 Next slide. As a part of aircraft
25 hazards, the Informational Item 3.52 is evaluated.

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1 Staff reviewed the applicant's information pertaining
2 to the site-specific aircraft analysis, aircraft
3 hazards, and found it to be acceptable as it satisfies
4 the guidance, NUREG-0800, and also SRP Section 3.5.16.

5 And the aircraft crash probability is
6 within the acceptance criteria of target of magnitude
7 of 1×10^{-7} per year.

8 Actually, in this case, staff has made a
9 confirmational analysis obtaining the real aircraft
10 flight numbers from 2004 to 2009. We requested FAA to
11 furnish the annual data within the five miles of the
12 site and also within the ten miles of the site, all
13 the aircrafts going in either direction.

14 They furnished by year from 2004 to 2009.
15 We analyzed that data and came up with a total number
16 of flights, irrespective of what flight it is.

17 Actually the data contains what type of
18 aircraft it is, what type of mission it is, from where
19 it is originated and where it is going. But all the
20 data is really in the data file. But, however, we did
21 not distinguish as it first occurred.

22 We looked at all the data, which is within
23 the five miles, and took that all flights, and
24 calculated the probability. And that probability also
25 satisfies the requirement 1×10^{-7} to the core minus

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1 six, eight actually to be precise.

2 MEMBER STETKAR: Six?

3 MR. TAMMARA: Eight, yes.

4 MEMBER STETKAR: I'm sorry, the criterion
5 is one minus seven. So that's a factor.

6 MR. TAMMARA: 10×4 minus 7, however, if
7 they are realistic assumptions and the data can be
8 provided, it can go as high as 10 to the core minus
9 six. That is the guidance provided in the SAR.

10 MEMBER STETKAR: And I'd like to see your
11 analysis. So if you could give me a copy of the
12 confirmatory analysis that you did, I'd love to see
13 that.

14 MR. TAMMARA: Yes.

15 MEMBER STETKAR: Because my experience,
16 having done several aircraft crash analyses for an
17 adjusted area like this site, 10 to the minus 6,
18 maybe. When somebody tells me it's on the order of
19 magnitude of 1×10 to the minus 7 I think perhaps a
20 factor of two or three either way from that.

21 I don't think that it's a factor of ten
22 higher than that. That's kind of like saying I'm
23 going to deliver a report in 2013 and sort of say
24 that's 2014.

25 MR. TAMMARA: However, you have to

1 understand, the very confirmatory analysis was met.

2 MEMBER STETKAR: I'd like to see that
3 confirmatory analysis.

4 MR. TAMMARA: You are assuming all the
5 flights within five miles of the site.

6 MEMBER STETKAR: I understand that.

7 MR. TAMMARA: So it is a very high
8 conservatism built into the calculation.

9 MEMBER STETKAR: I understand that. I'd
10 like to see the calculation. The reason I'd like to
11 see that is that the applicant cited some number, some
12 air traffic density in a particular airway.

13 And that airway is V383. And that works
14 out to be, get my notes here, bear with me here. I've
15 lost my notes. I think it was 165, or thereabout,
16 flights per day. Yes, 165.

17 They assumed that the same number of
18 flights are in airway V10, 176, 188. Now they're very
19 different airways. Because 383 is an approach airway
20 into DTW and 10, 176, 188 is an east/west transit
21 airway. So you're going to have different traffic
22 that's using those airways.

23 They've not addressed any of the other
24 four airways that are approach airways into DTW, 133,
25 426, 26, and 467.

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1 If you just do the stylistic calculation
2 according to the regulatory guidance, you would get
3 greater than ten to the minus seven crash frequency at
4 the site from those airways with traffic densities
5 that range from about 135 to about 180 flights per
6 day.

7 That sounds like a lot. But when you
8 start looking at the number of flights into and out of
9 DTW on a daily basis, I don't know where the rest of
10 them are coming from.

11 So that's why I'd like to see the number
12 of flights that you got within five miles of the site,
13 from the FAA. I mean that's where you get them. You
14 didn't have them by airway? You just asked them for
15 --

16 MR. TAMMARA: No, that is a very longer --

17 MEMBER STETKAR: It's hard to get. I
18 know, I've tried.

19 MR. TAMMARA: We negotiated this one to
20 have a conservative --

21 MEMBER STETKAR: I've done similar
22 negotiations with plans. I know. It's hard to get.
23 So you just have, you drew a circle and they gave you
24 a number of --

25 MR. TAMMARA: Right, if we can accommodate

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1 all the flights within the five miles we are making a
2 really, irrespective of what airway it is, you are
3 accommodating much more than what it would have gone.
4 So that is the basis for our thinking.

5 MEMBER STETKAR: Now, so I'd like to see
6 that. Because the airway stuff is what's giving, in
7 the FSAR, it's giving them a frequency of slightly
8 higher than 10 to the minus 7 . They calculate $1.6 \times$
9 17 to minus 7 from each of the two airways that they
10 looked at. So it's about three time ten to the minus
11 seven.

12 MR. TAMMARA: That's correct.

13 MEMBER STETKAR: What I'm curious is what
14 did you do with Detroit Metro Airport accidents?
15 Because in the FSAR, it just simply says, "an
16 evaluation of the probability of an aircraft accident
17 affecting Fermi 3 from Mills Field Airport or Detroit
18 Metropolitan Wayne County was performed.

19 The probability for an accident from the
20 Detroit Metropolitan Wayne County airport is less than
21 ten to the minus seven per year." In the FSAR you
22 just repeat that number. I don't see any analysis
23 that was done on that.

24 MR. TAMMARA: In the aircraft analysis, if
25 you go to the SRB, there are three criterion you have.

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1 First you'll see, if it is within five miles, the
2 airport is within five miles, you have an equation.
3 The total number of flights should be 50 times that
4 distance --

5 MEMBER STETKAR: And they'd all meet from
6 Mills Field.

7 MR. TAMMARA: So if it is ten miles it is
8 1,000 times. So as those go the number of those
9 flights is less than the specified number, then it is
10 that the airport is cleaned out.

11 MEMBER STETKAR: That's right.

12 MR. TAMMARA: You don't consider. That
13 accident is considered to be lower than ten to the
14 four minus six. So for those airports which have the
15 volume higher than that criteria, then you will look
16 into the calculation of determination of probability.

17 MEMBER STETKAR: Okay.

18 MR. TAMMARA: The other looking is, if it
19 is a military, then you have to address a different
20 way. And if you did the airway then it should be
21 within the two miles from the edge of the airport, I
22 mean central, the middle of the airway should be two
23 miles from the edge of the airport --

24 MEMBER STETKAR: So it's half the width of
25 the airway plus twice the distance of the site.

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1 MR. TAMMARA: Right. So if these
2 criterion are not met, then the accident is cleaned
3 out. So therefore, based upon that one, the number of
4 flights for that airport are lower, I think.

5 MEMBER STETKAR: No, that's not true,
6 wrong. The number of flights from, don't do this, I
7 can be this way. According to the FSAR, if I take
8 1,000 times the square of the distance to Detroit
9 Metro I get 361,000 flights.

10 And, according to data, the annual number
11 of operations, at least for whatever year they looked
12 at, was 481,435, which is greater than the 1,000 D-
13 squared criterion.

14 So they couldn't screen out Detroit Metro.
15 Then there's a simple sentence that says we did an
16 analysis. It came out less than ten to the minus
17 seven.

18 Your conclusion says they did an analysis,
19 it came out less than ten to the minus seven. I'm
20 asking for what analysis was done. I'd like to see
21 that analysis. And if you did a confirmatory
22 analysis, I'd like to see that one.

23 MR. TAMMARA: Yes. I did confirmatory
24 analysis on the --

25 MEMBER STETKAR: On the airport also.

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1 MR. TAMMARA: I did not consider the
2 airport.

3 MEMBER STETKAR: That's what I'm asking
4 about. Because my experience, if you look at NTSB
5 data for crash frequencies on the flight operations
6 that would affect this site would be climb and
7 descent, coming in from cruise down to what they call
8 approach. So it's the descent phase and the climb-out
9 phase.

10 I think you're hard-pressed to get
11 anything less than ten to the minus six. And it might
12 be higher, depending on the orientation of the airport
13 or --

14 MR. TAMMARA: I have to take a look at it
15 again.

16 MEMBER STETKAR: -- the approach paths,
17 and things like that. So I'm curious what analysis
18 was done. I was going to ask the applicant. But
19 since we said we're going to address it this afternoon
20 and the applicant breezed through Section 3, I figured
21 I'd see what the staff had done.

22 MR. TAMMARA: Yes the independent analysis
23 I have performed is based upon the --

24 MEMBER STETKAR: On the airways.

25 MR. TAMMARA: -- real data.

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1 MEMBER STETKAR: But that's only in the
2 airways. That's cruise operations.

3 MR. TAMMARA: It is not airways. It is
4 all the aircrafts within five miles. So even though
5 the aircraft is from that airport, if it falls in that
6 route, within that area, it has been included in that
7 analysis.

8 MEMBER STETKAR: The Reg Guide gives you
9 an artificial crash frequency of four times ten to the
10 minus ten, crash per aircraft, year, square mile.
11 That indeed is lower than actual NTSB statistics today
12 for cruise altitude, which comes out for, I've
13 forgotten which, 10 CF, 14 CFR, 150. I know it was
14 135 and 150.

15 For the 150s, the commercial aircraft, the
16 crash frequencies are on the order of about three
17 times ten to the minus nine. For the 145, which are
18 the air taxis and commuter, small aircraft, it's about
19 a factor of two times higher. It's about seven times
20 ten to minus nine, per flight, per square mile.

21 So the NUREG and Reg Guide numbers are out
22 of date. They're way to low. But you have to use
23 those numbers. But that's for cruise flights.
24 That's for flights in airways. That's not for near
25 airport operations.

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1 MR. TAMMARA: I think we answered that
2 question two years ago by writing a letter to ACRS.

3 MEMBER STETKAR: Did you? Okay.

4 MR. TAMMARA: And we compared that to ten
5 to the fourth, ten to the four minus ten versus the
6 other crash rates, which are documented in DOE --

7 MEMBER STETKAR: You don't want to use
8 DOE. You want to use NTSB.

9 MR. TAMMARA: Yes. I cannot give all the
10 information. But I think we compared and we concluded
11 the crash rates were almost comparable, or whatever.
12 So that middle was around two years ago.

13 MEMBER STETKAR: Now back to the near
14 airport operations --

15 CHAIRMAN CORRADINI: So you're having so
16 much fun, I want to make sure what their, you wanted
17 to get the analysis from both the --

18 MEMBER STETKAR: I'd like to see the
19 confirmatory analysis. I know what DTE did for the
20 two airways that they looked at. I know what they
21 did. I can reproduce your numbers. I don't know why
22 you didn't look at the other four airways. But the
23 staff said they looked at everything.

24 CHAIRMAN CORRADINI: And you'd like to see
25 that analysis.

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1 MEMBER STETKAR: So I'd like to see that
2 analysis. Because I don't know why DTE didn't look at
3 the other four airways. But I don't care as long as
4 the staff has a confirmatory analysis that justifies
5 something that's acceptable.

6 So that's one issue, is the airway crash
7 frequency. The other issue is what is the technical
8 justification for the statement in the FSAR, and the
9 staff's confirmation of that statement, that aircraft
10 crashes from Detroit Metropolitan Airport, in other
11 words airport operations, are less than ten to the
12 minus seven? Because you can't screen it out. You
13 can't screen it out based on the air traffic.

14 MR. TAMMARA: And we'll take another look
15 at it.

16 MR. THOMAS: If I could make just one
17 quick comment to that for what's in the FSAR? I'm
18 sorry this is Steve Thomas, from Black and Veatch.

19 CHAIRMAN CORRADINI: Thanks, Steve.

20 MR. THOMAS: And we had a RAI response
21 that dealt with this a little bit. The crash
22 probabilities that are used for the Mills Field,
23 because it is so close, come out of the SRP, which
24 uses the values from the DOE standard 3014.

25 And that table only goes to ten miles

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1 from, there's ten miles difference between the airport
2 and the locations, in this case Fermi 3.

3 And there's a statement in the DOE
4 standard that says if a facility's coordinate falls
5 outside the boundaries of any of the tables, or falls
6 in a bin where no value is given, the corresponding
7 probability value is assumed to be zero. So that's
8 the basis for why that's less than ten to minus seven.

9 CHAIRMAN CORRADINI: So basically you're
10 saying it's far away out, you just default to zero?

11 MR. THOMAS: For the probability related
12 to taking off or landing it's far enough out. So
13 you're focused in on the crash probability related to
14 the airways. So that's the basis for that.

15 CHAIRMAN CORRADINI: Okay.

16 MEMBER STETKAR: Okay.

17 CHAIRMAN CORRADINI: That answers the
18 question. It may not satisfy you.

19 MEMBER STETKAR: That's in the RAI
20 response, is it?

21 MR. THOMAS: Yes, it is --

22 MEMBER STETKAR: We'll get --

23 MR. THOMAS: RAI 03.05.

24 CHAIRMAN CORRADINI: That's fine. We
25 don't necessarily get all the RAI responses. But

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1 that's fine.

2 MEMBER STETKAR: Yes, but Steve had the
3 number. So that would help us.

4 MR. THOMAS: 03.05.01.06-1.

5 CHAIRMAN CORRADINI: You talk to Chris.
6 If you've got it. Chris, did you get it?

7 MR. BROWN: Yes, I'll get it from Steve.

8 CHAIRMAN CORRADINI: Okay, thank you.

9 MEMBER STETKAR: I'd like to see that.

10 MS. GOVAN: And that answers your second
11 question.

12 CHAIRMAN CORRADINI: Hum?

13 MS. GOVAN: Then that answers your second
14 question for Rao --

15 MEMBER STETKAR: Yes, not happily but I
16 know what they did now.

17 MR. SCARBROUGH: I'm Tom Scarbrough. I'm
18 in the component integrity branch. And I'm going to
19 update you on the Section 3.9.6, functional design
20 qualification in-service testing for Fermi Unit 3.

21 As an introduction, just to update you, 10
22 CFR 52.79A-11 requires that the applicant describe the
23 programs and their implementation necessary to ensure
24 that systems and components meet ASME boiler pressure
25 filter code and the code for operation and

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1 maintenance, the LOM code, per 10 CFR 50.55A, and
2 according to how we categorize programs, in-service
3 testing programs, and the motor operated valve
4 program, our operational programs.

5 So we finalized the review. We do review
6 as part of the design certification but we finalize it
7 as part of the COL application review.

8 And that's described in Commission Paper
9 SECY 05-0197, which talks about the applicant fully
10 describing, and they indicate what fully describe
11 means, in terms of operational programs so that they
12 do not need to have a programmatic ITAAC for those
13 programs.

14 So the FSAR, the Fermi 3 FSAR, in Section
15 3.9.6, incorporates by reference the ESBWR design
16 control document of DCD provisions for functional
17 design qualification in-service testing programs for
18 valves and dynamic restraints.

19 And basically, a summary of what's in
20 there, in that DCD, is it references QME 1-2007, the
21 ASME standard for qualification of mechanical
22 equipment.

23 It specifies that the code of record, the
24 OM code, for IC program is 2001 edition, 2003 addenda.
25 It indicates there are no safety related or motor

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1 operated valves, or safety related pumps, in the
2 ESBWR. And it references a couple of
3 other aspects there, the FSAR supplements, that
4 general description that was in the DCD, by describing
5 some overall IC provisions such as reference values
6 and pre-conditioning.

7 It talks about pre-service testing in terms
8 of setting it up so it's as near as practicable to in-
9 service testing. It talks about power operative valve
10 testing.

11 And there's no safety related motor
12 operated valve. It talks about safety related air
13 operated valves and the reactor issue summary, 2000-
14 03, in the incorporation of those lessons learned.

15 It talks about check valve testing, the
16 acceptance criteria for open and close, and describes
17 the snubber examination and testing program. And
18 that's OM subsection.

19 DR. WALLIS: Does it talk about the vacuum
20 breaker? Aren't there vacuum breakers in this thing?

21 MR. SCARBROUGH: The vacuum breakers would
22 be handled by, it's a valve.

23 DR. WALLIS: It's a valve. It's like a
24 check valve, in a way.

25 MR. SCARBROUGH: Yes. So it would have to

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1 be qualified per ASME --

2 DR. WALLIS: Those are something really
3 new in the ESBWR.

4 MR. SCARBROUGH: Right, so they would have
5 to be qualified per that standard.

6 CHAIRMAN CORRADINI: But I think where
7 Graham is going with this, I actually had a note to
8 myself about this. At least under the DCD a test plan
9 is still to be, excuse me, a series of tests is still
10 to be done for the vacuum breakers.

11 If they go beyond excessive leakage
12 there's an isolation valve that has to be tested, and
13 the associated detection, or I would call it
14 instrumentation.

15 DR. WALLIS: Which is still being
16 conducted.

17 CHAIRMAN CORRADINI: Has to be done before
18 fuel load. I think what we both want to do is verify
19 that we're on the same page with that.

20 DR. WALLIS: I didn't see it listed here.

21 CHAIRMAN CORRADINI: But it is in the
22 program plan. It is in the SER because I found it
23 also in the testing for the ITAAC.

24 MR. SCARBROUGH: They're going to have to
25 have ITAAC for that. And the DCD specified the use of

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1 QME-1-2007 for all new designs. And so this would be
2 a new design they would have to qualify to. And then,
3 as I mentioned, there's no safety related pump. So
4 there's none in the IFC program.

5 Next I wanted to update you on the squib
6 valve. So we talked quite a bit about squib valves
7 for the AP1000. And the ESBWR has some squib valves
8 also. There are squib valves in the stand-by liquid
9 control system very similar to what's in the current
10 boiling water reactors.

11 There're automatic de-pressurization
12 systems, the ADS system has some squib valves. The
13 gravity driven cooling system, GDCS, has some squib
14 valves. And there are also a couple of back-up squib
15 valves in the equipment pool for the isolation
16 condenser system, that they use in parallel with some
17 AOVs.

18 And as I mentioned, the ESBWR DCD
19 specifies for new valve designs they be qualified per
20 ASME standard QME-1-2007, which we accepted in
21 Revision 3, Direct Guide 1.100. And so they will need
22 to address that.

23 The FSAR includes a provision that the in-
24 service testing program for squib valves incorporates
25 the lessons learned from the design qualification

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1 process. Because they have not completed the design
2 of the squib valve. So they'll have to incorporate
3 those design aspects, just like they're going to do
4 for AP1000, into the surveillance program for that.

5 In the SER for Fermi 3, we included a
6 license condition for surveillance activities for the
7 ADS and EDCS squib valves. And they're very similar
8 to the Vogtle license condition, which addresses the
9 ADS valves and the injection reserve valves that are
10 squibs in AP1000.

11 And basically what that license condition
12 does, it talks about pre-service. They have to verify
13 all the circuitry that works properly. They have to
14 sample 20 percent of the charges to make sure they
15 have enough explosive power.

