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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

April 4, 2007

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

MEETING OF THE PLANT LICENSE RENEWAL SUBCOMMITTEE

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WEDNESDAY,

APRIL 4, 2007

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

ACRS MEMBERS PRESENT:

OTTO L. MAYNARD Chairman

WILLIAM J. SHACK

THOMAS S. KRESS

GRAHAM B. WALLIS

J. SAM ARMIJO

SAID ABDEL-KHALIK

MARIO V. BONACA

NRC STAFF PRESENT:

JIM BARTON
MAITRI BANERJEE
PERRY BUCKBERG
GLENN MEYER
JIM DAVIS
CLIFF MARKS
NAEEM IQBAL
KEN CHANG
LOUISE LUND
RICHARD CONTE
DUC NGUYEN
CLIFF MARKS
GLENN MEYER
NAEEM IQBAL
KEN CHANG
MATTHEW MITCHELL
LAMBROSE LOIS

ALSO PRESENT:

ROBERT SMITH
STEVE BETHAY
BRIAN SULLIVAN
ALAN COX
BRYAN FORD
FRED MOGOLESKO
GARY DYCKMAN
BARRY GORDON
FRANZ-JOSEPH ULM
TIM GRIESBACH
RAY PACE

A-G-E-N-D-A

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

10:29 a.m.

CHAIRMAN MAYNARD: Good morning. This meeting will now come to order.

This is a meeting of the Plant License Renewal Subcommittee. I'm Otto Maynard, Chairman of the Pilgrim Plant License Renewal Subcommittee.

ACRS members in attendance, we have Mario Bonaca. Said Abdel-Khalik, Sam Armijo, Graham Wallis, Bill Shack, Tom Kress and our consultant for this, Mr. Barton. And Ms. Maitri Banerjee of the ACRS staff is the Designated Federal Official for this meeting.

The purpose of this meeting is to review the license renewal application for the Pilgrim Nuclear Station, the draft Safety Evaluation Report and associated documents with focus on the unresolved items in the Staff's draft Safety Evaluation Report. We will here presentations from the representatives of the Office of Nuclear Reactor Regulations and the applicant, Entergy Nuclear Operations.

The Subcommittee will gather information, analyze relevant facts and formulate a proposed position and action as it is appropriate for deliberation at the full Committee.

The rules for participation in today's

meeting were announced as part of the notice of this meeting previously published in the *Federal Register* on March 23, 2007.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's meeting.

We have provided telephone bridge connections following requests from the members of the public to listen in. And to avoid unnecessary interruption and reduce the noise level, we request that these telephone bridge lines be kept in mute.

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

We will now proceed with the meeting, and I call upon the NRC Project Manager, Mr. Perry Buckberg of the Office of Nuclear Reactor Regulation.

MR. BUCKBERG: Thank you. Good morning.

My name is Perry Buckberg, I'm the Project Manager for the Staff review of the Pilgrim license renewal.

Joining me is my Branch Chief Bob Shaft, Deputy Division Director Louise Lund. From the Region are Rich Conte and Glenn Meyer. Glenn Meyer is the Inspection Team leader. Also joining me is Dr. Jim Davis from NRR, who is the audit team leader. And the technical reviewers are present as well.

We'll be presenting the results of the Staff's review this afternoon. This morning, the Pilgrim staff is going to present first. And let me turn it over to Steve Bethay from Entergy.

CHAIRMAN MAYNARD: Good morning, Steve. And before I turn it to you, I have looked through your representation here. You've got a lot of slides, a lot more than we can spend a lot of time on. I do think you're hitting a number of the key issues, especially towards the end there. I think some of the information up in the beginning is important, but I don't think you have to necessarily go over it line-by-line. In fact, some of it I think you can put for the record and see if there's any questions rather than spend a lot of time going through that.

MR. BETHAY: Just on that point, my intention wasn't to go through every picture and drawing that we put in there. We put that in there for background information. There are a handful that when we'll get to that portion I would like to emphasize, but any point if you're good, I can move on.

The first part I can go through fairly quickly. With that, I'll turn it over to Bob Smith for brief introductory remarks. He's our Plant Manager.

MR. SMITH: Good morning, Mr. Chairman. Thank you for having us here.

My name is Bob Smith. I'm the General Manager of Plant Operations for the Pilgrim Station. We're pleased to be here today and to represent Pilgrim for license renewal to the Committee on Reactor Safeguards.

Steve Bethay, to my right, is our Director of Nuclear Assurance. He will be our main speaker today in presenting for Pilgrim. Also with us today are members of our engineering department. Brian Sullivan, to Steve's right, he's the Director of Engineering.

And other members as I introduce you in the audience, if you'd just raise your hand. Tom White, Manager of Design. Ray Pace, Supervisor Design Mechanical and Civil. Gary Dyckman, Senior Staff Engineer.

Members of our Project Team for License Renewal. Fred Mogolesko is our Project Manager at Pilgrim. He's up front. Gary Young, our Corporate Project Manager. Alan Cox, who is also a Project Manager representing corporate following closely with the Pilgrim project. And Dave Locke, Project Manager.

For our Licensing Group, we have John McCann, Director of Licensing for corporate. Bryan Ford, Licensing Manager at Pilgrim, and Brian's up front. Jay Thayer is our Vice President for Operations and on loan to the Nuclear Energy Institute.

And we have several members in the audience from our license renewal teams at James A. Fitzpatrick and Vermont Yankee Station.

That concludes my introductions. And I'd like to turn it over to Steve Bethay.

MR. BETHAY: Good morning.

CHAIRMAN MAYNARD: And again, Steve, I'm sure we're going to ask questions that will require somebody from the audience. Again, everyone out here, if you are asked question please come to a microphone and identify yourself for answering.

MR. BETHAY: Okay. Just a point of order. In the past there's been a microphone stand, so they just come to this table or up to the front here.

Okay.

CHAIRMAN MAYNARD: Yes.

MR. BETHAY: We'll get them to a microphone.

CHAIRMAN MAYNARD: We'll get them to a microphone, that's the main thing.

MR. BETHAY: We'll get to a microphone, if need be.

CHAIRMAN MAYNARD: We may have one up here by the time they're called upon.

MR. BETHAY: Okay. Terrific.

Well, i'll apologize in the beginning. I have a terrible cold. If my voice starts to fade out, I may have to stop for a sip of water.

My name is Steve Bethay, as Bob said. I'm the Director of Nuclear Safety Assurance at Pilgrim, and I'm the senior management sponsor for our license renewal project at the plant. And I'll be serving as the master of ceremonies today and directing questions as appropriate to our team members.

I won't go over the list here.

MEMBER WALLIS: Slide one?

MR. BETHAY: Yes, sir.

MEMBER WALLIS: That big building is the reactor building, right? The big cube is the reactor building?

MR. BETHAY: Yes, sir. Just very briefly a side orientation --

MEMBER WALLIS: Well --

MR. BETHAY: Cape Code Bay intake channel, reactor building --

MEMBER WALLIS: Right.

MR. BETHAY: Turbine building.

MEMBER WALLIS: Now later on in the pictures do you have pictures of ground water in this presentation? But the lagoon intake seems to go right up to the reactor building. So how does the ground water compare with the sea water?

MR. BETHAY: We have a detailed discussion on that.

MEMBER WALLIS: You're going to talk about that later on?

MR. BETHAY: Yes, sir. Yes, sir.

MEMBER SHACK: Well, while you have the picture here, where are the wells that you're taking these water samples from located?

MR. BETHAY: There's one in this area. There's one back here. As part of another effort we're also installing three new wells back in this area between the ocean and the building.

Dr. Wallis, I will get into the --

MEMBER WALLIS: It is striking how close the sea water is, though.

MR. BETHAY: Yes. Guys, help me with the perspective here. From the edge of the building to the water, this is the diesel generator building, so it shields a good bit of property back here.

MEMBER WALLIS: Is there a drop from there to the water that we don't see?

MR. BETHAY: Yes. Nominal ground level is 23 feet between sea level.

MEMBER WALLIS: Ah.

MR. BETHAY: So ground level is about 23 feet above the mean tide level.

MEMBER WALLIS: Mean?

MR. BETHAY: It's probably 30 or 40 feet from the reactor building to the ocean. Maybe more, I'm estimating.

MEMBER WALLIS: All right.

MR. BETHAY: It's a good distance.

MR. FORD: This is Bryan Ford.

We also just completed a hydrology study of the site. And it shows that the water flow is from the land out towards the sea, not from the sea in towards the land.

MEMBER WALLIS: Sort of has to be, doesn't it?

MR. BETHAY: Okay. That's good news.

Moving on the agenda that I'd like to cover this morning, is I'll talk very briefly about the plant description and the current plant status. I'll briefly hit some significant licensing highlights for the plant. Our license renewal project, a brief overview of that.

I think it's noteworthy to spend just a minute on some of the cost beneficial SAMAs that we identify here. I think that's a very unique and interesting part of the whole license renewal process.

And then we'll spend the bulk of our time discussing the four open items that were identified in the report.

Pilgrim is located in Plymouth, Massachusetts, right on the shores as you saw, of Cape Cod Bay. We're about 40 miles south of the city of Boston sited on 1600 acres of predominately woodland that is managed as a forested area.

We are a BWR3 with a MARK 1 primary containment structure. It's a General Electric NSSS design and Bechtel was the original architect/engineering constructor.

Our current license power level is 2028 megawatts thermal and we generate approximately 690 megawatts electric.

As you notice from the site overview, we are an open cycle once through condenser cooling plant.

The plant is owned and operated by the Entergy Corporation, with headquarters in Jackson, Mississippi.

And we currently have a staff of around 655 employees, including our security force.

Current plant status as of this morning, the plant is operating at approximately 80 percent. We are in an end-of-cycle coastdown that began in early February. Our 16th refueling outage begins this Friday, April 6th at midnight.

Currently all of our NRC performance indicators and inspection findings are green and we're in column 1 of the regulatory oversight matrix.

Just a few highlights of the licensing history of the plant. Our construction permit was issued in August of 1968. Following four years of construction the operating license was issued in June of 1972 with a full power license in September of that year, and commercial operation in December of 1972.

The plant was owned and operated by the Boston Edison Company from that until 1999 when in July of 1999 Entergy bought Pilgrim in the first sale of a nuclear power plant in the United States. And we transferred the license and assumed ownership and possession in July of 1999.

We did the small Appendix K, a feedwater flow measurement uncertainty power uprate in 2003. We're currently not actively pursuing any additional power uprates for Pilgrim at this time.

Our license renewal application was submitted in January of last year in anticipation of the current license expiration in June of 2012.

Just some of the significant modifications and licensing actions that have occurred at Pilgrim over the years. I'd like to teach on these, primarily because looking back Pilgrim was the first or among the first plants to institute many of these modifications and improvements to the plant that in today's life serve us well in anticipation of a period of extended operation.

In 1977 we replaced the core spray piping instead the primary containment with intergranular stress corrosion cracking resistant material.

In the late '70s and early '80s, as all

BWRs with the Mark 1 containment did, we undertook the Mark 1 containment modification program, which was a series of structural enhancements to the primary containment structure to address concerns with cool swell and chugging and condensation loads in the torus following an accident.

In 1984 we replaced the recirculation system piping with intergranular stress corrosion cracking resistent material.

In 1986 to 1989 it's noteworthy that Pilgrim was among the first plants to implement some pretty significant safety enhancements that became the standards for the BWR industry. We implemented a salt service water to residual heat removal cross type that would allow us to actually pump the ocean into the reactor if that was necessary in a severe accident.

We also implemented the direct torus vent that allows us to have a harden vent path through the primary containment for pressure control in an extreme event.

And we also were among the first plants to address the station blackout rule. We installed an independent diesel generator that can provide full power to one of our emergency buses in a complete loss of AC power event.

In 1991 we instituted hydrogen water chemistry, again to address intergranular stress corrosion cracking concerns.

In 1995 --

MEMBER SHACK: Just out of curiosity --

MR. BETHAY: Yes, sir.

MEMBER SHACK: What is your fraction of time on the hydrogen water chemistry that your --

MR. BETHAY: We currently run about 95 percent availability. As I was going to mention in a moment, this outage we're injecting the noble metal chemistry addition, which will require us to increase that to a 98 percent availability. So we've got a number of system enhancements, procedural enhancements underway to raise that availability from the 95 percent to the 98 percent, which is a great lead in. What's not on the slide, as I mentioned, our 16th refueling outage starts this Friday, this weekend. And we're taking advantage of this outage. We consider it our license renewal outage. We'll be doing a number of modifications that will position the plant well for an additional 20 years of operations.

Some of examples. The noble metal chemical addition, which will allow us to reduce hydrogen usage but increase the availability.

We're replacing a reactor feedback motor.

We're replacing a condensate pump and motor. We're replacing one of the reactor recirculation system pumps and motors. And we'll be doing a preemptive repair of our core shroud tie rods.

So a significant outage for us in terms of positioning the plant for continued operation.

Just to briefly run through how we got to today.

Our license renewal application was prepared by a very experienced team of both corporate and on site multi-disciplined folks. And most of that team is present today should we have questions for them.

Noteworthy that the Pilgrim and Vermont Yankee applications were the first that were submitted following issuance of Revision 1 of the Standard Review Plan and the GALL. A lot of the work went into the application in late 2005 to ensure that we were as compliant as possible with Revision 1 of those documents.

We have incorporated lessons learned from our own in-house license renewal activities as well as the lessons learned from others.

Our application underwent a peer review

conducted by ten utilities. We received many comments from our peers that were incorporated into the application.

Once the application was completed, it underwent rigorous reviews by our own site safety review committee, our off site safety review committee and our Quality Assurance Department in addition to the technical reviews.

MEMBER WALLIS: You mentioned Vermont Yankee. Pilgrim is very much like Vermont Yankee?

MR. BETHAY: Very similar. Yes, sir. Very similar.

MEMBER ARMIJO: Lower core power density, though, right? You're at three and they're at four?

MR. BETHAY: I believe that's correct. Yes, sir.

In our application, obviously, a number of commitments were identified. We've refined those commitments over the last year or so. We've developed a number of aging management programs as a result of the inspections and audits and our own evaluations. All of those commitments are being tracked in our tracking process. And at the end of the day we're looking at 40 aging management programs to support operation in the period of extended operation.

Fourteen of those programs currently exist and will continue forward without significant changes. Sixteen programs currently exist but will require enhancement for an additional 20 years of operation. And there are ten new programs that were identified during the evaluations.

Next I'd like to move on, not necessarily as directly part of the Safety Evaluation Report, but in the environmental report side of the licensure world, we spend a significant amount of time and energy evaluating severe accident and mitigation alternatives. That review led us to conclude that there were seven potentially cross beneficial SAMAs that we should consider implementing.

As you look down that list, you'll see most of these are procedure changes. And it seemed to us that if could improve safety, if we could reduce core damage frequency and large early release fraction, then why not? So these seven SAMAs, none of them are age related, they're not directly related to an aging management issue at the plant, however I think it's important to point out to you that when we've identified something that can enhance safety, can enhance the core damage frequency, that we should seriously consider that.

MEMBER WALLIS: This portable power source, is that mounted on a truck or something or is it --

MR. BETHAY: It would be a skid. A skid mounting.

MEMBER WALLIS: On a skin? So someone has to hitch something up and slide it around?

MR. BETHAY: Right. Actually, these SAMAs work very well with a number of the post-9/11 security changes that are going on. Obviously, I can't get into the details of that. But these SAMAs marry very well with the need for firefighting and so forth and restoring power to things that may haver been significantly damaged in some event. So they work very well hand-in-hand. and I think we were somewhat fortunate that both evolutions were going on at the same time.

MR. BARTON: Can you explain what the use of diesel fire pump fuel transfer pump is all about?

MR. BETHAY: Fred or --

MR. MOGOLESKO: Yes, I'll try.

That SAMA 57 -- I'm Fred Mogolesko. I should have said that first.

Basically we're trying to eliminate failures of the direct torus vent valves. There are two of them. Due to the failure of a DC power supplies. And by eliminating that, we enhance the core damage frequency by eliminating at --

MR. BETHAY: I think you're in the wrong one, Fred.

MR. BARTON: Use of diesel fire pump transfer pump.

MR. FORD: This is Bryan Ford.

What that is is it's an allowing another pump that we have to pump fuel oil. We use this pump for our firefighting, our fire pumps. It's allowing that pump to supply fuel oil to our diesel generators.

MR. BARTON:

MR. FORD: For certain failures in the diesel generator fuel system.

MEMBER WALLIS: So what I understand is when you fight fire with water and you're going to pump diesel oil through --

MR. FORD: No. We have a diesel driven fire pump. And we will be --

MEMBER WALLIS: Oh, it's diesel driven?

MR. FORD: Yes. We will be using the systems for supplying that fire pump. It's basically doing some procedure changes so that we can use it to feed fuel oil to the emergency diesel generators and supply electrical power to the plant.

MEMBER WALLIS: Oh, it's a different pump but the same drive, is that it, or something?

MR. FORD: No. It's just a different pump to supply fuel oil to the emergency diesel generators.

MR. SULLIVAN: It's a hydro pump driven off the water discharge of the fire pump, which runs the fuel pump.

MEMBER WALLIS: So it's a fuel transfer pump that supplies fuel oil to the diesel fire pump?

MR. FORD: Yes, that's correct.

MR. BETHAY: Using it to supply oil to the emergency diesel generators.

MEMBER WALLIS: Not water.

MR. BETHAY: So all of these SAMAs have been included in our engineering request review process for detailed evaluation and possible implementation.

CHAIRMAN MAYNARD: And on the first two, the wiring was already set up to do it? You only had to change procedures to be able to cross tie the buses there?

MR. BETHAY: That's correct.

Okay. As I said, we would get to that front part fairly quickly. And we'll get to the meat of the matter here to discuss the SER open items.

In the SER four open items were identified. The first dealt with our security diesel generator. The second with fire barrier penetration seals. The third with our containment inservice inspection program. And the fourth with the reactor vessel neutron fluence calculations.

Now this is the part where if I get into too much detail or too many pictures, please just stop and say I've heard enough, and I'll move on.

The first issue dealt with the security diesel generator. And this was a Region I confirmatory item where the NRR Staff asked the Regional Inspectors go out and confirm basically what we had said in our application. Part of the initial request for that was that we didn't include drawings because of the security nature of this. So it required a little more leg work on the part of the Region to go out and verify that that what was in scope was correctly included and that there were no spatial interactions that we had failed to address and so forth.

It's our understanding that that regional inspection has been completed and that issues were identified. And that with the requested support, it's been provided and pending NRR review that that issue has been addressed.

MEMBER BONACA: So the security diesel components are --

MR. BETHAY: Are all within scope.

MEMBER BONACA: Within scope?

MR. BETHAY: Yes, sir.

MEMBER BONACA: Good.

CHAIRMAN MAYNARD: Now the Staff's going to have an opportunity to discuss their view on the open items. If something is said here that you disagree with, you can speak up, too.

MR. BUCKBERG: Thank you.

CHAIRMAN MAYNARD: Okay.

MR. BETHAY: The second open item dealt with fire barrier penetration seals --

MEMBER BONACA: Let me just get back to the issue. I understand it is a security related issue, but is the guidance now adequate for the licensees that go to license renewal?

MR. BETHAY: Yes, sir. It's adequate in terms of what mechanical components should be included, what electrical components should be included. I think the fundamental issue, and the Staff may need to comment on this well, was because we didn't provide the drawings for an off site review, that required some extra leg work on site by an inspection.

MEMBER BONACA: My question wasn't relating to your closure. It was relating to the items -- I mean it's not necessarily in GALL on what components should be, and so that's what I was trying to understand.

MR. BETHAY: Alan, is there anything to add to the --

MR. COX: Yes. This is Alan Cox with the license renewal team.

The guidance was fine as far as what should be included in scope. We had included the right components in scope.

MEMBER BONACA: I know. I understand.

MR. COX: The reason was just that -- review of actual drawings int he configuration to make sure that we had identified those correctly.

MR. BETHAY: Okay. The second open item that was identified expressed a concern on aging management of inaccessible fire barrier penetration seals. And the short answer to this is that all of our seals are included in the program. All of our seals are accessible and are included --

MEMBER WALLIS: So there are no

inaccessible seals?

MR. BETHAY: That's correct, sir.

MEMBER WALLIS: Oh, okay.

MR. BETHAY: There are no inaccessible seals.

MEMBER WALLIS: Well, I was wondering when you put this up how you inspected inaccessible seals.

MR. BETHAY: That's a very fair question. And, you know, the fact is that we don't have any inaccessible fire barrier penetration seals. So a little communication problem that has been resolved. And, again, we believe that that's pending Staff concurrence. We believe that issue is resolved as well.

Okay. With that, I'd like to take the opportunity to shuffle a couple of folks here at the table and bring up some of our containment people to support me in the next portion of this presentation, if that's okay.

CHAIRMAN MAYNARD: Sure.

MR. BETHAY: Okay. With that I'd like to ask Gary Dyckman, Barry Gordon and Franz Ulm to please join us.

As they're coming up, I'll introduce them. Gary Dyckman is our Senior Design Engineer in

Mechanical Civil Branch. He's been a design engineer in the civil structural world for a long time.

Next to him is Professor Franz Ulm. He's a Professor at the Massachusetts Institute of Technology in the Civil Engineering Department, who we brought in as a consultant to advise us on one aspect of this portion.

And at the end is Barry Gordon from Structural Integrity Associates, again, to help us answer questions when we get to the item dealing with the water on the torus room floor later in this part of the presentation.

So, thank you guys for joining me.

The third open item was stated as there is potential for corrosion in the inaccessible area of the steel containment shell, the base mat and the sand pocket region. And it also delineated three inspection observations that I'll address in this presentation.

1: The status of the rupture drain flow switch.

2: Documentation of surveillance documentation.

3: And the third item on which I'll spend the most time is questions that were raised regarding water on the torus room floor.

MEMBER WALLIS: Well in this inaccessible area, how do you know what's there? How do you know if it's wet?

MR. BETHAY: In the inaccessible area? Hopefully, I will explain that to you over the next few slides. I've got --

MEMBER WALLIS: You can look at where the water gets in, but how do you know if it's already there? You're going to explain that?

MR. BETHAY: I believe so. That's my objective is to answer that very question over the next five or six slides.

First of all, I'd like to start off by saying that the saying that the design for Pilgrim is a little different from maybe some others that you've seen. And I will go through that design.

The design minimizes the potential for undetected water intrusion into the air gap. We have a number of diverse methods of prevention and identification of potential water leakage.

MEMBER WALLIS: Well, minimizes, you mean it reduces? Minimize is a technical term meaning that you make as small as possible with constraints and as--

MR. BETHAY: Meaning that we've made

that--

MEMBER WALLIS: It is lesser than it as some other plants?

MR. BETHAY: We've made it lesser and we believe that we have extremely high probability of detecting any leakage before it were to become a concern. And, hopefully, I can show you through the design how we've come to that conclusion.

We have a number of diverse methods of preventing water and for identifying water should there be any. We've had no indication of refueling bellows leakage. Inspection have shown no water intrusion in the air gap, and I will explain that to you. We've seen no indication of drywell corrosion or degradation. And we have performed confirmatory ultrasonic inspections in the past and we will continue those in the future.

MEMBER WALLIS: Do you have some material in the dry well air gap? Some other plants have some material. in the gap.

MR. BETHAY: We don't have the foam sheets that some plants have had that.

MEMBER WALLIS: You don't have that? You don't have that?

MR. BETHAY: Correct. There were foam

sheets installed, and I'll show you some photographs. There were some sheets installed, but that were removed during the construction process.

MEMBER ARMIJO: Just a quick question.

MR. BETHAY: Yes, sir.

MEMBER ARMIJO: Your comment on no water intrusion into the gap, does that comment apply to the entire history of the operation of the plant?

MR. BETHAY: Yes, sir.

MEMBER ARMIJO: So you have enough, let's say, documentation or records that would give you assurance that that's a sound statement?

MR. BETHAY: Yes, sir. Yes, sir. I believe so. And I think when I talk about some of the design features, kind of to state it simplistically, we'll know for sure Monday morning when we reflood the cavity, that if it's not leaking then it hasn't leaked before. So I'll explain that in a moment.

This picture is a little hard to see. Hopefully it's clear in your handout.

This is a diagram of the primary containment structure. A typical Mark 1 containment with the drywell and torus with the concrete liner on the outside. This is the torus room, which will be the subject of the next part of the discussion.

What I'll be going through in detail is this drain and the alarm, this set of drains and inspections, this above sand pocket drain, it's item number 3, and a below sand pocket drain. So just to kind of put it in perspective of the areas elevation wise that I'll go through in the next several slides.

MEMBER ARMIJO: Just quickly, that upper sand cushion drain, how many are there?

MR. BETHAY: There are four, and I'll discuss that in just a moment.

And just to jump ahead a little bit, I personally went and look at all of this Monday afternoon.

MEMBER WALLIS: A four-inch drain, you must have expected a lot of water.

MR. BETHAY: It does seem like a big pipe, doesn't it?

The first one I'd like to talk about is the very first design feature that exists at Pilgrim to prevent water from entering the air gap. And I'll start at the refueling cavity liner plate.

The refueling cavity liner plate is attached to the concrete. This area would be flooded during refueling operations.

The most noteworthy feature is the bellows plate itself. This is the refueling bellows. This plate is welded to the liner. It's not a mechanical joint that some plants have. So this welded seal between the liner plates and their support structures is the first barrier to water getting into the air gap.

MEMBER WALLIS: That's a stainless steel bellows, is it, or what is it?

MR. BETHAY: I believe it is stainless steel. I don't know the grade of metal.

But if water should somehow get through this welded connection or through the liner plate, the first line of defense is a four-inch by two-inch call it a gutter, trough that runs all the way around the containment structure. At the bottom of that four-inch trough --

MEMBER BONACA: Before you go any further--

MR. BETHAY: Yes, sir.

MEMBER BONACA: Have you experienced any reactor cavity liner cracks?

MR. BETHAY: No, sir. But even if there were, the water would come down this way into this area below the bellows, into the four-inch by two-inch trough or gutter that fully sounds the primary containment and be collected in one three-inch line passed by a flow switch, which is annunciated in the the main control room.

The set point on this flow switch is fairly high. So it is intended to detect gross leakage that might be coming off of that line. Obviously, leakage below the set point would be collected and just drained off.

There was an issue raised in the inspection report about this switch. It was identified in late 2005 as failing surveillance. It was replaced following that surveillance and recelebrated. It's been recently recelebrated. It is functional in anticipation of the refueling outage, as I mentioned, that belongs this weekend where if we do have a significant failure here, then we know that this flow switch and control room alarm are functional.

MEMBER SHACK: But that's the only monitoring then of that drain is through the flow switch?

MR. BETHAY: That's the only monitoring of this drain. As I'll get to, there are other drains that are monitored.

MR. BARTON: How do we know that drain is not plugged?

MR. BETHAY: We do a surveillance on it every operating cycle to verify that there's flow and that the flow switch is functional. And that's what was identified in late 2005 that the flow switch failed a surveillance.

MEMBER WALLIS: Is this one pipe or several pipes?

MR. BETHAY: This is one.

MEMBER WALLIS: Just one?

MR. BETHAY: This is one three-inch pipe off of the four-inch by two-inch trough that runs around.

MEMBER ARMIJO: What's the set point of the switch?

MR. BETHAY: I believe six gallons per minute. So it's looking for gross failure of the bellows.

MEMBER ARMIJO: And there is just one drain at that location with a flow switch?

MR. BETHAY: That's correct.

MEMBER ARMIJO: There's nothing else around the circumference.

MR. BETHAY: Not on this trough.

MEMBER ARMIJO: Correct. Okay. Got it.

MR. BETHAY: Okay. The next level of defense if we presume that --

MR. SMITH: And when we're flooded up if there was any type of a leakage by there, you would see air bubbles up on the refueling floor if there was leakage through there, too. So that's another place to check.

MR. BETHAY: But even if we presume that there's been some failure that has allowed either behind the liner plates or through the bellows itself or through this welded joint or this welded joint such that water was collecting in this area and this line were either plugged or nonfunctional for whatever reason, the next line of defense is provided by a drain collection system in four locations around the periphery of the containment where two-inch reactor cavity drain -- this would not only be full of water in refueling. To drain this cavity there are four two-inch drain lines located around the primary containment. Each of those drain lines is encased in an eight-inch sleeve. At the bottom of that sleeve of each of the four is a three-quarter inch drain line that drains to a floor drain on the 72 foot elevation of the reactor building.

They're visible. Three of them drain to

an actual floor drain, but you can see the end of the pipe. One of them just runs out on the floor. It's not hard piped or directed directly into a floor drain.

It's also noteworthy our design provides for a four inch berm at the edge of the concrete from before the air gap. This is the air gap between the concrete and the line and the containment. So the volume is a four-inch high all the way around the primary containment that would be capable of holding whatever leakage came from this area.

IF it didn't go out this train, we would detect coming out these three quarter inch telltale drains. Those are part of operator rounds. They're surveilled once a shift. This was a question on documentation during the inspection on how well was that documentation or how well was that surveillance captured in the documentation when we looked to see that there's no water coming out of those pipes. As a result of that feedback, we have enhanced that procedure to make that more clear and a more definitive statement than kind of a statement of the negative that was in the procedure.

MEMBER WALLIS: Well, I guess that this works fine if the leak is of a drip. But if it's a jet, if you have a sort of hole with a spray coming out of there or a jet, it could conceivably in the worst possible situation aim for the air gap. I mean this is an extreme case. Your vision of a leak is just sort of a rain falling down rather than a jet?

MR. BETHAY: Well, I think the design that if it were a raining falling down, I don't know --

MEMBER WALLIS: The rain would be all right. IT would fall into that area. But a jet could go anywhere.

MR. BETHAY: Right. I don't know the dimension. If someone maybe could check that. Yes, this is several inches wide. And it's got to accommodate an eight-inch sleeve, it's got to accommodate a four-inch --

MEMBER WALLIS: You would be a very unusual kind of a leak.

MR. BETHAY: Right. But even presuming that, and I think the next line of design defense would help that.

So let's assume the water does overcome this drain somehow, water does overcome these four three quarter inch drains such that this entire volume all the way around the cavity fills up and spills over into the air gap, which is this space. Water then, you could hypothesize would run down the air gap to this is the 9 foot 2 elevation, the bottom, the floor of the primary containment structure. And it would be collected by four four-inch drain lines that sit just above an 18 gauge sheet metal plate and drain above the sand pocket region into collection containers that are on the torus room floor.

And as I started to mention a moment ago, Monday, this past Monday I personally went and verified that all of those catch containments are clean and dry and there's been no evidence of water leakage in there.

MEMBER SHACK: How is that four-inch berm plate sealed up at the top?

MR. BETHAY: It's welded.

MEMBER SHACK: It's welded?

MR. BETHAY: Yes.

And just as another point of interest, just back in the '80s when the concern was raised about corrosion of the primary containment structure, Pilgrim went into these four-inch drain lines and drilled holes in the elbows and did visual inspection to verify, first, that those lines were clear and unobstructed, and second to do a kind of brief visual inspection of the liner that they could see at the end of that. And the results of those inspections showed that the containment structure was in its original as constructed condition with no indication of corrosion or degradation of the liner.

MEMBER ARMIJO: Were any photographs taken of those particular --

MR. BETHAY: Unfortunately,, no, sir. We had hoped that there was a video or some photography, but we couldn't find any record of that photography. Just written word.

MR. SULLIVAN: We do have a record of the inspection results that document putting a fluoroscope up with no evidence of any debris, of any water or any further material for rust.

MEMBER ARMIJO: There wasn't massive amounts of rust or anything like that?

MR. SULLIVAN: No, sir. No, sir. No, sir.

MR. BETHAY: But if this drain didn't work for whatever reason and water made it into the sand pocket region, there are four bottom of sand pocket drains that would provide the final barrier of defense.

MEMBER WALLIS: Now in the previous on page 16 these are shown are inclined drains?

MR. BETHAY: Yes, sir.

MEMBER WALLIS: And are they inclined or are they horizontal?

MR. BETHAY: They're inclined like this. I don't know the exact degree.

MEMBER WALLIS: The other one, the one above was horizontal, wasn't it?

MR. SULLIVAN: Right.

MR. BETHAY: Yes, there's a slight slope to both of them and if you physically go and look and it, you can physically can see that there's a --

MEMBER WALLIS: So the sketch on page 16 is a little misleading about the angle of the --

MR. SULLIVAN: The sketch isn't to scale. I have actual construction drawings that I we can show you at a break or put into the record.

MR. BETHAY: We've brought most of the engineering details of this presentation if you need that. These tried to just put it in perspective for you.

So in the past as a result of industry concerns about potential degradation of the containment shell, we have performed some limited ultrasonic inspections. We have UT'ed 12 locations at the 9 foot 2 elevation, which is the floor of the inside of the primary containment.

We have chipped the concrete out an inch down into the sand bed region at four location, performed ultrasonic inspection in those locations, as well as six locations in the cylindrical upper portion of the containment structure. All of those showed nominal wall thickness and no indication of corrosion or degradation of the steel.

MEMBER ARMIJO: When were those UT inspections done?

MR. BETHAY: Brian?

MR. SULLIVAN: The UT inspections were informed in 1987.

MEMBER ARMIJO: All of them at 1987, the 9"2', 9"1" and the upper locations; all of them were done in 1987?

MR. SULLIVAN: No. Let me run through the date line. In 1987 we inspected the 9"2" elevation. In 1999 we inspected four location at one inch elevation. And in 1999 and again in 2001 we inspected upper elevations of the drywell.

MEMBER ARMIJO: Okay. Good.

MR. BETHAY: Again, we verified that the upper sand cushion drains were clear and unobstructed and dry. And as I mentioned, as recently as Monday afternoon I personally looked at them and they're clear and dry.

All of the inspections and UT evaluations have identified no corrosion. But in the future we do plan to do the 9"2' elevation locations again; once prior to the period of extended operation. And we've committed to do it again within the first ten years of extended operation, along with the routine surveillance of the drain lines that we do.

We've also committed to perform ultrasonic testing at the four 9"1' elevations, once prior to the period of operation and again within the first ten years of extended operation. And then we'll continue to do the upper elevations as part of the primary containment out of the inspection program.

MEMBER ARMIJO: Now you still have the sand in this sand cushion region?

MR. BETHAY: Yes, sir. Yes, we do.

MEMBER ARMIJO: So it's so still there?

MR. BETHAY: It's still there. That's correct.

MEMBER BONACA: You said at the beginning that the flow switch in the control room activates at 8 gpm. And a question I have for that system, I think is a three-inch pipe, I guess it can -- going much more than 6 gpm, right?

MR. BETHAY: I'm not sure what the maximum flow rate under just --

MEMBER BONACA: Certainly you have established what kind of leakage you would have to have in order to then have to rely on the other drain?

MR. BETHAY: I think just without doing a calculation in my head, I think you would have to have a pretty substantial leak --

MEMBER BONACA: Oh, a substantial leak?

MR. BETHAY: -- to not be handled by that.

MEMBER BONACA: Because there are four drain pipes, right?

MR. BETHAY: There's only one of those.

MEMBER BONACA: Only one, and that's the three-inch pipe?

MEMBER BONACA: Yes, sir.

CHAIRMAN MAYNARD: The gutter.

MR. BETHAY: That's correct. There's one three-inch drain off a gutter.

MEMBER BONACA: One three-inch drain. Okay.

CHAIRMAN MAYNARD: But you have four others that if that overflows --

MEMBER BONACA: Well, yes. I'm trying to understand --

CHAIRMAN MAYNARD: It'll go into some others.

MR. BETHAY: Yes, sir.

MEMBER BONACA: -- how much leakage you need to have to rely on the other four.

MEMBER WALLIS: It's not the pipe that's limiting. It's the gutter. I mean, if the leak is on the other side, it has to run all around the gutter. That's probably the limiting.

MR. BETHAY: Yes. So I don't know off the top of my head that diameter of the gutter. So perhaps one of your guys could do a quick calc to pick up that volume, and then we can talk. We can come back to that. I don't know that volume off the top of my head.

MEMBER BONACA: Now just to understand again the substantial leak.

MR. BETHAY: It would be a substantial leak, yes sir.

MEMBER BONACA: Yes. Yes.

Okay. The next item that I'd like to move to is an item that was identified or came to question -- I shouldn't say identified. But it was a question that was raised during the inspection. And it raised as a question relative to the previous discussion on the fact that there's water in some areas, some limited areas on the primary containment floor. And the question was raised are you sure that this water isn't coming from the air gap drains. We are sure that the water is not coming from the air gap drains. We are sure that the water is ground water that's coming in. We're sure that that's posing no adverse effect to embedded steel or to the structural integrity of the building.

And what I'd like to do for the next several slides with the help of my team here is walk through that.

Again, this is the part where I got a lot of pictures and drawings. If it's too much, just stop and we'll move on. We do have hyperlinks so we can slip around.

The water, as I just said, we have identified the source of the water. Historically we know that it's ground water. I can talk about that.

We are quite confident that the water has no effect on the integrity of the concrete or embedded steel or anchor bolts in the floor.

We are confident in the overall structural adequacy of the reactor building.

And we have committed to continue to

monitor that water, the concrete, and the bolts pending any repairs that we need to make. And I'll discuss that a little more.

CHAIRMAN MAYNARD: And you're going to go ahead and defends your statements here, your conclusions?

MR. BETHAY: Yes, sir.

Well, I may have to call on some of my cohorts.

CHAIRMAN MAYNARD: I understand that. I understand.

MR. BETHAY: As I mentioned, this became a question in the regional inspection, but the indications of water on the floor is not a new phenomenon. There have been indications of water on the torus room floor for a number of years. It's been evaluated by engineering several times --

MEMBER SHACK: Indications? I mean, is there any indications that the flow is increasing, is it constant, the same water -- the same areas have been wet --

MR. BETHAY: Yes, sir. Yes, sir. And I'll show you pictures. I think I can nail that for you.

So it's been evaluated many times. Most recently by Dr. Ulm from MIT, who we brought in this year to --

MEMBER WALLIS: Well, this water on the floor, does it saturate the air in that area?

MR. BETHAY: No, sir. The water on the floor just -- and let me go ahead and click to -- I'm going to show you the worst picture. This is the worst picture of the 16 torus bays.

MR. BARTON: Is your radiation something related to the water on the floor or to the activity in the torus.

MR. BETHAY: It's related to the activity on the torus.

The general dose rates in here are 5 to 10 per hour.

MR. BARTON: Okay.

MR. BETHAY: What you see is this water on the floor, you know we believe is emanating from around some of these base plates. This structure, and I'll show you in some other pictures, is the Mark 1 containment modification phase II torus saddle that was installed. There are 16 of these around the plant, each held down by eight rock bolts. They were installed to hold the torus down in the event of a complete blowdown to prevent pool swell, chugging loads from the torus lifting up.

What we've seen historically is water on the floor around one or more of these base plates. I'll show you some other pictures. Now --

MEMBER WALLIS: Now the water comes in and evaporates?

MR. BETHAY: It evaporates. When I was down there Monday afternoon, this water is not of a measurable depth. It's wet, so it's not like three or four inches of water. You know, to use a home analogy, it's kind of like what you'd see after a heavy rain maybe in your basement where you get some seepage, the floor gets wet, but it's never a pumpable and mechanically removable depth.

MEMBER WALLIS: Presumably the front goes back as the weather changes and the humidity changes and so on.

MR. BETHAY: IT flows in and evaporates.

MEMBER ARMIJO: Is that white material is salts from evaporation or something else?

MR. BETHAY: This? The perspective in this picture is a little hard to tell. This is painted out here. There is no indication -- this is the outside of the torus. The pedestal is under here. So we're standing on the outside of the circumference looking under.

MEMBER WALLIS: Okay. What's the white stuff then? It's not sea salt or something?

MR. BETHAY: It's not sea salt. There are calcium deposits that -- and we'll show some other pictures where you'll see --

MEMBER WALLIS: It comes out of the concrete?

MR. BETHAY: --some deposits on the concrete.

MEMBER WALLIS: Okay.

MR. BETHAY: But this the worst picture. And if you'll let me go along, I'll get to some with a little clear contrast.

MEMBER ARMIJO: I still want to know what that white material is. Is that a deposit --

MR. BETHAY: Yes, sir. This is --

MEMBER ARMIJO: -- or something that's leached out of the concrete or --

MR. BETHAY: This is material that has leached out of the concrete. And then I've got the chemical composition. We'll talk about that in a moment.

I just want to set this to kind of set the stage to show that you of the 16 bay areas of the torus, this is the worst one. So anything else that

I show you is less significant than what you see in this picture in terms of what it looks like.

So what we've concluded is that the source of the water is ground water. It seeps in under hydraulic pressure. And I'll talk a little bit about that as I show where the water table is relative to the plant.

IT's a very low seepage rate and it's counteracted by evaporation.

MEMBER WALLIS: This is because you have ventilation in there, do you?

MR. BETHAY: I think it's partly there's ventilation. It's a warm area and it's not that much water. And it just comes in and evaporates.

MEMBER WALLIS: You're monitoring the humidity in there, the relative humidity, the tendency to condense in other words, are you monitoring it?

MR. BETHAY: It does condense. Even with this issue aside, if you were to go into this plant or I venture most plants on a humid day in the summertime, you'll see condensation in the torus room. The torus is cold.

MEMBER WALLIS: Right.

MR. BETHAY: Relatively. It's not uncommon at all at this plant or any other to see condensation on the torus shell.

MEMBER BONACA: Is seepage occurring in every bay?

MR. BETHAY: No, sir. And Ill show you. I have a diagram that shows where it occurs and where it doesn't historically.

MEMBER ARMIJO: So does that mean there is some damage in some parts of the waterproof membrane?

MR. BETHAY: I'll get to that exact point in just a second. The short answer is yes.

MEMBER ARMIJO: One last. Is there a drain in that bay, bay 10? Is that one of the locations where you have --

MR. BETHAY: Where there's a drain?

MEMBER ARMIJO: Yes.

MR. BETHAY: No, sir.

MEMBER ARMIJO: Okay. There's no drain?

MR. BETHAY: There's no drain in bay 10.

MR. COX: Are you talking a drain --

MEMBER ARMIJO: Drains on the air gap?

MR. BETHAY: Oh, no, no, no, no.

MR. COX: He's talking about the air gap.

MR. BETHAY: The air gap drain. I have to look at the diagram. I don't remember the numbers.

MR. GORDON: The answer is no. The answer is no.

MR. BETHAY: Okay. Thank you, Barry.

MEMBER ARMIJO: Is the hydraulic pressure high enough to allow water to seep through the entire 22 foot 8 inch thick concrete pedestal?

MR. BETHAY: Well, if I can get to that, I think we can answer that question and then Dr. Ulm has a very scientific answer for that. Just one more second and I'll answer that very question.

I wanted to give you kind of the answer conclusions and then we'll go back and build some history and answer both of your questions.

We have determined that the water is not aggressive. It's a benign chemistry to both the concrete and any embedded steel.

We've seen no structure distress in the structures. No cracking on the floor beyond hairline, normal surface cracks that you might see in concrete. No evidence of spalling. No evidence of building settlement or differential settlements between the buildings.

And also as it'll become evident in our discussion later, that the grout around these anchor bolts around which we see water, there's been questions raised whether that grout serves any structural purpose. And it does not. It's there for -- you know , just a bolt.

MEMBER SHACK: How does the anchor bolt an anchor?

MR. BETHAY: How does it anchor?

MEMBER SHACK: Yes.

MR. BETHAY: It's a typical Williams lock bolt anchor.

Yes, Gary, you want to describe how that works?

MR. DYCKMAN: Yes. The Williams Rock Bolt Anchor has a cone and shell. It's a mechanical expansion anchor essentially. So it's drilled -- yes, it's drilled, the holes are drilled 2 inch diameter around 2 to 2½ deep and the bolt is inserted in the hole and then a torquing process or tensioning process is used to draw the cone up within the shell.

MEMBER ARMIJO: Now that doesn't penetrate your membrane, your waterproofing?

MR. DYCKMAN: That does not. No. The concrete mat is eight foot thick and these tie down bolts were in the range of 2 to 2½ feet deep.

MEMBER SHACK: So it is expanding, again-- which fraction of that hole? The lower six inches?

MR. DYCKMAN: The lower six inches, yes.

The coning shell are approximately six inches in height.

MR. BETHAY: Okay. The current status is that the water has been reanalyzed recently. It's been reanalyzed and it's been analyzed a number of times over the years. But recently we --

MEMBER WALLIS: Could you go back to the picture with the white stuff? Now on the left hand picture there there's a rust line or red line behind the anchor bolts on the white. What is that?

MR. BETHAY: Yes, sir. That's surface corrosion from this base plate. Because this floor was not flat originally. You know, it has a concave structure to collect water. These were an afterthought in the late '70s, early '90s. This was a grout pad that was poured to level the floor over what was concave. And these structures were set on top of that.

So you'll evidence -- in some areas, this is -- it looks worse than it is person. This is fairly minor surface corrosion --

MEMBER WALLIS: That's corrosion of this thing which was put it to support the torus?

MR. BETHAY: That's correct. Of this base plate that runs all the way across.

MEMBER WALLIS: So that it's wide sitting on the white part there.

MR. BETHAY: This is just a painted --

MEMBER WALLIS: That's just paint?

MR. BETHAY: This is just paint. Yes, sir.

MEMBER WALLIS: Okay. So obviously there's a separation there between the base plate and something else?

MR. BETHAY: That's correct.

MEMBER WALLIS: Okay.

MR. BETHAY: Now what I'd like to do is you have several questions about the base mat, you'd asked how it was built. I'd like to run through these because I think it's instructed to kind of see how we ended up today and how we started out. And if this gets too much, just stop me.

When the plant was originally built, the site was excavated to a depth of about 50 feet. And because the water table was around 24 feet below normal grade level, a dewatering system was installed to help in the construction of the site.

MEMBER WALLIS: And where is sea level there?

MR. BETHAY: Sea level, this is nominal 23 foot elevation. So sea level is the --

MEMBER WALLIS: Sea level is above the water table.

MR. BETHAY: It would be on average, they're about the same at this point. As your point earlier, it's very close to the ocean. So there --

MEMBER WALLIS: So the water table is about the same as mean sea level?

MR. BETHAY: Approximately.

MEMBER WALLIS: So there much inducement for flow to be towards the sea, is there?

MR. BETHAY: Well, we've done pretty detailed hydrological studies that clearly show, while it's not a rapid flow, the flow is clearly towards the sea.

CHAIRMAN MAYNARD: And that close you wouldn't expect a big difference of elevation.

MR. BETHAY: You wouldn't expect a huge difference. That's correct.

So the dewatering system was installed in order to facilitate the --

MEMBER WALLIS: Now is this rock or is this sand?

MR. BETHAY: Gary?

MR. DYCKMAN: At the bottom of the excavation there's approximately 60 feet of a granular material before you get to the top of bedrock.

MR. BETHAY: I believe it's been described as granular glacial till.

MEMBER WALLIS: So this is part of the huge glacier that made the Cap?

MR. DYCKMAN: Yes. Yes.

MEMBER WALLIS: So it is porous?

MR. DYCKMAN: Quite porous, yes.

MR. BETHAY: And there you can see in the 1968 time frame where the site had been excavated in preparation for the placement of the base mat.

And then a three inch work slab was poured just to provide a nice level surface on which to work and the water system was still in place.

We have construction pictures showing that the work slab being laid.

Then the waterproof membrane was laid down on top of that. That was intended to provide the vapor barrier below the base mat and up the sides.

MEMBER WALLIS: What's it made of?

MR. BETHAY: Gary, can you help be again?

MR. DYCKMAN: There were three different materials that were specified, and I'm not sure which one was used. But there was a neoprene, and a butile rubber material. It was in the original specifications.

MEMBER WALLIS: So what supports it on the side there? It doesn't seem to have any meaningful support.

MR. BETHAY: This is just a cartoon. This just shows --

MEMBER WALLIS: It doesn't have any means of support ont he side.

MR. BETHAY: No, this is just a cartoon.

MEMBER WALLIS: Okay. So there is some granular rocky material it's resting on or something on the side?

MR. DYCKMAN: This is just a cartoon.

MR. BETHAY: It's just a cartoon. This isn't actual --

MEMBER WALLIS: Presumably what's in that white triangle is glacial till?

MR. BETHAY: This is air. No, sir. this is air.

MEMBER WALLIS: Air? It's just standing there in air? It can't do that.

MR. BETHAY: This line -- Gary, help me here.

MR. DYCKMAN: Well, again, it's a cartoon. And once the concrete map, they had put the concrete map and it's placed and the vertical walls begin to be constructed, that material is brought up and bonded to the side of the concrete and then backfilled against the -- held in place with backfill.

MR. BETHAY: And I think that shows on the next picture you'll be able to see it.

MEMBER WALLIS: It doesn't get damaged where it's kinked from the edge of the slab there?

MR. DYCKMAN: WE suspect it probably did, and that's why we have water intrusion.

MR. BETHAY: And you can see where they've laid the portion of it. This is the membrane lying on the work slab before they begin replacing the rebar to fill the basin.

MEMBER WALLIS: They build a drain or something there, too.

MR. BETHAY: Then they poured the 8 foot thick base slab and the 14 foot pedestal in the middle.

And this construction picture is important because it shows us how the basement was actually constructed.

This is the outer portion of the torus room base mat, the reactor building base mat. You can see that it was poured in four sections. Here are the construction joints. And there's another one over here.

These four corner areas were poured first and then the large octagonal center core was poured the last. And that, we believe is a significant design factor or construction factor that led to small pathways for water intrusion.

MEMBER WALLIS: See, none of this do we see the waterproof liner.

MR. BETHAY: Just in the previous construction photo you could see it lying on the floor.

MEMBER WALLIS: Okay. Where is it there?

MR. BETHAY: Slide 34.

MEMBER WALLIS: Is it a cartoon or is a real thing.

MR. BETHAY: Slide 34.

CHAIRMAN MAYNARD: No, no. It's a real picture.

MEMBER WALLIS: So that's a mat that --

MR. BETHAY: That's the waterproof membrane.

MEMBER WALLIS: That looks like a tarp laid out on the ground?

MR. BETHAY: That's correct, yes.

MEMBER WALLIS: Now doesn't this concrete settle?

MR. BETHAY: Yes, sir.

MEMBER WALLIS: This kind of foundation?

MR. BETHAY: Gary?

MR. DYCKMAN: No. The material, the foundation matter is grainy material and it will settle elastically in response to load. And at the determination or completion of loading, it's basically stable and there's no time dependent settlement that I'm aware of.

MEMBER WALLIS: But it does settle when you load it?

MR. DYCKMAN: Yes, it does and the elasticity --

MEMBER WALLIS: So there is some motion?

MR. DYCKMAN: Yes, sir.

MEMBER WALLIS: So you could tire the liner, presumably? Then it gets through eight feet of concrete even if it gets through the liner? The water?

MR. BETHAY: Right.

Just as another point of reference, this is a side view of the base mat rebar as it was being installed. You can see point of reference. This is a six foot stepladder that's inside the rebar mat. This was then filled with concrete in the four sections that I showed before.

Then, as Gary mentioned, the walls were built ont he side and this membrane is folded up rolled up the sides.

The primary containment structure construction began. This is an interesting -- you know about half way through the construction of the primary containment and the torus you can see the torus under construction here with the vent header inside. This is the primary containment, a drywell. This guy standing on the ladder, he's standing on the sand pocket region that we talked about before.

This is the floor. This is good for perspective on the size of the room. This is the floor on which we see the water. And this is the center mat that was poured as the pedestal for the primary containment structure.

MEMBER WALLIS: IS that snow there?

MR. BETHAY: I think it's just glare.

MEMBER WALLIS: Just glare. Okay.

MR. BETHAY: Now this guy doesn't have a coat on, so it's not -- I don't think it's snow.

And then the construction continued. They continued to build the containment. You can tell here that when we say bays, it's these segments of the torus where it's welded together. That's what when we talk about bay, that's what we're talking about.

The room itself is octagonal in shape, essentially close to a circular room.

You can also -- it's interesting how they haven't actually placed the concrete coming up around the containment structure. It's an interesting note. This is looking towards the ocean.

Containment continued to be placed. The dewatering system was secured. And they began the cylindrical construction on the primary containment structure.

Finished completion of the reactor building and the water table then returned to its preconstruction level and the level that we believe it is today based on our hydrological studies. This level is at 23 feet main sea level. A nominal water table is around minus one. It's pretty much the same as sea level, very close on average. and then the bottom of the reactor building is another 25 feet below that.

So the bottom of the reactor building sits under a fairly constant static head of about 25 feet of water.

The water on the floor that we're talking about is this floor. The bottom of the reactor building floor.

MEMBER WALLIS: IS it on the land side or the sea side?

MR. BETHAY: If you'll look at the next drawing, sir, I'll show you. This is a plan view of the torus room and the construction sequence. The dotted lines represent the various construction concrete placements, being the four corner placements that were done that form the base mat, the eight foot base mat. The center section, octagonal section that forms the containment pedestal.

In this picture north is up and to the ocean. So in this drawing the ocean is to the top or in line with bay 10.

Each of the dots that you see in this picture represent one of the bolts that's holding down a torus saddle.

Where you see a red dot is indicative of an area that is currently or has shown some evidence in the past of having been wetted.

The green dots indicate bolts that we have not seen evidence of being wetted.

So you see the predominately the bays of concern as bay 10 and bay 6 are the most significant.

MEMBER ABDEL-KHALIK: So the red dots coincide with the location of the bolts?

MR. BETHAY: Yes, sir.

MEMBER ARMIJO: So is it possible that during tightening of these Williams Anchor Bolts that you may have fractured the concrete at the bottom of the bolt?

MR. BETHAY: We don't think that's the case. And in just a minute I'll probably ask Dr. Ulm to add some perspective on that. He's done some work that I believe has a better answer than we fractured the concrete. So let me just show you a couple of pictures again for perspective.

If you go to bay 2, this is the southern bay of the containment. And I think in your presentation the bay numbers are the top of the sheets.

Again, you're looking at -- this is the -- we're looking from the outer radius of the torus underneath the torus. You see one saddle structure on this side and the saddle structure on this side.

MEMBER ARMIJO: Are those the bolts that you're talking about?

MR. BETHAY: Yes, sir. These are the rock bolt anchors that were drilled down into the concrete approximately three feet. These 2 to 2½ inch diameter bolts were then dropped into the holes. Tensioned against this jacking plate, set into place. The holes were then regrouted and this load bearing assembly was constructed.

MEMBER ARMIJO: Okay.

MR. BETHAY: There are four of these on each side of each saddle.

This one, obviously, is in pretty good shape. You don't see any indication of stain. This line here is a paint line where they painted the floor. But these bolts look very good on the other side as well, however it doesn't show up well.

MEMBER WALLIS: These things that support the torus, are they reenforced concrete or are they steel?

MR. BETHAY: They're not supporting the torus, sir. They're actually holding it down.

MEMBER WALLIS: They've gone over the top of it?

MR. BETHAY: No, sir. This is the torus.

MEMBER WALLIS: Yes.

MR. BETHAY: The huge doughnut These

support structures -- got to bay 9, Ed.

MEMBER WALLIS: They go around. How do they hold it down?

MR. BETHAY: I'll show you. Let's go to bay 9. This is a slide.

You see this is the torus.

MEMBER WALLIS: All right.

MR. BETHAY: This is the original torus support. This is a pillar, there's one on each side.

In the phase one of the Mark 1 containment modifications this support structure was modified to provide not support capability but hold down capability.

MEMBER WALLIS: How does it hold down?

MR. BETHAY: How does it hold down or why?

MEMBER WALLIS: It pulls on it. It must pull on it. How does it pull on it?

MR. BETHAY: This is welded to the torus. This is bolted to the floor. And from a hold down perspective, originally --

MEMBER WALLIS: It could hold it down or up? I mean, it's just holding it.

MEMBER WALLIS: Right. Correct.

MEMBER WALLIS: It's not any tension.

MR. BETHAY: But this is the modification, this saddle --

MEMBER WALLIS: Yes, but it doesn't hold it down.

MR. BETHAY: -- it's welded to the torus. And its purpose is not support, but restraint.

MEMBER WALLIS: So it's the welding in, it's welded?

MR. BETHAY: Yes. Yes, sir. It's welded here and it's bolted to the floor.

MEMBER WALLIS: Well, it could support it up or down.

MR. BETHAY: I guess it actually does, but it's designed --

MEMBER WALLIS: It stops it bouncing?

MR. BETHAY: Exactly. Exactly. Okay. Move back.

MEMBER ARMIJO: Before you leave, that's a good spot.

Where are your drain lines from the supper sand bed region? Where do they come out on the --

MR. BETHAY: You've got the exact location?

MR. DYCKMAN: Yes, we do. They're in bays 12 -- I'm sorry. Bay 11, bay 15 --

MEMBER ARMIJO: Eleven?11,

MR. DYCKMAN: Eleven, 15, bay 17 and bay 3.

MR. BETHAY: So they're here, here and here.

MEMBER ARMIJO: I wish there wasn't one at a 11.

MR. BETHAY: Go to bay 11, let's look at that.

MEMBER ARMIJO: So that's close to your--

MR. BETHAY: That's bay 11.

MEMBER ARMIJO: The argument I'm getting at is how can you conclude the water doesn't come from that drain collection area which is closer, you know pretty near by the bay 10?

MR. BETHAY: That's true. This is pay 11. The catch containment, again we're looking at the outside of the torus. That catch container is behind -- it's at the end of the structure.

MEMBER ARMIJO: Yes.

MR. BETHAY: And the pipe comes down from above into a collection container. And we surveill that collection container, and it's always dry. So if this were water from there, it would be coming from that pocket.

MR. BARTON: Well, the chemistry would be different, too, wouldn't it?

MR. BETHAY: And the chemistry would be different, yes.

MEMBER ARMIJO: You know, I think it's just -- it may be just coincidental, but if you look at that picture you could argue that the water is coming from that inside corner there and coming out ont he floor and wetting --

MR. BETHAY: I think that's what raised the question to begin with.

MEMBER ARMIJO: Yes.

MR. BETHAY: And so we've gone in and verified that those drains are not the source of the water.

MEMBER ARMIJO: Okay. So you have an independent way of proving that that water came from the ground water?

MR. BETHAY: That's correct. By chemistry, as was mentioned, and by visual inspection.

MR. COX: One other point.

This is Alan Cox.

If you go back to the slide that Steve showed that showed the bays. You'll notice the construction joints are also shown on there. And I think it's interesting to note that the places where you had the most red dots are associated with those joints between the plates.

MEMBER ARMIJO: Yes.

MEMBER WALLIS: But the water on the floor is on the inside, isn't it? It's not on the outer periphery.

CHAIRMAN MAYNARD: It's on the inside.

MR. BETHAY: Go to --

MEMBER WALLIS: But it's on the inside. My impression is the picture we see is the water is on the inside of the --

MR. BETHAY: This is bay 6 now. This is not currently wet.

MEMBER WALLIS: No. But when you show water on the floor in a wet bay, the water is on the inside of the torus.

DR. ULM: If I can help, Steve.

MEMBER WALLIS: It's not on the outer wall.

MR. BETHAY: Yes.

MEMBER WALLIS: It's on the inside.

MR. BETHAY: No, it's on the inside. That's correct.

MEMBER WALLIS: So if it were seeping from the outer wall near -- you would expect to see it on the outside, wouldn't you?

MR. BETHAY: Yes. The floor is concave, so--

MEMBER WALLIS: Why do you see it in the middle? I mean it's got to get there somehow.

MR. BETHAY: Right. And we believe --

MEMBER WALLIS: It comes up the bolts and drains. Is that your theory, is that it comes up the bolts.

MR. BETHAY: Yes, the theory is it comes up the bolts.

Franz, maybe you could perspective here.

DR. ULM: I think first of all, the first question you have to ask is where does the water come from and how does it come from. So there are discontinuities there, it's clear.

The first question which was waste maybe, can it be due to the old older constantly seeping back through soil from under this high hydraulic rate. And if you make the calculations, you end up with a water fill per day of 7 micrometer. So it cannot be the water which you observe. And that directly evaporates in this humidity condition.

So it must be a very localized response.

The second one is if we look at that

picture, now comes the picture with the joints and you are seeing sequence of construction. So they first made the outside bays. And, you know, concrete is exothermic, is made with sediment. Sediment hydration is exothermic reaction.

Sot he temperature goes up and then it cools down.

Now then they made the inner parts, so the core, which is even much thicker. So the water is in between while the inner part was heating, the outer part was already cooling. And then you directly know where it comes from. Imagine just that the core here swells while the other part shrinks and you get exactly there at those construction joints, you get stress concentration and this continued.

MEMBER WALLIS: Well, you think it comes from that inner octagon there?

DR. ULM: Exactly. Now let's say those areas, of course, it's the way they emerge. If you look very very carefully. First of you all you see in bay 10. You see two construction joints, a vertical and a horizontal one. You know, that's made to happen at that joint. This is unavoidable in all concrete applications.

Same thing bay 6, which is similar type of configuration.

Now if you look at bay --

MEMBER WALLIS: But it doesn't come from the bolts. It comes from the main construction joints in the concrete.

DR. ULM: It is that is weakened by that point. That's my analysis would be to identify why does it come from. Because I cannot see the reason it was to raise the question before that if you make the bolt inside the material, would you actually crack something, would you damage it. Well, that's not the case. Because if you think about any tunneling operation, actually it doesn't create stress concentrations in contrast to if you would wedge something out. So that's the reason why it's actually pretty homogeneous. So that actually does not create sufficient stress intensity on --

MEMBER SHACK: If you tighten up on the bolts, you're going to create stress concentration down there.

DR. ULM: But if you would get it radiated, which would not propagate downwards. It goes down two feet?

MR. DYCKMAN: Two feet.

DR. ULM: Two feet and you have six feet

left. You know, you really must -- so it cannot come from additional damage from that.

So the only source then of that here which really is over the entire depth, because you have to go from the bottom upwards of the joints from the construction level.

Now could they have done it better? Well, honestly I've worked on so many concrete projects, you cannot avoid those cracks if you have those massive things, except for if you start, you know, moving different layers, let it cool down and construct. It's not over four years, but over 20 years and then it becomes --

MEMBER ABDEL-KHALIK: So why are they saying that the water comes up through the bolts?

DR. ULM: Well, first of all, it's assembled in this here. We have no direct record whether it comes through the direct to the bolt itself or in that area. Now please note the area where they have it from the bolt here, you see for instance bay 10, you have it both sides, right? The red points which is indicated there is that it's a large area. It's a specific area, which happens to be that the bolts are wet because there where you see most of the water actually standing, right? But what you see actually there are areas in which it occurs.

MEMBER ARMIJO: Is it typical that those membranes fail then? You know, are the membranes put there with the expectation that they'll do some good but they're not expected to be impervious?

DR. ULM: Yes. Unfortunately, this is the case. At the time, and I think also in the '80s and '90s when people built it, they still believed that those membranes would protect it forever. But it is a real problem. We all know that they are not, you have to do other things today. And if you were to rebuilt it, I think you would use other type of protective system.

So, that's the first thing: Where does the water come from?

Now the second question then which arises from those is to answer question how does it -- if it comes from there, what actually does that, this water seepage in terms of effecting your structural integrity? That's the second question which you want to answer.

Now, what I've done on the request here, you're taking the observations, taking sort of the surface areas. What I did, I calculated, I took the following problem. I said, okay, let me put at the bay or the joints into one cylinder. And let me calculate what is the diameter of the cylinder in order to explain the amount of water which you observe on the surface.

When you do this, you end up with a calculation of basically that all those add up to something four millimeter, so that's 1/6th of an inch size cylinder of water which is there. It's not much, but given the hydraulic pressure which you have there, the hydraulic head difference, 25 feet -- well, you know it's sufficient in order to bring that water up there. And so that's a maximum size of -- you can expect.

MEMBER WALLIS: Does this water corrode the bolts and the cones?

MR. BETHAY: Franz or Barry.

MR. GORDON: Yes. Still you have a high pH of your concrete bore water which will protect the bolts. If there is any subsequent corrosion of the steel, you know, there will be a passive film on the steel. And in fact, in your NUREG-6927 it demonstrates that you get corrosion. It actually increases the bonding between the steel and the concrete, just like 200/300 percent.

MEMBER WALLIS: Unless you have enough--

MR. GORDON: Unless it starts actually cracking the concrete.

MEMBER WALLIS: Presumably as it corrodes it grows and it gets tighter?

MR. GORDON: Yes. Yes. But it would take bore force to pull it out, that's correct.

DR. ULM: Let's bear in mind the four millimeter size, right. You don't have a complete reinforcement mat one beside the other. Actually, you saw you had quite a bit spacing in between. The likelihood that you hit exactly with one reinforcement those four millimeter diameter is very small. So the localized nature actually saves you of this here. There's a pH value which is on the order of 9.4, which is lower than the typical pH value which you have in concrete, which is 12.13 or rather on the 13 side which I expect to be everywhere in the concrete will be well protected. Around those local -- and that means including the bolt anchors, I expect that maybe some corrosion would be worthwhile to dig into that local corrosion --

MEMBER SHACK: So you are arguing that if you're getting the low pH because this is all local channeled water, you're not getting as much dissolution as you might expect from a --

DR. ULM: You not get so much -- you know, all over that.

MEMBER SHACK: Not as much alkalinity as you would expect --

DR. ULM: That's right.

MEMBER SHACK: -- because you're getting a more direct transport of the water?

DR. ULM: That's right. That's right. In addition what you have observed is that the calcium concentration, the water which has been measured actually in the calcium concentrated which was measured in the water, is lower than the calcium concentration which holds the -- back in the concrete. So you have around those joints some dissolution phenomena. But those dissolution phenomena are, unfortunately, so slow that they don't do much harm actually to the structure, at least not in the time scales you're looking at.

MEMBER SHACK: But they've got one measurement of chloride level that's fairly high.

DR. ULM: Yes.

MR. BETHAY: And maybe we could jump ahead to -- go to slide 62.

MEMBER ABDEL-KHALIK: Before we do that, now in the equivalent four millimeter diameter hole what is the calculated flow rate? What is the calculated seepage rate?