16 For in-service activities, they have to,
17 every two years, do an external and remote internal
18 inspection. They have to check the circuitry of the
19 sample valves. And every two years they have to
20 sample 20 percent of the charges.

21 They also have to do the circuitry. And
22 every ten years they have to do a disassembly of those
23 valves. So very similar to what we saw in the Vogtle
24 license condition.

25 And now ASME, in the 2012 edition, it

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1 should, it's already been approved and gone through
2 the process, they'll be updating the IST program for
3 squib valves, for new reactors.

4 And the provisions will be very consistent
5 with the Vogtle license condition and the Fermi 3
6 license condition because we had all the same people
7 working.

8 I was on that committee and then we also
9 shared information. So the requirements were very
10 similar to what we see for those. So that's what's
11 happening with ESBWR squib valves.

12 MEMBER STETKAR: I wasn't party to the
13 Vogtle discussion so I don't know whether I should
14 have known this. In the license condition for both
15 the pre-service testing and the operational
16 surveillance, the way it's written, it says confirm
17 the capability of each sample pyrotechnic charge to
18 provide the necessary motive force to operate the
19 valve to perform its intended function.

20 Is that going to be what I would call a
21 functional test? In other words, I think the DPVs are
22 what you call the ADS valves. They may need to open
23 under conditions to de-pressurize the primary system
24 for transient, where you have a fairly high DP across
25 the plug, at rated system temperature.

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1 Are those tests going to be done under
2 those conditions, in other words, with the
3 differential pressures and perhaps any temperature
4 effects on the plug? I know it's not a simple plug,
5 but rather than getting into the details --

6 MR. SCARBROUGH: Right, exactly. They
7 actually do the explosive test. They're actually
8 going to remove the charge from the valve and put it
9 in a test fixture, which I call a bomb. But they
10 don't like me to say it.

11 MEMBER STETKAR: You don't like to use
12 that word.

13 MR. SCARBROUGH: Yes, but we always called
14 it a bomb before. And so you put it in a test
15 fixture. And we actually, when we were at Wyle
16 Laboratories observing their AP1000 qualification for
17 these valves, there was review of their data from
18 that.

19 And what they do is they look at the
20 pressure and the time traces. And it has to reach a
21 certain amount of pressure inside that test fixture to
22 show that it has enough explosive capability to open
23 that valve. And they're doing actual testing of a
24 full actual valve to show that amount of charge is the
25 right amount of charge for that.

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1 MEMBER STETKAR: The concern I have is
2 that, I mean, I can hear all of those things, but
3 you're painfully familiar of motor operated valve
4 torque problems and things like that, where perhaps
5 analysis doesn't necessarily get you the real finding
6 of mechanical interferences that the real world
7 presents.

8 And there've been instances of check
9 valves not opening in plants. And we don't need to go
10 into all of that.

11 And perhaps the second thing that you
12 mentioned would solve my concern about whether or not
13 just measuring the explosive force and saying, well,
14 I've done an analysis that given that explosive force
15 I'll actually, whether it's a plug that moves out of
16 the way or the configuration that they have -- at
17 least one of them that I've seen -- will actually
18 work, can be two different things.

19 MR. SCARBROUGH: Right, exactly.

20 MEMBER STETKAR: And that's why I was
21 curious when I heard test rig. I thought, well, maybe
22 they're going to have a simulated valve body and put
23 a DP across it and actually demonstrate it.

24 MR. SCARBROUGH: Not during the in-service
25 testing. But during the qualification testing on the

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1 TME-1, that's what they're doing. They're doing
2 actual valve tests, they have multiple valve tests
3 they're doing.

4 In the design phase they did many
5 different tests with different parameters, different
6 amounts of charges, different amount of thicknesses.
7 They varied quite a different number of parameters to
8 be able to show that, yes, this is the right amount of
9 charge that we need before the explosive force.

10 And from that, now what they're doing is
11 they're setting up their limit curves that they'll
12 have to check every two years to verify that they work
13 properly. And if they don't have one work properly,
14 they'll have to take corrective action for it.

15 And that was something that, with the
16 current ASME code, before it was going to be updated,
17 you just had to fire the charge. You took it out and
18 fired it. And if it fired you're good. But that's
19 not acceptable for these new valves. And so that's
20 what we've had here.

21 MEMBER STETKAR: Okay, that helps, thank
22 you.

23 MEMBER SCHULTZ: Thomas, on the last
24 bullet there, with respect to the ASME code for the
25 squib valves, is that a point of interest, there's

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1 conformity, or is the licensee, the applicant, going
2 to be committed to the ASME code going forward?

3 MR. SCARBROUGH: Right. Actually, and I
4 didn't mention this, but there's a sunset clause in
5 the license condition where the license condition will
6 expire if you incorporate into the IFC program the
7 license condition as written, or you incorporate the
8 new OM code as incorporated by reference in 55A. And
9 so either one would satisfy it.

10 MEMBER STETKAR: That's where I thought
11 you were going, thank you.

12 MR. SCARBROUGH: Now way down the road,
13 there's also the regulation that says 12 months before
14 fuel load you need to update your program to the
15 latest ASME OM code, incorporate that reference.

16 So they're going to have to address that.
17 But we've already been in discussions with plants
18 that, as long as they make sure that they're up to
19 date, they may request an alternative to use the older
20 version. But they still are captured by
21 that regulation to make sure that they use the latest
22 version of the OM code, or something that we consider
23 to be equivalent.

24 MEMBER STETKAR: And to you it looks like
25 the setup here is going forward in a way that will

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1 make that tractable for them.

2 MR. SCARBROUGH: Yes. And in the ASME
3 committee there were industry individuals representing
4 Westinghouse and GE and such. And so they were aware
5 of these provisions and such. And they understand
6 what they need to do to address them.

7 MEMBER STETKAR: Thank you very much.

8 MR. SCARBROUGH: Thank you. All right,
9 now just to give you a status of where we are with
10 Section 3.9.6, Detroit Edison adopted the RAI
11 responses from the previous R-COLA. And that included
12 the OM code, the AOV provisions and that sort of
13 thing.

14 And then the staff found those RAIs and
15 some additional RAIs, additional RAIs on squib valves.
16 And we found those to be resolved, based on the FSAR
17 modifications and the clarifications that are present.

18 We also performed an audit of the
19 procurement specifications at the GEH facility in
20 Wilmington to confirm compliance with 10 CFR 52.47 and
21 52.79A11 back in July of 2009.

22 And we looked at where the procurement
23 specifications incorporating the QME-1-2007
24 requirements, we verified that. We looked at valve
25 factor assumptions of that sort of thing, in terms of

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1 the calculations for the valves. We looked at flow
2 induced vibration. We made sure that the DCD
3 provisions were being incorporated into the
4 procurement specs. And so that was the purpose of
5 that audit. A

6 And as a result of that, we concluded that
7 the FSAR, together with the DCD, fully described the
8 functional design qualification in IST programs for
9 valves and dynamic restraints, consistent with the
10 SECY paper. And we have no open items or confirmatory
11 items in this section. That's where we are.

12 CHAIRMAN CORRADINI: Questions by the
13 committee? John?

14 MEMBER STETKAR: I hate to do this but I
15 had one. But it doesn't have anything to do with
16 anything that we've discussed.

17 CHAIRMAN CORRADINI: Then you're out of
18 order.

19 MEMBER STETKAR: Okay. And it's a point
20 of clarification. This is seismic, but it's a
21 classification of SLCs.

22 CHAIRMAN CORRADINI: But if I might,
23 seismic is going to be covered in a subsequent
24 meeting.

25 MEMBER STETKAR: Okay.

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1 CHAIRMAN CORRADINI: So if you could hold
2 that.

3 MEMBER STETKAR: No, I can do it. It's
4 not a seismic analysis.

5 CHAIRMAN CORRADINI: But I think if it
6 connects up to those sections I would hold off on
7 that.

8 MEMBER STETKAR: It actually doesn't
9 connect up to the sections that are postponed.

10 CHAIRMAN CORRADINI: Should I give you
11 another shot?

12 MEMBER STETKAR: It's in Section 3.2,
13 rather than seven and eight that were postponed.

14 CHAIRMAN CORRADINI: Go ahead, I'm sorry.

15 MEMBER STETKAR: That's why.

16 CHAIRMAN CORRADINI: I'm sorry.

17 MEMBER STETKAR: I thought it might be
18 fair game.

19 CHAIRMAN CORRADINI: It's fair game, give
20 it a shot.

21 MEMBER STETKAR: In the classification of
22 SSCs, the seismic classification of SSCs, most of it
23 is extracted from the North Anna review. Because
24 Fermi just incorporated all of that stuff by
25 reference.

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1 In the North Anna review there was an
2 issue. It says they set the operating basis
3 earthquake at one third of the safe shutdown
4 earthquake acceleration.

5 And from the North Anna review, there's a
6 quote that says, "Since the COL applicant has not
7 deviated from the DCD, which sets the OBE ground
8 motion equal to one third of the SSE ground motion,
9 the applicant shouldn't submit a list of SSCs -- I'm
10 doing this for the benefit of our recorder --
11 necessary for continued operation either in this
12 section or in the operational programs for pre-
13 earthquake planning and COL FASR Section 3.7.4."

14 In other words, there was a request for a
15 list. "Therefore, resolution of this issue is pending
16 as Open Item 03.02.01-3."

17 In the Fermi SER there was a question
18 regarding are there any additional site-specific RTNSS
19 components in addition to RTNSS components in the DCD.
20 Answer, no, there're not.

21 So essentially the list of RTNSS equipment
22 in the DCD is the list of RTNSS equipment for Fermi.
23 SER cites that response, that there are no new RTNSS
24 equipment, as justification to close out that open
25 item from North Anna. Follow that logic?

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1 CHAIRMAN CORRADINI: Yes.

2 MEMBER STETKAR: Now my question is, there
3 are RTNSS equipment that must be Seismic Category 2.
4 And there's a lot of RTNSS equipment that is non-
5 seismic.

6 And what I don't know is what the concern
7 is about survivability of an OBE versus the population
8 of RTNSS equipment, some of which cannot survive an
9 OBE, some of which certainly can, to close out the
10 open item from the North Anna review. Because I don't
11 know really what the concern was.

12 CHAIRMAN CORRADINI: Right.

13 MEMBER STETKAR: But just simply saying
14 that there are no new RTNSS components, I don't think
15 there were any new RTNSS components in North Anna
16 either, but there was an open item.

17 MR. SCARBROUGH: Right, how does that
18 close that open item, right.

19 MEMBER STETKAR: How did just that
20 assertion that there isn't anything new close out that
21 open item? If somebody can answer that today that's
22 fine, but maybe the right people aren't here.

23 MR. SCARBROUGH: Right, we'll have to
24 track down the right people.

25 MEMBER STETKAR: And if that's the case we

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1 can bring it up again when we address it. But you may
2 want to have somebody look at that and come prepared
3 at least to answer that.

4 CHAIRMAN CORRADINI: Okay, got it. We
5 both captured it.

6 MR. SCARBROUGH: Yes.

7 CHAIRMAN CORRADINI: We've got it.
8 Anything else with the staff?

9 MR. SCARBROUGH: No, we're good.

10 CHAIRMAN CORRADINI: Okay, let's move on.
11 I'll thank the current set of staff. We'll come back
12 to DTE and start up with Chapter 10.

13 (Off the record comments)

14 CHAIRMAN CORRADINI: Steve, or Ryan, or
15 whomever?

16 MR. PRATT: My name is Ryan Pratt and I
17 will be presenting Chapter 10, Steam and Power
18 Conversion System. In Chapter 10 there are two
19 sections that are incorporated by reference, that's
20 10.1 and 10.3.

21 And I will be discussing Section 10.2,
22 turbine generator, and Section 10.4, other features of
23 the steam and power conversion system. In Section
24 10.2 we incorporate by reference and we add two COL
25 items and one standard supplemental item.

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1 Just for some history on this section,
2 these items were initially covered as COL holder
3 items. And subsequently ODC set forth a position that
4 the COL holder items were not appropriate. And then
5 these became COL information items.

6 As a result, Dominion started the actions
7 for the turbine missile probability analysis report as
8 part of the North Anna application. And now, as we
9 have transferred ourselves to the R-COLA, we have
10 taken responsibility of turbine missile probability
11 analysis.

12 The turbine missile report was submitted
13 as on the Fermi 3 docket, the most recent revisions
14 are, and we are not on Revision 4 of that report.

15 Still on Section 10.2, GE manufactures the
16 turbine and the generator. It is the model N3R-6F52
17 turbine from GE. We added testing requirements for
18 the rotor dovetails and extraction non-return valves
19 because testing for these components was not addressed
20 on the DCD. That was a standard COLA Item 10.2-1-A.

21 And then in standard COLA Item 10.2-2-A,
22 we referenced the turbine missile probability analysis
23 report. And for the most part, that report takes care
24 of all of the COL information items requested in
25 Section 10.2.

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1 Next slide. Section 10.4, Other Features
2 of the Steam and Tower Conversion System. The FSAR
3 provides site-specific conceptual design information
4 for the CIRC system, including the following.

5 A natural draft cooling tower, four CIRC
6 pumps, sides for condenser cooling requirements,
7 station water makeup capabilities provided for
8 evaporation, drift and blowdown, control of water
9 chemistry as provided through chemical addition and
10 blowdown, and the inner connection is provided with
11 the plant service water system during normal
12 operation.

13 Continuing in Section 10.4, we provided
14 further conceptual design information. CIRC failures
15 are considered and evaluated, including potential
16 flooding considerations external to the power block.

17 The DCD evaluates internal flooding
18 considerations and structural failure of the natural
19 draft cooling tower, which is located at least its
20 height away from the power block to ensure that
21 there's no adverse impact from failure of the natural
22 draft cooling tower.

23 In Table 10.4-201, we summarize
24 recommended threshold values of key water chemistry
25 parameters. And finally, supplemental item, we

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1 include design provisions for the condensate
2 purification system and condensate feed water system
3 to accommodate 100 percent feed water flow to support
4 a cascade configuration. And that concludes my
5 presentation of Chapter 10. Are there any questions?

6 DR. KRESS: On your turbine missile?

7 MR. PRATT: Yes.

8 DR. KRESS: Of probability. May occur
9 when you get a turbine overspeed event?

10 MR. PRATT: Yes, we have ductile fracture
11 from a turbine overspeed as well as stress corrosion
12 cracking.

13 DR. KRESS: And you somehow have a
14 frequency of turbine overspeeds. Does that come from
15 data to other plants or --

16 MR. PRATT: Yes. Does GE want to address
17 this?

18 MR. SCHUMITSCH: Yes. This is Skip
19 Schumitsch from GE Hitachi. Yes, the turbine missile
20 report looked at the information from the GE fleet in
21 developing the analysis that was performed.

22 CHAIRMAN CORRADINI: But if I might just,
23 I'm trying to remember, and you may want to repeat
24 this a little bit louder, this is not just the nuclear
25 fleet. This is all the steam turbine fleet, if I

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1 remember from the DCD questions we had on this.
2 That's a question. That's my memory. It's more than
3 just the nuclear fleet?

4 MR. SCHUMITSCH: That's correct.

5 DR. KRESS: What causes turbine overspeeds
6 anyway? What are the causes for those?

7 MR. SCHUMITSCH: One cause would be a
8 control system failure.

9 DR. KRESS: And a valve failure, you get
10 too much steam in?

11 MR. SCHUMITSCH: All those are analyzed in
12 the report.

13 DR. KRESS: Are those systems all
14 basically the same from this database that you used to
15 turbine overspeed frequency? Are all those things
16 basically pretty much the same?

17 DR. KRESS: Does the turbine system at
18 Fermi look like all the other turbine systems or is it
19 different?

20 MR. SCHUMITSCH: The control system is a
21 state of the art control system. Is that your
22 question?

23 DR. KRESS: Yes, I guess that's it. But
24 if you have an overspeed, in order for the turbine
25 motor to tell, does it have to have a flaw in it or

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1 something?

2 MR. SCHUMITSCH: Part of the analysis
3 includes a preventive maintenance program that expects
4 certain parts of the turbine to look for flaws.

5 DR. KRESS: I guess my question --

6 MR. SCHUMITSCH: So the probability is
7 based on the fact that the flaw, if it does exist, has
8 a propagate, yes.

9 DR. KRESS: Yes, my question about that,
10 I guess, are there flaws that you can't detect? Are
11 there flaws that might be there that you don't know
12 about by the maintenance and inspection?

13 MR. SCHUMITSCH: I think that would be the
14 only way you'd have the failure. But can we just --

15 DR. KRESS: If you detect the flaw you
16 correct it. So you're looking for the probability of
17 an undetected flaw?

18 MR. HINDS: Just a couple of more
19 comments, David Hinds from GEH. So you're concerned
20 about things that might influence failure and things
21 that might influence a turbine overspeed.

22 There are state of the art controls on
23 this turbine generator, the latest generation, an
24 evolution of digital control systems. We also have
25 the redundant turbine overspeed protection system to

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1 ensure that a failure of the overspeed protection
2 system wouldn't potentially cause the event.

3 And additionally, there's periodic
4 inspections similar to what you were questioning.
5 There are periodic inspections, disassembled
6 inspections of the turbine, to detect potential flaws.

7 So there's prevention of overspeed and
8 detection of flaws through periodic inspections. And
9 both build upon each other for minimizing the
10 probability.

11 And then additionally then, we favorably
12 orient the turbine such that even if all those things
13 fail, then the turbine blade ejection wouldn't cause
14 a hazard to a safety related component or structure.

15 DR. KRESS: Does your inspection look at
16 all the blades in the turbine?

17 MR. HINDS: I'm sorry?

18 DR. KRESS: Do these inspections look at
19 all the blades in the turbine?

20 CHAIRMAN CORRADINI: I don't think it's
21 the blades. It's the root, isn't it?

22 (Simultaneous speaking.)

23 MEMBER BROWN: It's where they connect
24 into the basic rotors, where the blades connect --

25 (Simultaneous speaking.)

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1 DR. KRESS: A lot of those blades, I was
2 just wondering how they inspected them.

3 CHAIRMAN CORRADINI: You really worry
4 about the rotor coming apart.

5 MEMBER BROWN: Yes, the rotor coming
6 apart.

7 DR. KRESS: My question is how do they
8 inspect all those?

9 MEMBER BROWN: You can't. If somebody
10 tells you they do they really can't. You've got to
11 take it apart to do it.

12 DR. KRESS: That's what I was worried
13 about. I was wondering what the inspection process
14 does.

15 MEMBER BROWN: Do the best you can and
16 then you keep your fingers crossed. And you have the
17 things oriented so it won't take anything out. And
18 then you hope that your overspeed trip system will
19 trip it before it goes fast enough that it exceeds the
20 stresses that you have in the rotors.

21 DR. KRESS: Right.

22 MEMBER BROWN: So the problem with their
23 design is that they've got magnetic trips, magnetic
24 sensors, on the shaft, which while it had redundant
25 sets, three for the overspeed trip, the electronic

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1 switch system, and three for the normal speed control
2 system, they're all magnetic trips.