DR. ULM: What I actually did, I mean the model is basically the pressure flow through a cylinder. And what I said, let's say I said okay, I concentrate all this here and then I got the information that basically 20 square meter face on the top of one bay was filled with a water film of one-quarter of an inch of water. And if they dried it out and it came out it was after one day or two days that you have this flow rate. So I had the entire flow rate of flow mass that came up.

Now by setting this here per day equal to the flow which I need under the pressure gradient with the -- flowing through it, you can back calculate the diameter or the radius of the cylinder.

MEMBER ABDEL-KHALIK: And what is that flow rate, do you recall?

DR. ULM: I don't have it here. I have it on my computer. I can show it. But the flow rate actually was relatively high because, you know, you get through four millimeter in there. It was pretty high. So that was actually also the reason when I looked at the problem, the calcium region may well have reached those bolt anchors was one of my conclusions from that. It was pretty high, actually.

MEMBER ABDEL-KHALIK: Well, what's pretty high? One gallon per minute, ten gallons per minute?

DR. ULM: No, no, no. I mean, no, no. We're not on this yet. I would say we're speaking about a foot per day. So that's what I'm talking about here. This is a foot, and then you have to take the volume. To permeability to concrete, yes. So typical velocities which is to concrete, which is very small rate.

MEMBER ABDEL-KHALIK: Okay. Thank you.

MR. BETHAY: And I think why don't we jump the pictures to slide 62.

MEMBER WALLIS: There's no tritium in this water?

MR. BETHAY: There is tritium in the water.

MEMBER WALLIS: How much tritium is in the water.

MR. BETHAY: It would be amazing if there were not.

MEMBER WALLIS: Yes, but how much?

MR. BETHAY: It was sampled for tritium, and we have that report. I'm not going to try to quote the numbers off the top of my head. We have that report with us for the water.

Bryan?

MR. FORD: I can call up the numbers for you.

I'm sorry. My name is Bryan Ford. I can call up the numbers for you during the break. But when we sampled for tritium what we found was numbers that were indicative of equilibrium with the tritium concentration in the air of the building. It was much, much lower than tritium concentrations from, say, the spent fuel pool. So it was indicative of water that was in an equilibrium with the reactor --

MEMBER WALLIS: Tritium does come from nuclear reactions. It's not a natural thing. It just decays away.

MR. FORD: Yes. But since we have tritium in our spent fuel pool and our spent fuel pool evaporates, we have an equilibrium concentration in the reactor building atmosphere. So that's what we compared it to.

MEMBER WALLIS: Okay.

MR. BETHAY: Next slide was just to show you some of the water chemistry results that we've seen over the years. Unfortunately, not every analysis was done every time, so there's some holes in the analyses.

The minimum threshold limits that are established by the GALL are shown at the top with a pH greater than 5.5 of chlorides, less than 500 in sulfates, less than 1500 would establish a threshold of acceptable, I'll say, water chemistry.

You can see that our ground water, which we sampled in the vicinity of the reactor building, has a nominal pH of around 6.2, chlorides between 200 and 400, and sulfates somewhere between 5 and 16 ppm.

And you can see that in 1989 when this is now inside the building when the floor was sampled, it indicated a pH of around 8.7, 8.8, chlorides around 120, calcium around 292 ppm.

In '88 and early '07 the water was again sampled just for pH, it wasn't sampled for it's -- of course, who knew at the time.

In March of this year we sampled it again. It indicated a pH of about 9.3, chlorides of about 560, sulfates of 9.1 and then the calcium very low. We think that had to do with differences in degree of cleaning and how well the floor was cleaned and decon'ed before the samples were collected.

MEMBER WALLIS: Presumably ground water near the ocean gets chlorides from ocean spray and you know fine sea driven mists and things. There's a transport of sea water through the air. That's not insignificant.

MR. BETHAY: I don't think that would contribute substantially to the ground water, which is flowing under the basical till. Maybe Gary or somebody else could help me a little more with that.

MEMBER WALLIS: It's a very slow ground water flow.

MR. BETHAY: It is very slow.

MR. BETHAY: Are you going to pick up --

MEMBER ARMIJO: But that's more chlorides. It seems pretty --

MEMBER SHACK: I mean that threshold on chlorides sort of assumes you have a pH. I mean, what you really have is a kind of a chloride oH balance. And, you know you're really assuming the concrete is probably higher than 9.

MR. GORDON: Again, Barry Gordon Structural Integrity.

And these are measurements, you know, they pick up $C0_2$ while they're measuring it, you know. And probably if you just did it raw, it would probably be 2 points higher than that.

MEMBER SHACK: You're right. You're right.

I mean this stuff is sitting there on the floor.

MR. GORDON: Yes.

MEMBER SHACK: Yes. Okay.

MEMBER WALLIS: But technically speaking 560 is bigger than 500.

MR. BETHAY: Technically that's correct.

MR. GORDON: That's also, that's on the surface and that's where it's been concentrated, you know. I mean who knows how many times it's been concentrated. It's not inside the concrete adjacent to embedded steel. So, it could be a build up over a period of time and as it evaporates you're going to be concentrating the amount of chloride on the surface.

MR. BETHAY: Thank you, Barry.

So our assessment findings and Dr. Ulm may -- yes sir.

MEMBER ABDEL-KHALIK: If we go to some of these pictures, these white deposits on the floor have a fine --

MR. BETHAY: Which bay, and we'll go back to it?

MEMBER ABDEL-KHALIK: Bay 10 on page 26.

MR. BETHAY: Can we go back to that. Let's go back. Okay.

MEMBER ABDEL-KHALIK: These white deposits especially on the left picture appear to have a finite thickness. I mean I can't tell from the perspective, but it looks like these are at least a quarter inch thick. The white deposits.

MR. BETHAY: No. That's an optical illusion. It's a calcium salt deposit on the floor that actually you can see it. When I was down there Monday, I tried to scratch some of it loose with my finger, and it's -- you know, it's a very think layer. It's not an inch thick layer on the floor.

Now if you go to bay 6 it's more --

MEMBER ARMIJO: But you've never taken a sample of that calcium deposit or what you think is calcium and analyzed the chloride --

MR. BETHAY: This is part of the water analysis.

MEMBER ARMIJO: But you've actually in that case, you just analyzed water. You didn't actually take the salt --

MR. GORDON: No. There is a sample analysis off the deposit.

DR. ULM: The deposit, which shows basically dominating calcium.

MEMBER ARMIJO: Calcium hydroxide or oxide?

MR. GORDON: Just calcium.

DR. ULM: Calcium, but it's not a hydroxide.

MEMBER ABDEL-KHALIK: Can one sort of estimate the total amount of water that seeped through over the years by looking at the volume of this white material?

MR. BETHAY: We have not done that to try to estimate over the years. I think what we could estimate is it's a fairly constant in most areas the amount of water. So, you know you see 80 square feet that generally stays wet, particularly in this area. So at equilibrium, it's coming in, it's evaporating -- go ahead, Franz.

DR. ULM: Maybe I can say something. So this is a phenomenon of what is known as calcium leaching. Leaching is the phenomenon that you have a concentration of calcium in your pour solution which has been low, the equilibrium concentration which holds the calcium in here solidly. What happens is in order to balance here, it dissolves part of the calcium into the pour solution and transport it away.

You were asking before about the high velocity. Because you have this high velocity, it's transported upwards. And that's the reason why you see it up there. That's why I'm believing that it's very localized.

Can you completely reconstruct this history? Well, for that you need basically a permanent monitoring of the flow velocity. Only in that way could you reconstruct --

MEMBER WALLIS: Does this calcium come from the concrete?

DR. ULM: Yes. From the --

MEMBER WALLIS: So presumably it's making the hole bigger?

DR. ULM: Well, it indeed does But let me give you a number. Let's say how fast is this? It's basically 0.1 millimeter per square root of days. That's a very, very slow process. It is --

MEMBER WALLIS: But it is making the hole bigger by washing out calcium?

DR. ULM: It does. It does actually. It increase the porosity, it actually takes away first what is called the -- and then it attacks the calcium acidic hydrates in there. But this is such a slow process that this is not relevant at the time scales you're looking at. It's a very important development for nuclear waste disposal structures, but it's not -- because there you speak about 10,000 years. But for that type of scale, time scales you're looking at it is not relevant. But it is sufficient in order to transport the amount of calcium dissolved into the pour solution upwards to the surface.

MR. BETHAY: So if you'd go to slide 62.

So just to try to bring this piece of it to a conclusion, to follow up on Dr. Ulm's assessment findings, and he can certainly join in, that the ground water migration is a highly localized phenomenon through very small imperfections.

That the path is most likely through the vertical construction joints and the zones most likely weakened by the tensions and stresses created during the settling of the concrete pours, particularly in light of the way the five structures were built.

That the localized zones are discontinuities equivalent to a cylinder all the way through the base mat on the order of 4 millimeters.

And that the localized calcium leaching doesn't affect the overall structural performance of the slab, primarily because of the time frames involved that it would cause any adverse situation.

MEMBER SHACK: Now is this for each of the bays it's equivalent to a four millimeter hole, or that's the total base mat leakage you're estimating?

DR. ULM: No. For each bay.

MEMBER SHACK: Each bay?

MEMBER WALLIS: So what are you going to do about it?

CHAIRMAN MAYNARD: That's what the next slide, I believe.

MR. BETHAY: That's what the next slide is about.

So because of the work that Dr. Ulm has done for us, he's made a number of recommendations to us.

First, that the calcium leaching may have reached the annular space around the bolt. And we will be inspecting bolts and grout around them to verify, first, is that really the source of the leakage that we see. Second, what's the integrity of the bolt. We don't believe there's any adverse effect, but we'll look at it. And third, what's the condition of the grout.

MEMBER WALLIS: Aren't you going to sort of mark lines on the floor about how the tide is and see if the tide is rising in the room?

MR. BETHAY: We don't believe this any connection to the tides.

MEMBER WALLIS: You leave it damp like

that. No, I mean it just gets colloquial. But I mean, presumably this wet region is spreading, isn't it?

MEMBER SHACK: The holes are getting bigger?

MEMBER WALLIS: The holes are getting bigger. I would think it's spreading. So you're going to monitor the spreading of the water?

MR. BETHAY: We're going to monitor the water. Until we identified the definitive the cause, the next action is, you know, it's localized zones.

MEMBER BONACA: Before you move, answer the question now. Before you move, I mean you kept saying we would look at it. What do you mean by "we would look at it?" I mean could you be a little more specific?

MR. BETHAY: If you go back to bay 9, Ed, for a second. Okay. Bay 2.

This one's obviously dry, but it's a better picture. What we'll do is loosen this nut on several of these bolts. We'll raise this base plate up and we will inspect the condition of the bolt as it passes into the grout. And we will inspect the condition of the grout around the hole. And based on what we find, then we'll enter that in our corrective action process and go wherever that leads us. But the intent is to loosen this bolt, raise the plate and perform an inspection of the grout, the concrete and the bolt in this area.

MEMBER ARMIJO: So you'll be doing that in bay 10 where the worst apparent problem is?

MR. BETHAY: We'll be doing it right now. Right. The maintenance request to do this is in the planning stage. And it will look at a sampling of the bolts in bay 10, because that's the worst. And then we'll expand scope if necessary based on whatever we find when we do that inspection.

MEMBER WALLIS: I would think the extent of the damp area would change with the seasons and so on, because the humidity of the air and everything changes how fast it dries.

MR. BETHAY: It changes with the humidity, that's correct.

MEMBER WALLIS: Well, you've seen all that, haven't you? You've seen it come and go during the winter and summer?

MR. BETHAY: We've seen it come and go.

Go to bay 6, please. That's gone. It's been there, but it's not wet now.

MEMBER WALLIS: That's right. So it dried up?

MR. BETHAY: It dried up. So we do see the water --

MEMBER WALLIS: There is a kind of history when it dries up. When it gets wetter, you don't have quite the same history exposed?

MR. BETHAY: That's right. That's correct. Yes, sir.

MEMBER WALLIS: So you're going to keep track of it?

MR. BETHAY: Yes, sir. Yes. Our intention is to keep track of the water, the chemistry of the water until -- obviously until we identify a fix to stop the water.

CHAIRMAN MAYNARD: If you can get to slide 65, I think it's not bulletized list of things.

MR. BETHAY: Right. If you go to 65, Ed. This is a summary of where we plan to go.

That we'll verify the condition of the bolts by sample in bay 10, is what we've lined out. We'll do that prior to extended operation, and actually that's --

MEMBER WALLIS: Once in ten years?

MR. BETHAY: I'm sorry?

MEMBER WALLIS: Well, I mean I'm always

astounded by these inspections every ten years or something. Presumably something might be happening this year.

MR. BETHAY: Well, there's a difference between what we'll put as an actual regulatory commitment and what we'll --

MEMBER WALLIS: What we'll actually do?

MR. BETHAY: -- actually do.

MEMBER WALLIS: I would think whenever you had an opportunity, you'd take a look and see what's going on down there.

MR. BETHAY: That's our actual plan. As I said, we're going to go down and look at the bolts. This is on routine rounds. You know, if anything changes from what's I'll say the norm, that's identified in our corrective action program and we would take corrective action.

MEMBER WALLIS: Do people go down there from time-to-time?

MR. BETHAY: Oh, yes. Yes.

MEMBER WALLIS: They look and see if it's wetter?

MR. BETHAY: Well, they look an see is it different from what I've seen before.

MEMBER WALLIS: So this five and ten years doesn't mean anything on that scale. It's being looked at several times a year?

MR. BETHAY: It's being looked at routinely, that's correct. But what we're planning to do beyond that sort of thing, is to actually go, I'll say, disassemble some of this and look at what's underneath.

MEMBER WALLIS: So if over a period of months you suddenly got an inch water on the floor someone would have seen it, right?

MR. BETHAY: Yes. That's correct.

MR. SULLIVAN: Operators make tours of the torus room routinely. I think it's twice a week they're down there.

MEMBER WALLIS: Okay. So that's better. Now I'm more --

CHAIRMAN MAYNARD: I would think your corrective action program would require you to take some action if --

MR. BETHAY: Absolutely. Yes. You know, this has been analyzed many times. And I'll say that people, the operators that are down there, they know that there's water on the floor from time-to-time. They know because they're there the quantity of water that's there. My expectation would be that if they saw significantly more or significantly less, something has changed and that should be identified in our corrective action process for evaluation.

MEMBER WALLIS: That might depend on the safety culture of the plant what they do.

MR. BETHAY: I believe that our operators would do just as I described.

So in slide 65, as I mentioned, we will verify the condition of the bolts. We'll determine whatever actions are necessary based on the bolt inspections and what that shows us.

We'll continue to monitor the chemistry of the water on the floor and the ground water.

And then from a macroscopic point of view, our structures monitoring program will continue to ensure that the overall structural integrity of the building is sound as evidence by things like significant cracking, spalling, settlement of the buildings.

MEMBER BONACA: Are these actions tied to license renewal or are you going to initiate them before?

MR. BETHAY: These actions?

MEMBER BONACA: Yes.

MR. BETHAY: These actions are ongoing.

We've been doing these. And although as Dr. Wallis says, it says five or ten years, it in fact is an ongoing process, an ongoing evaluation.

CHAIRMAN MAYNARD: I think we'll also get an opportunity to talk to the Staff about what ends up being requirements versus just what they're doing and stuff. Licensees always like to undercommit and overperform.

MEMBER ARMIJO: You maintain flexibility when you decide that you don't need to do it anymore, it's not a license commitment, so you're --

MEMBER WALLIS: But does the NRC resident inspector take a look at these floors from time-to-time, too?

MR. BETHAY: He goes down there. I'd rather you ask him that question. But I know they go down there.

So with that, if there are any questions we can probably finish up --

CHAIRMAN MAYNARD: What I'd like to do, we're at lunchtime right now. And we're ready for the next topic. We still have an hour for you after lunch.

So what I intend to do is to take an hour break here for lunch and then we'll come back and finish up on the other open item. And if we have any thought of any other questions that we want to ask on this, we'll have an opportunity and then it'd be the Staff's turn to get up here.

So with that, we'll take a break. We'll come back at 10 after 1:00.

(Whereupon, at 12:04 p.m. the Subcommittee was adjourned to reconvene this same day at 1:08 p.m.)

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

1:08 p.m.

CHAIRMAN MAYNARD: All right. I think we can go ahead and get started. Bring the session back into order.

Steve, turn it over to you and I think we're ready to talk about fluence.

MR. BETHAY: All right. Thank you very much.

One point I would like -- Ed, before you do that. One thing I would like to go back on, though, is a question I think Dr. Wallis raised regarding was there any material in the air gap between the concrete and the shell. And I believe that I said the foam was removed during construction. Some of my colleagues pointed out I should clarify that.

The way this was constructed was as the panels were poured there was a foam sheet or block put in that was then pulled out as the pours were made going up the side. At the upper elevations, though, there was an FME barrier put in below that so that when they pulled the sheets of foam out to make the next concrete pour, an FME barrier was put in.

In the upper elevations the FME barrier

may still be there, which that dictates those upper elevation levels where we do the UTs at the 72 and 84 foot elevation. But that's why those were selected in case that FME barrier were still there. And that would be a puddling location should there be any water.

So I just wanted to make that point of clarification.

MEMBER WALLIS: Well, thank you.

CHAIRMAN MAYNARD: Good.

MR. BETHAY: Okay. Moving onto the final open item in the Safety Evaluation Report. It has to do with the lack of benchmarking data to support plant specific fluence calculations for use in time limiting aging analysis.

Simplistically, what we determined here was a significant delta between the fluence values as indicated by our reactor vessel surveillance capsules and the fluence value predicted by the computer code. The computer code fairly significantly underpredicted the fluence level that we got from the in vessel dosimetry. And that gap between actual measured on the surveillance capsules and the predicted by the computer code was beyond a level that was acceptable to the NRC Staff to develop P-T curves for the period of extended operation. That's the gist of why this open item exists.

CHAIRMAN MAYNARD: And the actual measure was higher than the computer predicted?

MR. BETHAY: Yes, sir. That's correct.

So a couple of aspects of this that I just wanted to highlight to the Committee. You know, this is not just a license renewal issue. You know we have to comply with 10 CFR 50 Appendix G for normal operations. So this is a current day, current licensing basis issue as well as for the license renewal term.

Our current pressure temperature curves that were recently approved by the Staff are valid through cycle 18. So through 2011, which is obviously before the current license term expires.

As part of that license amendment we have a commitment to submit an action plan for final resolution of this. In other words, how are we going to develop curves that fully comply with the reg guide. And we've committed to provide that resolution plan by September of this year to the Staff for their review and evaluation.

And we've also got a commitment that based on the outcome of that plan, that we'll submit calculations that fully comply with Reg Guide 1.19 by

June of 2010 which is in support of startup from RFO 18. Again, this is all current licensing basis information prior to the term of extended operation.

So in order to move forward on this and the license renewal term -- and then I was remiss in not introducing Tim Griesbach is with us today. He's with Structural Integrity and has been doing a lot of the analysis for us in resolving this issue. And Ray Pace, who is our mechanic civil design supervisor at the plant.

Our current actions are to evaluate the time limiting aging analyses that we have in place for the vessel to determine what the limiting fluence levels would be for those components. And based on that to determine a limiting beltline adjusted reference temperature and upper shelf energy based on those limiting fluence levels. To look at the vessel internals, the welds and the nozzles near the beltline.

The core shroud fluence is limiting based on BWRVIP-35 specifications. And we've determined that in all cases for the period of extended operation that the limiting fluence values would not be challenged continuing to operate the plant.

MEMBER SHACK: What does it mean that the core shroud fluence is limiting?

MR. BETHAY: I'll ask Tim to fill in the details.

MR. GRIESBACH: There are criteria in the BWRVIP document to maintain the properties of the 304 stainless steel below a certain fluence. So there's fluence limitations also for areas outside the vessel. And fluence levels that would be projected if you would scale everything up, you would reach a limit for the shroud or you would reach a practical limit for the vessel material.

MEMBER SHACK: This is a toughness limit based on a crack size you can't detect or something?

MR. GRIESBACH: No. It's just a crack elements thing you don't want to go above a certain fluence. It still operate for internals. And so it's based on data for 304 stainless.

MEMBER SHACK: It's an IASCC limit then?

MR. GRIESBACH: Essentially, yes.

MEMBER SHACK: Okay. Which is?

MR. GRIESBACH: I think it's about eight times ten to the 21st, if my memory serves me.

MEMBER SHACK: And you're going to hit that on your core shroud?

MR. GRIESBACH: No. If you scaled

everything up evenly, well beyond the projected end of fluence you've even seen and what would be the first limit practical limit you would reach. Would it be a limit for the vessel, would it be a limit for upper shelf energy drop or would your internals reach some limit that you would want to go beyond.

MEMBER SHACK: But you're not going to get anywhere close to that even if at the end of your cycle here, the extended life?

MR. GRIESBACH: No. We're many factors below that even in the worse case projected fluence.

MEMBER WALLIS: Now the limit for the vessel is presumably more stringent than it is for the shroud?

MR. GRIESBACH: No. The other way around.

MEMBER WALLIS: So the vessel is pressure retaining element?

MR. GRIESBACH: Yes.

MEMBER WALLIS: The shroud just hangs there, isn't it?

MR. GRIESBACH: The question is can you maintain all of the ASME code criteria, regulatory criteria for upper shelf energy --

MEMBER WALLIS: Great reality, yes.

MR. GRIESBACH: -- and such. And the

answer is yes, the vessel could meet that well beyond the fluence levels that are projected, but you would reach a practical limit on the shroud, the internals, before the vessel would reach its limit.

MEMBER WALLIS: At the same limit.

MR. COX: This is Alan Cox. I think I can explain the difference here.

The fluence, that you're obviously going to have a higher fluence on the shroud because it's inside the vessel wall. So the limit on the shroud is eight times to the 21st. And the limit on the vessel is much less than that, but you're getting less fluence out there. But I mean the limits are not the same on both of them, but you could get to -- because it's closer to the core, you're going to get to the limit on the shroud before you get to the limit on the vessel.

MEMBER ARMIJO: But is the shroud limit an NRC limit or basically an economic issue that either you're going to have cracked shroud or --

MR. BETHAY: I guess it would be an economic issue. The shroud itself just directs the flow through the vessel --

MEMBER ARMIJO: Right.

MR. BETHAY: -- and provides some support for the internals. But, you know, obviously if you have to --

MEMBER ARMIJO: It's a big economic issue.

MR. BETHAY: It's a huge economic issue.

MR. FORD: Well, but are also committed to the BWRVIP requirements. Since the BWRVIP has this requirement, we will meet it.

MEMBER SHACK: Well, at 8 times 21, this would be brittle and it would be pretty susceptible to cracking. And even hydrogen water chemistry isn't going to save your butt.

MR. BETHAY: The point of this evaluation was to show that in the extreme we still wouldn't reach those levels because we haven't actually performed those reg guide compliant calculations yet.

MEMBER ARMIJO: Do you have an understanding of why your analyses don't match your measurements.

MR. BETHAY: We have a number of theories of why they don't match. We're still evaluating that. We've got Tim and Ray and a team of folks trying to ascertain that to see why this big gap in inability to benchmark the data. That's basically the plan that I talked about that we would submit to the Staff to review, is how are we going to reconcile this and what's the cause of it.

Today I can't explain why the gap. And that's why we've done this very limiting evaluation to say even with this gap, we know we've got substantial room on the fluence for the vessel.

MEMBER ABDEL-KHALIK: Could you give us an idea about the extent of that discrepancy? Is it a factor of two, a factor of ten?

MR. BETHAY: Ray or Tim, maybe --

MR. PACE: Yes. There is a bias that's .56, and that works out to a multiplier or a factor of 1.78. So it's substantial.

Presently the P-T curves that we have are based on a capsule pull. So they essentially have that factor worked into them. So in the future what we hope to do as we run through our plan is determine the cause for that bias and have resolved it so that our calculated and our measured values represented here.

CHAIRMAN MAYNARD: Is this potentially a generic issue or is this specific to Pilgrim>

MR. BETHAY: I think we're probably the first BWR3 that's run into this issue. One of the ways that we may be able to resolve this, you know maybe we have some oddity in our vessel or oddity in our surveillance capsules. We'd look to benchmark another

BWR3 of similar construction and similar metallurgy.

MEMBER SHACK: But do all the BWR3s use the same fluence calculation technology?

MR. BETHAY: I'll have to ask Tim.

MR. PACE: This is Ray Pace.

Many of the BWRs are using the same fluence calculation methodology. It's the RAMA code. And they are getting reasonable benchmarks. They're meeting the Reg. Guide 1.190 requirements. We happen to be the first BWR3 to use the RAMA code. But the 4s, 5s and I think one or two 6s have used it and they've come out within an acceptable bias. For some reason we're not. And being the first 3, there's not a lot of data behind us that we can pull from others. We are looking at other plant data that's similar plants to us. And we hope that as we look at that, we'll gain a better understanding of why we are seeing such a significant bias.

MR. FORD: This is Bryan Ford.

There is a couple of other 3s that are working on developing new curves using the RAMA code. So one of the ways this may be resolved for us is some other plants going down the path and resolving the dosimetry discrepancy. They just haven't gotten there yet.

MEMBER WALLIS: Is your shroud cracked?

MR. BETHAY: We implemented the preemptive shroud repair.

MEMBER WALLIS: Yes, that's what you said earlier. Right.

MR. BETHAY: Right. And that repair was done in the late '90s, I forget the exact date.

MEMBER WALLIS: This is the thing where you have sort of --

MR. BETHAY: That's correct. There's four tie rods --

MEMBER WALLIS: -- rods. Right.

MR. BETHAY: -- that grip over the top of the shroud and they're tied to the gussets on the flex shroud support plate at the bottom.

MEMBER WALLIS: Well, was it cracked at that time or is cracked now?

MR. BETHAY: The shroud?

MEMBER WALLIS: Yes.

MR. BETHAY: We made the presumption that all of the horizontal welds were fully cracked. And the tie rod design, the four rods were put in our structural replacement for the H-1 through 9 welds, I believe, on the shroud.

MEMBER SHACK: But does having the tie rod get you out of an inspection --

MR. BETHAY: That's correct.

MEMBER SHACK: Okay. So you don't really know whether it's cracked or not.

MR. BETHAY: That's correct. The design assumption --

MEMBER SHACK: The design assumption is it's fully cracked.

MR. BETHAY: Right. And then just as another point on that, you may be aware there has been industry experience --

MEMBER WALLIS: Well, cracked means it would fall off if you undid the tie rods?

MR. BETHAY: No.

MEMBER ARMIJO: Yes, you could disassemble it.

MR. BETHAY: I suppose if all the welds were all cracked, it would --

MEMBER SHACK: That's the presumption at any rate.

MR. BETHAY: Yes. There has been industry experience recently, though, at another, a similar plant where they found some cracking in the upper connecting hooks, I'll call them, of the tie rod repaired. We're a similar design. The stress levels in our upper tie rod connecting pieces were similar levels of stress. So this upcoming outage that begins Friday, as I said, we're going to go in and preemptively replace that upper portion of the tie rod repair to change a couple of sharp corners. It had significant stress risers, to more rounded corners to reduce the applied stress on those hooks.

It'll perform the same function. It's essentially the same design. It relieves a potentially overstressed condition in there.

So if we move on here to slide 69.

So our future actions, as we've been discussing, is that we will benchmark our computer code using Pilgrim or other BWR3 dosimetry data as we're able to retrieve it. As I mentioned, we have a commitment to submit that action plan to the Staff for review by September of this year. And we've also agreed to a license condition to submit these calculations that fully comply with Reg. Guide 1.19 prior to startup from the 18th refueling outage, which will be in 2011.

MEMBER ARMIJO: What do you mean by benchmark?

MR. BETHAY: Is there a technical explanation, Tim or Ray?

MR. PACE: Yes. This is Ray Pace.

The benchmark is just the dosimetry or some other means to demonstrate that the calculated value that's coming out of the RAMA code for us matches the value that we're actually measuring. So it's a calculated measure.

MEMBER ARMIJO: But now these two values are not the same?

MR. PACE: Right now the two values are not the same.

MEMBER ARMIJO: So how are you going to get them to be the same?

MR. PACE: One thing that we might do, and we're considering on doing, is pulling another capsule next outage which has dosimetry in it. And it's in a different location in the vessel. So we would be able to look at that data and it would give us a second data point. Understand that we only have one real data point right now, which was a capsule pulled in RF 04. We're coming up to RF 016, so it was quite a while ago. So a more recent capsule would give us better information because it's been in the plant for the duration. So that would be one means of obtaining a benchmark.

The reg guide also allows us to look at

other similar plant data. And there is a plant that's a sister plant of ours. And we will likely look at two capsules that were pulled from that plant to see if that helps us understand why the one capsule we have has a bias in it.

We've done a root cause analysis to try to determine the cause for the bias. We used the Traygo methodology to do the root cause analysis and it did not come up with a definitive answer. So we're still looking. But we're confident we'll have a plan together by September that will describe exactly what the steps are that we're going through to solve the problem.

MEMBER ARMIJO: But I guess you're essentially collecting more data and there is no guarantee, a priori, whether or not you're going to get better agreement when you do the comparison with the other samples?

MR. PACE: That's correct.

MEMBER ARMIJO: So --

MR. PACE: We can't be a 100 percent confident that at this point in time to be able to come up with a reasonable why the original capsule --

MEMBER ARMIJO: And you're not implying that the original measurement from the original sample is erroneous?

MR. PACE: We're not implying that at this time. We've actually saved that piece of dosimetry and actually recounted that dosimetry and it came out very close to the first --

MEMBER ARMIJO: And at the same time you're not implying that the physics in the computer code is incorrect?

MR. PACE: That's correct.

MEMBER ARMIJO: It could be, somewhere. Something's wrong.

MR. PACE: Yes. And there are a number of things you can look at. We can look at our power history to make sure that our power history is correct. There is a tremendous amount of data or input data that goes into this program. So we would, obviously, go back and look at all the input data to the program to make sure that's all correct. And it's going to be a very, very large parameter. It's going to take quite a while for us --

MEMBER BONACA: So you have to have a solution by 2010?

MR. PACE: We have to have a solution by 2010.

CHAIRMAN MAYNARD: And right now you're

using the conservative number of the two?

MR. PACE: Yes.

MR. BETHAY: That's correct.

CHAIRMAN MAYNARD: So you're being conservative now, but it's a current operational issue as well as a license renewal so it's going to have to be resolved prior to the period of extended operation?

MR. PACE: That's correct.

MEMBER SHACK: It has to be resolved by the time you get to your end of your current P-T limits?

MR. PACE: By the time we get to --

MR. BETHAY: Yes. You know, the fact is that if we don't reach a satisfactory resolution, then we can't start up from our RF 019 in 2011. So a great incentive to figure this out.

MEMBER ARMIJO: You're motivated.

MEMBER SHACK: Yes, you're motivated.

MR. BETHAY: Well, I suppose if there are no other --

MEMBER ABDEL-KHALIK: Let's just hold up a little bit.

What do you expect at the end of this benchmarking process?

MR. PACE: I expect we will find some

additional data either through our own capsule pull next outage or from other plant data that will benchmark against the RAMA code for us. And that we'll be able to determine what happened -- based on that data benchmarking, we'll be able to determine what happened with that cycle 4 capsule and why there's a difference that we see.

MEMBER ABDEL-KHALIK: So you know, in a big picture then you'll either find out that the data from that one sample is wrong or the code is wrong?

MR. PACE: That's correct.

MEMBER ABDEL-KHALIK: And what would you do in these two scenarios?

MR. PACE: We'll make the appropriate adjustments. We'll have the experts that have the RAMA code make the adjustments to the RAMA code or the input data or the power history, whatever that might be, and rerun it. And demonstrate that we do in fact have agreement with the capsule of the RAMA code is wrong. And that will, of course, be reviewed by the NRC because this code's been reviewed and approved for use by the NRC. Or, if it happens to be a capsule problem, we will identify it through the use of additional data that we gain either from our capsule pull or other plants that are similar to us. And then we'll be able to demonstrate that it's a capsule problem and why that problem exists.

There are some theories about why that problems exists. And we would put those theories on the table, if that is the case.

CHAIRMAN MAYNARD: It would appear to be that you're definitely in regulatory space. So no matter what you do, it's something that you're going to have to come back to the NRC --

MR. BETHAY: Absolutely.

CHAIRMAN MAYNARD: -- their review and approval on? It's not something you can do in house, right?

MR. PACE: Absolutely.

MR. BETHAY: We'll have to submit a tech spec amendment request prior to start up from RF 018 that the Staff that will have to review and approve. And if they don't find a sound basis to review and approve it, then obviously they won't.

MEMBER BONACA: I have a couple of questions regarding the BWR vessel integrity program from a different issue.

The BWR vessel integrity program I believe B.1.8. You have to exceptions. One is 3 and 4. And they are exceptions to do with the BWRVIP-18, which means you cannot -- well there are inaccessible welds inside the core spray and I believe there are some inaccessible welds in the jet pump assembly. And you're unable to inspect yet these welds because of the location where they are. And the statement is that you will not be able to be inspect these welds until UT delivery system is developed. And apparently and EPRI and GE center is developing this technology?

In reading this I was left with a question of when? I mean, you know, BWRVIP-18 has been in place for quite a while. A requirement is there for inspection. You cannot inspect it so you're taking an exception. And I was left hanging there with when will this happen.

MR. PACE: That's basically up to the BWRVIP to determine an appropriate priority for developing the inspection tools that are required. And, of course, we as utilities will feed input to the VIP.

MEMBER BONACA: Yes. I imagine that you're not the only utility with a BWR in the same situation. I mean, here you have a BWRVIP-18 that's supposed to bring a solution to an issue. But it cannot be implemented because there is no technology to implement to do what it's supposed to do.

MR. PACE: Right.

MEMBER BONACA: And there's an open ended statement there in the SER that says they'll inspect when the technology is available. Well, what happens if technology is available 20 from now? Will you go for 20 years without inspections or --

MR. GRIESBACH: I'm not familiar with that particular statement. But for Pilgrim and other plants, they've taken exception to inspecting those areas that are inaccessible through other analyses. Through probabilistic fraction mechanics analyses that shows the risk of failure of those welds is within acceptable limits. And those analyses have to be redone for higher fluence levels when the toughness changes. So you can continue to do analysis instead of those inspections.

MEMBER BONACA: Okay. So --

MR. GRIESBACH: And I think credit is being taken for that, for these analyses.

MEMBER BONACA: I mean in the inspection report from the audit report, actually, you know it leaves it hanging there that says they'll inspect it when the technology will be available. And you're saying now that this alternative is available to you indefinitely until the end of the --

MR. GRIESBACH: If the criteria for the weld failure probability of those regions can be shown to be within acceptable limits, then you can continue to not inspect those welds.

MEMBER BONACA: Yes, I'm done.

CHAIRMAN MAYNARD: Before lunch, I misled. I said we had an hour, we actually have a half hour scheduled for you after lunch here.

Are there any other questions, though --

MEMBER BONACA: I have one more question.

CHAIRMAN MAYNARD: Okay. Go ahead, Mario.

MEMBER BONACA: The other question has to do with the -- inaccessible medium voltage cables. You know, that was inspected and you have a problem, which is acceptable apparently. And the question came up regarding testing of the service water cables, which are 480 volts. And the answer to that was that's not a medium voltage cable because the voltage is too low.

So I was left hanging there with a question in mind what do you do about the service water inaccessible power cable? Do you ever inspect that?

MR. BETHAY: Alan, do you want to mention that or --

MR. COX: This is Alan Cox.

Of course, we inspect the same type of cable in other applications, the same voltage level. We would inspect the accessible portion of that cable.

MEMBER BONACA: Well how do you infer the conditions of the cable since it is inaccessible, I mean --

MR. COX: Well, I guess, we would infer from the inspections at the other locations, I think the industry data that we've looked at that backs up this program has not identified that voltage level as being susceptible to the water treating issue that requires a special program for the other cable.

MEMBER BONACA: Okay. Again, this is an issue where maybe I should Staff. Because, you know, you read it and you're left hanging with a question of what about that. Now, that may be the issue that that voltage level you're not susceptible to treat.

MR. COX: Right.

MR. NGUYEN: My name Duc Nguyen from the License Renewal Branch.

The question with the low voltage in an inaccessible cable, what we do with it. Right now for the GALL we define the medium voltage, the to 235 kilowatt. So at the Pilgrim, they have program right now that it will test the cable. However, to address the concern, the Staff also issued a generic letter request all the licensee to address the low voltage cable inaccessible. And based on that information the Staff will require some kind of surveillance. And that will carry over to license renewal period that is part of the current licensing basis. And we will carry over.

So that vehicle that we want to use because if we challenge the applicant based on GALL, they say why you require to rely on GALL recommendation.

So to answer your question, yes, we already issued generic letter to cover that.

MEMBER BONACA: All right. Thank you.

I have no further questions.

CHAIRMAN MAYNARD: John, I think you had a couple of questions.

MR. BARTON: Yes, I've got a couple of questions.

In the audit report there's some discussion on aluminum and in outdoor environments. And the conclusion in the audit report was that aluminum exposed to outdoor air environment doesn't have any applicable aging effects. Now I got a problem with that. Since you guys are on salt water, I don't know how much aluminum you've got outside, but I understand how you can conclude that there's no aging effects with external aluminum exposed to salt air environments.

And a related question to that one, is some in the LRA in your application where you state that salt deposits on high voltage insulators are not an aging mechanism.

It seems to me I remember a while back when you guys had a plant trip or something due to salt buildup in your switchyard, and I'm sure you have some aluminum components in the switchyard. Why aren't these things a concern and why aren't there any aging management in aluminum at the site that's exposed to a salt environment.

MR. BETHAY: We can break that into two pieces. Maybe, Bryan, do you want to take the first piece and Brian Sullivan the second piece of that.

MR. FORD: The specific question on the aging management programs. You were in the mechanical section. There's only one mechanical component that's made out of aluminum that's exposed to outside air. That is the exhaust silencer on the station blackout diesel generator, which is located over in the switchyard on the land side of the plant. And, yes, we do have other aluminum components in the area and we are not experiencing severe degradation that would effect the structural integrity of it. So it's one component, it's literally an exhaust silencer for the diesel.

MR. BETHAY: Brian on the --

MR. SULLIVAN: The insulators in the switchyard have all been replaced. They've been coated with silguard and we haven't experienced a plant trip in a number of years related to salt deposits on the insulators. And we've had a very aggressive repair and preventative maintenance program ongoing in our switchyard to reduce switchyard related events. Since we embarked in that program, we've not lost power due to a switchyard related event.

MR. COX: This is Alan Cox.

One thing I might add to what Brian said, the salt on the insulators in the switchyard typically those are -- I think you actually called it an event, and that's the way we consider it for license renewal. If you have the right weather conditions, you can have that event occur in a matter of hours or days. It's not an aging effect, per se. It's more of an event that's based on those conditions.

MR. BARTON: Unless you don't take care of it and it builds up over a long period of time?

MR. COX: Right. But, you know, we haven't seen the history of that over a long period of time. It's typically been associated with events and weather conditions like that that create conditions are conducive to that.

MR. SULLIVAN: Technology has advanced and now we have our corona cameras that we monitor the switchyard with. When operators make rounds of the switchyard, if they hit a cracking that's the first sign that you have a problem; debris on your insulators. We'll go out with a corona camera, identify the specific --

MR. BARTON: That responds.

MR. SULLIVAN: That's correct. And we'll go and clean them.

MR. COX: Yes. A lot of those activities are initiated independent of license renewal because they have been problems under the current --

MR. BARTON: Okay. I understand. Fine.

I have another one. In several applications that -- and this has been an issue that goes back to when NRC first asked a question about fuse holders. I've seen a lot of applicants come in and say that they will have a program to monitor fuse holders. And in your LRA you say that fuse holders are an active device. Please explain to me how the clips on a fuse are active devices. I don't understand that.

MR. COX: Let me try it, and then I may let Brian finish up on the end of that.

But for license renewal the scope of the fuse holder program in GALL, the E5 program actually says the supply to fuse holders that are outside of active devices. And the thought behind that is if the fuse holders that are in the switch gear, in the motor control center cabinet or control panel are maintained, inspected, I think in some cases actually check the tension on these spring clips as part of the normal maintenance of that active assembly. So for fuse holders, what we did for license renewal, we looked for fuse holders that were not included in those active devices, such as switch gear. And if there were any, and I don't know how many there were, but we looked at the intended function of those that are outside of those active license and found that they weren't associated with intended function for license renewal. And we didn't need to be subject to aging management review for that purpose.

MR. NGUYEN: Again, my name Duc Nguyan.

Maybe I can add some value to the applicant's statement. Because, you know, I am the auditor at the Pilgrim for electrical.

The fuse and the fuse holder, the fuse is active device because when it function, it can -- the question with the fuse holder is a passive long live device.

The Staff identify this issue in back in 2001. And we issued the -- in the interim staff guidance 5. In there we specified any fuse that belong to the recovery active assembly and under the 54.21 rule, it inside active assembly, it is considered active. So it's not required aging management review.

The only fuse holder outside the active assembly by a fuse panel, because, see, require aging management review.

Most of the fuse inside either MCC, mobile control center power supply. Very few case the outside. And it depend on design of the plant.

In Pilgrim they are either outside -- inside the active assembly or they did not perform the licensing function. And this is consistent with interim staff guidance number 5 that was issued to applicant. And we conclude that because they didn't have none on outside active assembly, then they are not required aging management review.

MR. BARTON: Thank you.

I got one more. Also on your LRA you're talking about a condensate storage tank and diesel fuel tank. You described their foundations. But also in there you talk about that they sit on sand beds. And have you ever inspected the bottoms of these tanks>

In the LRA you're proposing a one time random ultrasonic test of the bottoms. How do you know that that's going to be adequate? How do you know there's no corrosion, degradation going on on the bottoms of those tanks after all these years sitting on a sand bed?

MR. COX: This is Alan Cox.

The condensate storage tank does have the one UT inspection. But in addition, it has a visual inspection on a periodic basis as part of our periodic surveillance and permanent maintenance review.

MR. BARTON: That's going inside the tank and looking?

MR. COX: Right. Right. So that the UT is a confirmatory. You know if we see indications on the visual inspections of rust or corrosion from the outside, we would look at it.

MR. BARTON: Would you expect to go in a tank and look at the bottom, would you expect to see-- what is the tank made of? Is it carbon steel or aluminum?

MR. COX: I think carbon steel.

MR. BETHAY: Coated. It's lined inside.

MR. BARTON: It's lined inside? All right. Then you haven't done any inspection of the lining?

MR. COX: We've gone into one of them a couple of years ago. I forget the --

MR. FORD: This is Bryan Ford.

I believe we've went into both of them. We're planning a tank relining in 2008 of both tanks.

MR. BARTON: Of both tanks?

MR. FORD: And during that time we were planning on doing the UT of the bottoms of the tanks.

MR. BARTON: Okay. I'd be satisfied with that.

MEMBER BONACA: Since you are talking about tanks. I was reading they are diesel?

MR. COX: The diesel tanks.

MEMBER BONACA: You define diesel tank at T.107.A you found leaking in 2001. And you're monitoring the leakage and you will repair at some point in the future. When are you going to repair it? I mean, six years ago?

MR. BETHAY: Do you have the tank, the number?

MEMBER BONACA: Yes. It's T.107.A. I mean I was surprised by, you know, looking at this in your operating experience description. And it seems like to monitor a leakage.

MR. BETHAY: Bryan and I were just discussing. We think that's a fire water storage tank that has been repaired.

MEMBER BONACA: That's the fire water storage tank.

MR. BETHAY: Yes.

MEMBER BONACA: 107.A.

MR. BETHAY: I believe that has been repaired, but let us verify that.

CHAIRMAN MAYNARD: What we could do if you could, when the Staff's up here, maybe have somebody check on that.

MR. BETHAY: We'll do that.

CHAIRMAN MAYNARD: And perhaps get it by the end of the meeting.

MR. COX: I did want to say one more thing about the -- Mr. Barton asked about the fuel tanks. We do have two fuel tanks that also sit on a sand cushion. And they are subject to periodic inspections and UT of the tank bottom surface under the diesel fuel monitoring programming.

MR. BARTON: And you do it more than a one time?

MR. COX: Right.

MR. BARTON: Okay. Fine. That's excellent.

CHAIRMAN MAYNARD: Said?

MEMBER ABDEL-KHALIK: Have you had any leaks inside the containment from things like recirc pump seals?

MR. BETHAY: We've had leakage inside the primary containment, yes sir, from packing leaks. I don't recall from recirc pump seals offhand, but certainly packing leaks and other such leakage inside the containment.

MEMBER ABDEL-KHALIK: So is there a curve around the edge of the floor inside the containment between the floor and the steel or is it just butted against the steel --

MR. BETHAY: It's just flat. I know some designs have a fairly large curve that comes up the side. Ours does not have that curve.

MEMBER ABDEL-KHALIK: Were some of these leaks at sometime in the past significant enough that water may have seeped between the concrete floor and the inside surface of the containment?

MR. BETHAY: That's why -- we don't believe so, but that's why we do the confirmatory measurements that we've done and that we propose in the future right at the surface and an inch down.

MEMBER ABDEL-KHALIK: Now how would you do that? How would you confirm that you don't have any water between the concrete and the --

MR. BETHAY: Well, we do the UT for evidence of degradation.

MEMBER ABDEL-KHALIK: So there is no way for the water to sort of penetrate below the depth that which you're going to do the UT?

MR. BETHAY: I don't believe so. Unless mechanistically that would happen.

MEMBER ABDEL-KHALIK: So there is direct intimate contact between the concrete and the steel over the entire surface --

MR. SMITH: IT's embedded.

MEMBER ABDEL-KHALIK: -- of that area on the inside surface of the containment?

MR. BETHAY: That's correct. Yes.

MR. SULLIVAN: And that the surface is coated with a coating to protect it above where the concrete meets up to it.

MR. BETHAY: Gary Dyckman.

MR. DYCKMAN: I'm Gary Dyckman.

Inside the drywell the elevation 9 foot is concrete poured against the concrete shell. And what we did for evaluating the potential for any corrosion if water were to get into that joint was to chip away the concrete, perform the UT inspection. And the logic behind that examination was that if water had gotten into that joint that you would find evidence of degradation in the upper layer where we chipped down and did the UT.

MEMBER ABDEL-KHALIK: But if the water can penetrate much farther down, it may be closer to the bottom of that light bulb.

MR. DYCKMAN: Well, it's certainly possible that that could do that. It would seem unlikely. There is a joint at the top. The concrete is bonded to the liner. It would seem unlikely to us that that would happen. But right at the top where the joint is if water penetrated there, we would have expected to find some evidence of degradation. That was the approach that we took.

MEMBER ABDEL-KHALIK: Thank you.

MEMBER BONACA: I have just one more question regarding the torus. Reading material on the audit, again, the comment is made that that in several location, the thickness, the wall thickness of the torus is below nominal, although still in excess of minimal requirements. Where is this coming from? Is it the original design of the torus that was that way and the wall has always been that way or is it the result of some corrosion taking place?

MR. BETHAY: Ray.

MR. PACE: This is Ray Pace.

I can answer that. Inside the torus most of the problems that we have are below the water level.

MEMBER BONACA: Yes.

MR. PACE: And really at the water level is where we have the most problems where the surface gets wetted. It is coated. It's a zinc-rich coating. And after time some of the zinc gets depleted in some local areas and then we get local corrosion. We have to go in on a regular basis and we inspect the torus pretty much every other outage right now we have a coat inspectionist come in and we reapply coating over those locations after we measure to make sure that we're still well above minimal wall requirements.

MEMBER BONACA: So you do have an active program to assure that you don't go any further below?

MR. PACE: Yes, we do.

MEMBER BONACA: I mean, because right now you're claiming that in all locations that you have measured you have excess margin with respect to the minimum code criteria.

MR. PACE: Yes, sir.

MEMBER BONACA: But certainly you don't want to have progression erosion of that?

MR. PACE: Right. And that's why we go in every other outage and we restore the coating.

MEMBER BONACA: You're doing monitoring in the same locations, for example where you measure -- are you measuring the same locations where you'd found minimum thicknesses?

MR. PACE: What we're doing is we're restoring the coating so then at that location we have no more corrosion because we have the zinc-rich coating on it. And we also look for other locations that need to be repaired.

MEMBER BONACA: So you don't go back to the same location where you found minimum thicknesses?

MR. PACE: Not necessarily.

MEMBER BONACA: Not necessarily. How do you know that in the process of, you know, the fact that you lost your coating and you're restoring it now that you haven't lost further margin in thickness?

MR. PACE: The corrosion is very visible and the coating that would remain with the application of the new coating, we'd just look at it and just tell that the coating is standing up and there are no problems with this --

MEMBER BONACA: Now is this a specific program you have? Is this a license renewal program or is this --

MR. BETHAY: This is age old ongoing --

MEMBER BONACA: That's an ongoing --

MR. BETHAY: Is it IWE that dictates that?

MR. PACE: It is part of IWE.

MEMBER BONACA: IWE. Okay.

MR. PACE: It's primary containment.

MEMBER BONACA: Yes. Okay. And do you have sister plants there that you are comparing this experience with their margin?

MR. PACE: That's right. We compare with Fitzpatrick mostly because their coating is the same vintage as ours and we're constantly sharing data to make sure that we're maintaining the coating appropriately.

MEMBER BONACA: Okay. Thank you.

CHAIRMAN MAYNARD: We need to be moving on to the Staff presentation.

We'll have another shot. This is a Subcommittee meeting. At the end we'll kind of go through and if there's any still open questions, whatever, that can be answered right away, we'll include those when we have a full Committee meeting. So we'll have another chance to ask questions on these subjects, too.

So unless somebody has a burning question, I just can't hold back.

Thank you very much.

MR. BETHAY: Thank you for the opportunity. Thank you very much.

CHAIRMAN MAYNARD: And we'll turn it over to Perry.

And I think, from the agenda, you're covering the right items. I do want to make sure we leave some time at the end to discuss the open items from the Staff's perspective. I know it's on your agenda here, so we'll leave some time for that.

MR. BUCKBERG: Thanks.

I'll go through the script I wrote. The introductions I made a little earlier.

My name is Perry Buckberg. I'm the Project Manager for the Staff review of the program license renewal.

Joining me today from Region I is Glenn Meyer, the inspection team leader. Also joining me is Dr. Jim Davis from NRR, who is the audit team leader. And the technical staff is back over there, and they've already spoken up a few times.

We'll be presenting the results of the Staff's review.

I'll provide an overview of the plant and the application followed by a discussion of the scoping and screening results.

Glenn Meyer will discuss the results of the license renewal inspections.

Dr. Davis will present the results of the aging management review.

And I'll conclude with the TLAAs.

Displayed is some general information regarding the plant and its license renewal. The current operating license, as stated earlier, expires in June of 2012.

A lot of this was covered earlier, so I'll flip through.

The SER with open items was issued just over a month ago on March 1st. In addition to the open items, the SER includes three license conditions. They are just the standard three license conditions for all approved plants. They've been repeated in each license.

MEMBER WALLIS: Is there a small number of RAIs compared with the usual?

MR. BUCKBERG: It's less than some of the recent plants.

MEMBER WALLIS: It looks rather small, yes.

MR. BUCKBERG: But there's some recent RAIs where we discussed the torus and neutron fluence. Continued discussions on those, which go back to one RAI, you know the hours put into it.

CHAIRMAN MAYNARD: It's sometimes hard to compare just numbers. It also depends on what the RAIs are for.

DR. DAVIS: Also the audit team is taking a lot more of the issues and so there are fewer RAIs because there are less of other staff there.

MEMBER BONACA: So much as being on site, right?

MR. BUCKBERG: This slide shows the dates of the audits and regional inspection for your information.

During the scoping and screening methodology audit, the audit team determined there were no omissions of systems or structures within the scope of license renewal. The Staff then concluded there were no omissions following it review of Section 2.2.

Sixty mechanic systems were identified in the application as being in scope, of which 100 percent were reviewed. The review of the security diesel system became an open item. In addition there were several components were brought into scope.

MEMBER BONACA: I had a question regarding the audit. The audit is performed by the organization that you're hiring to do the job, right?

DR. DAVIS: Yes. It was actually five staff members and three contractors.

MEMBER BONACA: Okay. So it's a mixed team.

DR. DAVIS: Mixed.

MEMBER BONACA: Okay. Thank you.

MR. BUCKBERG: The security diesel open item was discussed a little earlier, and I'll elaborate. The applicant included the security diesel system in the scope of license renewal. There was insufficient information in the application to verify what is in scope. This issue was referred to the regional inspector who verified the applicant's claim on March 9th. That issue we consider settled at this point.

MEMBER BONACA: On the issue of -- no, this is the fire. Okay. I'll talk about it when we get there.

MR. BARTON: And what was the issue here? The inspection of the diesel fuel oil tank or something like that?

MR. BUCKBERG: No. It was actually the whole security diesel system. The physical location, if there is any possibility for spatial interaction. And since there were no drawings included, which was mentioned a little earlier, we needed to dispatch someone directly to the site. It was a formality that I kind of overlooked. I thought there was a process in place. I finally turned on the regional inspector just before the SER was issued and we didn't get the response in time. And we've closed it since.

MR. BARTON: Okay.

MR. BUCKBERG: Continuing with mechanical systems. All listed components were brought into scope as a result of the Staff's review.

MEMBER WALLIS: Now presumably it's only the casing of the turbocharger or something? It's not active --

MEMBER SHACK: It's not passive.

MEMBER WALLIS: The turbocharger is active?

MR. BUCKBERG: It's an active --

MEMBER WALLIS: It's just the casing with the passive --

MR. BUCKBERG: It's the casing and the environment that were added in the scope.

MEMBER BONACA: You know, these issues for example the emergency transfer skid has come back in previous applications. Is the guidance clear enough? I mean, why they didn't have it in scope? I mean why did it take a review of the inspector to bring it in scope? I thought that the guidance for this item is very clear.

MR. BUCKBERG: These items were brought in scope by the Staff, not by the inspectors.

MR. MARKS: This is Cliff Marks. I work for ISO and I was the contractor on the scoping and screening.

There are sometimes components that are not intuitively obvious whether they should be in scope or not. And when we performed our review, these were identified as having an attended function and should be managed. And in one case, the correct environment in which it exists wasn't identified. And this is what we came with.

MEMBER BONACA: All right. So it was not that the guidance wasn't clear. It was more that it was an item --

MR. MARKS: No. The guidance I believe was clear and during the review this was identified.

MEMBER BONACA: Okay.

MR. BUCKBERG: Thanks.

There are no omission of components within the scope of license renewal for Sections 2.4, 2.5.

MR. BARTON: I had a question on 2.5. Cable connections. Isn't there a question as to whether cable connectors should be in scope or not? License said no, they're active or something. Aren't the cable connectors passive? I don't understand the issue here.

MR. NGUYEN: My name is Duc Nguyen and I am the responsible party over the electrical audit.

In application the applicants determined that the cable commission have no aging effect. Okay. And we disagree with that statement. And because in the GALL we state that cable connection can have the aging due to corrosion, due to -- thermal expansion, different material have different thermal expansion. The loser the bolt connection is aging effect.

We stressed the concern with applicant and through II the applicant submit the aging management program. And the Staff review and find it acceptable. So that issue is closed.

And we also addressed in the SER Sections 3.6.2.3. If you look at that, you will see the Staff evaluation in detail.

MR. BUCKBERG: Thanks.

In conclusion, the Staff determined that the applicant's scoping methodology meets the requirements of 10 CFR 54.4

I'm going to introduce Glenn Meyer from Region I who is going to discuss license renewal inspections.

MR. MEYER: Good afternoon, Chairman Maynard and Committee members. I'm Glenn Meyer and I lead the regional inspection for license renewal at Pilgrim. Richard Conte, the Branch Chief in Region 1 is joining me.

There were two objective for the inspection. We looked at scoping regarding 54.4(a)(2). We also looked at the implementation of the aging management programs.

Next.

MEMBER WALLIS: When you walked down, did you look on the floor in the bays of the torus?

MR. MEYER: Absolutely. IT was our inspection that identified that.

MEMBER WALLIS: Yes. Do you have anything to say about what you saw which differs from what we heard this morning?

MR. MEYER: No. It was our raising of the issue that prompted the RAI and led to the actions to address it.

CHAIRMAN MAYNARD: As far as the amount of water or moisture, the way it was characterized is pretty close to your characterization, too?

MR. MEYER: I would say so. I would say it looks a little better in the slides today than it did when we looked at it, but that's reasonable.

MEMBER SHACK: It dried up a little bit.

Did you talk to the resident inspector? Was he aware of the water in the torus room? Is that something that --

MR. MEYER: I would have to say that water in torus rooms is something that is not atypical, having been a senior resident inspector. I mean, you can see some evidence that there has been water in the torus room. In this case where we were looking for the monitoring of the drywell shell, and that was potentially evidence that there had been evidence in the inaccessible gap portion, it was particularly important.

I don't know of any other sites that have brought in experts to monitor the amount of water and determine the depth of analyses that occurred here. But it's not atypical.

MEMBER BONACA: A comment on the physical conditions of the torus and really visually from the pictures it looks in good shape.

MR. MEYER: I did not personally go in the torus room, but from what the inspector said it was typical of what you would see. There were some other materials there that he felt inappropriate. There was a corrective action I think initiated and it addressed other issues in the torus room. But for the condition of the equipment and the moisture, I wouldn't say it was unusual.

MR. CONTE: I believe the licensee has

now, or the applicant has now has put bottles underneath those drains so that anything that comes out of those drains will be collected in water bottles and distinguish from the ground water on the floor since the inspection.

DR. DAVIS: The audit team was very surprised when we heard this news. Because we would have asked a number of questions about water in the torus room because of the drywell shelf issue. And we were under the understanding that there -- Dan and I were under the understanding that it was dry. I almost fell off my chair when I heard that there was water on the torus room floor, and that's why there were a lot of internal meetings and a lot of RAIs that resulted as a result of this finding. It was thanks to the regional inspection got this information.

MEMBER SHACK: But those drains then weren't feeding into a collection thing before?

MR. MEYER: I would say that our inspector looked for -- these are referred to as buckets.

MEMBER SHACK: Buckets.

MR. MEYER: He looked for buckets. He didn't identify what the buckets were. So it's open to interpretation as to whether they existed before and whether they were there.

You know, he mentioned his observation. Pilgrim believes that the buckets were there and had been there. I don't know how we'd resolve that.

MR. FORD: This is Bryan Ford with Entergy.

When you do a tour of the torus room outside the radiation area and don't crawl on your stomach underneath the torus, you can't see the buckets that collect from these drains. So the inspector when he was down there with his tour didn't see them. The person who he was with hadn't seem them himself. So he didn't know. When he raised the issue in the inspection, we wrote a corrective action document. We assigned somebody to go down there and put buckets under them. He crawled under the torus, found the buckets that were already there and labeled saying "Do not remove." And he came back out with his new buckets.

So the buckets have been there since 1987. '87, I believe. We have twice every outage documented that a V2R examine going in and looking to make sure everything is dry.

MEMBER SHACK: Okay. That is documented?

MR. FORD: And in several cases they've said in the buckets. You know, in some cases they just say it's dry, no evidence of leakage. But in a few cases they say in the buckets.

The buckets were there when we went in and crawled under the torus and looked.

And as Steve said, they showed no evidence of previous watering.

MR. MEYER: In the scoping and screening area, our inspection looks at non-safety systems, structures and components whose failure could affect safety systems, structures and components. Primarily that involves spatial and structural interaction. Spatial as in the vicinity and liquid could affect a system. And structural non-safety related parts of piping that are directly connected that could affect the seismic design.

We reviewed drawings and program procedures. We went in the field and looked at the systems.

Are conclusion is that the spatial interaction part was acceptable. They had taken a conservative spaces approach and it did address all the applicable SSEs. Nonetheless, in the structural area we found that there were some incorrect boundaries. They had made assumptions based on drawing notations that they believed indicated the seismic boundaries, but that was in fact true. So after identifying that, they did reevaluate, added the components that needed to be added and amended to the application. And we did reinspect that area and concluded that they had done a thorough job.

Next.

In the aging management area, as we've discussed, one of the primary findings that we had was concerning the drywell, the flow switch that had failed and that had not been repaired, the water on the torus floor and the inconclusive monitoring. I think Entergy has addressed.

There were six other areas where we felt there were concerned that Entergy addressed to our satisfaction during the inspection. And they're documented in the inspection report.

The typical approach was to look at the programs, what they had done, records of and evidence of effectiveness and walkdowns and discussions with personnel.

MR. BARTON: Before you go off that slide. In your inspection report you mentioned that several of the programs that -- you talk about all the programs you looked at. In several instances you said that as a result of your looking at the programs, the applicant will expand and provide inspection acceptance criteria in some of these programs. How will you guys follow up and assure yourselves that these things are done and that you're satisfied with what they've done to their programs?

MR. MEYER: Okay. The inspection program provides another round of inspections before the period of extended operation. And although the procedure is being -- it's in development. But, yes, I firmly believe that as part of that inspection we'll look at the report to see the issues that were addressed, to look at other commitments and then confirm that their actions have been acceptable.

MR. BARTON: Okay. Thank you.

MR. MEYER: Okay. So, next slide.

So inspection conclusions. We concluded that the scoping area and the aging management programs support a conclusion that aging effects will be managed. The drywell shell monitoring has been addressed under an SER open item.

And there was one other program that we looked at that we didn't feel there was enough key parameters or critical elements to reach a determination. We call that a determinant. But I think has been looked more thoroughly by the audit.

So that's the conclusion of the inspection.

From a regional perspective, I'd also like to address current performance. Pilgrim Station is in the licensee response column, which represents the lowest level of regulatory interaction. That is based on all their performance indicators being green and all the findings also being green.

The end-of-cycle or annual assessment letter did not establish any substance crosscutting issues.

And we expect to do the baseline program in the next period.

Performance indicators and findings.

That concludes my remarks. Any questions?

MR. BARTON: Yes. You did some plant walkdowns. Did you walkdown with some of the system engineers when you did some of the walkdowns?

MR. MEYER: I did not myself, but my team members do.

MR. BARTON: You did.

MR. MEYER: Yes.

MR. BARTON: Well, has the team determined that the -- the applicant takes credit for system walkdowns or a system walkdown program and a preventative maintenance program. Do you feel comfortable that the system walkdown program is adequate or --

MR. MEYER: Yes. I believe that the system walkdowns typically have been done in the last, say, ten years in response to the maintenance rule. And they have developed to the point, and I think they are also planning to further develop to put more aging management aspects into the program. But thus far we felt that the systems engineers were knowledgeable and that they did a credible job when they have guidance, and their application of that guidance has been satisfactory. And we believe that that leads to a generally effective program of identifying problems in the field and addressing them.

MR. BARTON: Okay.

MEMBER BONACA: I had a question I would like your impressions. They have many problems with exceptions. And typically, you know, those exceptions have been acceptable to the NRC. For example, in the fire protection program there are a lot of exceptions regarding the frequency of inspections, the monitoring or whatever activity.

Years ago we made some comments to the Staff that in reviewing GALL, you know, we should probably eliminate some of the prescriptiveness of GALL since a range of time, for example for inspections, seems to be acceptable. Do you feel that still GALL forces to a lot of prescriptive steps that you have to evaluate individually to accept exceptions or is there room for improvement still?

MR. MEYER: I think the question could be better answered by Dr. Davis.

We look at the field implementation and the exceptions and whether they are found to be acceptable is pretty a foregone conclusion when we go in.

MR. IQBAL: This is Naeem Iqbal from NRR.

The Pilgrim program is based on their approved fire protection program that we reviewed in 1978 SER. The GALL recommendation are based on most recent NFPA codes. When we review the license renewal application we pull all the old SERs and review the program.

So the GALL recommend like six month versus the refueling cycle for the CO_2 system. So there's a difference of like one year, but at that time we approved it --

MEMBER BONACA: The reason why I asked the question is that we've always tried to improve the efficiency of the process. And if you have a lot of exceptions that the licensee has to make because you're prescribing six months and he has eight months, then all you have to do is to say it and then the exception is granted, then the best thing to do is maybe provide them more latitude and so they'll have less exceptions and yet you'll have an acceptable--

MR. IQBAL: Yes. In some cases some of the applicants they don't have those frequencies. So we asked to enhance their program to follow the GALL.

DR. DAVIS: The frequency tend to follow some type of a national standard.

CHAIRMAN MAYNARD: Could you state your name for the record again?

MR. IQBAL: Naeem Iqbal.

MEMBER BONACA: I understand. You know, but still GALL has a flexibility to include that. And, you know, that would eliminate a need for the licensee to make an exception.

DR. DAVIS: Right.

MR. CHANG: This is Ken Chang.

MEMBER BONACA: It would facilitate your life because it's within the acceptable range and it's easier to address.

MR. CHANG: I'd like to give that question a little more general response.

In the 2005 GALL update SRP license renewal update and generation of the basis document we incorporate a lot of plan specific programs into GALL programs. And also we eliminated some of the exceptions being frequently used into the GALL. But now since 2005, September -- or 2005 GALL already issued, the next update of the GALL, we don't know when. So in my License Renewal Branch we instituted a collection of exceptions, plant-specific programs or what we call the --let's say why -- frequently encountered problems. We collect those. We asked the team members to write up a smaller card, let's call a cue card.

Jim Davis is a collection of all the cue cards.

Until we update the GALL next time, all the experience we learned, we collected in a central location and people can use it. Now my audit team members of this plant and other plants can use it.

We plan to continue this process to take care of those exceptions, enhancements so make it more standard. At least we have a standard set of questions and standards areas to look into it. That's a goal. It may not be addressing your question that fast, but we are in the direction.

MEMBER BONACA: I think this does. I think it is the right thing to do.

DR. DAVIS: We'd identified a real strong weakness in the GALL report in the last several audits, and that is the code addition that you use. Because when they go into a new interval within 12 months the applicant submits to the NRC which code addition they're going to use. We put in the 2001 one addition with the 2002 and 2003 addenda in GALL. And nobody's using that yet.

MEMBER BONACA: Right.