3 And they're sort of contiguously located
4 on the same shaft, in the same location. There's so
5 little information at the DCD to describe that it's
6 difficult to understand what they did.

7 CHAIRMAN CORRADINI: So a little --

8 MEMBER BROWN: No, let me finish, just let
9 me finish.

10 CHAIRMAN CORRADINI: Well, you haven't
11 spoken so I'll give you another 30 seconds.

12 MEMBER BROWN: I'm awake now, so that's
13 going to help out. But the problem is those magnetic
14 sensors could be susceptible to interference or noise
15 from a common source, and then take out both the
16 control system and the trip system.

17 CHAIRMAN CORRADINI: I've actually had that
18 happen before, Tom, and it was saved by an operator
19 before it exceeded 150 percent rated speed.

20 DR. KRESS: Well, given all this, I guess
21 if I were going to calculate the probability of one of
22 these missiles, I would just assume there's a flaw
23 there.

24 CHAIRMAN CORRADINI: Let me ask, did Mr.
25 Stetkar have a question?

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1 MR. ARMIJO: The flaws are assumed in the
2 design analysis.

3 DR. KRESS: So you don't have to rely on
4 the inspection.

5 MR. HINDS: There is a flaw size assumed in
6 the probability, assume the flaw size and therefore,
7 and then a growth --

8 DR. KRESS: My concern was I was worried
9 about --

10 MR. HINDS: -- with a growth calculation.

11 DR. KRESS: -- them relying on the
12 inspection. But if you assume it's there I don't --

13 MR. HINDS: You assume a flaw size in a
14 growth. So there's defense in depth here.

15 DR. KRESS: Okay, that takes care of my
16 issue.

17 CHAIRMAN CORRADINI: I was about to ask
18 something but I think Mr. Stetkar is next. Mr.
19 Stetkar?

20 MEMBER STETKAR: Well, all I would like is
21 a copy of Report, write it down, ST-56834/P, Revision
22 4. Please could you send that to us?

23 MS. CAMPBELL: That has already been
24 submitted.

25 MEMBER STETKAR: I'm sorry. This one, I

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1 want Revision 4. I don't want a previous revision. I
2 don't want the 1984 GE analysis. I'd like the Revision
3 4.

4 MS. CAMPBELL: Revision 4 has been
5 submitted.

6 MEMBER STETKAR: To the staff.

7 MS. CAMPBELL: Yes.

8 MEMBER STETKAR: Okay, I'd like whoever can
9 get me that copy I would like that.

10 CHAIRMAN CORRADINI: Just to remind parts
11 of the committee that forgot this, John reminded me.
12 The reason this was pushed from the DCD to the R-COLA
13 was that analysis was not available at that time
14 because it wasn't clear whose turbine would be
15 acquired. So under the assumption this is a GE
16 turbine, we have an analysis.

17 MEMBER STETKAR: Okay, I've got it. I've
18 got hard copy but we'll need to get it for the record
19 for the subcommittee. The staff has it because it was
20 submitted last October.

21 CHAIRMAN CORRADINI: Okay, other questions
22 for our speaker? Ryan, thank you.

23 MR. PRATT: Thank you.

24 CHAIRMAN CORRADINI: We'll let the NRC
25 staff come up now and have their shot at it. Okay, who

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1 will lead us?

2 MR. EUDY: Good afternoon.

3 CHAIRMAN CORRADINI: Mike, you will?

4 MR. EUDY: Yes, I'm Mike Eudy, the project
5 manager for Chapter 10. And we're going to go through
6 the staff's evaluation for the Fermi COL application
7 review for Chapter 10, the steam and power conversion
8 system.

9 We decided that we were just going to focus
10 on what we thought would be the topic of interest in
11 this chapter. It would be 10.2, turbine rotor
12 integrity.

13 And we have Greg Makar and John Honcharik
14 here, our technical experts. And they will be talking
15 about the turbine maintenance and inspection program,
16 turbine missile probability analysis, and the turbine
17 design. So turn it over to Greg Makar.

18 MR. MAKAR: Okay, this slide is showing
19 what information is required from the COL applicant.
20 So this is what we're looking for to review. There are
21 two items, as you heard Mr. Pratt explain.

22 One is for the maintenance and inspection
23 program. And that needs to address the SRP 3513
24 turbine missiles acceptance criteria and various
25 inspection and testing.

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1 And then there's the turbine missile
2 probability analysis, is the second item. Many of the
3 details of these two things are addressed in the DCD.
4 So there's a lot of overlap between what's there and
5 what we'll describe.

6 But these items are needed to address the
7 remaining details that were not in the DCD. So again,
8 these are requirements for the applicant.

9 Next slide, please. And then quickly, this
10 is what we received to review. We have the maintenance
11 and inspection program, the probability analysis, and
12 a supplement identifying the turbine model.

13 Now if you've seen in the FASR, the
14 applicant's FSAR, there's not a lot of words in there.
15 They chose not to repeat a lot of information that's
16 already in the DCD. And so a lot of this COL
17 information is accomplished by pointing at where the
18 information is in the DCD and the missile analysis.

19 Now all three of these items are submitted
20 as standards so they could apply to all ESBWR COL
21 applicants. Our plan is that I will describe our
22 review of the maintenance and inspection program and
23 then John will present our review of the missile
24 probability analysis report.

25 Now, I'll just quickly cover the supplement

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1 now. That is only to provide the turbine model number.
2 And we found that acceptable because it meets the
3 description in the DCD and it is the model covered in
4 the turbine missile analysis report.

5 MEMBER STETKAR: But any COL applicant who
6 might decide not to use that GE turbine would have to
7 do another analysis, right?

8 MR. MAKAR: Correct.

9 MEMBER STETKAR: Okay.

10 MR. MAKAR: Okay, next slide please. So
11 for our review, we're looking for the applicant to meet
12 the acceptance criteria in SRP Section 3513 for this
13 maintenance and inspection program.

14 I just want to quickly review what they
15 are, GDC 4 for environmental and dynamic effects, P-
16 Sub-1, which is defined as the probability of the
17 turbine failure resulting in the injection of a turbine
18 rotor or internal structure fragments through the
19 turbine casing.

20 So it's that parameter that's identified in
21 our acceptance criteria. And so the missile generation
22 probability needs to be related to the design and the
23 control system maintenance testing, a variety of
24 things. And there has to be a commitment from the
25 applicant to visual surface and body metric

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1 inspections.

2 And I'll review what the staff says in that
3 SRP. "Staff believes that maintaining an acceptably
4 low missile generation probability, P-1, by means of a
5 suitable program of periodic testing and inspection, is
6 a reliable method for ensuring that the objective of
7 precluding generation of turbine missiles can be met."

8 So that's why we're looking for all this.
9 And of course that includes, as you can see, the
10 missile probability analysis is important. So this why
11 these two things are intertwined. Next slide please.

12 MEMBER STETKAR: Greg, can I ask you a
13 question before we get into what may be more details.
14 And it's something I just thought about. I looked at
15 the DCD Table 1984 for RTNSS structures.

16 And I brought it up earlier with external
17 flooding because there are external flooding
18 requirements in the DCD for RTNSS structure. Well,
19 what it says in the DCD for internal missiles, it says
20 there are no credible sources of internal missiles per
21 Section 3.5.

22 How are RTNSS structures treated from the
23 perspective of, for example, turbine missiles? Because
24 this turbine is not favorably oriented to the
25 electrical building, which is a RTNSS structure. It

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1 contains RTNSS equipment. My question is how is that
2 treated in this process?

3 MR. MAKAR: Well, I'm not sure. I know we
4 didn't do a separate evaluation. I'm not aware of the
5 applicant doing one for RTNSS. Do you know, John?

6 MR. HONCHARIK: I don't remember looking at
7 that. Because I was basically looking at the turbine
8 missile analysis. But I guess you're saying that it's
9 unfavorable for Fermi 3?

10 MEMBER STETKAR: The Fermi 3 turbine is
11 unfavorable for the Fermi 3 electrical building. Now
12 the electrical building is not a safety related
13 building. It is, however, identified as a RTNSS
14 structure.

15 MR. HONCHARIK: Okay, it's a RTNSS
16 structure and it's required for a safe shutdown?

17 MEMBER STETKAR: No, it's Category C, I
18 think, no, B, no C, I think. I think it's all C.
19 There are too many entries and too many different
20 tables for me to do it in real time here.

21 So don't hold me to whether it's a B, which
22 would be long-term cooling, or C, which is basically
23 risk reduction. I don't know the answer to that right
24 at the moment. I do know that it is a RTNSS structure.

25 MR. HONCHARIK: Right, but I think if it's

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1 RTNSS for a certain category where it may be important
2 for a safe shutdown --

3 MEMBER STETKAR: That's the one that you
4 care about, or in principal? Well, anyway, if you
5 could put it on your notes there to make sure that
6 we're okay from a regulatory perspective, that we're
7 not missing something, that ought to be considered.

8 I know it's kind of strange area. But as
9 I said, in Chapter 19 of the DCD, it's not addressed
10 explicitly in Chapter 19 because the column in Chapter
11 19 just says internal missiles.

12 And it says, well, there aren't any
13 credible internal missiles. But they do address other
14 external hazards, such as high winds, external
15 flooding, internal flooding. So I don't know how this
16 area of turbine missiles relates to that topic.

17 MR. HONCHARIK: Okay. I've got that.

18 MEMBER STETKAR: And it's certainly not
19 favorably oriented. Now, on the other hand, if the
20 turbine missile analysis indeed confirms that it's less
21 than ten to the minus five, I think we're okay, which
22 I think they claim they did. But I was just curious
23 how you folks, during your reviews, think about that.

24 MR. MAKAR: It's a challenging area, RTNSS.

25 MEMBER STETKAR: It is. And we're plowing

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1 some new ground here. And it's something I've been
2 trying to follow as a member of the subcommittee, how
3 that's treated in the transition from design
4 certification through COL, and in principal out into
5 operation where we don't get involved. But at least at
6 this snapshot, I was trying to follow.

7 MR. MAKAR: Thank you. Next slide please.
8 All right, as I said, there's not a lot in the FSAR.
9 So we're looking at four sections where there is some
10 description. And mostly there is pointers to where the
11 appropriate information is found.

12 These four sections are from the COLA FSAR.
13 Now, two of them are from Section 10.2.2, which is more
14 related to turbine design and overspeed protection.
15 And 10.2.3 is where the turbine rotor integrity
16 resides. That's our branch's main interest.

17 But these are all reviewed as one package
18 because the information from the maintenance inspection
19 program, the missile probability analysis, is where
20 turbine rotor integrity information is. So we're
21 reviewing all of these together.

22 And so because there's not a lot of
23 information, our review is really based on looking at
24 whether what the applicant provided affirms what's in
25 the DCD that we've already approved, and supplements

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1 those adequately with the turbine missile probability
2 analysis. So that's really how we're reviewing this.
3 Okay, next slide please.

4 MEMBER STETKAR: Greg, before you get to
5 the next slide, just so we have it on the record, a
6 point of clarification, I found the right table. It's
7 19A-3. And indeed the electrical building is not
8 listed as a RTNSS criterion B structure.

9 MR. MAKAR: Okay, so it's not RTNSS.

10 MEMBER STETKAR: So apparently it's not
11 something that you need to worry about. It does indeed
12 house a lot of equipment that's classified as RTNSS
13 equipment. But it's all apparently under Category C,
14 which is risk reduction.

15 MR. MAKAR: 19A-3?

16 MEMBER STETKAR: It's 19A-3 is the table
17 that actually lists the structures. And all of the
18 structures that are listed in that table are classified
19 under Criterion B. And the electrical building does
20 not appear in that list. So that's probably the
21 answer.

22 MR. MAKAR: Thank you.

23 MR. EUDY: You want us to X-out that
24 question?

25 MEMBER STETKAR: Just cross it off.

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1 MR. EUDY: Okay, thank you.

2 MR. MAKAR: Slide 7 please.

3 MEMBER BROWN: The next slides, are you
4 going to talk about 10.2.2.7 referring to the testing?

5 MR. MAKAR: Yes. Probably not every detail
6 that's in there.

7 MEMBER BROWN: In that case, I'll wait
8 until you talk before I ask something.

9 MR. MAKAR: 10.2.2.7, in this application
10 --

11 MEMBER BROWN: Well, there's only one
12 thing. It just says they made one change. A standard
13 called 10.2-1-A talked about non-return valves are
14 inspected. And it's discussed in 10.2.3.7, which is
15 one of your later --

16 MR. MAKAR: Right.

17 MEMBER BROWN: So that's it.

18 MR. MAKAR: You're doing a lot of pointing
19 here and we will address what's actually done under
20 10.2.3.7 in the turbine missile probability analysis.
21 But if we don't --

22 MEMBER BROWN: But not relative to actual
23 testing of the turbine protection system or anything
24 else. The DCD is kind of sparse. And that's why I
25 asked the question.

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1 There's a Paragraph 10.2.2.7 in the DCD.
2 I guess it's Rev 9. And it's kind of the same in the
3 earlier revs. But it just says, "Operation of the
4 overspeed protection devices under controlled speed
5 conditions is checked at startup and after each
6 refueling or maintenance outage."

7 But in other places it says, well, we don't
8 really need to test these in operation because we can
9 insert electronic signals to check that the circuits
10 work.

11 That means that the sensors themselves are
12 never tested up in the range in which they're expected
13 to operate. In other words, they're only tested at low
14 speeds and/or up to rated.

15 And there's nothing that ever addresses or
16 evaluates the characteristics of these magnetic sensors
17 to ensure that they don't saturate. I mean, iron is
18 iron. And depending on what you do and how you do it,
19 you may not have a design that does that.

20 And there was no evidence in the DCD, under
21 qualification testing, where you would validate the
22 performance of the sensors at speeds of 120 percent
23 rated, or whatever the numbers are, or even above 110
24 or even above 101 or 102. Because that's where you
25 would logically expect to see them actually perform.

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1 MR. MAKAR: Well, I can tell we're not
2 going to address your concerns adequately in our
3 presentation. But we do have a 10.2.2. reviewer,
4 Devender Reddy, here from the Balance of Plant branch.
5 And their branch reviewed, they're more of the design
6 and controls reviewers. So I'll ask him to --

7 MR. REDDY: Yes, Mr. Brown, this is
8 Devender Reddy. I'm BOP branch. Especially for your
9 question, the inspection of the spring assisted monitor
10 welds will be inspected in accordance with the
11 recommendations and will include seal to disc contact
12 --

13 MEMBER BROWN: No, not the I'm talking
14 about the magnetic feed sensors.

15 MR. REDDY: Actually, Mr. Brown, to the
16 extent I know of, there is not much testing about the
17 magnetic sensors.

18 MEMBER BROWN: That's my question. I read
19 through the valve stuff. You take valves apart, you
20 put them back together. You look at this, you look at
21 seals, you do all kinds of nifty stuff.

22 But it doesn't do anything else relative to
23 actually testing to ensure that the system actually
24 picks up within the range based on actual signals from
25 the sensors themselves.

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1 And since it was absent, I'm not sure I was
2 on the committee at the time this was reviewed at the
3 DCD. I remember when that was done.

4 CHAIRMAN CORRADINI: You were there.

5 MEMBER BROWN: For Chapter 10? I might
6 have been. But I wasn't smart enough to ask the
7 question then.

8 CHAIRMAN CORRADINI: Okay, is that on the
9 record?

10 MEMBER BROWN: It is now.

11 (Laughter)

12 MR. REDDY: Mr. Brown, you are correct in
13 that you know there is not much in the DCD regarding
14 the magnetic sensors, or even testing of. I want you
15 to know that not much details are in the DCD.

16 MEMBER BROWN: Well, there's nothing in
17 here either, in the SRE.

18 MR. REDDY: I'm sorry. It is not there.
19 I'm sorry, go ahead.

20 CHAIRMAN CORRADINI: No, I just wanted to
21 make sure I understand your point. So your concern is
22 it's not being appropriately tested?

23 MEMBER BROWN: Yes. There's two problems
24 here. Number one, this has got both an electrical
25 control and electronic software based control system

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1 and it's got electronic software based overspeed
2 protections.

3 They say they're diverse but there's no
4 definition in either the DCD or the FSARs as to what
5 makes them diverse. There's one FPGAs and the other
6 one's microprocessors. There's one of them solid state
7 transistors or integrated circuits and the other one's,
8 there's nothing in there. So it's just the magic word
9 diverse. What does that mean?

10 MR. REDDY: Well --

11 MEMBER BROWN: Let me finish. The second
12 part is there's nothing any place in here relative to
13 testing, at least I didn't find it, that says how they
14 are actually tested at some point, the design actually
15 tested, to ensure that it actually responds properly
16 within the speed range at which it's operational.

17 So that's fundamentally the question. If
18 you had a mechanical, centrifugal overspeed switch and
19 you had the electronics, the only way to test that is
20 to run it up.

21 And then you'd get a verification that both
22 of them worked, or at least you had the proper outputs
23 from the other one. But here you don't. It's all
24 based on, well gee, we can test them with input signals
25 on the input to the circuits. And everybody assumes

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1 the magnetic speed sensors work just fine.

2 MR. REDDY: This is Devender Reddy again.
3 Mr. Brown, you are right. As far as the testing is
4 concerned, the process, there is not much in the DCD,
5 neither in the FSAR affirming. But they did
6 differentiate between the two electric overspeed
7 systems, how they are related, how they are diverse.
8 It is in the DCD.

9 MEMBER BROWN: Well, how are they diverse?

10 MR. REDDY: Under the seal. This is from
11 the DCD.

12 MEMBER BROWN: Yes, I read the whole thing
13 and I didn't see where it said where one is one design
14 and stuff. They just said they were diverse.

15 MR. REDDY: Diversity is provided by
16 separate sets of physically isolated primary and
17 emergency overspeed protection controllers. The
18 primary overspeed trip and emergency overspeed trip
19 controllers are independent and diverse by providing
20 unique hardware and logic design and implementation.

21 MEMBER BROWN: That doesn't mean they're
22 not both not software controlled.

23 CHAIRMAN CORRADINI: So I just want to
24 bring this to a close. So what your concern is, you're
25 still concerned about the diversity question.

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1 MEMBER BROWN: Diversity because those
2 words don't segregate a hardware based design by a
3 software controlled design, that's all. If they're
4 both software controlled designs, and you had diverse
5 processors, there's got to be some testing or something
6 to show that something's different enough in there.

7 CHAIRMAN CORRADINI: Okay.

8 MEMBER BROWN: That's not a good idea. The
9 second piece is it says diverse but it doesn't say are
10 the sensors diverse. It just says they're magnetic
11 speed sensors.

12 And during the design phase, or at some
13 point, you would expect the sensors to be tested to
14 confirm that their outputs are linear and run up
15 through the design range.

16 But there's no testing, once the design is
17 complete, to show that it does that. I like testing.
18 It's a bent. Stuff that's designed doesn't always work
19 the way you design it.