DR. DAVIS: So everybody has to have an exception. So we made a big mistake, and I was the one that's did it. So I'm the one -- but in the future we've got to address that so that we're not everybody take an exception.

MEMBER BONACA: Yes. Right.

DR. DAVIS: And there's an easy way to take care of it.

MS. LUND: This is Louise Lund.

I can't resist putting on management's spin on it as well. We also look at -- we don't have a schedule for updating the GALL at a regular interval inasmuch as we have to weigh, you know, the benefit with the amount of resources. Because it a hugely resource intensive effort when we do upgrade the GALL. But as Ken Chang was just saying, you know, we do recognize that there are improvements that can be made and we do tend to track those. So when we get the opportunity to and it looks like the balance between putting the resources towards as versus the benefit, it would be good that we are staged and ready to do that.

MEMBER BONACA: Right. Thank you.

MR. CHANG: And I have to say that we are better off on BWRs than in PWRs. Because in the last four audits it's all BWRs. So those consistent experience that we're trying to collect is there.

Now we start to audit some PWRs, we do likewise. So we have PWR experience, we have BWR experience. Hopefully my life will be easier.

MR. BUCKBERG: I was going to introduce you. Dr. Davis will discuss the safety audit.

DR. DAVIS: This next slide might a little confusing. It was confusing to me. Because when we were at the audit we had 13 programs consistent with GALL and we added one more program consistent with GALL. So we have 14 programs consistent with GALL. Since then several of the programs we've asked to make enhancement to. So the numbers keep changing a little bit. But somewhere between 12 and 14 programs are consistent with GALL.

During the audit we had six programs that were plant specific and we added another electrical program after the audit. So seven programs are plant specific.

Of the 40 aging management programs that we looked at, 30 programs are existing programs and 10 are new programs.

During the AMP audit we scared Ken Chang a little bit. When he left we had about 50 open items out of 165 questions. We managed to close all of them by Friday when we left.

One was the E6 issue. And we closed it but then we made it an RAI because it was going to take more time than we had there to resolve it.

MR. BARTON: What's the difference between 165 questions during the AMP audit and 329 audit questions?

DR. DAVIS: Those are total questions. 329 is the total. Because on the AMR review we had 164 questions. So we had 165 on the first audit, 164 on the second audit.

And then the AMR review we had one issue, which they did a weld overlay. We asked the Headquarter staff to do a flaw evaluation to see if they'd done their flaw evaluation correctly, just to check it. So we closed that one in an RAI.

MEMBER SHACK: Where was the weld overlay since they have a whole new recirculation system, right?

DR. DAVIS: I don't recall exactly.

MR. BUCKBERG: It's a nozzle. I think it's a CRD nozzle or something.

DR. DAVIS: It was a nozzle repair.

MR. PACE: This is Ray Pace from Pilgrim. We have one weld overlay that's recent on the N10 nozzle. It was a CRD return line that was cut and capped and there was a problem with the weld of the cap to the nozzle.

MR. BUCKBERG: Okay. Thank you.

DR. DAVIS: This is an interesting issue because to do a weld overlay, and that's a code case. The code cases aren't valid for the extended operation. So that one got a little bit tricky. Because 5055(a) does not allow you to extend code cases past the current interval. So what we did was we had to make a commitment to do a code repair. And then when they get within 12 months of the next interval, they can come in for relief from the code or they can use an approved code case.

There were 36 commitments made during the audit. And commitments basically are to implement a new program or to enhance a procedure to conduct some type of an inspection, like the tank bottom inspection UT to perform a code repair or it goes into the tracking system. So anytime they're making a change, we request that they give us a commitment.

MR. BARTON: How come on these commitments, I noted someplace that the commitments -- no commitments were being implemented to June 8, 2012, which is the start of their extended period. Why wouldn't some of these be implemented as they --

DR. DAVIS: They are.

MR. BARTON: Okay.

DR. DAVIS: They are.

MR. BARTON: Somewhere it wouldn't be until June 8th and I wondered why. But you said they will be implemented. Okay.

DR. DAVIS: Yes. This is one of my boss, Ken Chang's pet peeves. Is if you have 44 commitments and you have one day to do them all, you're not probably going to finish them.

MR. BARTON: Exactly.

DR. DAVIS: And so I've learned from working with Ken that I ask the applicants, you know you can't do them all on the last day. You've got to schedule them. And of course they're going to schedule them. We had them actually put them in the plan of when they're going to start them. And some of them are two years ahead of time, some are a year ahead of time. But they can't all be on the last day.

If you're going to do an inspection of four tanks, you don't want to be doing them one day.

Now we had a couple of open items that I'd like to discuss. And they've already been discussed, so I'll just touch on them again.

The fire protection program, they're not adequately addressing the aging effects of inaccessible seals. And this was one of the easier ones we had to resolve, because they have no inaccessible seals. So that item is closed.

MEMBER SHACK: How about the sampling in the program, there was a discrepancy on that? The difference between the GALL, 10 percent versus --

DR. DAVIS: Naeem, can you answer that?

MR. IQBAL: I think the program they're doing 25 percent, so they're doing more than the GALL requirement.

MEMBER SHACK: Yes, there was 25 percent of all versus 10 percent of each type I thought was the difference. They were doing more, but they were only guaranteed to do one of each type although they did more, at least as I understood the issue.

MEMBER BONACA: That's right.

MR. COX: Alan Cox with Entergy.

And I think the answer to that lies in the number of seals that we're dealing with here. We're in the hundreds, even up to the thousands of seals of each type. So if you do 20 percent on a completely random basis, which is the way the program is set up, you're doing 20 percent of 3,000 seals and you're 99.9 percent sure that you're going to get at least 10 percent of --

MEMBER SHACK: Okay. You just worked through a statistically likelihood of meeting the requirement.

MR. COX: Right. Very unlikely that you're not going to have at least a very representative sample of every type.

MEMBER SHACK: Your literally doing these seals at random. Someone sits there with a random number generator and plucks seals out of the air?

MR. COX: Yes. My understanding is it's a computer program that does exactly that.

MEMBER SHACK: A true sampling program. I can't believe it.

DR. DAVIS: The next one was the containment inservice inspection. And we paid a lot of attention to this because we have the interim staff guidance on the corrosion of the containment shell. And we were very concerned about any evidence of leakage because the interim staff guidance says that's one of the things that you do is if you have no evidence of leaking, then there's a pretty good chance that you're not getting corrosion.

When we found out that there was water on the torus room floor that caused a lot of internal meetings to occur and a lot of RAIs, additional RAIs to go. And then a number of conversations with the applicant. And as they have shown you, they've done quite a big of work to resolve this.

We had a few additional issues in the last week, and we've resolved those. Things like --

MEMBER WALLIS: This switch that was inoperative, that was the six gallons per minute?

DR. DAVIS: Yes.

MEMBER WALLIS: That's a lot of flow to set the setpoint at.

MEMBER SHACK: Bellows failure.

MEMBER WALLIS: Yes, it's a real failure they're looking for.

DR. DAVIS: But they haven't seen any evidence of leaking.

MEMBER WALLIS: Is this something that goes into a bucket?

DR. DAVIS: No. I think that goes into the rad waste system.

MR. BETHAY: Right.

MEMBER WALLIS: Okay.

DR. DAVIS: This is a zone 3 seismic area and we were a little bit concerned about what happens if you have a seismic event.

MEMBER WALLIS: Yes, I was going to ask about that. I mean, all this business about -- we haven't about seismic. But this is a seismic area, isn't it?

DR. DAVIS: Right. Zone 3.

MEMBER WALLIS: What sort of earthquakes have they had there?

DR. DAVIS: I'm not really sure that they've had any recently.

MEMBER WALLIS: The earth has shaken in New England over the past few decades.

MR. FORD: This is Bryan Ford with Entergy.

We have had a couple of earthquakes. We had a very, very small one outside of Plymouth just a year and a half ago that barely felt at the plant.

I want to say our seismic design is based upon a earthquake that happened 1860 is the one that defines it for the area.

MEMBER WALLIS: There's a ground shaking event when some people came from England and landed in Plymouth, too.

DR. DAVIS: We were concerned about that and what would happen if the leakage would increase as the result of earthquake, or the 100 flood. And in our discussions they've got drains that would handle that. And they would have a flood in the torus room.

MEMBER WALLIS: You worried about tsunami in Cape Cod Bay --

MR. BETHAY: If I could, Jim, I think Dr. Ulm has some interesting thoughts on that if you could indulge Dr. Ulm.

DR. ULM: So I think as far as earthquakes are concerned, as we discussed this morning, the four millimeter cylinder does not do anything in terms of damaging the structural performance of the slab, foundation slab when an earthquake occurs.

The only question which one could raise is the question what would be if the pressure in the fluid face or in the water below the foundation rises so to increase the pressure.

So if you look at typical values of this pressure increase and you increase this by, let's say a factor of five, which actually would lead to liquefaction, typically the type of pressure increase which you have because you're under undrained conditions, you would basically expect over that period of time of an earthquake to see five times that much -- to increase of the hydraulic head -- five times as much liquid coming through the hole.

Now if you take duration typically of an earthquake, ten seconds, seven seconds, five seconds, depending on that, so it would be pretty short. However, if you look at the aftermath until the water actually dissipates, the water pressure below the foundation dissipates to become homogeneous again, that may take some time. And if you look at the soil which is below, so this granule material, it may take up to three hours that you go back to normal pressure level.

In other words, what would you expect

altogether is maybe something like one-third more of the water which you see under normal operating conditions if you call them normal operating conditions of the water coming in there, which is something like six liters per day.

DR. DAVIS: So we've hopefully we've all. So we spent a lot of effort and a lot of concern.

It's also interesting to note that P.T. Kuo who is a seismic engineer, and he had the original design code in his office. So he looked -- he generated some questions about the design of the base mat.

And I think that finishes the audit section.

CHAIRMAN MAYNARD: Okay. Before we go on, let's take a short break. Let's take a ten minute break and then we'll come back and finish up with your presentation. And then we'll have time for discussion among the members here.

So we'll come back at 15 'til.

(Whereupon, at 2:32 p.m. a recess until 2:43 p.m.)

CHAIRMAN MAYNARD: I'll go ahead and call the meeting back into session. And Perry --

MEMBER SHACK: Mr. Chairman, can I

interrupt for just one thing that came up when we were on the seismic issue. You mentioned you had the Cape Anne earthquake, and it sort of dawned me that your design basis was probably wrong before in LANL and EPRI curves and that sort of thing. When you compute your seismic CDF of 2.3 times ten to the minus five you must use a recurrence frequency. Do you have any idea what that recurrence frequency is for your earthquake?

DR. DAVIS: No.

MEMBER SHACK: That number just comes up.

DR. DAVIS: Yes. Just doesn't leak to the front of --

MR. BETHAY: If you'd like, we can get somebody to step out and make a call and find out what the recurrence frequency is.

MEMBER SHACK: I'm just curious.

MR. BETHAY: Okay. We'll find that out for you.

CHAIRMAN MAYNARD: Okay. Perry, TLAA.

MR. BUCKBERG: Okay. For the record, I'm Perry Buckberg. I'll be presenting Section 4 Staff review.

The applicant included the TLAAs shown in the license renewal application. The six TLAAs could not be accepted as originally evaluated due to the unacceptable performance calculation, as all discussed earlier in detail.

All six TLAAs are related to open item 4.2

CHAIRMAN MAYNARD: How do you from regulatory space expect that to be handled? They're probably not going to have an answer by next August or September, or do you expect it to be resolved or are you carrying this as purgatory item or --

MR. BUCKBERG: It's going to be a condition, license condition. I believe there's a plan right now in place. We haven't worked it through yet completely. That's what we expect.

MR. MITCHELL: Yes. This is Matthew Mitchell, Chief of the Vessels and Internals Integrity Branch, NRR.

That is what we understand that the applicant's proposal is going to be is to establish concrete fixed fluence limits in relation to these various TLAAs that will then be monitored with a license condition wherein the applicant will have to come in with an influence evaluation acceptable to the staff to demonstrate that those previously established fluence criteria limits are met when they do their updated Regulatory Guide 1.190 compliant analysis.

CHAIRMAN MAYNARD: Okay.

MR. MITCHELL: We understand that's the proposed path. We will evaluate that when we see the details of the applicant's proposals in response to the open item.

CHAIRMAN MAYNARD: Okay.

MR. BUCKBERG: Some background in neutron fluence. The Staff finds the RAMA, which stands for radiation analysis modeling application, methodology for calculating fluence acceptable provided adequate benchmark and can be performed. The applicants calculations were deemed not acceptable by the Staff because the only available dosimetry sample was not acceptable as a benchmark.

The applicant will establish and submit for industry review specific neutron fluence criteria which must be met to verify the acceptability of the bounding TLAA analysis. The applicant will, in accordance with their proposed license condition, complete an updated neutron fluence evaluation and submit it for Staff review and approval prior to entering the PEO, period of extendEd operation. The Staff will confirm that all neutron fluence criteria associated with the identified TLAAs have been met based on this updated applicant neutron fluence evaluation. That's the plan as we understand it right now.

Section 4.3, metal fatigue, to change the subject that is. Components are designed to either ASME B31.1 code for piping or for vessel components ASME Section 3. Through the audit commitments 31 and 35 were added to address effects of fatigue.

Section 4.4, EQ of electrical equipment. The Staff reviewed the applicants TLAA on the environmental qualification of electrical equipment and concluded that the evaluation was acceptable.

Conclusions. On the basis of its review of the LRA, with the exception of open item 4.2 and pending resolution of open items 2.3.3.6, 3.0.3.2.10 and 3.0.3.3.2 the staff determines that the requirements of 10 CFR 52.29(a) have been met.

Questions?

CHAIRMAN MAYNARD: Does anyone have any questions for the Staff?

What I plan to do is if there's anymore questions for the Staff, any other burning questions that we need to raise, and then we'll go around the room and just kind of talk about, input as much as anything, for the full Committee meeting which doesn't occur until like August/September time frame. So a little bit of time there.

So, with that, any questions for the Staff?

MEMBER ARMIJO: I had one more clarification. Now, the licensee presented information, you know something on the order of a dozen UT measurements had been made, but they didn't provide any numbers. Did you actually see the numerical values of the containment shell and were these close to the nominal --

DR. DAVIS: They all were nominal.

MEMBER ARMIJO: They were nominal? Okay.

DR. DAVIS: In the shell.

MEMBER ARMIJO: Yes.

CHAIRMAN MAYNARD: Okay. Any other questions? Any other for the applicant?

I'll tell you what I'd like to do is to take a few minutes, go around any general comments. And I think one of the things we need to accomplish out of this is to identify for when this comes to the full Committee any specific items that you believe we need to focus on. I believe, obviously, the fluence issue is going to need to be discussed. I believe that the moisture is going to need to be discussed in detail. And if there's any of the other issues that you'd like to see, I'd like to get that identified now to give both the Staff and the applicant something to be prepared for us.

MEMBER ABDEL-KHALIK: I just a follow up question to the gentleman from MIT who provided some information.He indicated that the calculated seepage rate, the estimated seepage rate is between 3.2 and 6.4 kilograms per meter square per day. And based on a wetted area in each bay of about, the worst case, of about 20 square meters, that corresponds to about 20 to 30 gallons per day. And presumably if the water doesn't cool very much in these bays, that you're evaporating this water as it seeps out, can you actually evaporate 30 gallons per day in that area?

MR. BETHAY: Yes. I think the calculation that Franz did was an extremely conservative one. You know, just by observation you go down and look, I would say it's a few gallons of water on the floor. It's clearly an equilibrium. So it is evaporating whatever is coming in in bay 10, as I showed you, which is the worst one.

When you go down there it's always about that amount of water on the floor. So whether the calculation is very conservative and the actual end leakage at that point is significantly, it has reached a state of equilibrium that the puddle doesn't seem to get any bigger, it doesn't get a whole lot smaller.

MEMBER WALLIS: So it's not leaking very much and it's not evaporating very much? You just see a puddle which is essentially static.

MR. BETHAY: And I would agree with you, sir.

MEMBER WALLIS: It's nothing like 30 gallons a day. It couldn't be.

MR. BETHAY: Agree. I think that's a very conservative assumption.

MR. BARTON: What's the temperature in the torus room?

MR. BETHAY: It varies. Of course during the year I would say the other day, Monday when I was down there, it was 75 degrees. It was comfortable in scrubs.

MEMBER BONACA: The condensation dripping all over the place.

CHAIRMAN MAYNARD: Well, Said, maybe that's something for the full Committee to come back and have some more discussion.

MEMBER ABDEL-KHALIK: Right. I mean, calculations can be so conservative that they become meaningless. And the question is what's a realistic number.

MR. BETHAY: Okay. Bryan, let's take that action to refine --

MEMBER WALLIS: I don't see how you can calculate it. Because you don't know anything about the cracks. You just know how much water is there.

MEMBER SHACK: I mean you back calculate the crack size.

MEMBER WALLIS: You calculate the crack size.

MEMBER ABDEL-KHALIK: As I indicated before you can do a calculation where you use all the amount of material, that white stuff that has accumulated, to come up with an integral amount for the total amount that has -- right.

DR. ULM: Since I was the one who made these conservative estimates, so let me say how I did come to them.

So my calculation was based on the following. It was felt that a previously dried area, there was observed reoccurrence of water in roughly a time frame of one to two days. And looking on the pictures which we have, when you look at the maximum amount of area which was touched, I said let's say the maximum amount what you can have -- maybe half of it.

Half of it. So I speak about the orders of magnitude here.

So the orders of magnitude to which I came up then here is a comparison with an amount of water which normally seeps through concrete. And this is roughly 300 times more per unit surface than what you observe there. And so I came to the conclusion that it's a very localized phenomenon.

And then I said, okay now let me calculate what would be the worst, the biggest size of cylinder which I can get if the whole area -- so the 20 square meter, would be flooded with a half quarter to half an inch of water in there and let me calculate on that basis the amount of the cylinder size, which that was the 4 millimeter.

In the report which is with Entergy, I said let's say this is an absolute upper bound and I would expect actually that the size of the real one is in the sub-millimeter scale, so it's below the millimeter size. But I want to give here the worst case scenario to say, let's say, in order to come to a conclusion about whether or not a four millimeter cylinder will effect the seismic stability of it and structural performance of the base mat.

So that was the idea to that equation.

MEMBER SHACK: Yes, but a four millimeter cylinder is a little phony. I mean what you're sort of saying is you can't have cracked this thing up all that much in order to come up with an equivalent level size that would fill a four millimeter cylinder. I mean it's not just broken up very much, is my conclusion which I gained from it, so --

DR. ULM: And it's very concentrated.

MEMBER SHACK: It's a pretty integral thing.

MEMBER BONACA: It seems to me that if a room was dried up, to raise the inflow of the water it seems to be low enough that you could see, first of all, the -- where it's coming from location wise and second, you could also judgment on the rate at which it's coming in. And, has anybody intended to do that?

MR. BETHAY: Yes. If you noticed in the very first photograph that I showed -- Steve Bethay.

The very first photograph I showed of bay 10 the photograph on the right showed a tinted enclosure. That's exactly why that was tented. There's a small berm that was built around one of the bolts. It was dried out completely excavated of water, dried out completely. Tented over, you know, condensation or nothing added to. And then what Franz calculated was based on how long it took water to reappear in that area. That's correct.

MEMBER ARMIJO: And it did happen, right?

MR. BETHAY: It did happen.

MEMBER ARMIJO: The water did reappear?

MR. BETHAY: Yes, sir. Yes, sir.

And Franz' calculation, correct me, but he based it on the theoretical permeability of concrete would have such a rate coming through. The rate that we saw we obviously much greater than the theoretical permeability of concrete. So we know there's some flow path.

MEMBER WALLIS: Well, it's probably not seeping in everywhere. It's probably seeping in from a few places. And I think if you actually carefully examined it or put in some traceable dye or something, you could probably figure out where it's coming from, if you wanted to. It's not seeping in from everywhere. It's seeping in from a few places where it's probably where the concrete was joined in the manufacturing of the bed and in the base mat.

MR. BETHAY: And that's exactly the goal of the commitment that we have to lift the base plates, look under them, see what we see and follow the trail from there.

MEMBER WALLIS: Right.

CHAIRMAN MAYNARD: Mario, I'll start with you. Comments, thoughts --

MEMBER BONACA: Regarding whatever today or --

CHAIRMAN MAYNARD: Yes, what you heard today and then also to focus on anything in addition to what I brought up earlier that what needed to be discussed at the full Committee.

MEMBER BONACA: Well, I think I was positively impressed by the presentation. I think the issues have been dealt and with the communication is good.

I think that the open items can be closed. I mean, they're on their way to being dealt with, most of them.

And regarding the main Committee meeting, I think that the emphasis should be again on what we have today on the torus room, that's important. I think that's on the part of the licensee.

Again, we will have much of a summary of licensee committees or whatever. It is good. Because we don't need to have a lot of information. Mostly just look at the issue of water coming in and the issue of the containment shell. Both of them will be of interest to the Committee.

Insofar as the Staff, I certainly appreciate their presentation from the inspection, from the inspector. And I think that's important. That's going to be of interest to the whole Committee.

And pretty much the format of today, again, we didn't have a lot of slides from the Staff with, you know, items such-and-such, numbers that were included. It not very important for the Committee itself. But for example those insights from the walkdowns and the inspections, those are very important.

I think that's pretty where I am.

CHAIRMAN MAYNARD: Said?

MEMBER ABDEL-KHALIK: I think the only question that remains in my own mind is the issue benchmarking. And it is not clear to me how the benchmarking process itself will be done and what the outcome of the process will be. And therefore in the full Committee presentation I think it might be a good idea to outline how this benchmarking process will be done and what sort of an acceptable outcome of that process from the Staff's perspective would be.

I mean in a big picture they'll come back and say either the code is wrong or the data was wrong. And I'm not sure if either one of these would be acceptable to you. So, just what the process will be and what the projected outcome will be that would satisfy your condition.

MR. LOIS: This is Lambrose Louis and we're at the Systems Branch. And I'm involved with the fluence issue.

Benchmarking in this case is to be able to demonstrate that a specific dosimetry from inside the vessel, or some other location, can be accurately calculated using the RAMA code. That's benchmarking, published with benchmarking.

In Regulatory Guide 1.190 there are specific objectives for the benchmarking as well as uncertainty limits within which it is acceptable such a benchmarking.

The code has been based on adequate benchmarking for BWR4s. Mainly we had enough data to decide that this was sufficiently accurate code. The code does a very good job. Actually it's one of a kind based on different principles than the conventional codes that have been in use for the last 50 years, 40 years, whatever it is, on discrete ordinance. And so it produces higher accuracy than the conventional codes.

So we don't really have much of a problem as to the performance of the code. The question is whether we can get an accurate measurement or well-known location and be able to reproduce that. It's not as simple as it sounds. It's a very complicated calculation. But, of course, it is being done everyday in plants and is part of the requirements.

I don't have a problem that the licensee will be able to provide such a proof, so to speak.

MEMBER ABDEL-KHALIK: You know, I hope you're right. I just would like to see the process of how they will go about doing that.

MR. LOIS: Well, of course, the specific means of approving that is up to the licensee. There's quite a variety of ways they can do it.

MEMBER ABDEL-KHALIK: That's it. Thank you.

CHAIRMAN MAYNARD: Sam?

MEMBER ARMIJO: Oh, I agree with what Mario and Said said. I think the water issue on the floor, it has been handled very well. I think it's pretty convincing that that they know where the source is and at the rates of which the water comes up. So I'm pretty comfortable that.

I think the full Committee should hear

that story.

In the case of the fluence, something is wrong, with all due respect to the Staff. If the code's good and the symmetry's good, then the inputs are bad. Something is bad going on there. You shouldn't be off that much. And I just worry that it might open up other issues, this discrepancy might lead to other issues related to the plant that we're not aware of.

MR. LOIS: Again, this is Lambrose Louis.

What conventionally through experience we know to be wrong is the location of the capsule, traditionally. We have had this problem in the past. And we have disqualified a number of capsules from other plants because of very wide discrepancies between calculated the measured value, which eventually we're able to identify them, but they were not in like, direct location.

As you know --

MEMBER ARMIJO: That kind of information would be very helpful.

MEMBER SHACK: You might just point what the accuracy required for that location is?

MR. LOIS: Well, what we require in the Commission paper, it's plus or minus 20 percent one sigma. However, recently -- recently in the last several years, five or ten years, the actual performance of most calculations is in the neighborhood of ten percent.

MEMBER SHACK: Yes. But I mean what is the physical location of the specimen you need?

MR. LOIS: In the inside of the pressure vessel.

MEMBER SHACK: No.

MR. LOIS: I'm sorry.

MEMBER SHACK: How accurately do you have to know the location of your dosimetry.

MR. LOIS: Oh, very accurately. We're in a location, obviously, where the --this extremely steep gradient of the fluence. And that makes it extremely important that one knows precisely where the location is.

A quarter of an inch, for example, will throw you off a 100 percent, or nearly.

MEMBER ABDEL-KHALIK: That qualitative description in some way if it could be worked into the Staff's presentation or the licensee's for the whole Committee would be helpful. Because it seems like a big discrepancy and there's no --

MR. LOIS: Yes. The number is large.

However, the cause of it could be relatively small in terms of inches, let's say, if the location of the capsule was not accurately known.

MEMBER ABDEL-KHALIK: That's it.

CHAIRMAN MAYNARD: Graham?

MEMBER WALLIS: Yes. This looks like a pretty straightforward license renewal. The thing that was interesting was, of course, the water on the floor which took up 60 percent of the slides. And the thing that surprised me was it seems to have been initiated by the inspection. I would think if it was a characteristic that's somehow different in this plant, something notably different about this plant, that it would have been part of the application. It would have been cleared up at that stage and wouldn't have required the inspectors to raise the question, which seems to be what happened. Maybe I got the story wrong. But it looks as if it was the inspectors who raised the question about what about all this water that's been on the floor over all -- and then it turned out it had been over many years. I would have expected that to have been cleared in the application. Not to have to have been cleared up afterwards. Otherwise, it seems very straightforward license renewal. No issues.

CHAIRMAN MAYNARD: Bill?

MEMBER SHACK: No. It was a good presentation today. I think it did clarify some of the things and sort of made me confident that the problem is as described and it's not part of the drywell shell problem that effects our judgment.

I think that the Staff has a well defined process for how to resolve the fluence question. And they will provide the evidence, and if they don't, they won't get an approvement for the method. So I'm not too concerned.

CHAIRMAN MAYNARD: Tom?

MEMBER KRESS: I agree with most of what I hear. I would like to add a comment on the fluence issue. I don't see that big of a difference from BWR4s and 3s. I don't see why the validation data for RAMA from BWR4s couldn't be applied to say it's valid for BWR3s.

I'd like to see more discussion on why that data isn't happening.

MR. LOIS: I can respond to that, Dr. Kress.

This is Lambrose Lois again.

You'll be surprised at the kind -- the type of reactor makes some difference. We've seen that -- I've seen that because I have reviewed other methodologies and product lines.

For example, between BWR -- I mean PWR, you think well the Westinghouse and Combustion were the same, yet as each one population of the data were different.

The same thing from, obviously, with the only vendor we've seen for PWRs between PWR4s and the remaining of the data that were available.

Now in this particular case with the BWRs, unfortunately, we didn't have the number of data we had for PWRs.

MEMBER KRESS: One data point, that's all.

CHAIRMAN MAYNARD: Yes, one data point.

Anything else, Tom?

MEMBER KRESS: No, that's good.

CHAIRMAN MAYNARD: Okay. John?

MR. BARTON: I think you hit the important issues that you want to bring before the full Committee and there really only two issues.

As far as the presentations, I think the applicant made a terrific presentation. It's probably one of the best I've seen as far as presenting your application and what your issues are and the ability to answer the questions. I thought that was very good.

As far as the application itself goes, I thought it was well prepared. It was one of the easiest ones I think to read and go through. Not a lot of flip flopping back and forth to find out. It was well organized.

That's about it. I thought it was a pretty good application. It's one of the better ones I've reviewed.

CHAIRMAN MAYNARD: Well, I agree with the comments that have been made. I think both the Staff and the applicant presentations hit the important issues, key issues and answered the questions that had answers to them at this time. So I believe that was good.

I think that maybe for the full Committee meeting there will be more members. I think it's possible it could get a few more questions relative to the chemistry around the site. And I think maybe some more concrete questions could potentially come out. So I think both the Staff and the applicant could be prepared for that.

MEMBER KRESS: I'm glad they measured the sulphur content.

CHAIRMAN MAYNARD: And I'm wondering on the water in the torus room, of whether this is really unique or whether we're starting to get more sensitive. It's not uncommon to have water on the floor in some of these areas. And I don't know, it may actually be something that's positive that both the Staff -- that the Staff is getting more sensitive to these things. I don't know without having gone into a number of these. I think it is good that it got brought up and it deserves a good thorough presentation. I think it may that we're getting more sensitive on some of these things, too.

DR. DAVIS: It's in the interim staff guidance for the shell, and that's one of the reasons we really took a careful look at it. Because that's a strong indication that you may be having a problem. And also if you have no water on the torus floor, then that's a good strong indication that you don't have a problem with the shell.

MR. BARTON: I mean, this is not the only plant that's got water on the floor. So I think everybody got interest really aroused here because of the drywell issue in other plants. And you wonder about okay, how is this related to that. And I think that's what really raised the interest in this issue.

DR. DAVIS: That's right.

CHAIRMAN MAYNARD: Okay. If there is no

other questions or comments --

MS. LUND: Dr. Maynard, I just want to make a quick comment. This is Louise Lund.

And then also, I think this also points out the value of a license renewal inspections that are performed, you know. And it gives us an opportunity to identify these and they get to pull on the thread of where the water's actually coming from.

So, that's -- you know, they did an outstanding job in doing that.

MEMBER SHACK: I just wonder how many variations we'll find on this drain design that GE put into these things. Yes, we've see Nine Mile, we've seen Oyster Creek and this one doesn't look like either one of those.

MR. BARTON: And some of the MODs resulting in blocks the drains.

MEMBER WALLIS: I'd like to know what a nuclear grade bucket looks like.

MEMBER SHACK: They're only white plastic.

CHAIRMAN MAYNARD: Just as we get all this figured out, then we switch to a different model --

DR. DAVIS: And it costs $1,000.

CHAIRMAN MAYNARD: If there's nothing else, we're adjourned. Thank you very much.

(Whereupon, at 3:12 p.m. the Subcommittee meeting was adjourned.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Reactor Safeguards License Renewal Subcommittee

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Charles Morrison
Official Reporter
Neal R. Gross & Co., Inc.