20 CHAIRMAN CORRADINI: Okay, I've captured
21 it.

22 MEMBER BROWN: Okay, and that's my only
23 point.

24 CHAIRMAN CORRADINI: Okay.

25 MEMBER BROWN: I'm done.

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1 MR. REDDY: So what is --

2 MEMBER BROWN: I have no idea what we're
3 doing with that yet, but we've got it captured.

4 CHAIRMAN CORRADINI: I'll capture it and
5 let's move on here.

6 MR. ARMIJO: Is there general agreement
7 that these aren't tested. It's hard to believe that
8 they aren't tested.

9 MEMBER BROWN: In the other projects we've
10 discussed, I have asked this question in the later
11 ones. And I don't remember the answers.

12 MR. ARMIJO: We should have GE here. Can
13 they answer that question, that these sensors are
14 tested and the overspeed is tested in some --

15 MEMBER BROWN: Actual sensor output.

16 MR. ARMIJO: -- actual, yes, these turbines
17 are out there.

18 MEMBER BROWN: At regular overspeed
19 conditions, that's all.

20 MR. HINDS: Hi, this is David Hinds from
21 GEH. Yes, there is testing for overspeed testing. And
22 it's actually described in the report that I think you
23 were just requesting a copy of previously.

24 CHAIRMAN CORRADINI: That's was I was
25 guessing.

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1 MEMBER BROWN: Once we get that I'll take
2 a look at it.

3 MR. HINDS: Yes, they are tested at or
4 above rated speed by means of controls in the main
5 control room. So there is an overspeed testing as --

6 MEMBER BROWN: Say that again.

7 MR. HINDS: It's tested during either
8 shutdown or startup with an overspeed condition to
9 verify that we have the overspeed. It's in Section 2.4
10 of the missile generation probability analysis report.

11 CHAIRMAN CORRADINI: So we just got that.
12 We'll have to look at it and come back. Okay?

13 MEMBER BROWN: Well, you don't have to do
14 it right this minute, Chris. I'm not going to read it
15 right this minute.

16 CHAIRMAN CORRADINI: Go ahead.

17 MEMBER BROWN: That's fine. We can go on.

18 MR. MAKAR: Okay, so for these two sections
19 in the FSAR turbine overspeed and testing, since they
20 mostly are pointing to the two other sections in
21 turbine rotor integrity, they way we viewed these is
22 these are affirming information in the DCD. And
23 they're pointing to other information that we're
24 reviewing.

25 So for these two sections, what's in the

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1 COL FSAR, it's not a technical review of technical
2 information. It's a review that it's referencing the
3 right source and consistent with the DCD.

4 So we can move on then to the next slide,
5 please, in the actual maintenance and inspection
6 program. So in 10.2.3.6, it again references certain
7 DCD sections. So, in that sense, it's getting
8 consistent with what the DCD said.

9 But only affirming what's in the DCD would
10 not be sufficient. As we said, there was some missing
11 information. So the overlap here is some of the
12 volumetric and service and visual inspections, a
13 combination of them. And the overlap is both in the
14 DCD and the missile probability analysis.

15 But the new information is that there's a
16 requirement for rotor dovetail inspections, not in the
17 DCD. And this is a variety of ultrasonic testing and
18 magnetic particle testing. And then there's also the
19 necessary inspection interval, which is 12 years
20 maximum for each low pressure rotor section.

21 And there are a variety of techniques that
22 are included in those inspections, which consist of
23 visual magnetic particle, ultrasonic testing, of
24 various parts. This includes the accessible rotor
25 services, turbine blades, couplings and coupling bolts.

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1 And as I said, different places on dovetail
2 inspection, dovetails with two different approaches,
3 depending on whether they are axial entry or
4 circumferential entry, tangential entry I should say.

5 Next slide please. And Section 10.2.3.7 is
6 in-service inspection of turbine valves. So we're
7 adding here to what's in the DCD, the reference to the
8 probability analysis, which includes now valve and
9 control system maintenance inspection and testing
10 details.

11 And so that's what's new here. There is a
12 categorization of extraction non-return valves and
13 daily or monthly testing, depending on how they're
14 categorized.

15 There is the valve testing interval, which
16 is needed and not in the DCD, 120 days. And that's
17 connected to the missile probability analysis. It
18 includes main stop, main control, intermediate stop,
19 and intercept valves.

20 And then the valve inspection intervals,
21 every valve at least once within a six year period,
22 looking for conditions such as wear and erosion,
23 deposits and distortions.

24 Next slide please. So for this COL item,
25 the maintenance and inspection program, we concluded

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1 that the information provided is acceptable because it
2 affirms the information in the DCD, supplements it with
3 the turbine missile probability analysis report.

4 And again, those criteria are that they
5 have an ISI, an in-service inspection and in-service
6 testing to maintain P-1 at ten to the minus four.
7 They've related the missile generation probability to
8 the design materials, valves, et cetera.

9 The other commitment to different
10 inspection techniques and the missile generation is
11 provided to the staff for review and approval. So when
12 we're ready to go to the next slide, John will describe
13 our review of that report.

14 DR. WALLIS: Do these blades creep outwards
15 as they get older, creep outwards? Are there any
16 dimensional change as they get older, like they creep
17 outwards?

18 MR. HONCHARIK: I don't think they, they're
19 really not subject to, I guess --

20 DR. WALLIS: Uptakes or anything like that?

21 MR. HONCHARIK: Right. Because it's not a
22 high enough temperature.

23 DR. WALLIS: Not high enough.

24 CHAIRMAN CORRADINI: Go ahead, John.

25 MR. HONCHARIK: Thank you, great. My name

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1 is John Honcharik and I want to talk about the turbine
2 missile probability analysis. And that was submitted
3 to address the standard COL Item 10.2.2-A. And this
4 would be for the GE turbine design for that specific
5 model number.

6 So the applicant uses the report, the ST-
7 56834, Revision 4, as the bounding turbine missile
8 analysis. And this would determine the inspection and
9 test intervals and any augmented inspection
10 requirements, as Greg has discussed already.

11 The analysis uses the guidance in Reg Guide
12 1.115 to determine the probability of generating
13 turbine missile due to several mechanisms. This
14 includes failure due to brittle fracture, due to
15 fatigue and stress corrosion cracking, and also ductile
16 failure due to destructive overspeed of the turbine.
17 The destructive overspeed is due to the failure of the
18 overspeed protection system.

19 Next slide. As previously mentioned, the
20 analysis used to provide the inspection intervals, so
21 this analysis basically calculates the probability of
22 generating a turbine missile that meets the
23 requirements of less than ten to the minus five.

24 And it should be noted that ten to the
25 minus five is for an unfavorable turbine orientation,

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1 which was a specific statement or requirement in the
2 ESBWR DCD.

3 So even though the standard ESBWR design,
4 which is user Fermi, is a favorable orientation, the
5 DCD set that criteria to be for unfavorable turbine for
6 conservatism.

7 The turbine missile analysis uses bounding
8 material properties of the rotor since the as-built
9 material properties will not be available until the
10 turbine is manufactured. In addition, the analysis
11 uses a methodology that was previously approved by the
12 NRC.

13 The next slide please. I'll now discuss
14 the material that's used for the turbine rotor. The
15 rotor material is a nickel, chromium, molybdenum and
16 vanadium alloy steel that's under a GE-specific
17 material specification.

18 The material is similar to other turbine
19 rotor materials, such as ASTM A470, and has specific
20 requirements to ensure toughness. This includes vacuum
21 treatment and restrictions on sulphur and phosphorus to
22 minimize these alloy impurity elements and to improve
23 toughness.

24 This material is also similar to material
25 that was used in the past but has a more restrictive

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1 nickel content, which is a specific requirement in
2 order to achieve the desired material properties for
3 this nuclear monoblock and integral rotor.

4 The toughness of the as-built rotor is
5 verified by the fracture appearance transition
6 temperature, or what is called FATT. And for this
7 rotor it's plus 30 degrees Fahrenheit, as required by
8 the material specification and also the DCD.

9 The as-built rotor will be tested by
10 removing impact test specimens from the radial trepans
11 between the rotor wheels to ensure that the deep-seated
12 FATT, which is basically FATT value closest to the
13 bore, center of the integral rotor.

14 And that's done in order to ensure that the
15 toughness value used in this analysis is bounded by the
16 actual as-built material values specifically within the
17 inner region of the monoblock rotor.

18 Next slide. The bounding material
19 properties specified in the GE materials specification
20 was used in the analysis. And it included the
21 toughness, or the FATT value of plus 30 degrees
22 Fahrenheit, and also the minimal tensile strength.

23 And the analysis also referenced the GE
24 material specification, which is the material spec that
25 would be used for the Fermi turbine rotor. This

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1 ensures that the turbine missile analysis is only
2 applicable for this GE designed turbine with this GE
3 material specification.

4 Next slide please. To determine the
5 inspection interval of the rotor, analysis consisted of
6 determining probability of rotor burst and the
7 probability of a turbine rotor fragment penetrating the
8 casing.

9 The failure modes assumed include ductile
10 bursts due to overspeed and brittle fracture of assumed
11 mis-flaw growing to critical size due to cyclic fatigue
12 and stress corrosion cracking at the rotor dovetails.

13 The ductile tensile burst was performed
14 using the tangential stresses of each rotor stage and
15 a minimal tensile strength of the material. The cyclic
16 fatigue evaluation was performed assuming mechanical
17 and thermal loading of propagating of an internal
18 forging defect, which was an assumed assumption.

19 The stress corrosion cracking failure mode
20 was also performed by assuming the crack growth in the
21 slot bottoms of the rotor dovetails that would
22 propagate through the rotor and thereby generating a
23 missile.

24 The probabilities of a rotor rupturing for
25 each of the failure modes was combined with the

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1 probability of the ruptured rotor fragment penetrating
2 the turbine casing.

3 So the resulting probabilities in the
4 analysis demonstrated that the probability of
5 generating turbine missile was much less than ten to
6 the minus five for an inspection interval of greater
7 than ten years.

8 DR. KRESS: Let me ask you a question about
9 that. I was under the assumption that you use an
10 undetectable flaw as a start for determining whether
11 you get a blade, for example, converted into a missile
12 due to an overspeed. That undetectable flaw must grow
13 to some critical size. Is that where the cyclic
14 fatigue, given SCC and stuff enters it?

15 MR. HONCHARIK: Right.

16 DR. KRESS: Well, somehow you have a cyclic
17 fatigue that's based on time and you grow this
18 undetectable flaw. And after 12 years it's reached a
19 failure particular to that? And I'm asking this just
20 for information.

21 MR. HONCHARIK: Yes. I think basically
22 what they do is you assume a certain size flaw, right.

23 DR. KRESS: But the size is assumed.

24 MR. HONCHARIK: Right. And you're assuming
25 this because you may have missed it during inspection,

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1 okay, whether it's smaller, but you typically have a
2 larger size flaw that you assume.

3 And in that you assume it proves different
4 failure modes to set the fatigue and stress corrosion
5 cracking. And then you do each one separately and then
6 they combine them. But what they do is they grow it
7 out, but what this is saying is --

8 DR. KRESS: So you have equations for the
9 rates of growth of this due to these failure modes?

10 MR. HONCHARIK: Correct. And they plug
11 that in. But what the results of this analysis showed,
12 was that it was well beyond 12 years that you would
13 have any indications of growing this flaw to a critical
14 size. It was way, way out, 12 years is very --

15 DR. KRESS: And these models for the
16 effects of these growth mechanisms, I assume they're
17 fairly conservative so that you don't have to worry
18 about the --

19 MR. HONCHARIK: Yes, they're pretty much
20 conservative and pretty much what was used for other
21 designs and even operating plants.

22 DR. KRESS: Thank you, that's clear.

23 MR. ARMIJO: But they're backed up by tests
24 too, Tom. They do crack growth tests based on fatigue
25 loading of these initial flaws. And they also do crack

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1 growth testing due to the environmental effects. So
2 it's a lot of testing.

3 DR. KRESS: Well, that helps.

4 MR. HONCHARIK: So basically, the analysis
5 confirmed that 12 years is acceptable. Also, since the
6 stress corrosion cracking failure mechanism and the
7 dovetail slot bottoms controls the probability of
8 generating a missile after 20 years, the turbine
9 manufacturer recommended that the rotor dovetails be
10 inspected every 12 years, which was discussed in the
11 COL item.

12 The next slide. To determine the test
13 interval of the turbine control system, the destructive
14 overspeed probability was performed. The analysis used
15 previous failure rate models that had the same
16 functional design and component requirements as for the
17 ESBWR turbine generator.

18 The ESBWR turbine Mark VIe control system
19 uses previous components that have had improvements
20 made based on past operating experience.

21 Also valve failure rates were updated to
22 include failure rate assessments collected in 1993 and
23 2008. And they identified certain common failure modes
24 throughout that time period after 1984 and were
25 corrected, and therefore were included in some of these

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1 failure rate assessments in '93 and 2008. These
2 corrective actions were incorporated into the current
3 Mark VIe control system.

4 The overspeed probability analysis
5 therefore demonstrated that the valve test interval of
6 120 days was well within the criteria of ten to the
7 minus five per year and meets the guidance in Reg Guide
8 1.115.

9 Next slide. So in conclusion, the staff
10 finds that the turbine missile probability analysis was
11 acceptable because it meets the annual missile
12 probability criteria of ten to the minus five per year
13 in Reg Guide 1.115 for unfavorable orientation. And
14 this would ensure that turbine rotor integrity is
15 maintained.

16 Also, the associated turbine rotor
17 inspection interval of ten years, and the turbine
18 manufacturer's recommendation for inspection of the
19 turbine, meets the requirements of the Reg Guide.

20 And the associated turbine valve test
21 interval of 120 days, and the manufacturer's
22 recommendation for testing the valves, meets the
23 criteria in the Reg Guide 1.115. And that concludes my
24 presentation.

25 MR. EUDY: Are there any other questions or

1 comments from this area?

2 CHAIRMAN CORRADINI: From the committee?

3 Okay, thank you very much.

4 MR. EUDY: And I'm going to go ahead and
5 wrap up a couple of the whatever it is, action items
6 for you. We're supposed to get you the Rev 4 of the
7 missile probability report.

8 CHAIRMAN CORRADINI: We have it.

9 MR. EUDY: You do have it.

10 CHAIRMAN CORRADINI: We have it.

11 MR. EUDY: Okay, great. That's done.

12 CHAIRMAN CORRADINI: Everybody's got it
13 electronically.

14 MR. EUDY: Has Member Brown got it? He had
15 concerns about the testing, the overspeed protection
16 systems and the related sensors that maybe in this
17 report.

18 MEMBER BROWN: If it's in the report I'll
19 read it.

20 MR. EUDY: Okay, that's what I need to
21 hear. Great, thank you.

22 CHAIRMAN CORRADINI: Thank you. Okay why
23 don't we take a ten minute break until 3:15. Do you
24 want a 15 minute break?

25 CHAIRMAN CORRADINI: Okay, let's take a

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1 break until 3:20.

2 (Whereupon, the above-mentioned matter went
3 off the record at 3:05 p.m. and resumed at 3:19 p.m.)

4 CHAIRMAN CORRADINI: Why don't we get
5 started. And we'll start with DTE presenting Chapter
6 14. Steve, I guess you're the kick-off speaker.

7 MR. THOMAS: I'm the kick-off speaker until
8 Mike Brandon is here.

9 MR. BRANDON: Okay, I'm Mike Brandon,
10 leading the discussion on Chapter 14. There's
11 basically five sections on Chapter 14. One is
12 incorporated by reference annexes. I'll speak some to
13 the other four.

14 This is Section 14.2, the initial plant
15 test program. It's Appendix 14, Alpha, Alpha, provides
16 a detailed description of the test program. And that
17 gets to more detail on the subsequent slide.

18 The COLA Part 10 includes a license
19 condition to provide approved test procedures to the
20 onsite NRC inspector only 60 days prior to their
21 intended use.

22 And the detailed test program including
23 schedule will be made available for review at least 60
24 days prior to the first pre-op test, or pre-operational
25 test program, and 60 days prior to the start of the

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1 initial fuel load for the startup test program. And
2 these milestones are provided in Table 13.4-201 in
3 Section 13.4 of our FSAR.

4 Next slide. Also on Section 14.2, there's
5 four supplemental items, and this is for site-specific
6 testing. For the AC power distribution we've committed
7 to perform pre-operational tests.

8 And we've added testing to confirm proper
9 operation of the automatic transfer capability of the
10 normal preferred power source to the alternate
11 preferred power source, relative to the plant service
12 water.

13 We have per-operational tests to basically
14 confirm proper operation of the various components,
15 fans, motors, valves. We've added testing to confirm
16 proper operation of the automatic transfer between the
17 plant service water trains in components in response to
18 AOOs.

19 We've added testing to confirm proper
20 operation of water hammer mitigating design features,
21 and also for the heat exchanger and the auxiliary
22 heatsink performance verification. But those two
23 functions are actually deferred until the plant's in
24 startup phase so systems are heated to perform those
25 tests.

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1 And then for the service water system we'll
2 do pre-operational testing. We've added testing to
3 confirm proper operation of individual components in
4 the system in integrating matter.

5 And lastly, for the natural draft cooling
6 towers, we have a pre-operational test to confirm
7 proper operation of pumps, valves, motors, logic and
8 interlocks.

9 And then last two, we'll do a performance
10 test to verify proper performance of the cooling tower.
11 And that will be under operating load conditions.

12 MEMBER STETKAR: Mike?

13 MR. BRANDON: Yes, sir?

14 MEMBER STETKAR: Under the plant service
15 water system performance testing, this might be covered
16 somewhere else so bear with me.

17 MR. BRANDON: Okay.

18 MEMBER STETKAR: It says what you've added
19 is the objective of the test is to verify performance
20 of the PSWS, including the auxiliary heatsink along
21 with reactor closed cooling water system.

22 Under expected reactor power operation load
23 conditions, I can see how that will take care of TCCW
24 and AHS. Isn't the maximum load on our CCW shutdown
25 conditions? Are you going to do an integrated

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1 functional test for just after shutdown, RHR cooling?

2 MR. BRANDON: Oh, like after your first
3 cycle and you have sufficient decay heat build-up.

4 MEMBER STETKAR: Isn't that the peak load
5 for that part of the lead?

6 MR. BRANDON: Correct.

7 MEMBER STETKAR: The load RCCW is pretty
8 small during power up.

9 MR. BRANDON: Right, I agree, yes.

10 MEMBER STETKAR: You are --

11 MR. BRANDON: Yes, we would do some sort of
12 shutdown test to verify the capability of the system
13 with those heat loads on the system.

14 MEMBER STETKAR: Okay. I didn't read that
15 but --

16 MR. BRANDON: Yes, I'm not sure --

17 MEMBER STETKAR: The only thing that
18 tripped over, it says during reactor power operation
19 load conditions, which isn't verifying the heat removal
20 of RCCW, in the sense.

21 MR. BRANDON: The other piece of that is
22 when we have, there will be more heat transfer from the
23 RCCWs during operation than prior to operation.

24 MEMBER STETKAR: Certainly, yes. It's
25 clear you can't do it pre-start.

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1 MR. BRANDON: So with that higher heat we
2 can use that heat load, plus the Delta Ts, to verify
3 the system performance during the operation.

4 MEMBER STETKAR: Yes, I guess you could do
5 heat --

6 MR. BRANDON: And then you can extrapolate
7 that to your shutdown conditions.

8 MEMBER STETKAR: Yes, yes.

9 MR. HINDS: Yes, and just one comment,
10 David Hinds from GH. You're correct that as far as the
11 actual heat loads should be higher on RCCW during
12 shutdown conditions during decay removal from the
13 reactors here, correct there. But also correct that
14 you can do performance testing.

15 MEMBER STETKAR: Yes, I mean you can infer
16 heat transfer across the heat exchangers that way.

17 MR. HINDS: Sure.

18 MEMBER STETKAR: Okay, thanks.

19 MR. BRANDON: Okay, 14.3 is inspection test
20 analysis and acceptance criteria for the standard COL
21 item, a number of ITAAC that we've included.

22 Design certification ITAAC, physical
23 security, emergency planning, site-specific ITAACs,
24 we've identified and committed to for concrete backfill
25 under Seismic Category 1 structures, requirement for

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1 backfill adjacent to Seismic Category 1 structures.
2 The requirements on the plant service water basin
3 water, as far as the volume and its ability to remove
4 heat for a period of seven days and also to maintain
5 the net positive suction head for those pumps after
6 that water's existed for seven days.

7 For offsite power, there's a number of
8 ITAAC that basically verifies the minimum two
9 independent offsite power supplies ready to supply the
10 necessary load requirements during design basis
11 operating modes.

12 During normal operation, an offsite power
13 supply is capable of supplying required voltage and
14 frequency to the interface in the onsite portions of
15 the preferred power system.

16 And then the fault current contribution is
17 compatible with the interrupting capability of the
18 onsite short circuit interrupting devices.

19 And the next slide. This is for Section
20 14.3 Alpha. Let's see, Design Acceptance Criteria
21 Closure Process. And we have a Fermi 3 item that
22 basically addresses committments for design acceptance
23 criteria and the OPEC closure schedule.

24 And this will address the sector-related
25 piping, manufacturers, engineering, and I&C procedures

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1 and test program. And that testing will be done
2 basically using the NEI 0801 closure process that's
3 endorsed by Reg Guide 1.215 by the NRC.

4 And then lastly, this talks about a
5 description of the initial test program administration,
6 just like the other COLs will have a startup
7 administrative manual.

8 And that manual will address the
9 bookability of the initial test program to systems,
10 structures and components, the bond of the different
11 testing program phases, the organizational staffing and
12 responsibilities that will conduct and manage those
13 tests, the test procedure development and review
14 process, the conduct of the test program, the review
15 and approval of the test results, legalization of
16 operating experiencing, developing those procedures,
17 they way you fight procedures during the initial test
18 program for operator training purposes to extend
19 practical, and will identify the prerequisites and
20 procedures that are required for fuel loading. Because
21 basically you don't need administrative aspects of
22 developing and implementing test procedures.

23 CHAIRMAN CORRADINI: Just as a verification
24 though, but what we had discussed, I think previously,
25 under Chapter 3, part of that will be the test program

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1 in the ITAAC for the vacuum breakers and the associated
2 isolation valve systems --

3 MR. BRANDON: That's correct.

4 CHAIRMAN CORRADINI: -- and sensing.

5 MR. BRANDON: Okay, correct.

6 CHAIRMAN CORRADINI: And this is a
7 clarification. I guess I should know this but I can't
8 remember. This is not the chapter, because we had a
9 discussion, I don't remember what chapter it was. I
10 think it was under Chapter 6 on engineered features,
11 about periodic testing of the passive safety systems,
12 where you've committed to every ten years.

13 And we wanted to see some sort of rotating
14 testing. For example, the isolation and density of
15 multiple banks, that you would test each one on some
16 sort of rotating basis.

17 MR. BRANDON: Correct, yes, got a lot of
18 discussion at the ACRS meeting back in 2010 with GEH.

19 CHAIRMAN CORRADINI: I can't remember.
20 It's all a mystery to me now. Between the DCD and the
21 COLA we got commitment that you would test on some sort
22 of every two year basis. So you would run through,
23 over ten years, all the various modules of your passive
24 systems.

25 MR. BRANDON: Right. We anticipated that.

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1 CHAIRMAN CORRADINI: Yes, as well as the
2 isolation condenser.

3 MR. BRANDON: Okay. And we anticipated
4 that as a possible question you would ask. And I think
5 GEH has a good answer they can provide.

6 MR. HINDS: Yes, this is David Hinds from
7 GEH. So, yes, you're correct that there's, in the
8 TexFlex surveillance requirement, there's a staggered
9 test basis --

10 MR. BRANDON: Right, that's what I was
11 trying to get at.

12 MR. HINDS: -- 24 month cycle, at least for
13 those four training systems, on a 24 month cycle,
14 staggered test basis. So we rotate through the four
15 trains.

16 And then there's additionally one for the
17 exhaust ventilation, or moisture separator, from the
18 boil-off where there's two trains there. And it's a
19 four year staggered test basis there.

20 And additionally, on the vacuum breaker
21 question, we did do a test program for the vacuum
22 breaker itself. The backup valve that you were
23 referring to a minute ago, the butterfly valve --

24 MR. BRANDON: I guess I called it an
25 isolation valve but --

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1 MR. HINDS: It is not going through a test
2 program. And so that's a test program yet to be done,
3 which you were referring to a minute ago.

4 MR. BRANDON: Right, but that's committed
5 to because --

6 MR. HINDS: Yes.

7 MR. BRANDON: Okay.

8 MR. HINDS: And the sensing circuit, the
9 leakage sensing circuit you referred to and also the
10 backup isolation valve. Both are committed for
11 testing.

12 We did an analysis and put in a topical
13 report. And that was reviewed. And then for the
14 vacuum breaker itself though, it was actually a
15 physical test done there and also a test report went
16 out for that.

17 CHAIRMAN CORRADINI: All right, thank you.
18 I just wanted to check.

19 MEMBER BROWN: Part of that discussion two
20 years ago also involved the squib valves, that they
21 were supposed to be tested in --

22 CHAIRMAN CORRADINI: But the testing
23 sequence though, there was --

24 MEMBER BROWN: I mean the whole valve.

25 CHAIRMAN CORRADINI: Only upon

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1 manufacturing QA acceptance of the valve. What we
2 agreed to was essentially testing of the charge as it
3 was brought out.

4 MEMBER BROWN: No, I never agreed to that.

5 CHAIRMAN CORRADINI: Well, okay. You were
6 absent during that week.

7 (Simultaneous speaking.)

8 MEMBER BROWN: No, I was not absent during
9 that meeting. And I remember all this very clearly
10 because I got excoriated. But that's a big word.

11 (Laughter)

12 CHAIRMAN CORRADINI: I can think of a
13 smaller word but we came to a final result.

14 MEMBER BROWN: No, we came to a consensus.
15 I remember on the qualification that I talked about was
16 we were not testing the squib valve after it was shock
17 tested. That's what I made my additional comments on.

18 But for in-service testing, this is my
19 memory. It was to be included on an every couple,
20 whatever, not every one but a staggered basis, where
21 the squib valves were supposed to be removed to see
22 that, hey, yes, would the squib valve actually operate.

23 And you would go through all the sequences
24 and then you would test them, just like these other
25 ones, in every two years. So you covered all the whole

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1 range, all the valves over a ten year period or
2 something like that. But you were supposed to take a
3 squib and test it, blow it up, and make sure it worked.

4 CHAIRMAN CORRADINI: That was not agreed
5 to, as far as I know.

6 MEMBER BROWN: That's my memory.

7 CHAIRMAN CORRADINI: I'm going to look to
8 the staff but my memory is that the chemical --

9 MEMBER BROWN: Well, the staff didn't like
10 that either at the time. But I thought that's what we
11 all agreed to at that time. I don't know, Sam, do you
12 remember any of that?

13 MR. ARMIJO: I remember the discussion.
14 And I know what we didn't agree to and that was --

15 MEMBER BROWN: The qualification test, I
16 got shot down, okay. But the blood running out of my
17 body --

18 MR. ARMIJO: I don't remember what the
19 objection was to --

20 CHAIRMAN CORRADINI: Other than the fact
21 you'd have to take apart the valve and then reassemble
22 it and test it and then reassemble it back on the
23 thing, I think that was the objection.

24 MR. ARMIJO: Yes.

25 MEMBER BROWN: Well, you've got to take

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1 part of it apart --

2 CHAIRMAN CORRADINI: We will find out and
3 get you the commitment.

4 (Off the record comments)

5 MEMBER BROWN: What, John?

6 MEMBER STETKAR: What you're talking about
7 is the license condition that we just talked about for
8 Chapter 3.

9 MR. BRANDON: Were you here for that
10 discussion?

11 MEMBER BROWN: I got here in May of 2008.

12 MEMBER STETKAR: This would have been about
13 two hours ago.

14 MEMBER BROWN: Oh, yes, I was here for
15 that.

16 Okay.

17 (Simultaneous speaking.)

18 MEMBER BROWN: That one whipped right by
19 me.

20 MEMBER STETKAR: That's when I was talking,
21 where Tom said he doesn't like to use the word bomb.
22 And I talked to him about how they were going to --

23 MEMBER BROWN: Oh, yes. But I didn't put
24 that in the context of the ITAAC because we hadn't
25 gotten there yet.

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1 MEMBER STETKAR: Okay.

2 CHAIRMAN CORRADINI: Just so we're not
3 misinforming you, Charlie, that's not taking the whole
4 valve out and testing it. It's taking out --

5 MEMBER BROWN: Well, you can test it in
6 place if you want to, and then replace the whole valve
7 or rebuild it inside. That's what they said they had
8 to do.

9 If one of them activates you had to take
10 the internals out and replace them. That's at least
11 what people were talking about at the time. Otherwise,
12 these just sit there for 30 or 40 years.

13 MR. ARMIJO: Testing little charges.

14 MEMBER BROWN: Testing the little charge.
15 That's insane.

16 CHAIRMAN CORRADINI: We will get back to
17 you. My impression is what Tom explained to us earlier
18 this afternoon is exactly what we agreed. And I will
19 get it for you in black and white so you can review it
20 again. Okay?

21 MEMBER BROWN: I actually listened to that.
22 I didn't get that flavor at all.

23 CHAIRMAN CORRADINI: Okay.

24 MEMBER BROWN: I remember the word bomb
25 very clearly.

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1 CHAIRMAN CORRADINI: All right, that's all
2 for the staff.

3 MR. BRANDON: That's all for my
4 presentation.

5 (Off microphone comments)

6 MEMBER BROWN: While we're waiting, can I
7 ask the GEH guy that talked about, that gentleman on
8 the missile report? Is that talk about diversity
9 between the sensors for the emergency trip system and
10 the primary, or the normal speed control primary
11 oversee, assigned to two different systems?

12 MR. HINDS: Yes, this is David Hinds, GEH.
13 It does state that they are diverse.

14 MEMBER BROWN: The sensors, not the
15 electronics, cabinets, and all that kind of stuff.

16 MR. HINDS: Certainly the electronics.
17 I'll look in the report and verify the sensors.

18 MEMBER BROWN: I just wondered if it was
19 going to be covered.

20 MR. HINDS: But certainly the electronics
21 are diverse and one --

22 MEMBER BROWN: Does it talk about how
23 they're supposed to be diverse?

24 MR. HINDS: One is software and the other
25 is firmware. But it's --

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1 MEMBER BROWN: Firmware, you mean like
2 FPGAs or something like that?

3 MR. HINDS: I believe so.

4 MEMBER BROWN: Programmable field data rays
5 or whatever?

6 MR. HINDS: I think that's correct. I can
7 verify.

8 MEMBER BROWN: The PLDs or something,
9 whatever.

10 MR. HINDS: But you were asking also on the
11 sensors. I'll have to --

12 MEMBER BROWN: The sensors is the other --

13 MR. HINDS: I'll have to look up the
14 sensors. But I know there're separate sensors and they
15 operate independently.

16 MEMBER BROWN: I got that but they're both
17 in the same standard front-bearing standard as the
18 design description talks about them, in terms of their
19 location. They're located in the same, right next to
20 each other.

21 MR. HINDS: Yes, same general location,
22 yes. I'll check the diversity of the sensor design
23 though.

24 MEMBER BROWN: Thanks, excuse me, Mike.

25 MR. EUDY: Okay, Mike Eudy, the Chapter PM.

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1 And we're going to go over the status evaluation in
2 Chapter 14 for the Ferramine 3 application for the
3 initial test program.

4 We have our expert, Andrea Keim, is going
5 to go over the initial test program, Section 14.2. And
6 then I'm going to give a high level review description
7 for 14.3, site-specific ITAAC.

8 MS. KEIM: Hi, I'm Andrea Keim. I've
9 worked for the NRC since 1996. I've been in NRO for
10 the past three years. I have a bachelor's degree, a
11 masters degree in materials and metallurgical
12 engineering.

13 I'll be addressing the staff review of the
14 Fermi 3 final safety analysis report, Section 14.2,
15 initial plant test program.

16 What we did was we addressed the
17 enhancements to the ESBWR DCD for the startup tests.
18 There were three that were addressed for the AC power
19 distribution system, the pre-operational test. It's
20 14.2.8.1.36.

21 They've provided supplemental information
22 that was added to address the need to verify proper
23 operation of the automatic transfer capability of the
24 normal preferred power source to the ultimate preferred
25 power source.

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1 Some of this review was also done in
2 Chapter 8 in Section 8.2.1.2 for plant service water
3 system. The pre-operational test was also addressed in
4 Chapter 9 in Section 9.2.1, but the addition for the
5 testing was they added to the purpose.

6 The objective is to verify proper operation
7 of the plant service water system, including the
8 alternate heatsink. So they added portions about the
9 alternate heatsink to the purpose, and its ability to
10 supply the design quantities of cooling water to the
11 reactor component cooling water system, and to the
12 turbine component cooling water system heat exchangers.

13 And they added some subs to the general
14 acceptance criteria. I think they already talked about
15 that. And then they also added, to the last paragraph
16 of the DCD, that these tests are delayed due to the
17 insufficient heat loads during the pre-operational test
18 phase.

19 And so the heat exchanger and alternate
20 heatsink verification is deferred until the startup
21 phase. And the staff found those acceptable.

22 And also with the plant service water
23 system test, performance test now, they added to the
24 purpose, again.

25 The objective of the test was to verify the

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1 performance of the plant service water system,
2 including the alternate heatsink along with the reactor
3 component cooling water and the turbine component
4 cooling water under expected reactor power operation
5 load conditions. And we had the discussion earlier.
6 And the staff found their additions acceptable.

7 There were also three site-specific pre-
8 operational startup tests. So these were tests that
9 weren't reviewed in the DCD and were reviewed by the
10 technical staff.

11 One was the station water system pre-
12 operational test, which was addressed in Chapter 9,
13 Section 9.2.10. And the technical reviewers found the
14 test adequate, or the test abstract adequate.

15 And then they added cooling tower pre-
16 operational tests and the cooling tower performance
17 test. These were addressed in Chapter 10 and the staff
18 found that the information provided in the test
19 abstracts in Chapter 14.2 provided adequate information
20 that they can develop procedures to implement the test
21 to verify.

22 Next slide. The staff identified post-
23 licensing activities to be addressed through license
24 conditions. The license conditions provide for the
25 milestones for the startup --

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1 DR. WALLIS: How do you test a cooling
2 tower pre-operational? Don't you have to have a big
3 source of steam and stuff like that from somewhere?

4 MS. KEIM: Do we have the guy who reviewed
5 this?

6 MR. ARMIJO: I have never tested a cooling
7 tower.

8 (Off the record comments)

9 MS. KEIM: Is Chung-Li here? We might have
10 to get back to you with that one.

11 CHAIRMAN CORRADINI: Could you re-clarify
12 the question for us?

13 DR. WALLIS: Well, I'm not quite sure
14 what's involved in this pre-operational performance
15 test of the cooling tower. But a cooling tower has to
16 have all the steam going through it in order to work.
17 You can't produce the steam unless you have a reactor
18 running. So I'm not sure how you test the cooling
19 tower.

20 CHAIRMAN CORRADINI: I think there's an
21 answer for you.

22 MR. THOMAS: Excuse me, it's Steve Thomas
23 from Black and Veatch. In the FSAR we identify the
24 pre-operational testing, which is testing of the basic
25 components in the system, except for the cooling tower.

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1 Obviously we can't test the cooling tower
2 unless we have large heat load. And then we identify
3 that there's the performance testing of the cooling
4 tower, which is done when we have the heat load.

5 DR. WALLIS: When you do have a heat load?

6 MR. THOMAS: Right.

7 DR. WALLIS: So it's after you've started
8 up?

9 MR. THOMAS: Correct.

10 DR. WALLIS: Okay, so that's not pre-
11 operation?

12 MR. THOMAS: Right, that's the performance
13 testing --

14 MS. KEIM: The pre-operational tests the
15 system --

16 MR. THOMAS: It's like the service water
17 system.

18 DR. WALLIS: Pre-operational test is just
19 to check that everything's there, really.

20 MEMBER STETKAR: Well, there's spray
21 distribution and things like that, that you can check.

22 DR. WALLIS: You do the water side.

23 MR. THOMAS: While the distribution pumps
24 are running.

25 CHAIRMAN CORRADINI: You can put in

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1 temporary components that test pieces of the system.

2 DR. WALLIS: Okay, that's all right.

3 CHAIRMAN CORRADINI: Go ahead.

4 MS. KEIM: Okay. So the staff identified
5 the post-license activities to be addressed by license
6 conditions. The license conditions provide for
7 milestones for the startup administrative manual, which
8 is 60 days prior to use, the pre-operational and
9 startup test procedures, which is 60 days prior to
10 their intended use, power ascension test phase reports,
11 and milestones with updates for the operational program
12 implementation, which includes the initial test
13 program.

14 In addition, there's also one license
15 condition for the evaluation reporting of test changes.
16 Now, I'll hand it back over to Mike to address 14.3.

17 MR. EUDY: Any questions on 14.2?

18 (Off the record comments)

19 CHAIRMAN CORRADINI: Sorry, we were having
20 a side conversation, I apologize. Go ahead.

21 MR. EUDY: Okay, I'm going to give a high
22 level overview of the staff's review of 14.3, which
23 consists of the ITAAC. The entire set of ITAAC has
24 been provided in Part 10 of the application and
25 consists of four parts.

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1 We have the design certification ITAAC,
2 which contains Tier 1 ITAAC incorporated by reference,
3 emergency planning ITAAC, which has been provided and
4 reviewed by the staff in their Chapter 13 SER, physical
5 security ITAAC, which includes Tier 1 physical security
6 ITAAC within the scope of the DCD, along with site-
7 specific physical security ITAAC and have been
8 identified to applicant and have been reviewed
9 accordingly in the staff's Chapter 13 SER.