Pilgrim Nuclear Power Station
License Renewal Safety Evaluation Report

Staff Presentation to the ACRS

Perry Buckberg, Project Manager
Office of Nuclear Reactor Regulation

April 4, 2007

Introduction

- Overview
- Section 2: Scoping and Screening Review
- License Renewal Inspections
- Section 3: Aging Management Review Results
- Section 4: Time-Limited Aging Analyses (TLAAs)

Overview

- LRA Submitted by Letter, January 27, 2006
- GE BWR3 - MARK 1 Containment
- 2028 MWth, 690 MWe
- Op License DPR-35 Expires June 8, 2012
- Located in Plymouth, MA

Overview

- SER Issued March 1, 2007
- Four (4) Open Items
- No Confirmatory Items
- Three (3) License Conditions
- 91 RAIs Issued, 329 Audit Questions
- ≈82% Consistent With Draft GALL Report, Revision 1
- Minor Components Brought Into Scope

Review Highlights

- AMP GALL Audit
  - May 22, 2006
- Scoping and Screening Methodology Audit
  - June 6 - June 9, 2006
- AMR GALL Audit
  - June 19, 2006
- AMP/AMR Status Briefing
  - July 17 - 19, 2006
- Regional Inspections
  - September 18 - 22, 2006
  - October 2 - 6, 2006
  - December 6 - 7, 2006

Section 2: Scoping and Screening Review

Section 2.1 - Scoping and Screening Methodology

- On-site Audit - June 6 – June 9, 2006
- Staff Audit And Review Concluded That The Applicant's Methodology Satisfies The Rule (10 CFR 54.4(a) and 10 CFR 54.21)

Section 2.2 – Plant-Level Scoping

- No Omission Of Systems Or Structures Within The Scope Of License Renewal

Section 2: Scoping and Screening Review

Section 2.3 – Mechanical Systems

- 60 Mechanical Systems
- 100% Reviewed
- On-site Review Of Mechanical Systems
- Review of the Security Diesel System was Referred to the Regional Inspection Team
- Minor Components Brought Into Scope

Security Diesel

- Open Item 2.3.3.6: Security Diesel
  - LRA Did not Include System Drawings
  - Referred to Regional Inspector to Determine System Components in Scope
  - Staff Considers the 3/9/2007 Inspector Input Adequate to Close the Open Item

Section 2: Scoping and Screening Review

Section 2.3 – Mechanical Systems

- Components Brought Into Scope
  - Turbocharger (Emergency Diesel)
  - Turbocharger (Station Blackout Diesel)
  - Diesel Fuel Oil Emergency Transfer Skid
  - Outdoor Transformer Fire Suppression Systems

Section 2: Scoping and Screening Review

Section 2.4 – Containment, Structures, and Supports

- No Omission Of Structures Or Supports Within The Scope Of License Renewal

Section 2.5 – Electrical and Instrumentation & Control

- No Omission Of Electrical And Instrumentation & Control Systems Components Within The Scope Of License Renewal

Section 2: Scoping and Screening Summary

- The Applicant's Scoping Methodology Meets The Requirements Of 10 CFR Part 54

- Scoping And Screening Results, As Amended, Included All SSCs Within The Scope Of License Renewal And Subject To AMR

License Renewal Inspections

Glenn Meyer

Region I

Scoping and Screening

- 54.4(a)(2) - Non-safety SSCs Whose Failure Could Impact Safety SSCs
- Spatial and Structural Interactions
- LRA Drawings and Procedures Reviewed
- Plant Walkdowns Performed

Scoping and Screening Conclusions

- Spatial Interaction - Acceptable
- Structural Interaction – Corrected
- Scoping and Screening Acceptable for License Renewal

Aging Management

- Reviewed 26 AMP Programs
- Reviewed Programs, Evaluations, and Records
  - Program Procedures
  - Operational Experience Information
  - Prior Pilgrim Issues
- Performed Plant Walk Downs
- Interviewed Cognizant Personnel

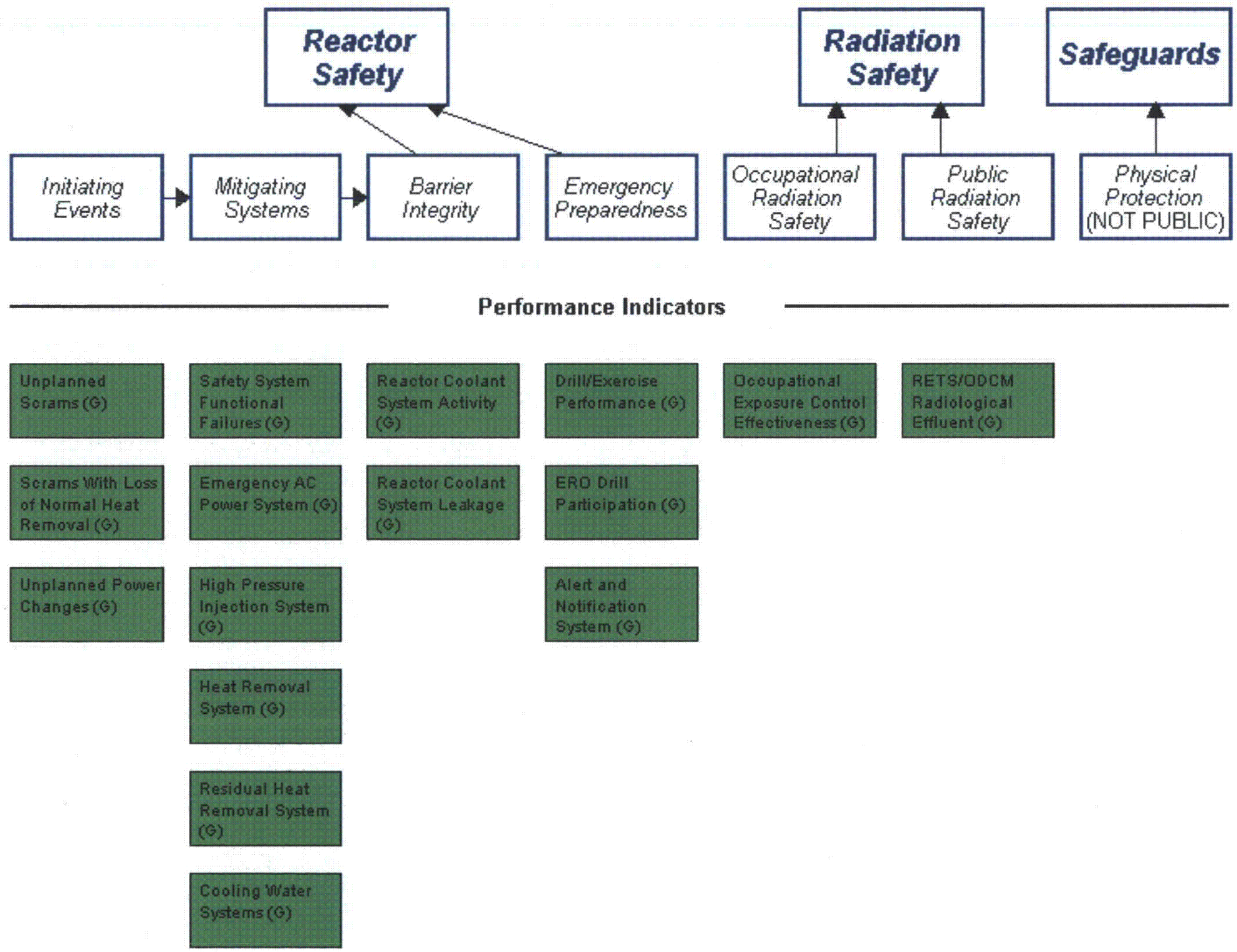
Inspection Conclusions

- Scoping and Aging Management Programs Support Conclusion That Aging Effects will be Managed
- Drywell Shell Monitoring – SER OI 3.0.3.3.2
- Instrumentation Circuit Testing Program

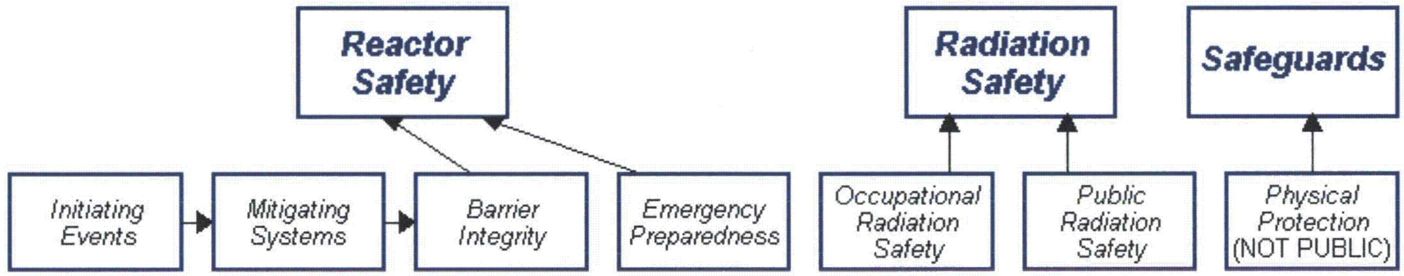
Current Performance

- Licensee Response Column (Column I) of the NRC's Action Matrix – Green PIs and Findings
- No Cross-cutting Issues
- Reactor Oversight Process Baseline Inspections

Performance Indicators



Inspection Findings



Most Significant Inspection Findings

	Initiating Events	Mitigating Systems	Barrier Integrity	Emergency Preparedness	Occupational Radiation Safety	Public Radiation Safety
4Q/2006	No findings this quarter	G	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter
3Q/2006	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter
2Q/2006	G	G	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter
1Q/2006	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter	No findings this quarter

Miscellaneous findings

Pilgrim Nuclear Power Station Safety Audit

Dr. James A. Davis

Audit Team Leader

Aging Management Program Audit

- 40 AMPs in the LRA Reviewed by Staff
  - 14 Programs Consistent with GALL
  - 19 Programs Consistent with GALL with Exceptions or Enhancements
  - 7 Programs are Plant Specific
  - 30 Programs are Existing Programs
  - 10 are New Programs

AMP Audit (Continued)

- 165 Questions During AMP Audit
- All Questions Were Resolved

Aging Management Review Audit

- 164 Questions Closed
  - Includes One Converted To RAI (Flaw Evaluation)

Commitments

- 36 Commitments at the End of the Audit
- 8 Additional Commitments After Regional Inspection and Result of RAIs

Fire Protection Program (B.1.13.1)

- Open Item 3.0.3.2.10:
  - Applicant did not Adequately Address how to Manage the Aging Effects of Inaccessible Seals.

Containment Inservice Inspection Program (B.1.16.1)

- Open Item 3.0.3.3.2:
  - Regional Inspection Documented:
    - Inoperative Bellows Rupture Drain Flow Switch
    - Drain Monitoring Inconclusive & Undocumented
    - Water on Torus Room Floor

Containment Inservice Inspection Program (B.1.16.1)

- Open Item 3.0.3.3.2:
  - Applicant Actions
    - Replace Flow Switches
    - Drywell UT Data
    - Performance Evaluation of Torus Basemat
      - Verify Condition of Torus Hold Down Bolts and Grout

Section 4: Time-Limited Aging Analyses (TLAA)

- 4.1 Identification of TLAA
- 4.2 Reactor Vessel Neutron Embrittlement
- 4.3 Metal Fatigue
- 4.4 Environmental Qualification Analyses of Electrical Equipment
- 4.5 Concrete Containment Tendon Prestress
- 4.6 Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analysis
- 4.7 Other TLAA
  - 4.7.1 Reflood Thermal Shock of the Reactor Vessel Internals
  - 4.7.2 TLAA in BWRVIP Documents

Section 4.2: Reactor Vessel Neutron Embrittlement

- Six TLAAs Affected by Neutron Fluence
  - Reactor Vessel Fluence
  - Pressure-Temperature Limits
  - Upper Shelf Energy
  - Adjusted Reference Temperature
  - Circumferential Weld Inspection Relief
  - Axial Weld Failure Probability
- TLAA Analyses was Submitted and Deemed Not Acceptable

Neutron Fluence

- <u>Open Item 4.2</u>
  - RAMA Methodology Used to Calculate Neutron Fluence
  - Dosimetry Data was not Available with Which to Benchmark the Calculated Results.
  - Result - Fluence Calculation Not Acceptable Per Reg Guide 1.190 -Lead to Open Item 4.2

Neutron Fluence

- <u>Open Item 4.2</u>
  - Applicant's Submittal IAW Described Plan
  - Applicant Completes Fluence Evaluation and Verifies TLAA Basis
  - The Staff Will Review Submittal for Acceptance

Section 4.3: Metal Fatigue

- Commitments 31 and 35 Will Ensure That Either
  - Projected 60 yrs Cycles Enveloped by Design Cycles
  - Refined CUF ≤ 1 for PEO
  - Aging Effects Will be Managed for the Components
  - Repair Or Replace the Affected RPV Locations
- Based on These Commitments, the Staff Accepted the Evaluations in accordance with 10 CFR 54.21(c)(1)(i),(ii) and (iii)

Section 4.4: Environmental Qualification (EQ) of Electrical Equipment

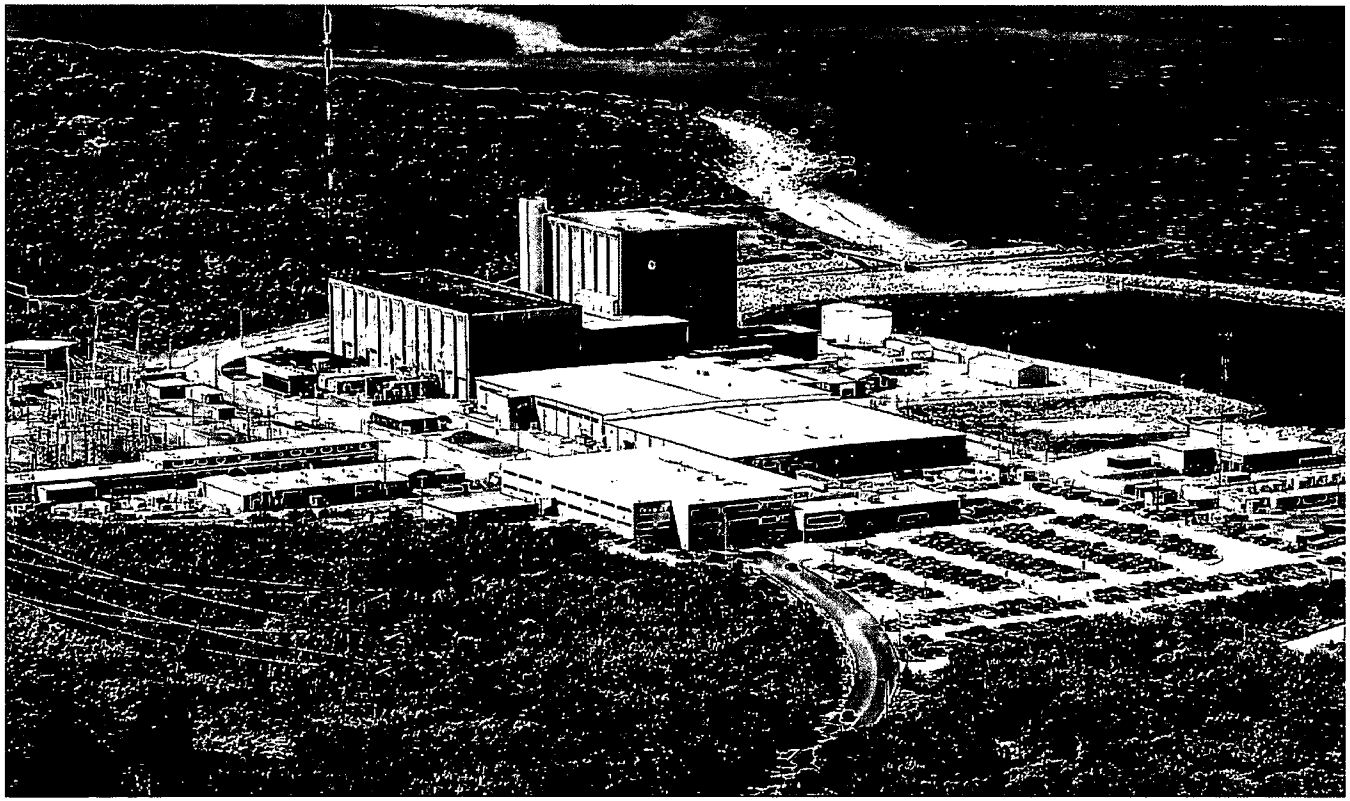
- Applicant's EQ Program consistent with GALL AMP X.E1, "Environmental Qualification of Electrical Equipment"
- Staff Concluded The EQ Program Is Adequate To Manage The Effects Of Aging On The Intended Function Of Electrical Components
- The Staff Accepted the Evaluation in Accordance with 10 CFR 54.21(c)(1)(iii)

Conclusions

- On the basis of its review of the LRA, with the exception of Open Item (OI) 4.2, and pending resolution of OIs 2.3.3.6, 3.0.3.2.10 and 3.0.3.3.2, the staff determines that the requirements of 10 CFR 54.29(a) have been met.

Pilgrim Nuclear Power Station

ACRS License Renewal Subcommittee Presentation
April 4, 2007



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RETAIN FOR THE LIFE OF THE COMMITTEE

Entergy

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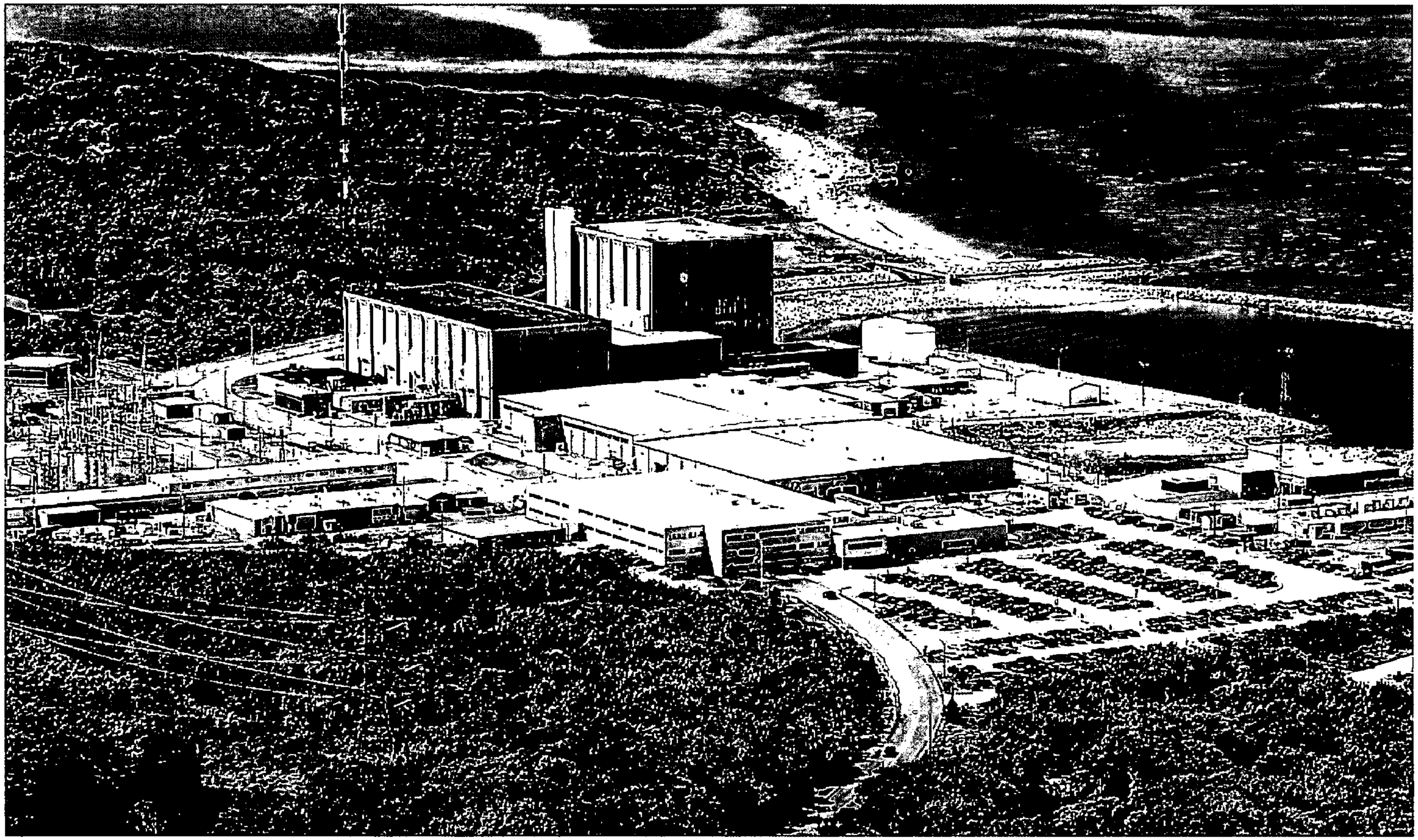
Pilgrim Nuclear Power Station

ACRS License Renewal Subcommittee Presentation
April 4, 2007



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Pilgrim Personnel in Attendance

Bob Smith	General Manager Plant Operations
Steve Bethay	Director of Nuclear Safety Assurance
Brian Sullivan	Director of Engineering
Bryan Ford	Licensing Manager
Ray Pace	Mechanical Engineering Design Supervisor
Alan Cox	Entergy LR Project Manager
Fred Mogolesko	Pilgrim LR Project Manager

Other support personnel

Agenda

- Pilgrim Description and Current Status
- Pilgrim Licensing History/Highlights
- License Renewal Project
- Cost-Beneficial SAMAs
- Pilgrim SER Open Items
  - Security Diesel Generator
  - Fire Barrier Penetration Seals
  - Containment Inservice Inspection
  - Neutron Fluence
- Questions

Pilgrim Description

- Located in Plymouth, Massachusetts on Cape Cod Bay
- ~ 40 miles south of Boston
- Sited on 1600 Acres
- BWR-3
- Mark I Containment
- General Electric (NSSS), Bechtel (AE and Constructor)
- 2028 MWt Thermal Power; ~ 690 MWe
- Open Cycle Condenser Cooling
- Owned and Operated by Entergy
- Staff: ~ 655

Entergy

Current Plant Status

• Coastdown began	February 1, 2007
• 2007 RFO-16 begins	April 6, 2007
• NRC PIs & Inspection Findings	All Column 1

Entergy

Pilgrim Licensing History/Highlights

• Construction Permit	August 26, 1968
• Operating License	June 8, 1972
• Full Power License	September 15, 1972
• Commercial Operation	December 9, 1972
• License Transfer to Entergy	July 13, 1999
• Appendix K Power Uprate (1.5%)	May 8, 2003
• LR Application Submitted	January 25, 2006
• Operating License Expires	June 8, 2012

Pilgrim Licensing History/Highlights
(continued)

- 1977- Replaced Core Spray safe-ends and piping inside primary containment with IGSCC-resistant material
- 1978 -1982 Mark I containment modifications
- 1984 - Replaced recirculation piping to address IGSCC concerns
- 1986 -1989 Safety enhancement modifications (SSW-RHR cross-tie, Direct Torus Vent to Main Stack, Station Blackout Diesel Generator)
- 1991 - Hydrogen water chemistry
- 1995 - Replaced ECCS suction strainers

Pilgrim License Renewal Project

- LRA Prepared by experienced, multi-discipline Entergy team (corporate and on-site)
- Pilgrim and VY LRAs first applications submitted following issuance of Rev. 1, SRP and GALL
- Incorporated lessons learned from previous applications
- Peer review conducted (10 Utilities)
- LRA internal reviews (OSRC, SRC, QA)

Pilgrim License Renewal Project
(continued)

- Commitments in the LRA refined as needed during audit/inspection process (40 aging management programs)
- Commitments tracked - Pilgrim commitment tracking system
- 40 aging management programs
  - 14 programs in place w/o enhancements
  - 16 programs require enhancement
  - 10 New Programs

  <u>Aging Management Program Implementation</u>

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Cost-Beneficial SAMAs

- Evaluating Cost-Beneficial SAMAs

SAMA 30	Procedures to cross-tie AC buses
SAMA 34	Procedures to cross-tie DC buses
SAMA 53	Containment venting within narrow pressure band
SAMA 56	Redundant DC power to DTV valves
SAMA 57	Use of diesel fire pump fuel transfer pump
SAMA 58	Power SR Division A load center bus loads via NSR Bus, SR Division B loads via NSR Bus, when SR 4kV unavailable post-trip
New	Portable power source to SR 125 vdc Battery

- None are age-related
- SAMA Details

Pilgrim Draft SER Open Items

- OI 2.3.3.6 Security Diesel Generator
- OI 3.0.3.2.10 Fire Barrier Penetration Seals
- OI 3.0.3.3.2 Containment Inservice Inspection
- OI 4.2 Reactor Vessel Neutron Fluence

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Security Diesel Generator

OI 2.3.3.6

- Region 1 Confirmatory Item
    - Determine whether security diesel components are within the scope of license renewal
- Requested Support Provided

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Fire Barrier Penetration Seals

OI 3.0.3.2.10

- Concern on aging management of inaccessible seals
- All penetration seals are included in the inspection program

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Containment Inservice Inspection
OI 3.0.3.3.2

- Potential for corrosion in the inaccessible area of the steel containment shell, base mat and sand pocket region

- Inspection Observations
  - Rupture drain flow switch
  - Surveillance documentation
  - Torus room floor water

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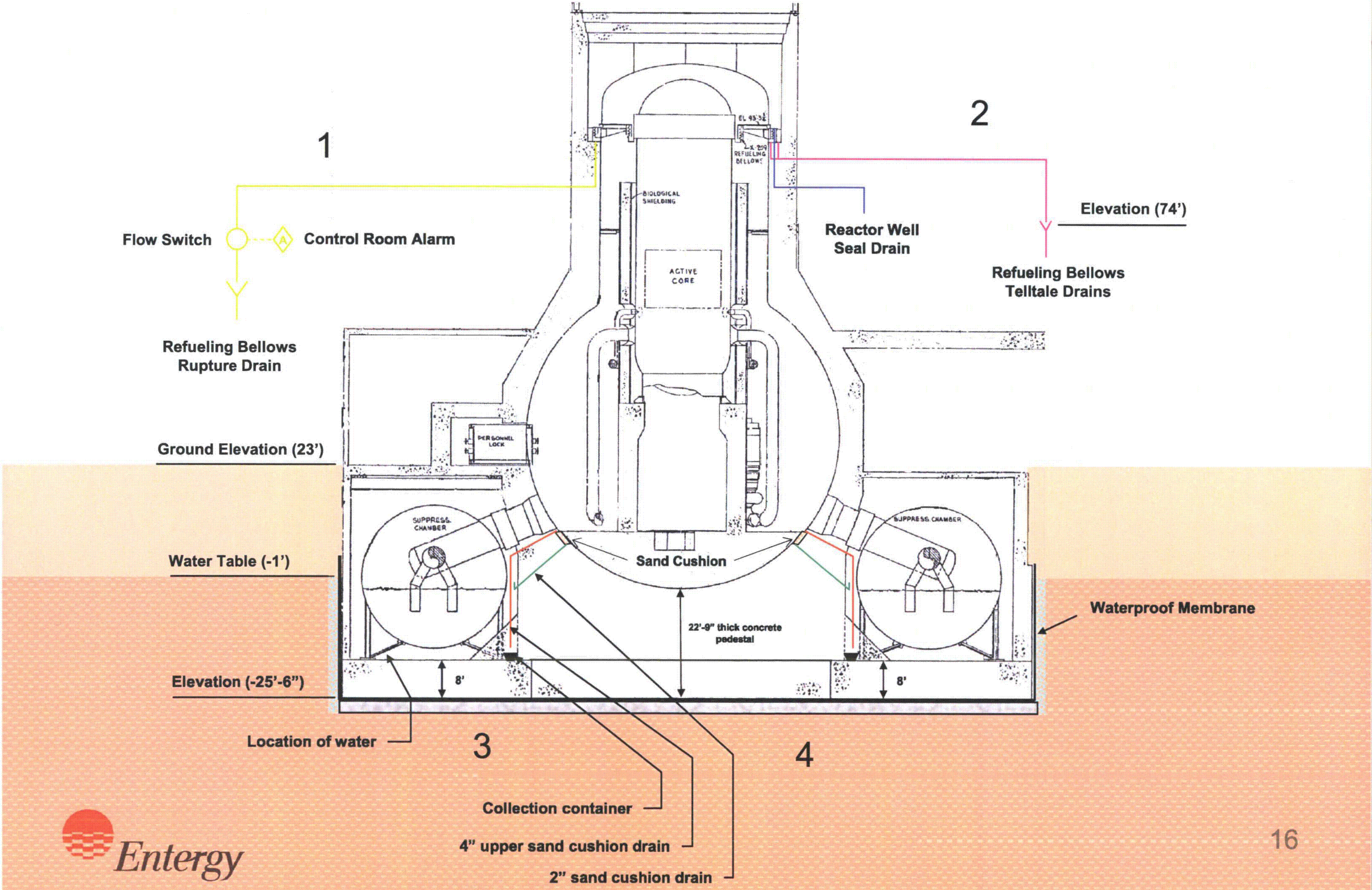
Containment Inservice Inspection
Drywell Shell Condition and Monitoring

- Design minimizes potential for undetected water intrusion
- Diverse methods of prevention and identification of potential water leakage into air gap
- No Refueling Bellows leakage
- No water intrusion into drywell air gap
- No drywell shell degradation
- Confirmatory inspections performed and planned

Containment Inservice Inspection
Drywell Shell Condition and Monitoring



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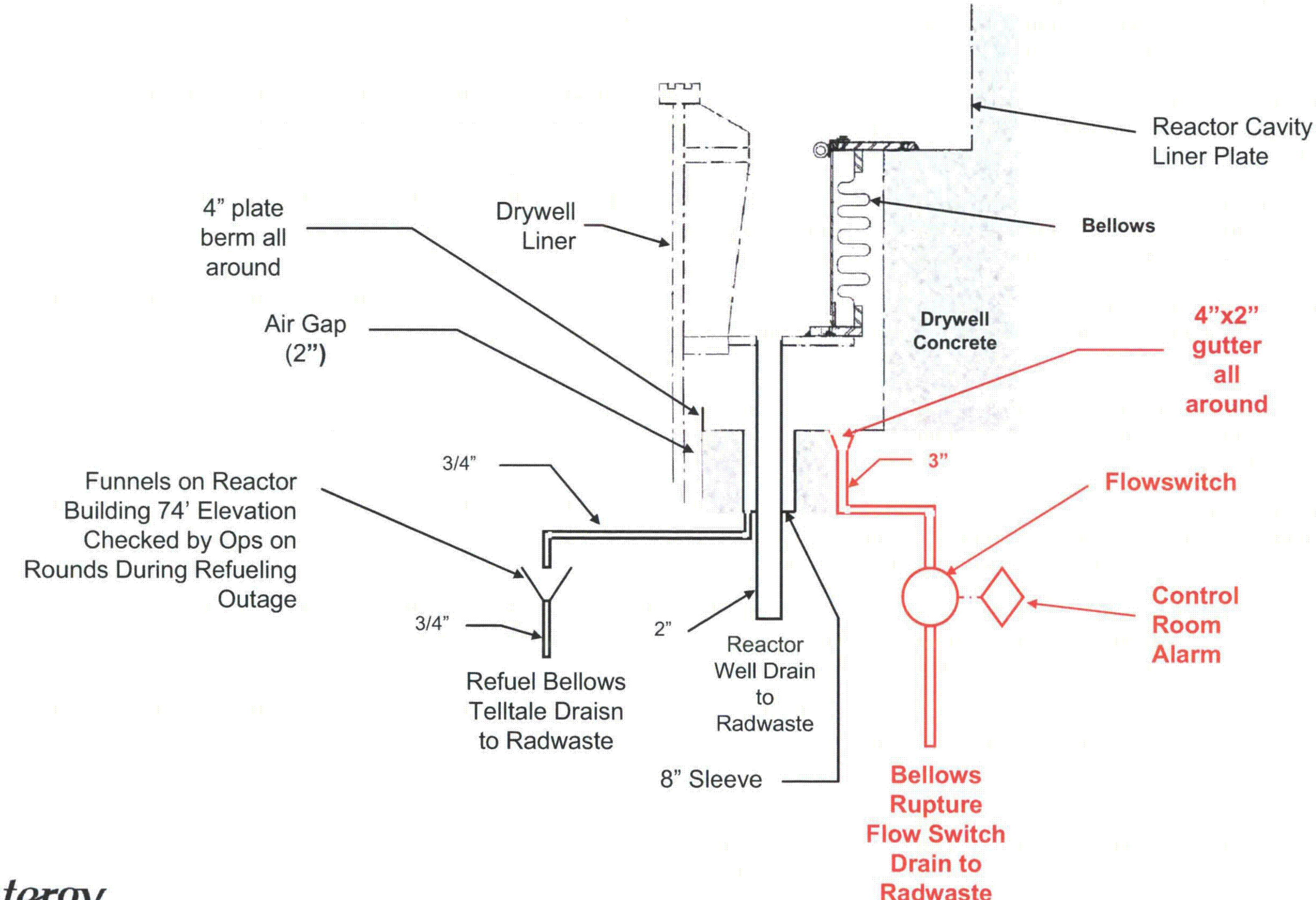
Containment Inservice Inspection
Drywell Shell Condition and Monitoring

3" instrumented drain line alarms in control room



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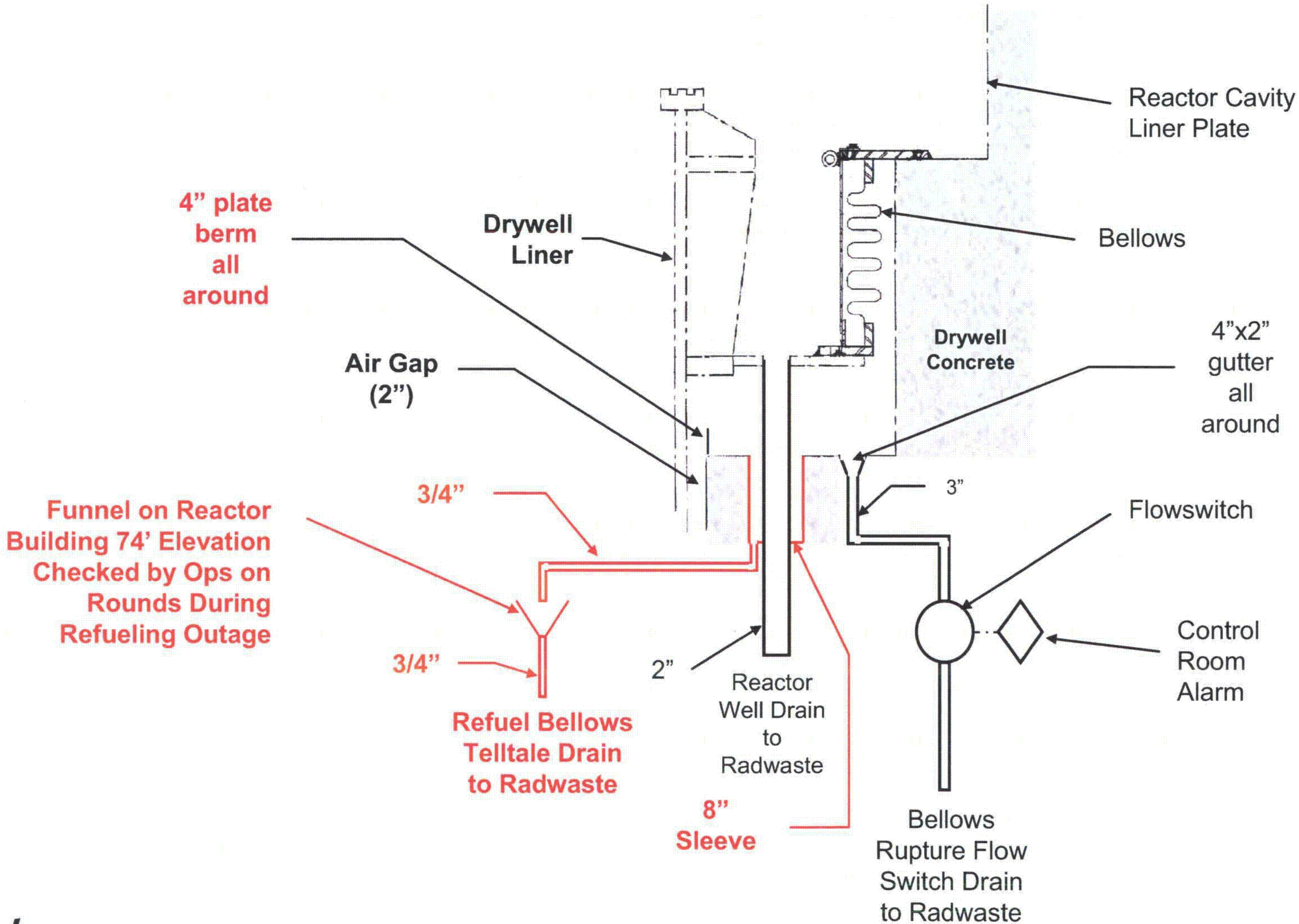
Containment Inservice Inspection