10 And then there's the fourth component,
11 which is site-specific ITAAC for site-specific systems,
12 not evaluated in the DCD and have been identified by
13 the applicant and reviewed accordingly in various
14 sections of the staff's safety evaluations.

15 In FSAR, Section 14.3, the applicant
16 provided the following COL items. Standard COL 14.3-1-
17 A, emergency planning ITAAC, standard COL 14.3-2-A,
18 site-specific ITAAC, and site-specific COL item 14.3A-
19 1-1, which is the schedule for design acceptance
20 criteria, ITACC closure.

21 For emergency planning ITAAC, this COL item
22 requires for the applicant to provide emergency
23 planning ITAAC. The emergency planning ITAAC provided
24 were reviewed accordingly by the staff and our Chapter
25 13 SER and were found to be acceptable. For the

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1 purposes of Chapter 14, the applicant has addressed
2 this COL item.

3 Site-specific ITAAC, this COL item requires
4 for the applicant to provide site-specific ITAAC for
5 systems not evaluated in the DCD.

6 In FSAR Subsection 14.3.9, the applicant
7 states that the selection criteria and methodology
8 provided in Subsection 14.3 of the referenced DCD were
9 utilized to identify site-specific ITAAC for systems
10 not evaluated as part of the DCD.

11 Based on a site-specific systems safety
12 significance, ITAAC were proposed by the applicant. Or
13 if a site-specific system described in the FSAR does
14 not meet an ITAAC selection criteria, then the
15 applicant would indicate that there would simply be no
16 entry for that system, no ITAAC entry.

17 For the following site-specific systems,
18 the applicant proposed site-specific ITAAC. We have a
19 2.4.1 backfill under Seismic Category 1 structures.
20 And that will be presented at a later time in the
21 staff's evaluation in SER Subsection 2.5.4. The
22 indications I have are what they have is acceptable.

23 Backfill for the second part is the
24 backfill surrounding Seismic Category 1 structures.
25 Again, that will be discussed later when the staff

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1 presents their Chapter 2, 0.5.4 SER.

2 Plant service water system includes the
3 portion outside the scope of the DCD. It was reviewed
4 in the Chapter 9, SER Subsection 9.2.1. Off site power
5 systems were reviewed by the staff in Chapter 8, SER
6 Section 8.2. And the communication systems, the
7 emergency notification system, was reviewed in Chapter
8 13, SER Section 13.3.

9 DR. WALLIS: This is just a physical system
10 or is it also the procedures, or just a physical
11 system?

12 MR. EUDY: The communication system?

13 DR. WALLIS: Yes.

14 MR. EUDY: I don't know if I have, who's
15 the communication system technical expert? I'd have to
16 get back to you on a description of the communication
17 systems.

18 DR. WALLIS: Well, it's the emergency part
19 I was interested in. Is it the whole process or is it
20 just some physical gadgets?

21 MR. SMITH: No, this is Peter Smith. This
22 relates to the physical equipment that's installed.

23 DR. WALLIS: Just the physical equipment,
24 that's all.

25 MR. SMITH: All of the functioning of the

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1 emergency operations organization is under the
2 emergency planning ITAAC. So all of the procedures
3 associated with --

4 DR. WALLIS: It's all being done, that's
5 okay, thank you.

6 MR. EUDY: Right, their entry inside Part
7 10 was basically go see the ITAAC. So based on the
8 staff's evaluation and the respective SER sections for
9 the above ITAAC, and site-specific ITAAC entries, staff
10 found the applicant had adequately addressed the site-
11 specific ITAAC requirements for those systems.

12 For the remainder of the site-specific
13 systems listed by the applicant in Part 10 as having no
14 entries, the staff reviewed these systems and agreed
15 with the applicant that the site-specific ITAACs are
16 not required for those systems.

17 In summary, the staff has found the
18 applicant has adequately addressed the COL item for
19 site-specific ITAAC.

20 MEMBER BROWN: Are you done with this page?

21 MR. EUDY: No, I'm still on this page.
22 Maybe I'm a little too verbose. Next is the site-
23 specific COL item 14.3A-1-1, which discusses the
24 schedule for design for DAC ITAAC closure, DAC ITAAC
25 under a special type of ITAAC that consists of a set of

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1 pre-prescribed limits, parameters, procedures, and
2 attributes upon which the NRC may rely in making a
3 final safety determination.

4 The ESBWR design includes DAC in the areas
5 of piping, digital instrumentation and controls, along
6 with human factors engineering. This COL item requires
7 for the applicant to choose one of three options for
8 closing the specified DAC ITAAC.

9 They can have resolution through an
10 amendment to the DCD, the COL application process, or
11 through DAC ITAAC closure after COL issuance. The
12 applicant chose to resolve this item in DAC ITAAC
13 closure after COL issuance and provided a closure
14 schedule.

15 Essentially, the closure schedule is that
16 the applicant provided a commitment 3.10-003, which
17 specifies that no later than one year after the
18 issuance of the combined license or at the start of
19 construction, whichever is later, the implementation
20 schedules for the following DAC ITAACs identified in
21 the referenced DCD, shall be submitted to NRC.

22 In addition, updates to the schedule will
23 be submitted every six months and within one year of
24 initial fuel load, with updates every 30 days. And
25 those DAC are the piping DAC, digital I&C DAC, and the

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1 human factors engineering DAC. The staff has found
2 that the applicant has adequately addressed this site-
3 specific COL item.

4 DR. WALLIS: These are things that have not
5 yet been finalized?

6 MR. EUDY: Right.

7 DR. WALLIS: And so they've done it all
8 right so far. What matters really is how well they do
9 it a few years from now, when they've really got the
10 whole thing designed.

11 MR. EUDY: Right. It's Tier 2 starting
12 information inside the DCD. So they can't change it.

13 DR. WALLIS: That's right.

14 MR. EUDY: They'd have to change it with a
15 departure or an amendment. So basically, they've
16 incorporated what's in the DCD. The only thing they
17 had to do for this was just give us a schedule for
18 closing those.

19 MEMBER BROWN: And they don't have to give
20 that to you yet?

21 MR. EUDY: Well, they've told us how
22 they're going to do it. And it's essentially what's in
23 21 CFR 5299, inspection and construction for ITAAC
24 closure.

25 MEMBER BROWN: So all this Section, Table

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1 2.2.7-4 and all the 2.2.13 safeguards, that's the
2 protection system, the safeguard stuff, all of those
3 pages and tables worth of stuff --

4 MR. EUDY: Is that in Part 10 of the
5 application?

6 MEMBER BROWN: That's in Tier 1 of the DCD.
7 You won't be told how they're going to be addressed for
8 another year, two years, whatever it is, based on
9 whatever this hypothetical schedule time is going to
10 be?

11 MR. EUDY: They've incorporated all the
12 Tier 1 ITAAC. I don't know if that's part of the DAC.

13 MEMBER BROWN: Where?

14 MR. EUDY: I'm not sure what table you're
15 referring to.

16 MEMBER BROWN: I'm looking at Table 2.2-7-4
17 of the DCD Rev 9, Tier 1. It's the Rev protection
18 system ITAAC. And that was defined as DAC in those
19 days. It was an acceptance criteria. I'm just trying
20 to figure out --

21 CHAIRMAN CORRADINI: They're all called
22 ITAAC.

23 MEMBER BROWN: I know. They're all ITAAC
24 but they were --

25 CHAIRMAN CORRADINI: Special ITAACs.

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1 MEMBER BROWN: Special ITAACs. I agree
2 with that. And they're very vague and I was just
3 wondering how --

4 CHAIRMAN CORRADINI: I don't believe it was
5 ever --

6 MEMBER BROWN: I was just asking questions,
7 how they were going to get addressed. I had found
8 Appendix 14.3A-1-1, which was just a little paragraph,
9 which said we'll see it later. I'm trying to see how
10 the DAC and stuff that we dealt with back during the
11 design phase is going to get factored in to the test
12 program. And right now it's still empty.

13 CHAIRMAN CORRADINI: Other than a
14 commitment to give you a schedule.

15 MEMBER BROWN: And if that's the case then
16 that's the case.

17 MR. ARMIJO: It all has to be finished
18 before fuel load.

19 CHAIRMAN CORRADINI: I think he's trying to
20 answer.

21 MR. EUDY: I don't think it's the sub-set
22 of what you brought up. I don't think they're
23 considering that DAC in this section. This section is
24 just for the piping design in HFE. That is Tier 1
25 ITAAC, which has been fully incorporated by reference.

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1 So it should be prescriptive enough.

2 MR. MUNIZ: This is Adrian. What he's
3 referring to here is this special category of ITAAC
4 being DAC here, which is limited to piping, neatol
5 (phonetic) and the HFE design areas.

6 So what the applicant chose to do is
7 they're going to close these DACs after the issuance of
8 the license. And that will be rolling to the
9 inspection process.

10 So when they are sending their letters
11 indicating the DAC has been closed, the inspection
12 process will take over. And for this special set of
13 ITAACs, I think the inspection process will probably
14 use some of the experts from headquarters in
15 determining whether the DAC was closed properly.

16 CHAIRMAN CORRADINI: Does that answer your
17 question, Charlie?

18 MEMBER BROWN: Not really. I mean the
19 whole section is in there. I think those are the DACs
20 that we were talking about back in those days. And
21 there's a bunch of items in there.

22 And they fundamentally say we'll take the
23 description and the various sections and we'll go run
24 a test. And that was the acceptance criteria. We'll
25 go test it to see that it meets stuff, kind of vague.

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1 We'll make sure something's not done by
2 software and something is. And all the software has to
3 be done and reviewed by regional, hopefully some senior
4 qualified NRC folks.

5 I don't think this has been cranked in.
6 That sounds like this is still under the 14.3A-1-1,
7 those parts of Tier 1. Correct me if I'm wrong, John.
8 Am I fuzzy on this?

9 I thought those were the DACS we talked
10 about back in those days, tables of stuff and also the
11 human factors get thrown in there as well, human
12 factors engineering.

13 CHAIRMAN CORRADINI: Did you have a
14 question, John?

15 MEMBER STETKAR: I do. But I want to make
16 sure Charlie's got --

17 MEMBER BROWN: I'm done, finished. Go
18 ahead.

19 MEMBER STETKAR: I don't know whether it's
20 Mike or Adrian. Adrian was a good straight man. But
21 I'll address it to the people up front.

22 Back in November of last year we had a
23 briefing, it was under a different subcommittee. But
24 under the topic we've been trying to follow a bit, in
25 our subcommittees, the staff's progress on preparing

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1 for these, in particular the DAC ITAAC close outs.

2 And at one time I thought there were going
3 to be, I hate the term, but a set of table-top
4 exercises done to kind of test that process, in
5 particular for the digital I&C, which is obviously a
6 pretty challenging process.

7 Just looking at my notes from November and
8 it said well, basically, that seemed to have fallen
9 apart because of additional resource constraints
10 because of responding into Fukushima.

11 Nobody quite knew where it was headed.
12 Could you quickly give us an update on where the staff
13 is, in terms of that process? Are you gearing up? And
14 what is the plan?

15 (Off the record comments)

16 MR. TANEJA: This is Dinish Taneja from the
17 Energy Branch. The phase 1 of the pilot at that time,
18 with STP, I think there was an attachment to that
19 procedure. Attachment 1 was the initial phase of the
20 life cycle development.

21 We piloted that portion of it. And after
22 that STP fell apart, basically, that Fukushima
23 happened, so that pilot was going to continue over the
24 next phase, which never happened. Now I believe we're
25 already doing the DAC inspections for AP1000.

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1 MEMBER STETKAR: That's what I wanted to
2 hear. But those are real --

3 MR. TANEJA: Those are real.

4 MEMBER STETKAR: Those are real
5 inspections.

6 MR. TANEJA: Those are real inspections.
7 So I believe there was an inspection among the
8 requirement phase. There were significant findings
9 during that.

10 MEMBER STETKAR: We may want to schedule.
11 I mean it's not a USAPWR. That's why I wanted to wait
12 until the end.

13 MR. TANEJA: No. That's AP1000.

14 MEMBER STETKAR: Yes. But I mean it's not
15 pertinent to this particular subcommittee.

16 (Off the record comments)

17 MEMBER STETKAR: But we may want to
18 schedule a subcommittee to get --

19 CHAIRMAN CORRADINI: But your point is the
20 generic process --

21 MEMBER STETKAR: The generic process, if
22 it's in progress for AP1000 --

23 MR. TANEJA: The volunteer was South Texas
24 for that one, right?

25 MEMBER STETKAR: Yes, I know.

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1 MR. TANEJA: And so they are no longer in
2 that stage. So we actually are proceeding, the actual
3 licensees are handling it now.

4 MEMBER BROWN: Do you actually have a plan,
5 since you're into it, do you actually have a plan for
6 completion as to what you would be doing at each stage,
7 or each phase, to get to the end point? That would be
8 --

9 MEMBER STETKAR: We will take care of this
10 offline. If that's in progress then --

11 MR. TANEJA: That is in progress and there
12 is a plan that's taking shape on that one already.

13 MEMBER BROWN: Do you want to do that under
14 the digital I&C or under AP1000?

15 CHAIRMAN CORRADINI: Can we pull ourselves
16 back Ferramine Unit 3? I'll let you guys discuss this
17 privately. So anything else for our Chapter 14 team up
18 in front of us? Okay, hearing none, I'll thank them
19 and go around the table, starting with our consultants.
20 Dr. Wallis?

21 DR. WALLIS: Well, I think I'll have to
22 write something about these extreme events. This is --

23 CHAIRMAN CORRADINI: I had a funny feeling
24 you might.

25 DR. WALLIS: -- unbelievable floods and 100

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1 mile and hour winds and things. And I think this is
2 more a generic thing, when they seem to postulate
3 things which are almost impossible.

4 But they only just look at one aspect of
5 it, like what's the water level? What are all the
6 other things they tell us? And so I'm going to write
7 something. But I think it's more generic than applying
8 to this particular --

9 CHAIRMAN CORRADINI: Well, I think Mr.
10 Stetkar is waiting for your contribution. No, I think
11 he wants your active contribution. Anything else,
12 though, about today?

13 DR. WALLIS: I'm puzzled by some of that.
14 But otherwise I think this is okay.

15 DR. KRESS: I don't have a lot to say. I
16 think they did a good job with answering the questions
17 I had before I came here. I may have to say some words
18 about societal risk.

19 CHAIRMAN CORRADINI: That'd be good.

20 DR. KRESS: And I'm not sure I'm still
21 satisfied on the missile, turbine missile.

22 CHAIRMAN CORRADINI: Well, I think the
23 takeaway for the committee, the subcommittee, and all
24 the other residual members of the subcommittee, is we
25 just got electronically the report. I just downloaded

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1 it. So I think we all should look at it. And when
2 things pop up there we should hear about them when we
3 get together next.

4 DR. WALLIS: Missiles popping up, do you
5 think anyone?

6 (Laughter)

7 CHAIRMAN CORRADINI: Tom, anything else?
8 I'm going to let your compatriot over there, I'm
9 ignoring him.

10 DR. KRESS: No, I'm through.

11 DR. HINZE: I'll let Tom talk about
12 societal risk. But I had concerns coming in regarding
13 some of the meteorological issues and some of the
14 ground water issues. And they've been well answered.
15 And so I'm satisfied with where we are.

16 CHAIRMAN CORRADINI: Okay. Steve?

17 MEMBER SCHULTZ: Some of the design
18 specific information was new to me, just being with the
19 opportunity for the first discussion with the
20 subcommittee.

21 CHAIRMAN CORRADINI: And you can come back
22 a lot.

23 MEMBER SCHULTZ: Well, thank you. I
24 appreciate the quality of the presentations, both by
25 the applicant and by the staff reviews that have been

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1 done. As it turned out, the level of information was
2 very well organized and presented today. And I
3 appreciate that. Thank you.

4 CHAIRMAN CORRADINI: Sam?

5 MR. ARMIJO: I have no problems. Looking
6 forward to reading the turbine report.

7 CHAIRMAN CORRADINI: John?

8 MEMBER STETKAR: I've got a couple of
9 things. I've been chomping at the bit so I'll --

10 CHAIRMAN CORRADINI: He's dying to get
11 something on the record.

12 MEMBER STETKAR: This is a quote from
13 Section 1.3 of HMR 51, one of the seminal references,
14 definition of PMP. I'll read the second paragraph.
15 "Another definition of PMP, more operational in
16 concept, is 'the steps followed by hydro meteorologists
17 in arriving at the answers supplied to engineers for
18 hydrological design purposes' WMO, World Meteorological
19 Organization, 1973.

20 "This definition leads to answers deemed
21 adequate by competent meteorologists and engineers and
22 judged as meeting the requirements of a design
23 criteria." That what it is. Okay.

24 Now, a couple of other things. One, I will
25 note that prior to fuel load, according to Part 52,

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1 Fermi Unit 3 must have in place a site-specific
2 probabilistic risk assessment that indeed evaluates all
3 external events according to consensus standards in
4 place one year prior to fuel load.

5 So in principal, they will have an
6 evaluation of high winds, flooding, all of those
7 things, in a probabilistic sense. How those compared
8 to what I just read is anybody's guess.

9 DR. WALLIS: All of the effects? I mean if
10 the flood picks up propane tanks --

11 MEMBER STETKAR: It's a risk assessment, so
12 in principle, yes. How they do that, I don't know. I
13 just wanted to get that. As far as other comments, I'd
14 like to say one thing. I really appreciated the --

15 (Off the record comments)

16 MEMBER STETKAR: I really like the level of
17 detail that this particular applicant, and the staff,
18 went into in the meteorological analyses. It's
19 actually a lot more than I've seen in terms of scope
20 and comparative analyses and confirmatory analyses done
21 by the staff.

22 It's a lot better than I've seen in other
23 applications. And I think you both deserve credit in
24 that area in particular. Other than that, nothing to
25 say.

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1 CHAIRMAN CORRADINI: Mike?

2 MEMBER RYAN: Nothing new to add. But I
3 second John's last comments, and Steve Schultz's
4 comments as well, on the quality of the presentations
5 and the type of material. Thank you.

6 CHAIRMAN CORRADINI: Charlie?

7 MEMBER BROWN: I've said my piece.

8 CHAIRMAN CORRADINI: And I've noted it.

9 MEMBER BROWN: Yes, hopefully you'll take
10 some action on it.

11 CHAIRMAN CORRADINI: I noted it. Okay, let
12 me thank the staff and DTE for their presentations. I
13 think the way John said it is probably best, which is
14 I think this has been a fairly complete description,
15 particularly in Chapter 2, where we knew this would be
16 where the substantive discussions would be relative to
17 Fermi 3, where a lot of it before was essentially
18 included by reference.

19 I wanted to review what I had listed as,
20 I'm not going to call them even open items, I'm just
21 going to call them things that we're still keeping on
22 the books to note.

23 One was DTE is, or I should say the staff,
24 promised to get back and double-check Bill's
25 suggestion, or reminder of shale gas exploration to

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1 make sure it's within the affected areas of five miles
2 or less or ten miles or less. And staff was going to
3 double-check that. They didn't think that was an issue
4 but they were going to check it.

5 MEMBER RYAN: That answers mine. Do you
6 want a response or not?

7 CHAIRMAN CORRADINI: Do you have a response
8 to that?

9 MR. SMITH: Yes, this is Peter Smith. We
10 did check. There's two areas in Michigan. The closest
11 one is 75 miles away, Utica shale development.

12 CHAIRMAN CORRADINI: Cross that one off.
13 Okay. And staff has checked it and trusts you?

14 MR. TAMMARA: I honestly checked. I didn't
15 find anything.

16 CHAIRMAN CORRADINI: You have to come to a
17 microphone.

18 MR. TAMMARA: My name is Rao Tammara. I
19 looked at within five miles and ten miles. I didn't
20 find anything. So that's why I came back and asked
21 them whether they have any information.

22 CHAIRMAN CORRADINI: Okay, thank you. The
23 second one I have here is flood levels for RTNSS
24 structures, same as the safety structure. Staff should
25 verify this, since DTE essentially came on the record

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1 they did that, and verify they've checked that and
2 verified it.

3 And then I probably wrote this wrong. The
4 perched water table, staff should verify the review of
5 what DTE presented.

6 Aircraft, airway crash frequency, we want
7 to see the staff's confirmatory analysis. And then
8 we're all supposed to look at and review the turbine
9 missile analysis, which we've gotten.

10 And then finally, I'll get a clarification
11 for Mr. Brown as to what the Chapter 3 discussion was
12 in terms of the condition for testing the squib valves.
13 And that's what I've got.

14 I also sent to the committee -- well, at
15 least the people that were listed as coming to the
16 meeting, I'm not sure if all of you have it but I think
17 I sent it to all the ACRS and the consultants --
18 basically my summary of the past three subcommittee
19 meetings as what was essentially a carry forward of
20 anything.

21 And we didn't really have any open things
22 to discuss. I just tried to summarize it. If people
23 can remember that I did send that out and look at it,
24 if there's something there that looks incorrect, please
25 let me know.

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1 But I tried to summarize essentially the
2 last three meetings for 9 months ago, 14 months ago,
3 and longer than that ago. I tried to at least put it
4 all together so we get on the same page.

5 Other than that, I think we're all set with
6 the committee. Are there any public, I should ask
7 Chris, did anybody, we had checked earlier and nobody
8 was on the line from the public to make comments. Can
9 we check again?

10 (Off the record comments)

11 CHAIRMAN CORRADINI: Is anybody out there
12 that's from the public that wants to make a comment?
13 Okay, I hear a lot of clicking so I think we're set.
14 So with that we'll adjourn. And we will get back to
15 you all about the next subcommittee meeting.

16 (Whereupon, the above-mentioned matter was
17 concluded at 4:10 p.m.)

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**Fermi 3 COLA
Presentation to ACRS Subcommittee
Section 2.1**

Section 2.1, Geography and Demography



Section 2.1 Addresses the Following Topics:

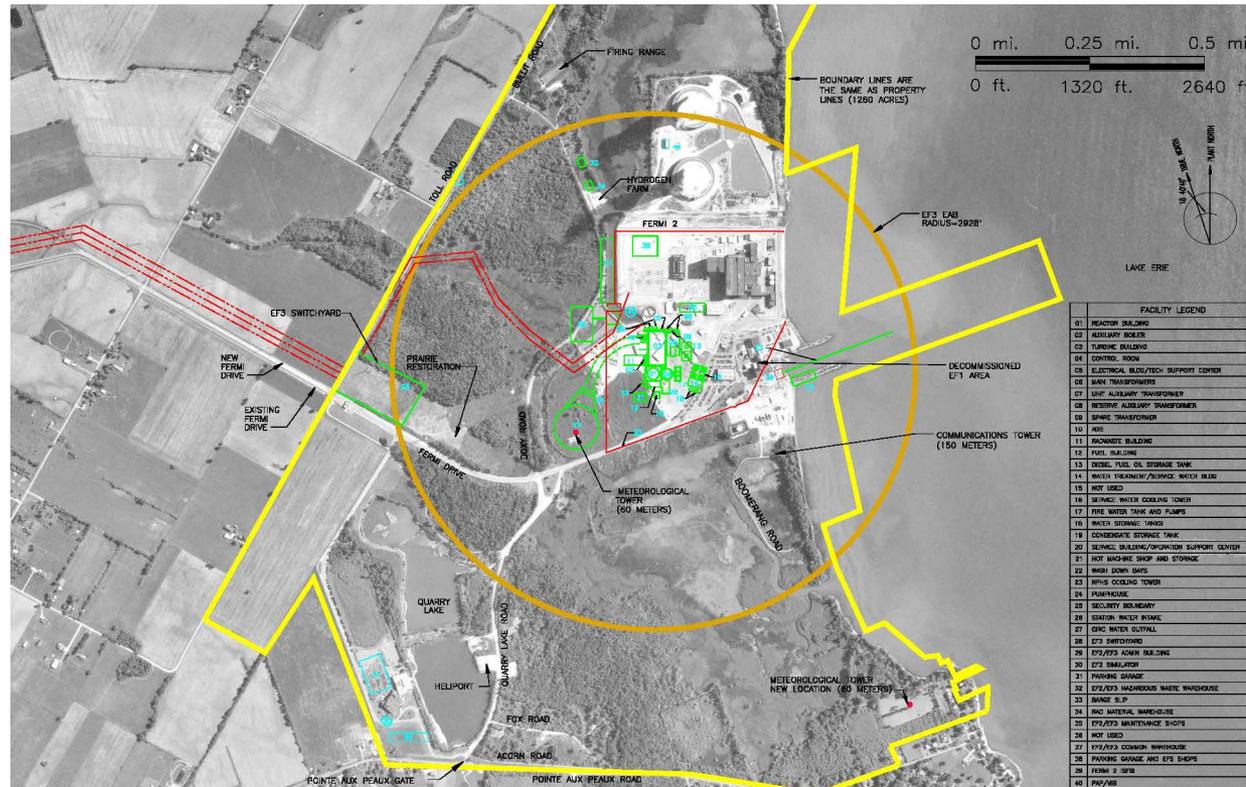
- Site Location and Description
- Exclusion Area Boundary, Authority and Control
- Population Distribution

Section 2.1, Geography and Demography



Site Layout

- Exclusion Area Boundary (EAB) – 892 meters
- Low Population Zone (LPZ) – 4828 meters (3 miles)



Section 2.1, Geography and Demography



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.

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**Fermi 3 COLA
Presentation to ACRS Subcommittee
Section 2.2**

Section 2.2, Nearby Industrial, Transportation, and Military Facilities



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



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



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



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



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



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/ft² vs. 50 lb/ft² in the DCD.
 - Extreme Winter Precipitation Event: 51.5 lb/ft² vs. 162 lb/ft² 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.

Section 2.3, Meteorology:

2.3.1 Regional Meteorology



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



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:

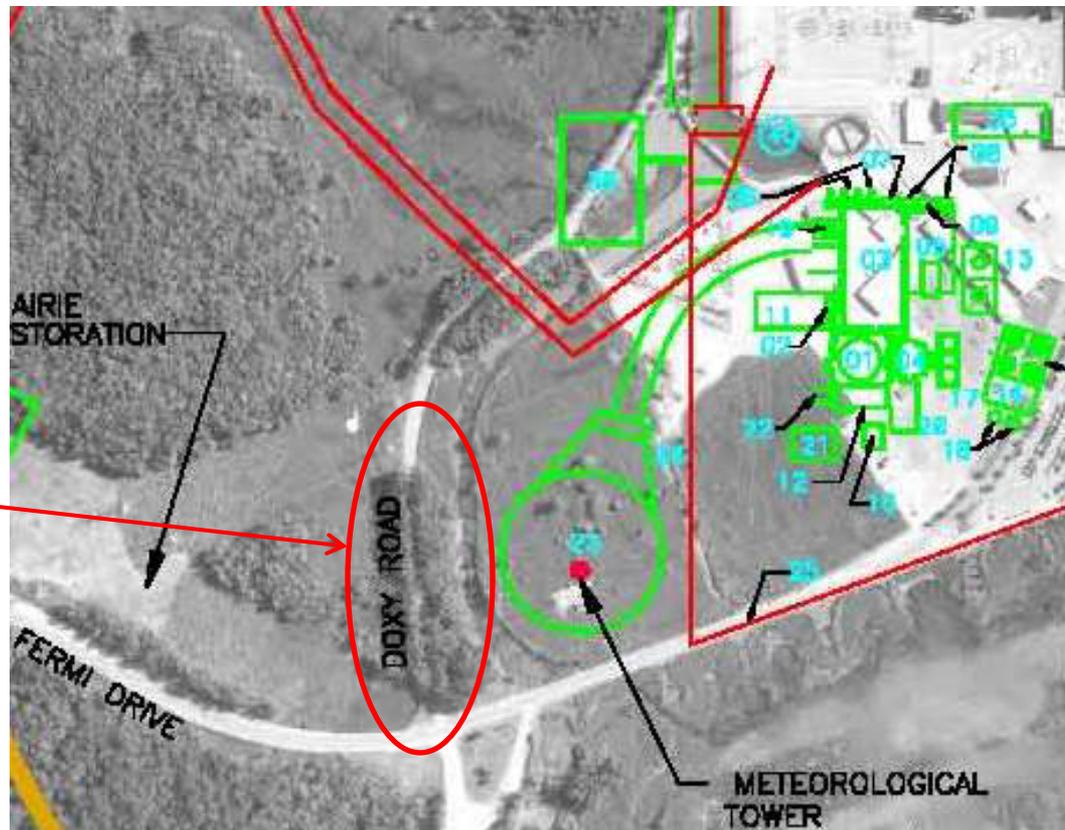
- RAI 02.03.03-1, Proximity of Trees to Meteorological Tower
- RAI 02.03.04-5, Impact of Trees to Short Term Atmospheric Dispersion Analysis
- RAI 02.03.05-3, Impact of Trees to Long Term Atmospheric Dispersion Analysis

Section 2.3, Meteorology:

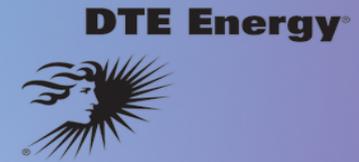
2.3.3 Meteorological Monitoring

Meteorological Tower Location

Trees of Concern



Section 2.3, Meteorology: 2.3.3 Meteorological Monitoring

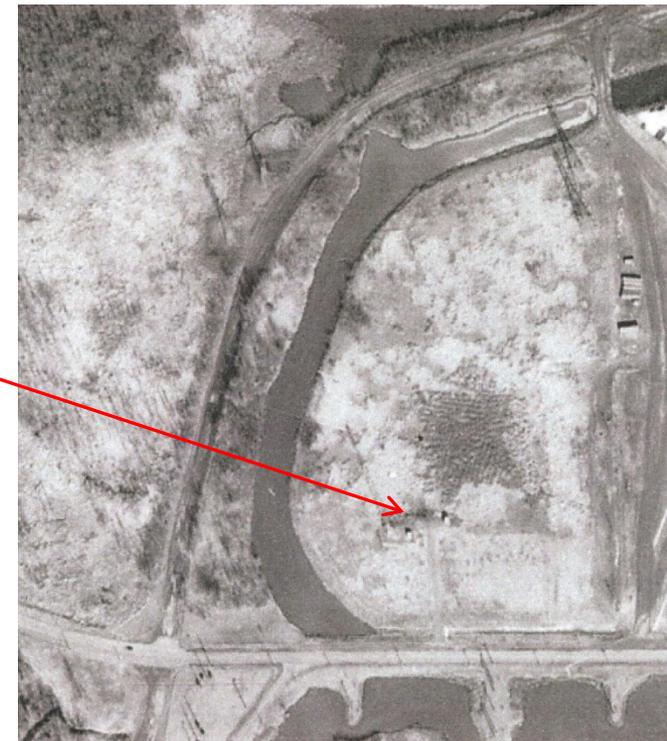


Impact from Trees (Continued):

1981 Aerial Photo



1991 Aerial Photo



Tower

Section 2.3, Meteorology:

2.3.3 Meteorological Monitoring



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



- 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



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



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



Topics addressed in Section 2.4 include:

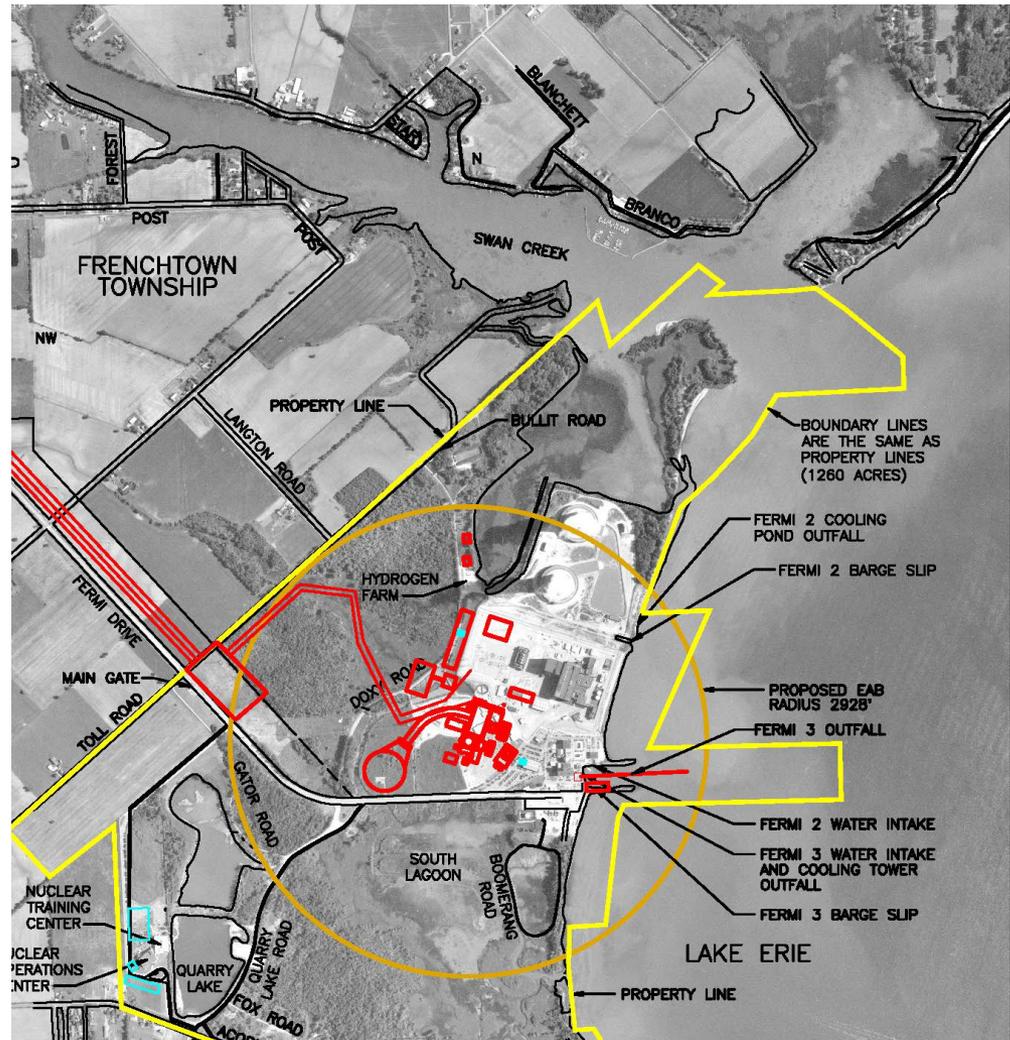
- Overview of Hydrology in Site Vicinity
- Flooding due to Local Intense Precipitation
- Flooding from Swan Creek
- Flooding from Lake Erie
- Minimum Lake Levels
- Groundwater
- Radionuclide Transport in Groundwater

Section 2.4, Hydrology: Specific Topics



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.



Section 2.4, Hydrology: Specific Topics



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.

Section 2.4, Hydrology: Specific Topics



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



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



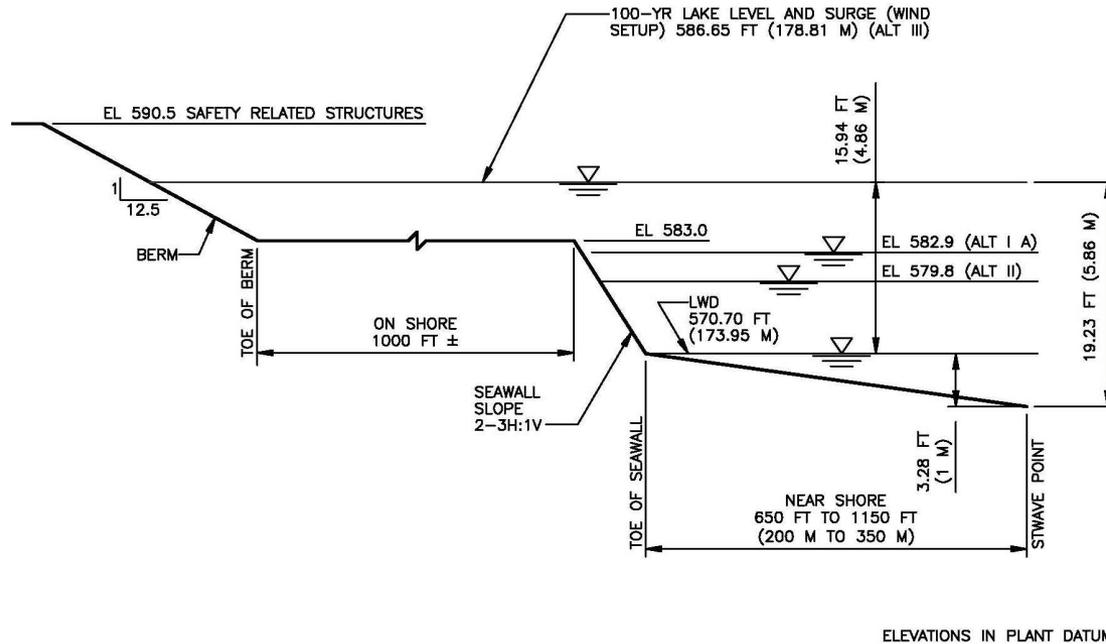
Flooding from Lake Erie (Probable Maximum Surge and Seiche)

- 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



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.

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.

Section 2.4, Hydrology: Section Topics



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.

Section 2.4, Hydrology: Section Topics



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.

Section 2.4, Hydrology: Section Topics



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.

Section 2.4, Hydrology: Section Topics



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 (K_d values).

Section 2.4, Hydrology: Section Topics



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



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.



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

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)

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

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

LICENSE CONDITION 2.2.3-1

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

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

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-induced 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.