Drywell Shell Condition and Monitoring

Four ¾" drain lines which exit to 74' floor drains checked during operator tours



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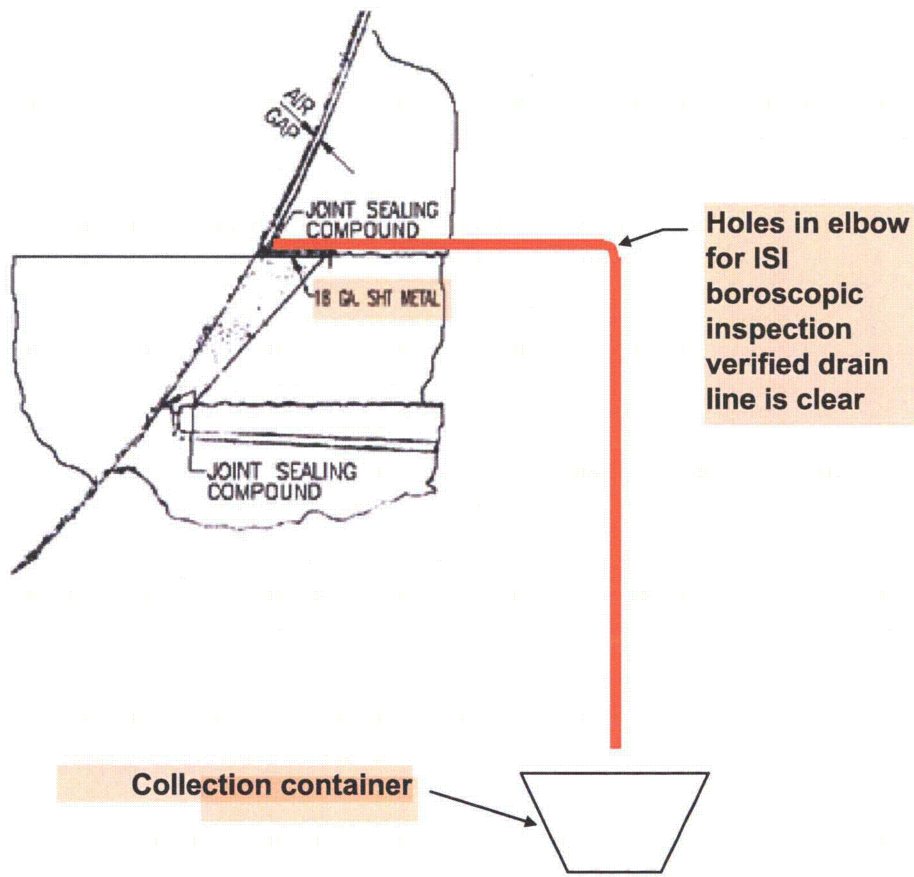
Containment Inservice Inspection

Drywell Shell Condition and Monitoring

Four 4" upper sand cushion drains drain into collection devices and are monitored at beginning and end of each RFO



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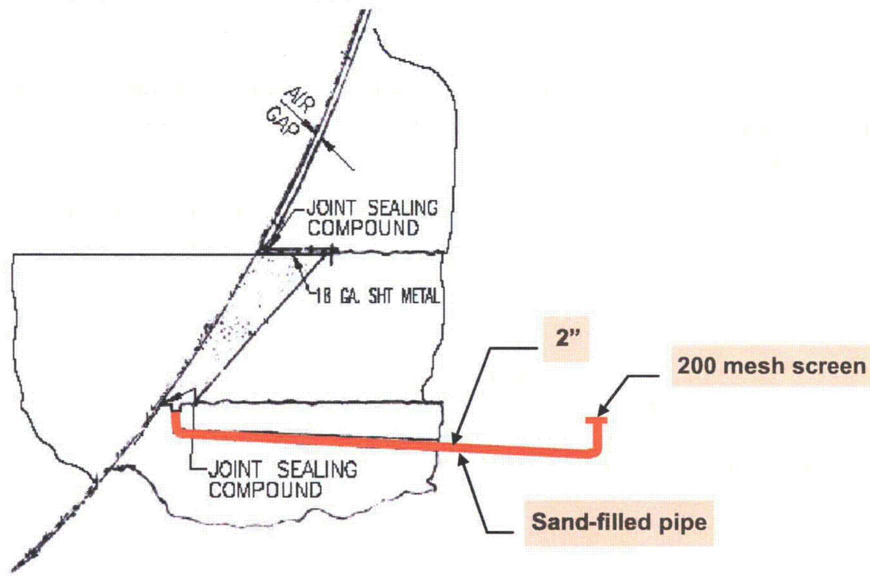
Containment Inservice Inspection
Drywell Shell Condition and Monitoring

Four sand cushion drains provide further detection capabilities



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Containment Inservice Inspection

Drywell Shell Condition and Monitoring

Past Inspections

- Limited confirmatory UT
  - UT at twelve locations at 9'-2" elevation
  - UT at four locations at 9'-1" elevation
    - Concrete chipped out to a depth of 1"
  - UT at six locations at 72' and 83' elevations
- Verified upper sand cushion drains unobstructed and dry
- All inspections identified no corrosion

Containment Inservice Inspection
Drywell Shell Condition and Monitoring

Future Inspections

- UTs at 12 Locations at 9'-2" Elevation
  - Prior to Period of Extended Operation
  - Once within first 10 years
- UTs at 4 Locations at 9'-1" Elevation
  - Prior to Period of Extended Operation
  - Once within first 10 years
- UT at 72' Elevation Adjacent to SFP
  - Conducted every 40 months by IWE

Containment Inservice Inspection

Water on Torus Room Floor

Containment Inservice Inspection

Water on Torus Room Floor

Aspects Evaluated

- Source of water
- Integrity of concrete and anchor bolts
- Structural adequacy of the reactor building
- Inspection and monitoring of water, concrete, and Torus hold down anchor bolts

Containment Inservice Inspection

Water on Torus Room Floor

- Water on torus room floor was initially identified in late 1970's and early 1980's.

- Multiple Engineering Evaluations

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Containment Inservice Inspection
Torus Room Floor

Bay 10

Entergy

Back

Containment Inservice Inspection
Water on Torus Room Floor

Evaluation

- The source is ground water seepage under hydraulic pressure.
- Low seepage rate is counteracted by evaporation.
- Non aggressive, benign water chemistry.
- No structural distress evident
  - No cracks other than hairline
  - No evidence of structural settlement
- Grout around Williams Anchor Bolts performs no structural integrity function.

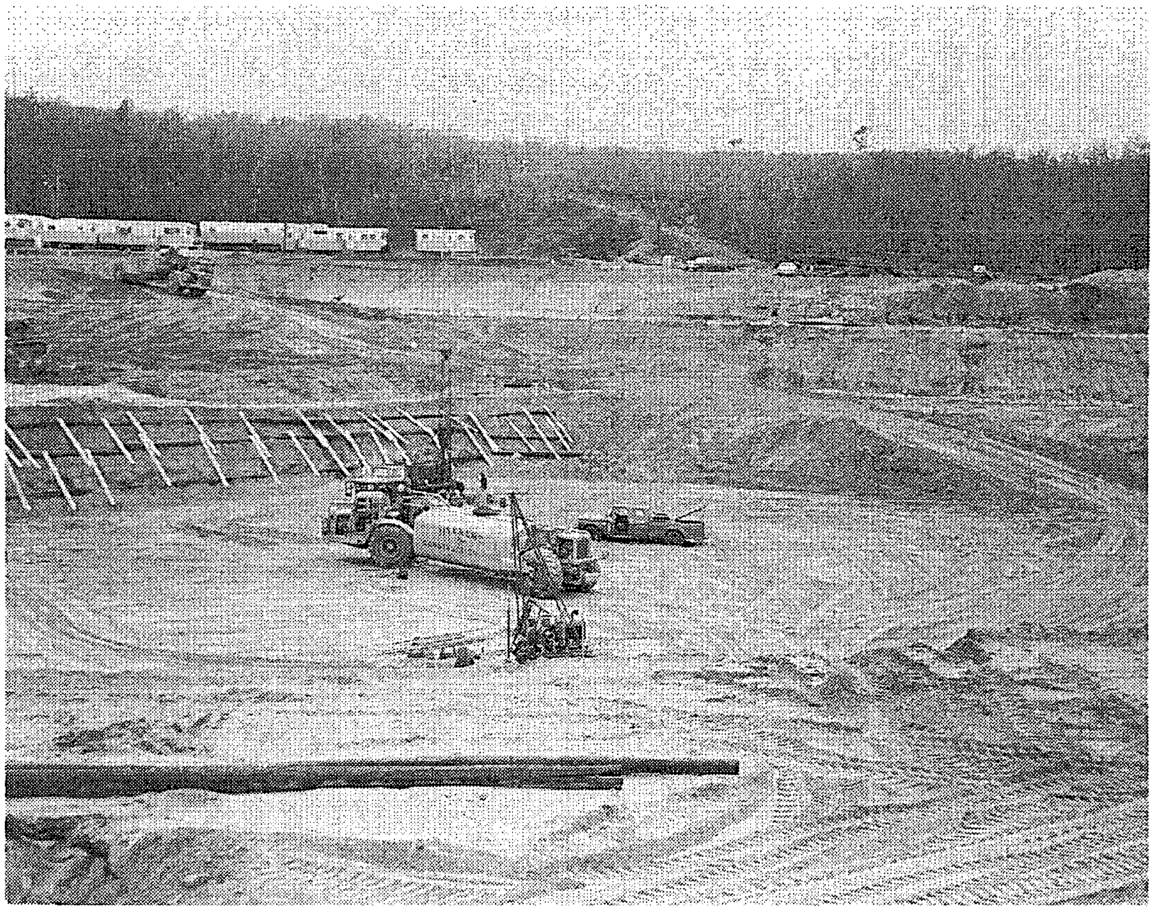
Containment Inservice Inspection

Water on Torus Room Floor

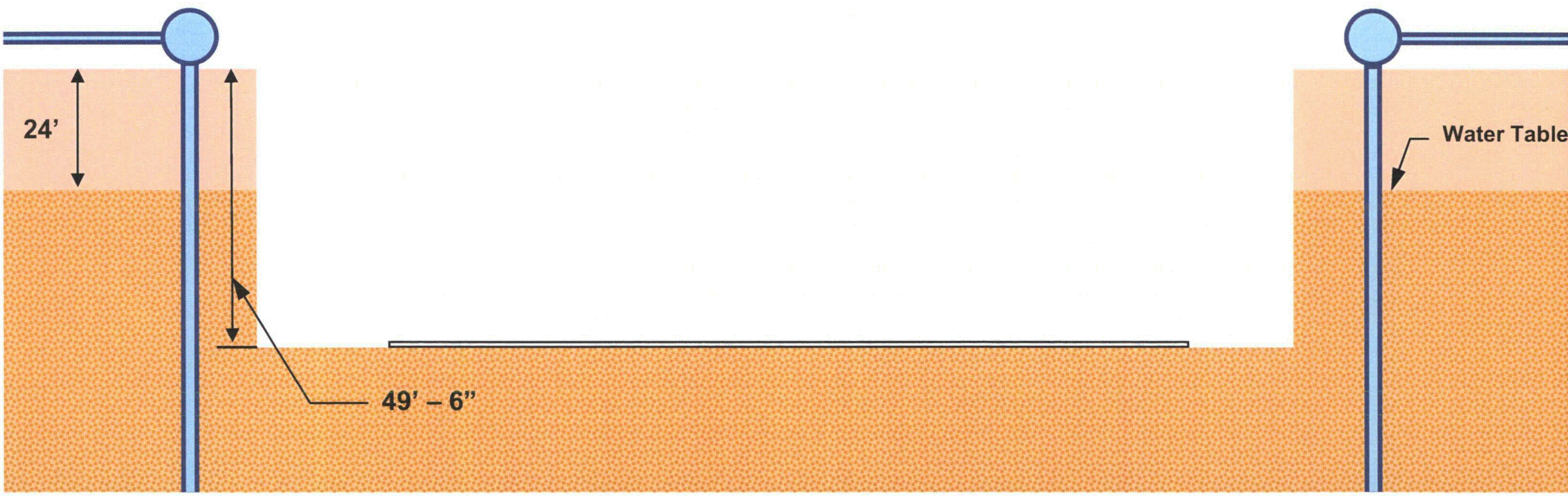
- Current Status
  - Water re-analyzed to demonstrate non aggressiveness.
  - Review over last 6-weeks shows minimal water on torus floor.
    - Seepage, mostly in Bay 10 estimated at ¼" to ½" over 100 square feet.
  - Independent Assessment to demonstrate full functional capability of torus base-mat conducted.
    - Professor Franz Ulm of MIT's Department of Civil Engineering

Reactor Building Site Preparation

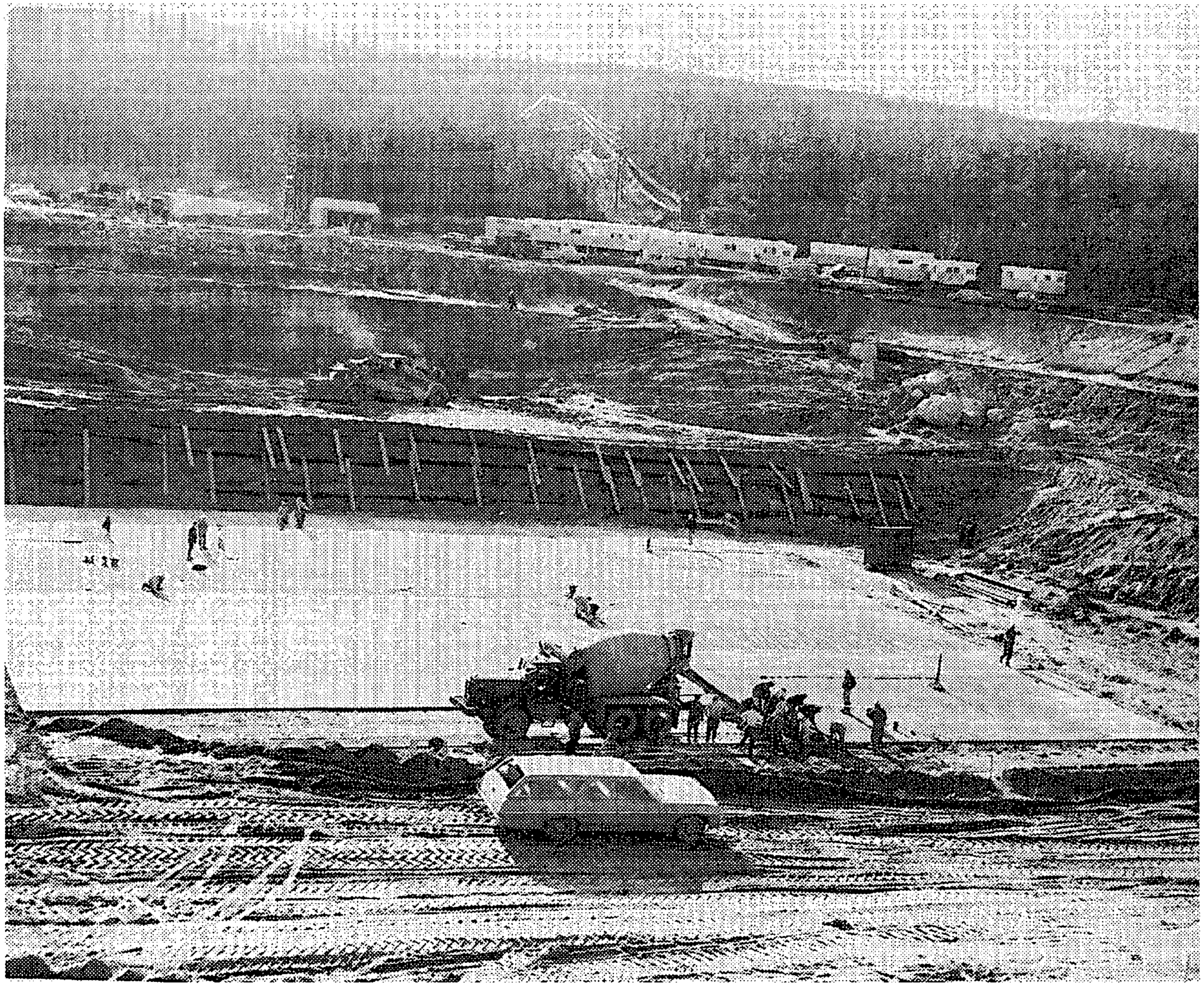
Reactor Building Site Preparation



Place 3" Work Slab



Place 3” Work Slab



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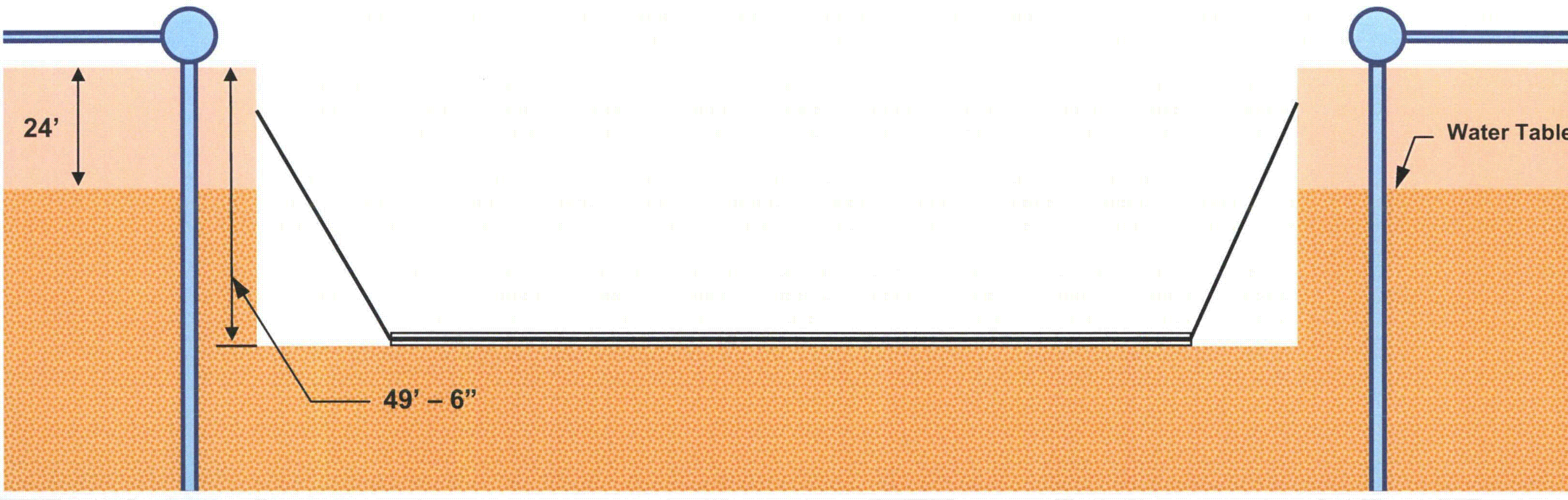
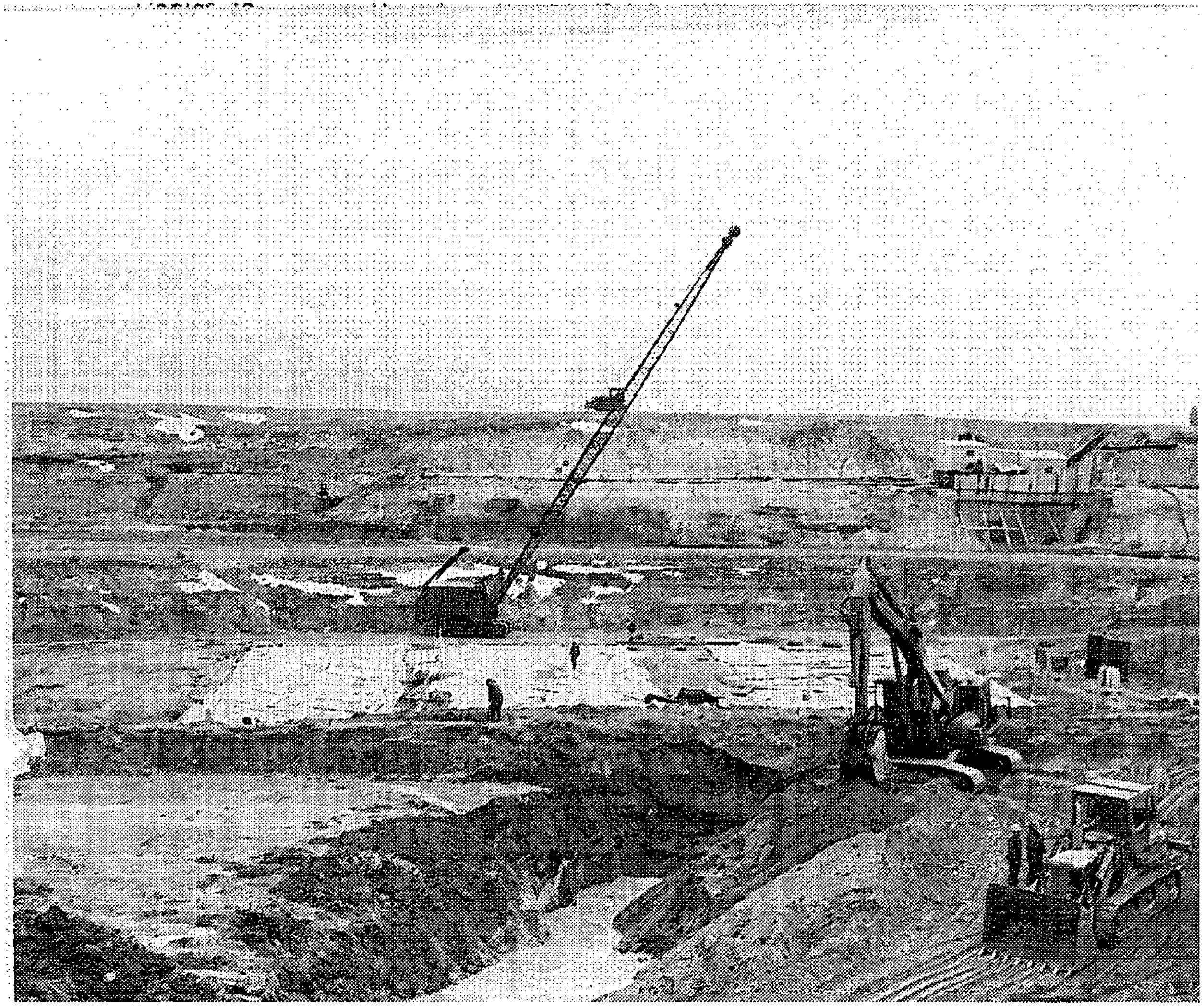
Foundation Membrane



Foundation Membrane



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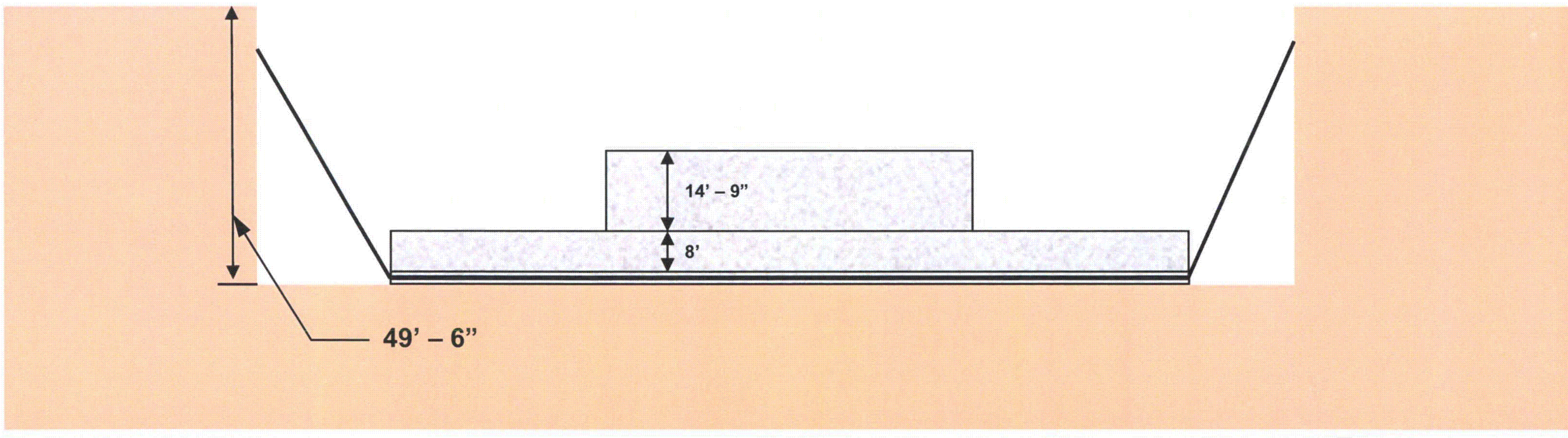
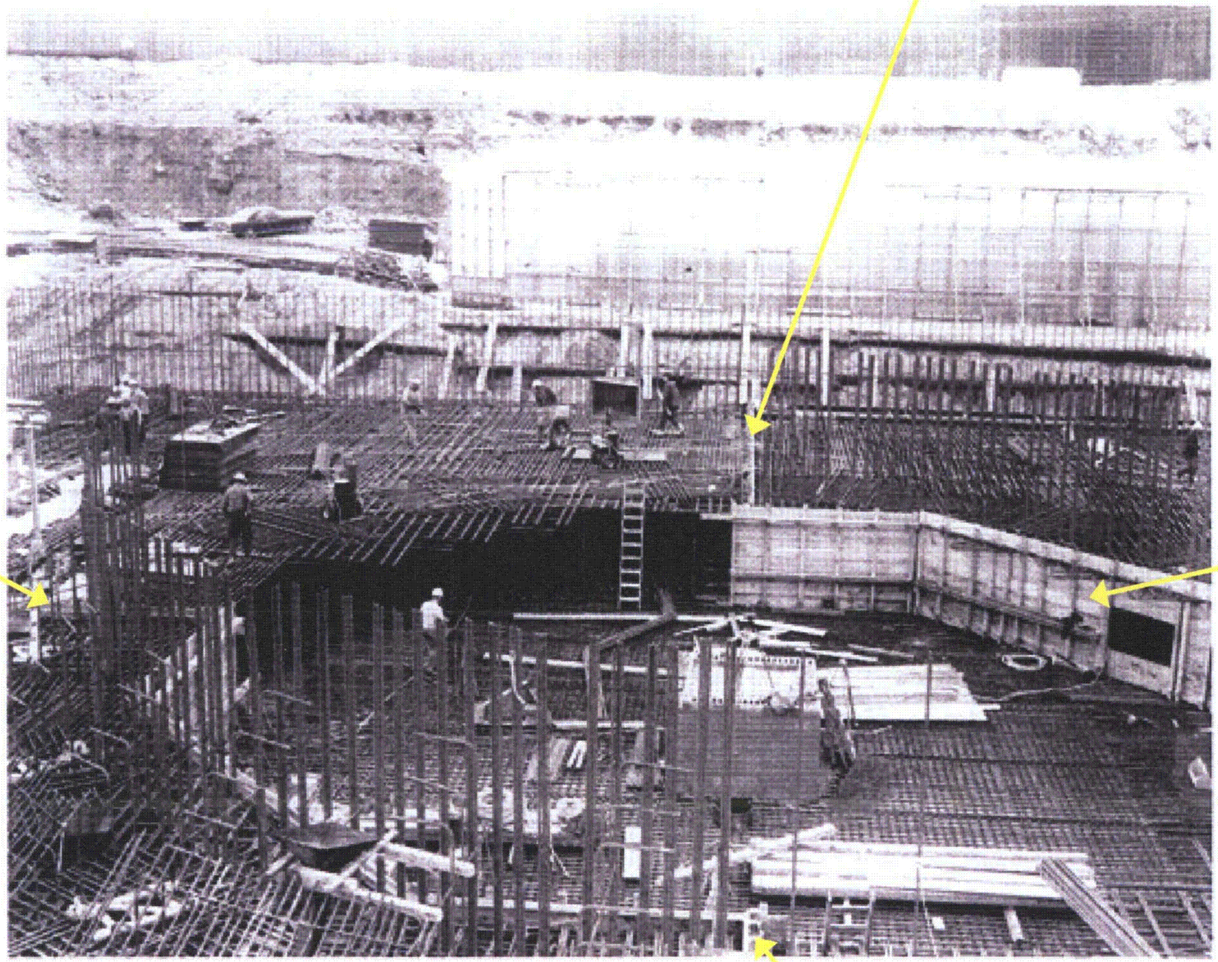
Base Mat Construction



Reactor Building Base Mat Rebar

Construction Joint

Construction Joint



Location of Octagonal Construction Joint Under Torus

Construction Joint

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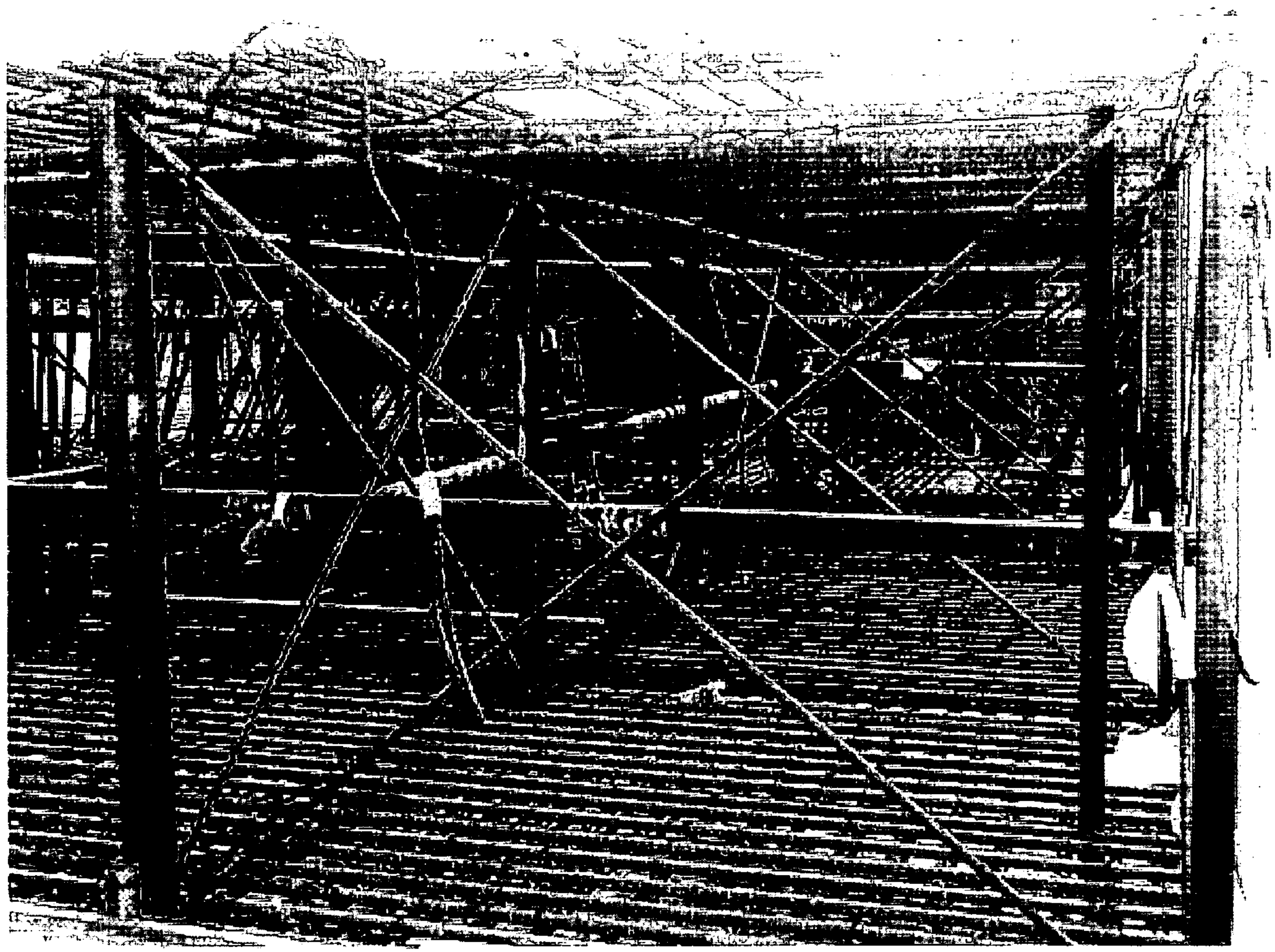
Reactor Building Base Mat Rebar