Chapter 2

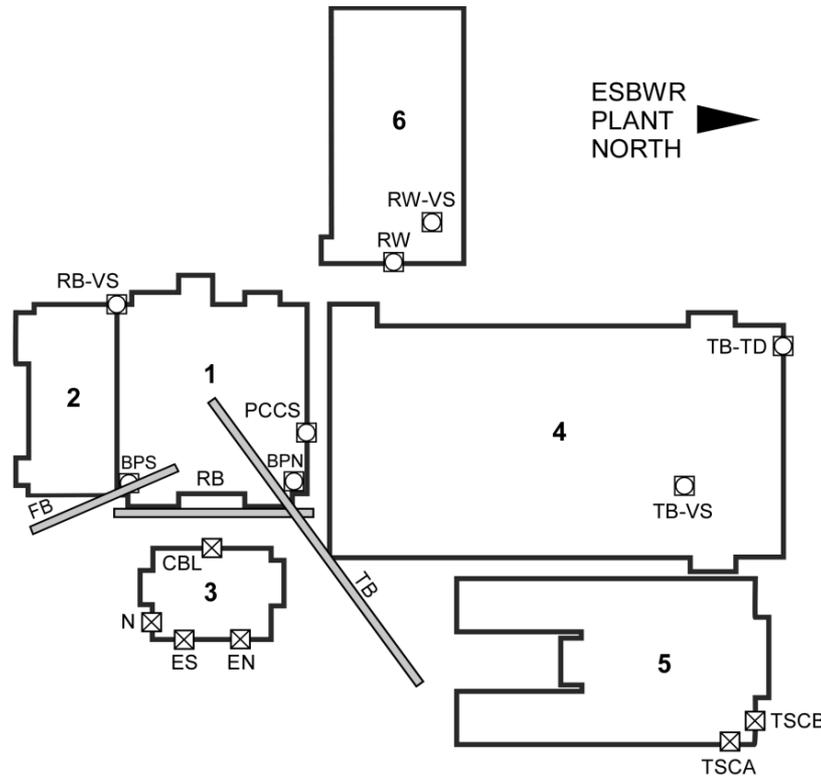
“Site Characteristics”

Questions/Comments

Backup Slides

Section 2.3 Meteorology and Air Quality

ESBWR Airborne Release Points and Receptors



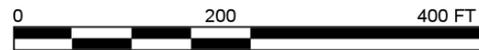
Plant Structures

- 1 Reactor Building
- 2 Fuel Building
- 3 Control Building
- 4 Turbine Building
- 5 Electrical Building
- 6 Radwaste Building

☒ = Point Receptor

■ = Diffuse Source

○ = Point Source



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



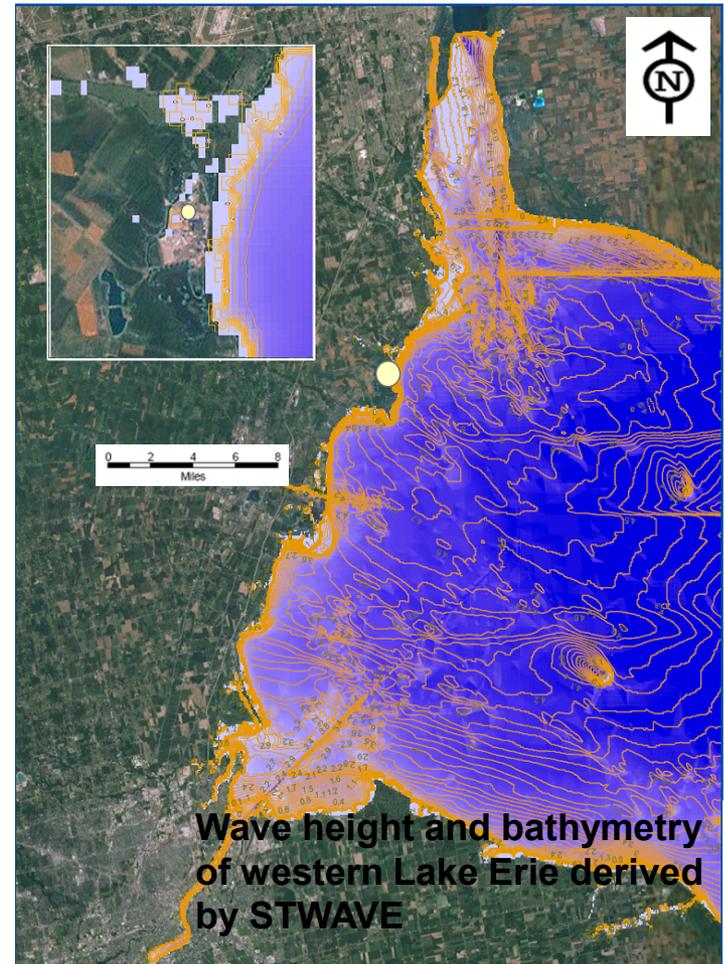
Flood Analyses

- **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.



LEGEND

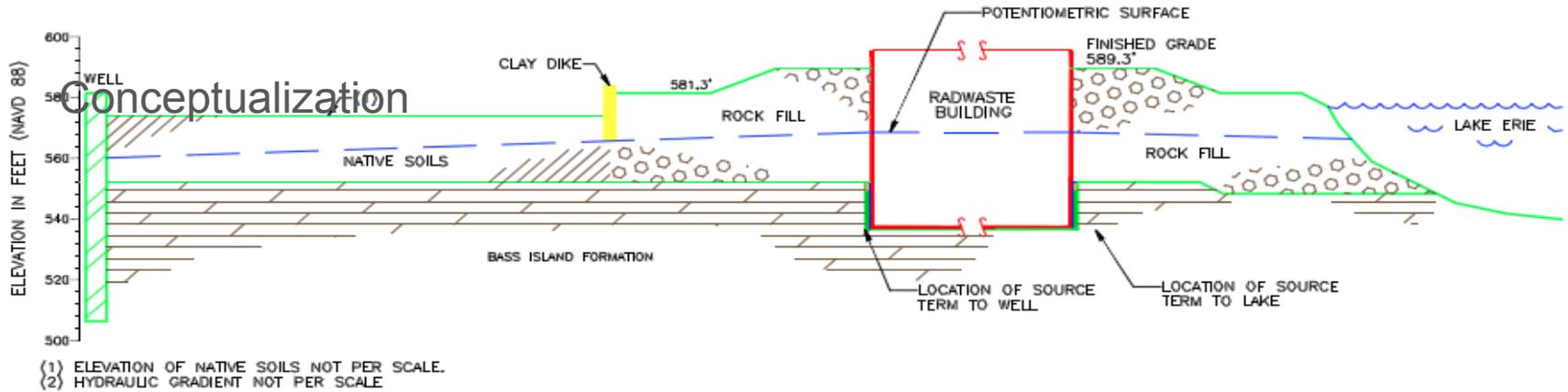
-  Fermi Site
-  Wave Height -meters

Bathymetry-meters



Hydrostratigraphy

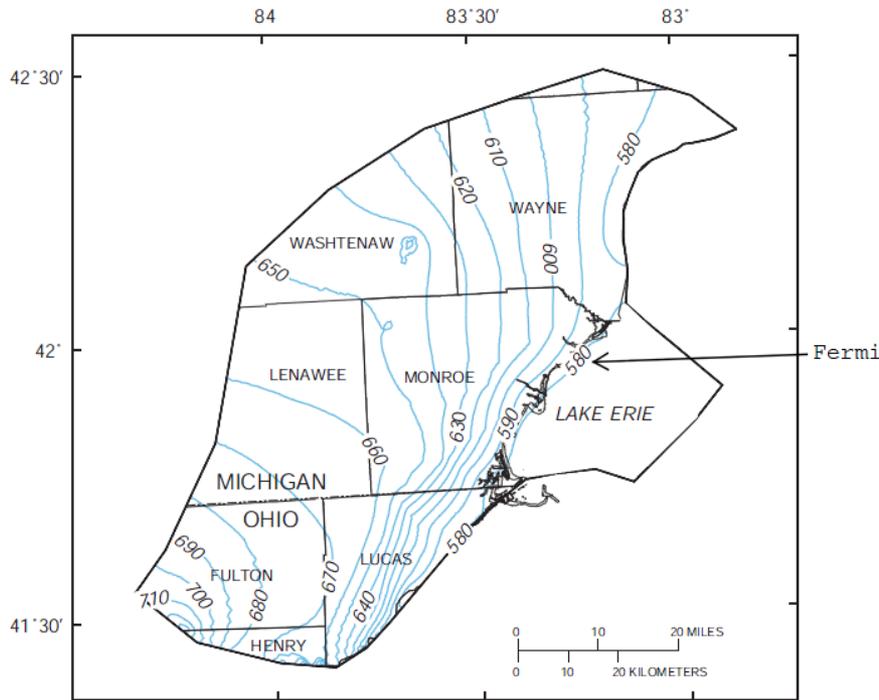
- **Shallow overburden**
 - Generally low-permeability native soils [lacustrine (muck) and glacial till] and clay fill
 - Relatively high permeability construction (rock) fill
 - 18 monitoring wells
 - Complex flowpaths due to low-permeability materials and high-permeability rock fill
- **Bass Islands Aquifer (bedrock)**
 - Dolomitic limestone, primary flow through fractures
 - 13 monitoring wells
 - Low to moderate permeability



Ground Water Flow - Regional

**Pre-development:
toward Lake Erie**

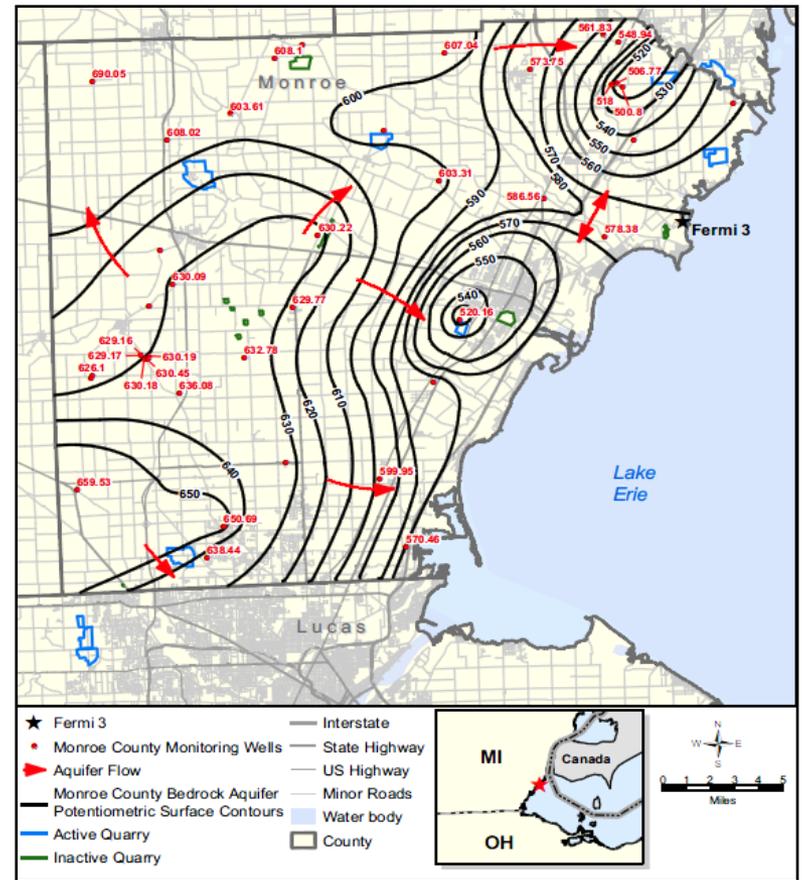
**Post development:
varying directions due to
quarry dewatering**



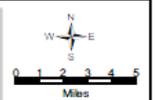
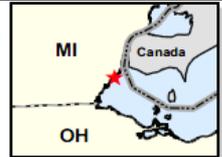
Base from U.S. Geological Survey
1:24,000 quadrangles

EXPLANATION

- 600 - LINE OF EQUAL ALTITUDE FOR SIMULATED PREDEVELOPMENT HYDRAULIC HEADS
Contour interval is 10 feet. Datum is NGVD 29
- MODEL BOUNDARY



- ★ Fermi 3
- Monroe County Monitoring Wells
- ▶ Aquifer Flow
- ▭ Monroe County Bedrock Aquifer
- ▭ Potentiometric Surface Contours
- ▭ Active Quarry
- ▭ Inactive Quarry
- Interstate
- State Highway
- US Highway
- Minor Roads
- ▭ Water body
- ▭ County



Ground Water Flow - Local

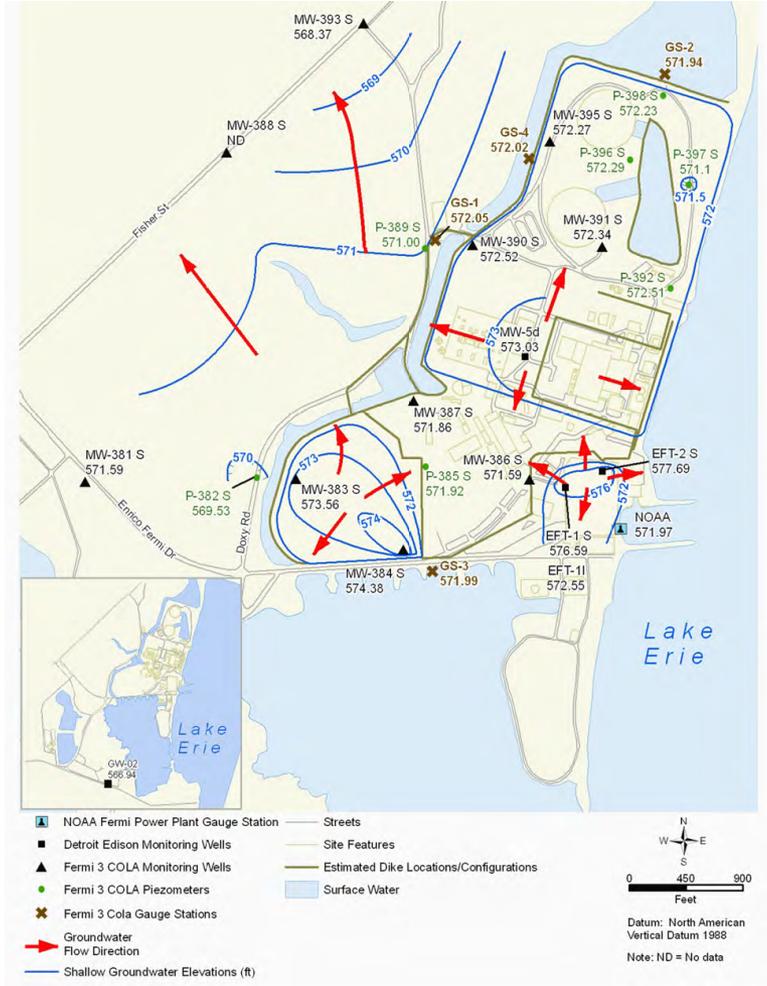
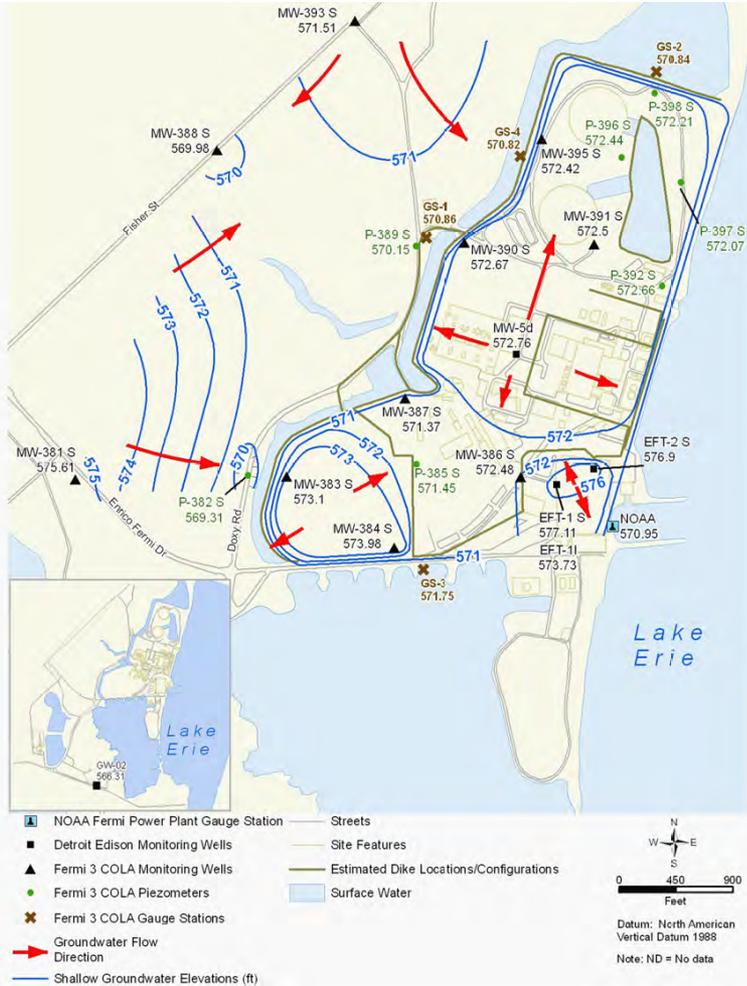
- Site patterns in shallow overburden dependent on material
 - General downward flow from the overburden to the bedrock
 - Water levels recorded at monitoring well pairs in shallow and bedrock monitoring.
 - Steep gradients in lacustrine muck, shallow gradients in rock fill
 - Downward gradient into 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



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.

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**Fermi 3 COLA
Presentation to ACRS Subcommittee
Chapter 3**

Chapter 3, Design of Structures, Components, Equipment, and Systems: Chapter Topics



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.

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.



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

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)

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

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 with 10 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.

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

Chapter 10, Steam and Power Conversion: Supplemental Information



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

Chapter 10, Steam and Power Conversion: Supplemental Information



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.

Chapter 10, Steam and Power Conversion: Supplemental Information



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.

Chapter 10, Steam and Power Conversion: Supplemental Information



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.

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.

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)

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 turbine 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

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}

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

DTE Energy[®]



**Fermi 3 COLA
Presentation to ACRS Subcommittee
Chapter 14**

Chapter 14, Initial Test Program: Chapter Topics



	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

Chapter 14, Initial Test Program: Supplemental Information



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.

Chapter 14, Initial Test Program: Supplemental Information



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.

Chapter 14, Initial Test Program: Supplemental Information



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.

Chapter 14, Initial Test Program: Supplemental Information



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.

Chapter 14, Initial Test Program: Supplemental Information



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

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.

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 COL 14.3-1-A Emergency Planning ITAAC
 - STD COL 14.3-2-A Site-Specific ITAAC
 - EF3 COL 14.3A-1-1 Schedule for Design Acceptance Criteria (DAC) ITAAC Closure

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