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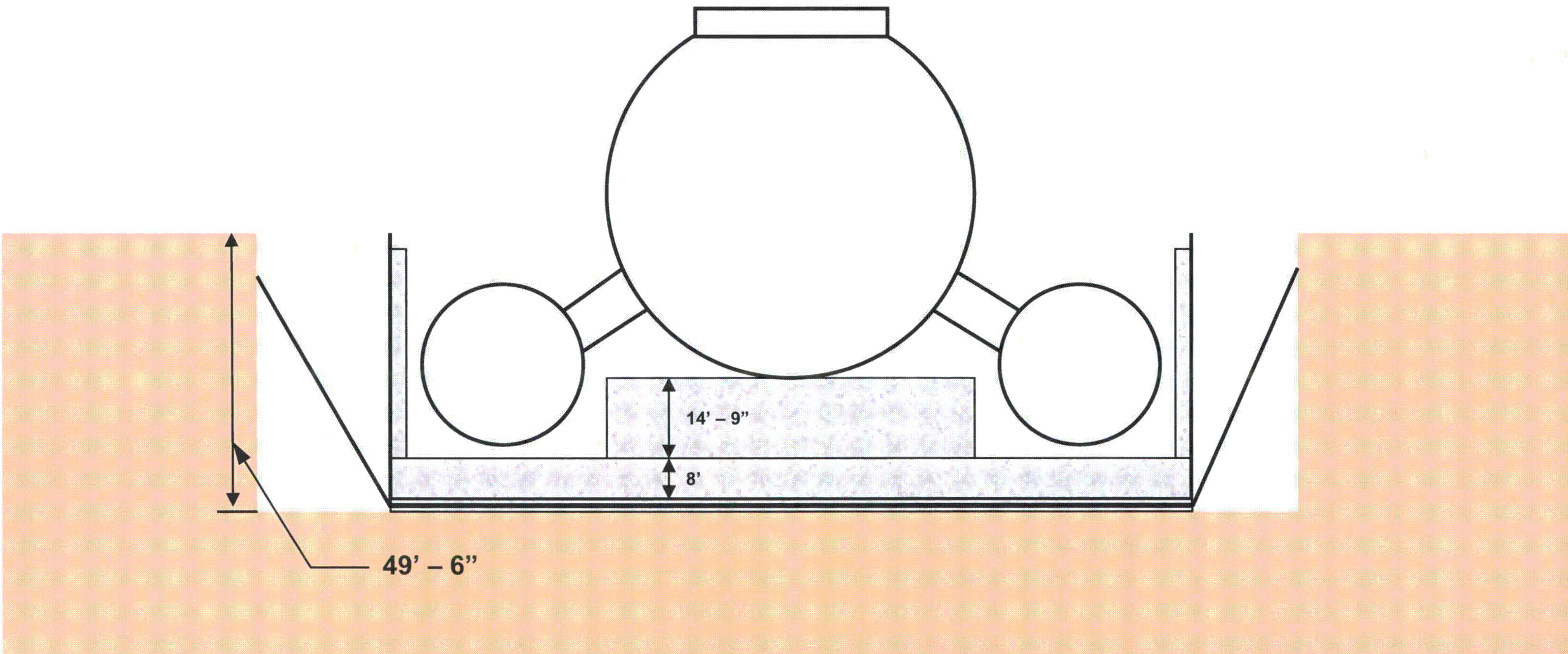
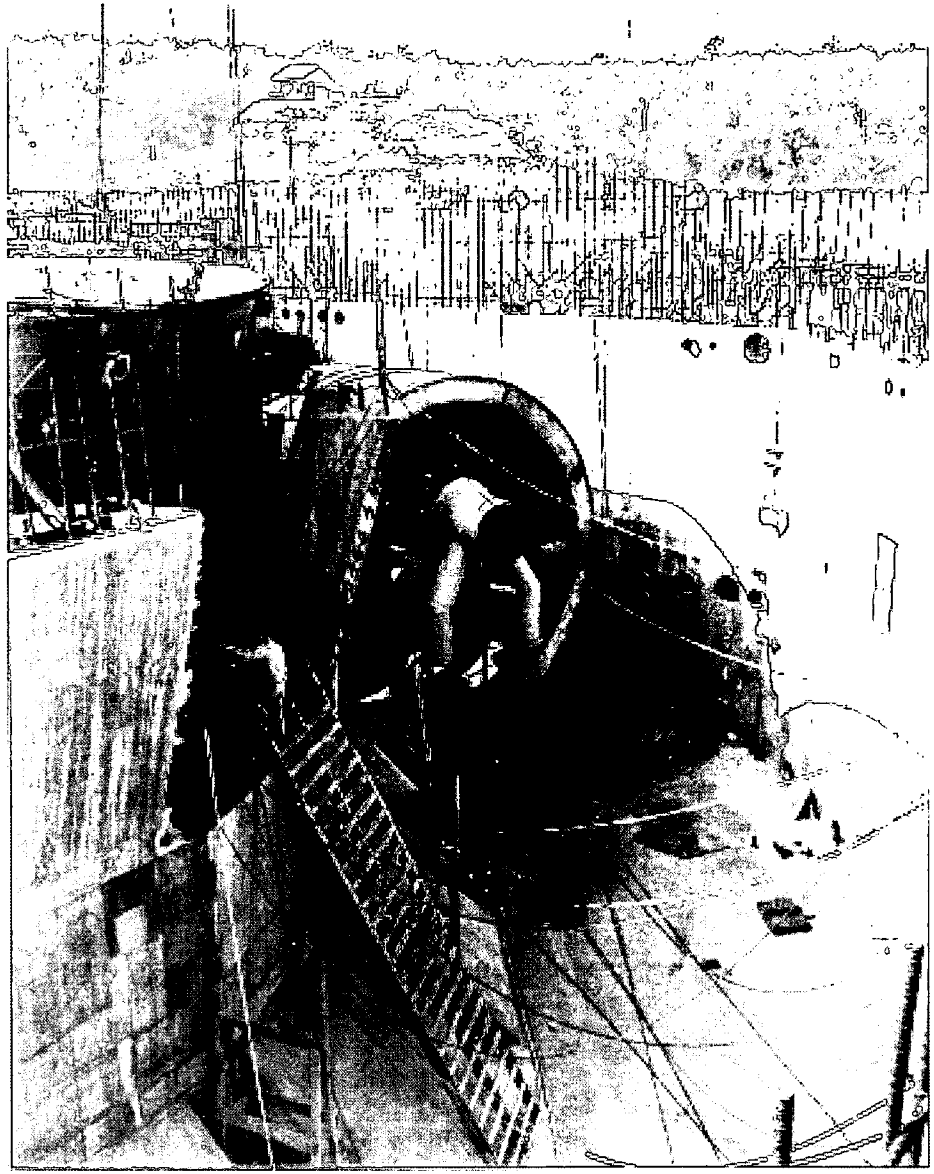
Drywell & Torus Construction



Torus Construction



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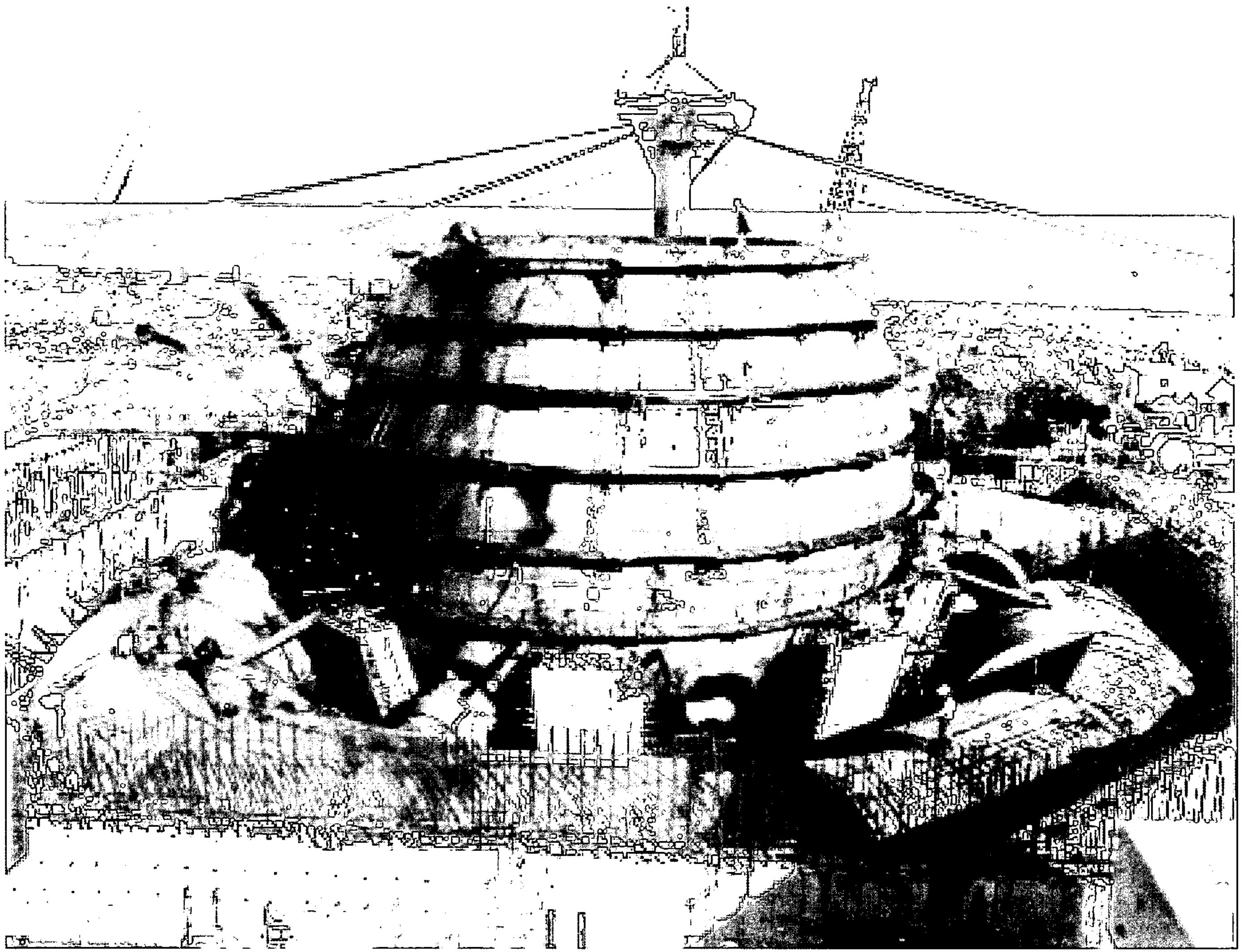
Drywell & Torus Construction



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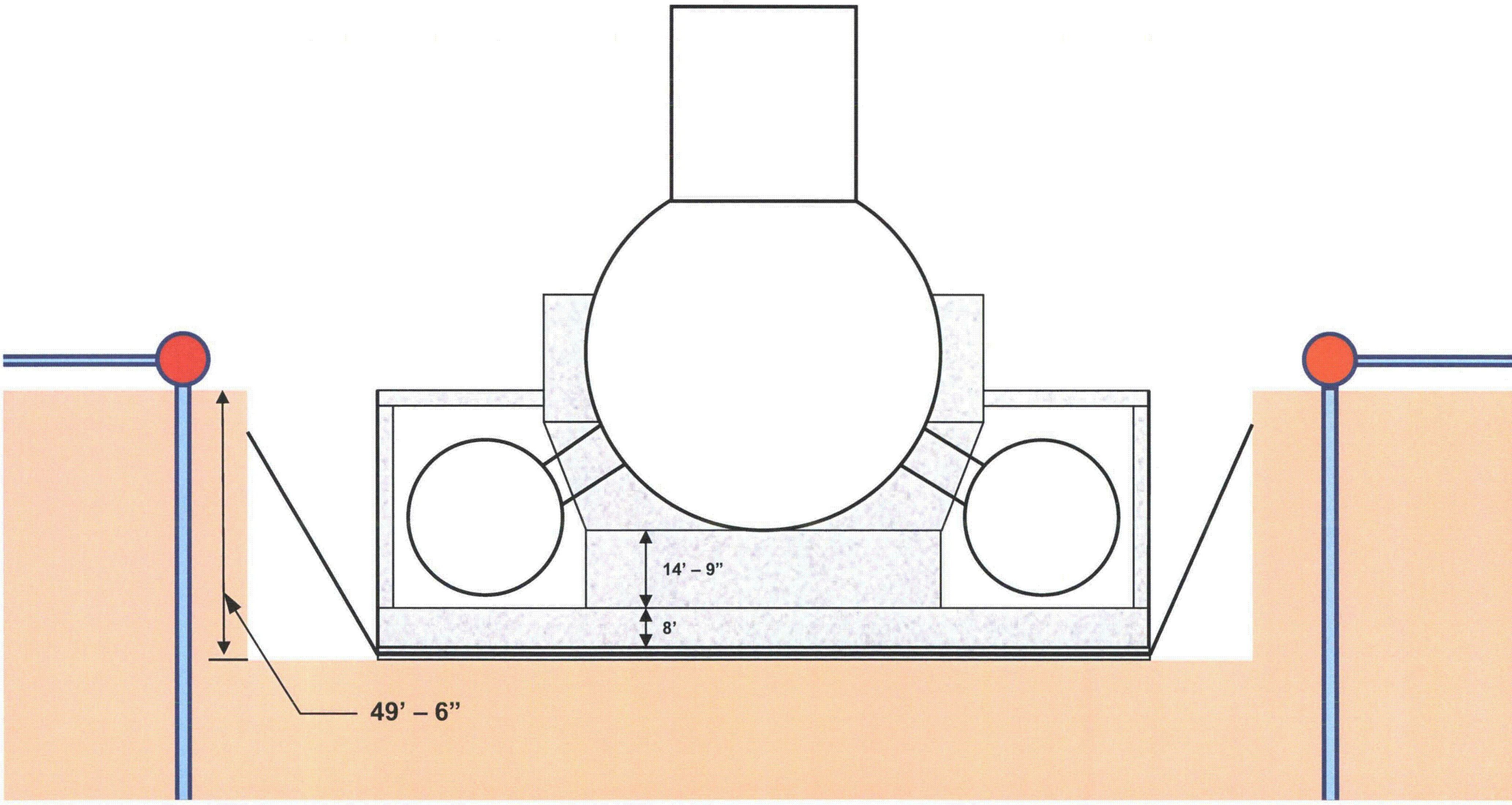
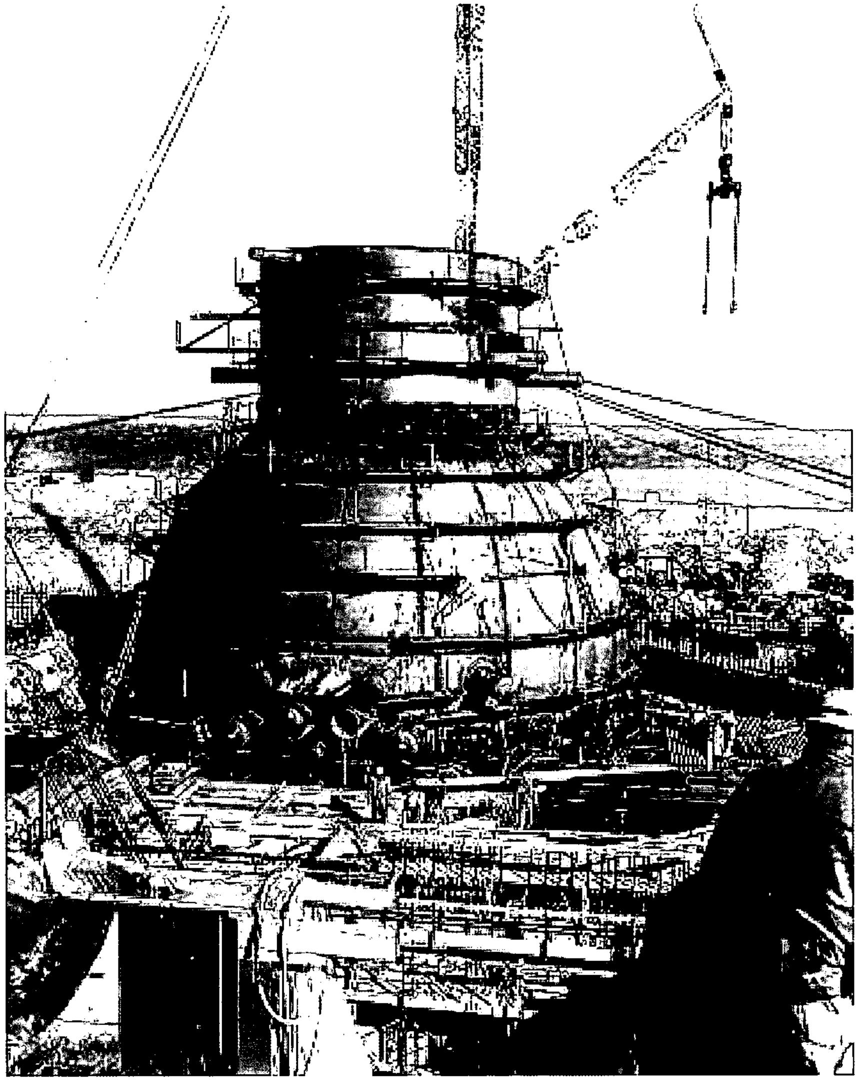
Drywell Construction



Drywell Construction



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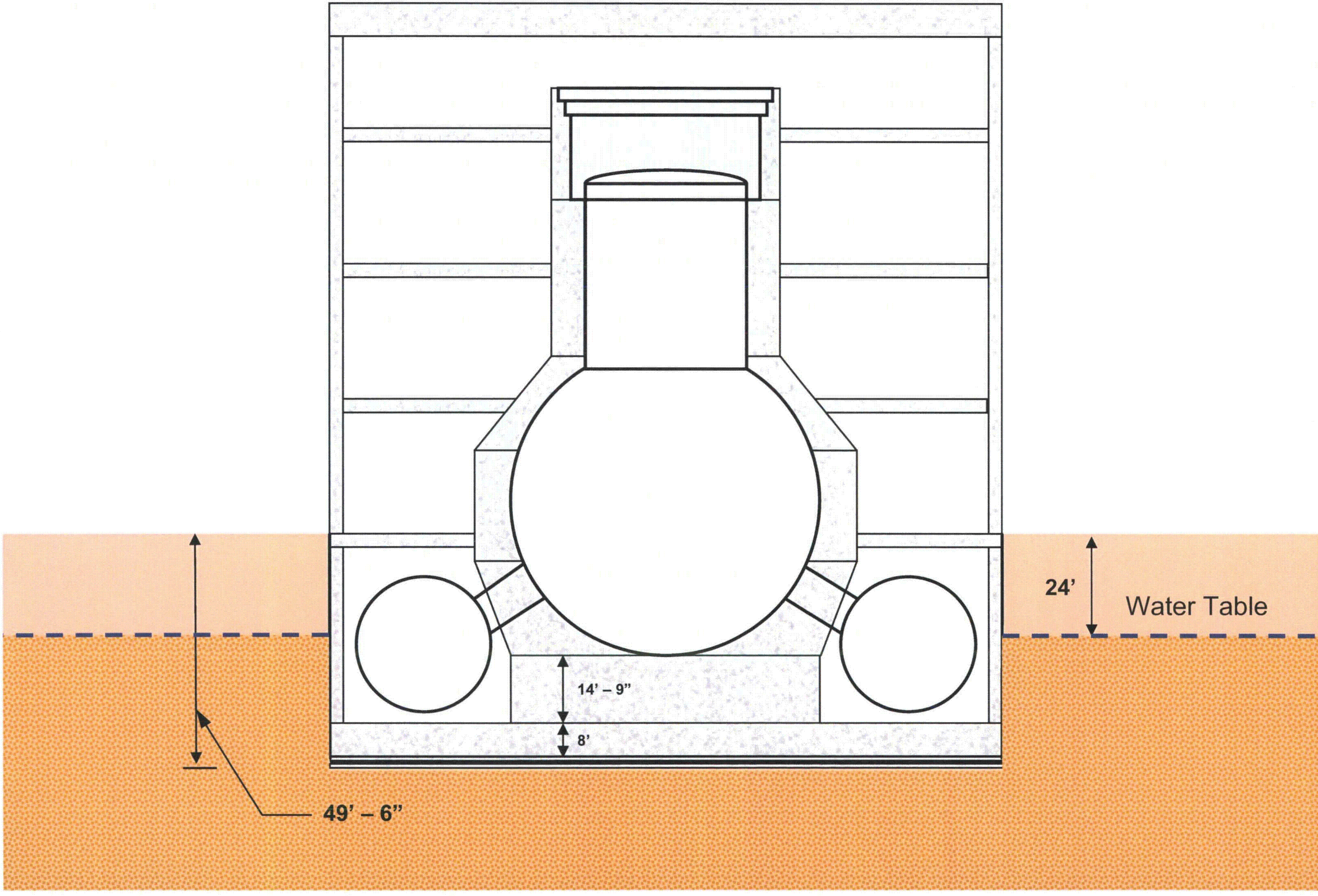
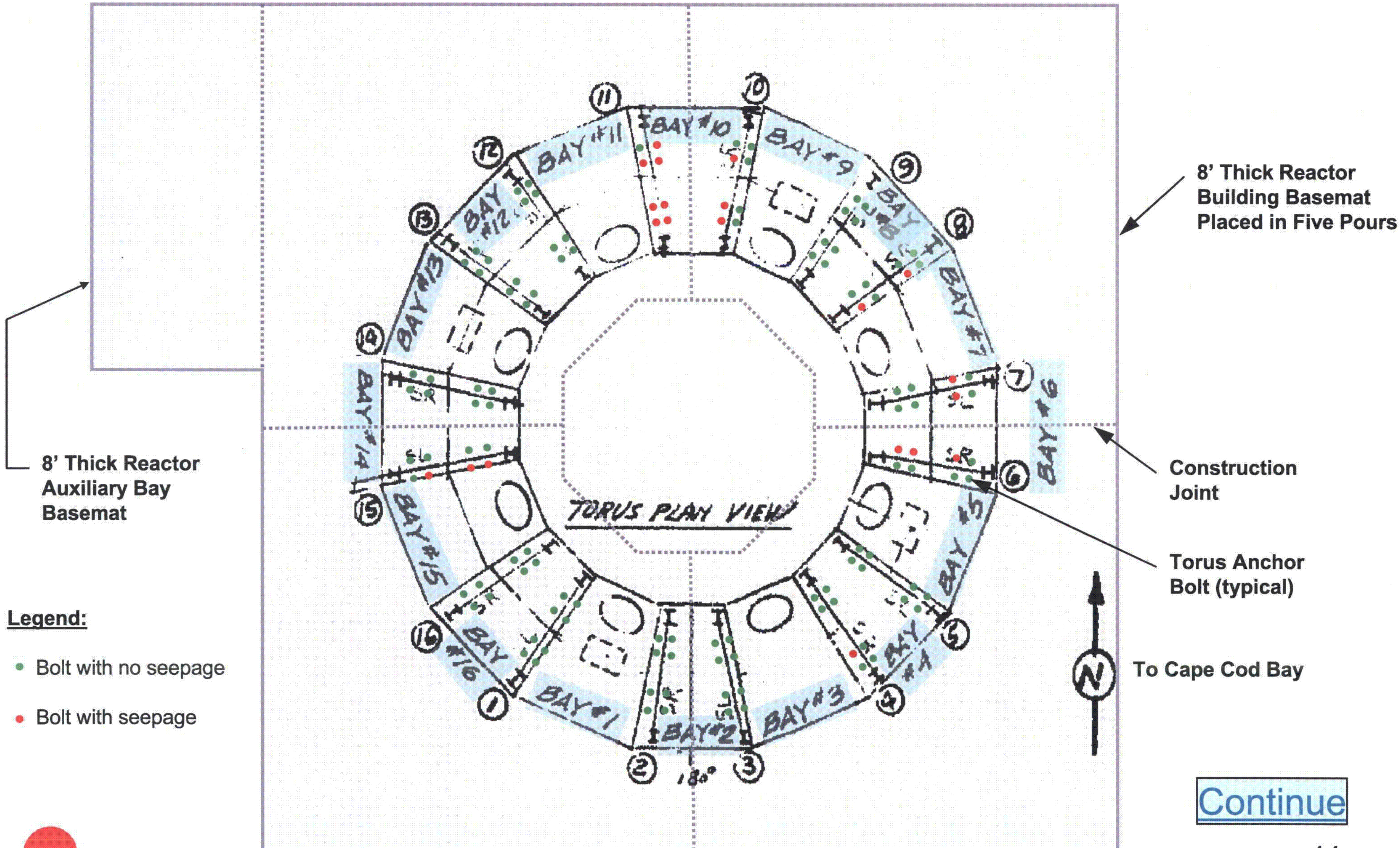
Completed Reactor Building



Containment Inservice Inspection

Torus Room Floor



Legend:

- Bolt with no seepage
- Bolt with seepage

Continue

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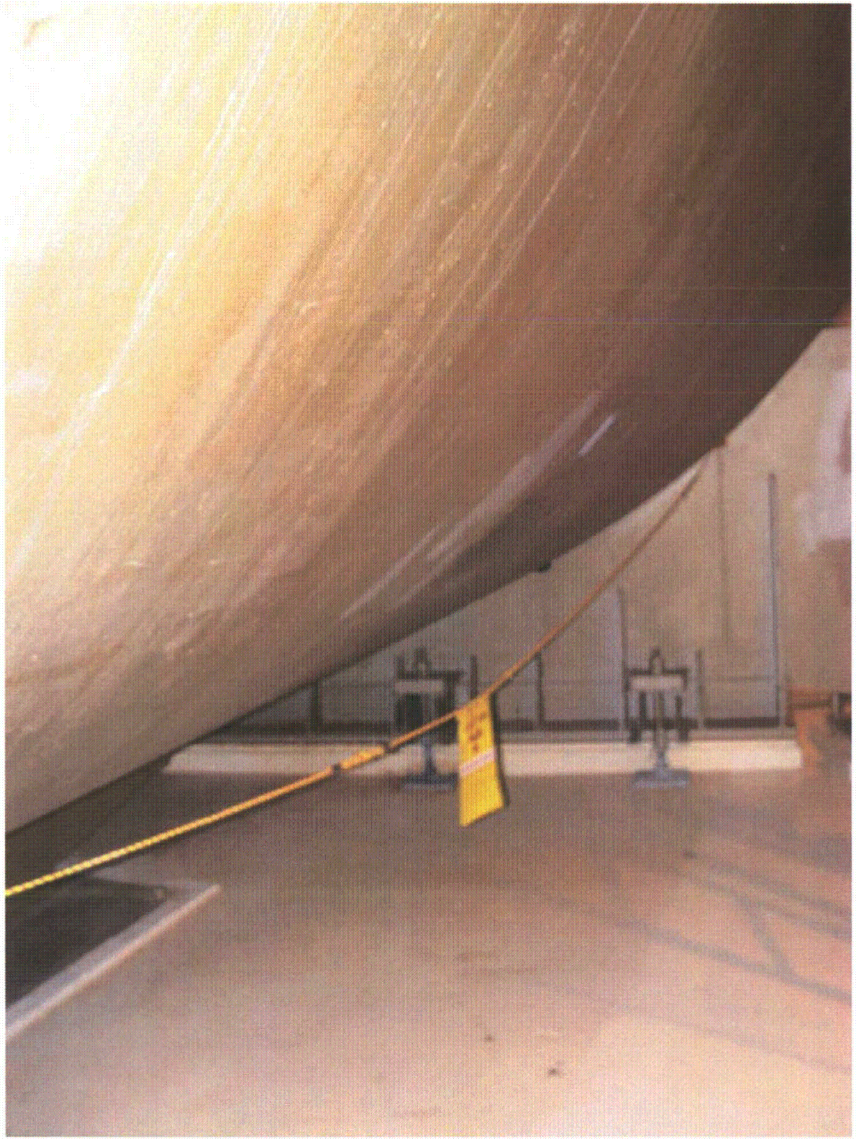
Containment Inservice Inspection
Torus Room Floor

Bay 1



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Containment Inservice Inspection
Torus Room Floor

Bay 2

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Containment Inservice Inspection
Torus Room Floor

Bay 3

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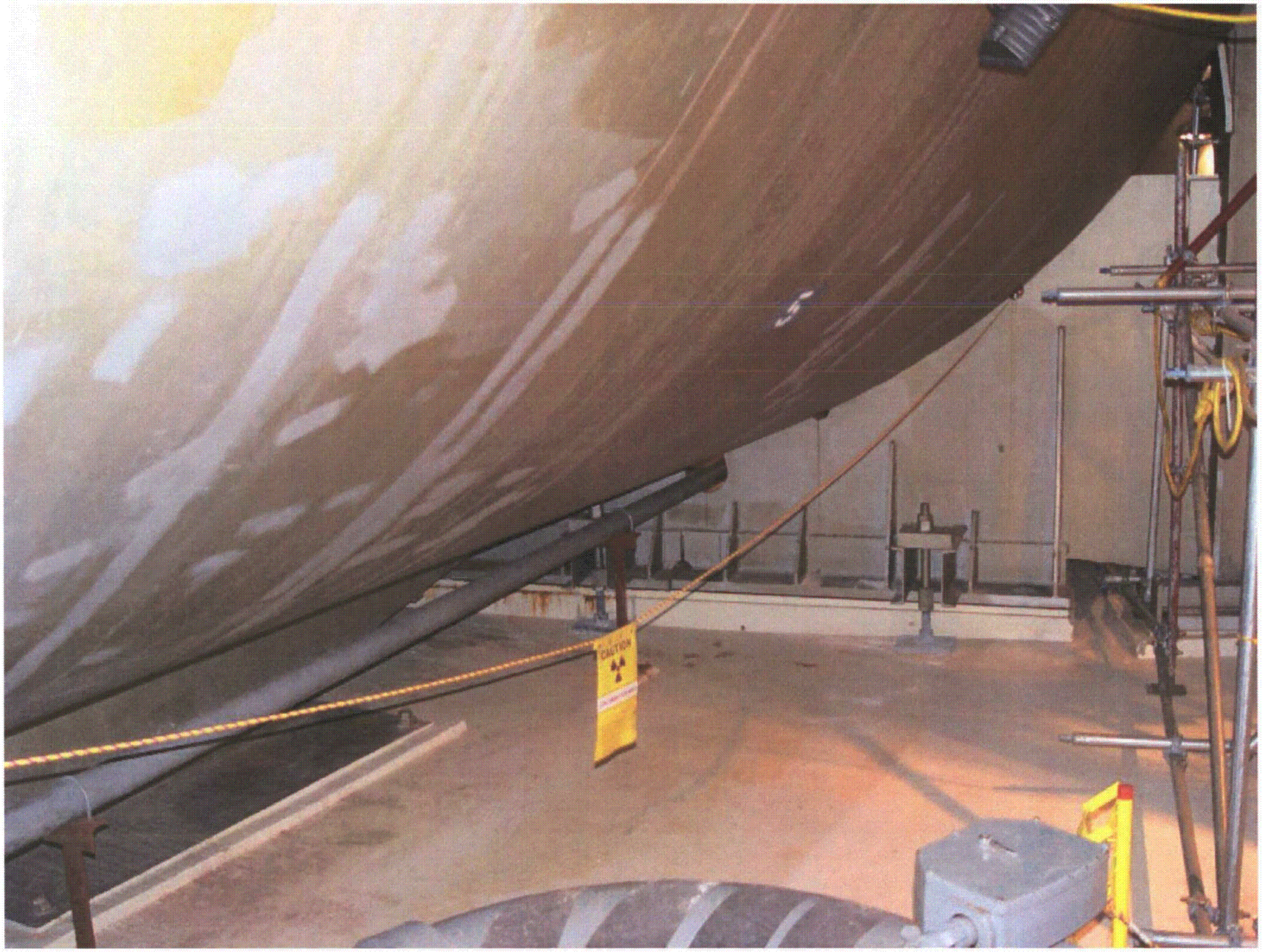
Containment Inservice Inspection
Torus Room Floor

Bay 4

Back

Containment Inservice Inspection
Torus Room Floor

Bay 5



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Containment Inservice Inspection
Torus Room Floor

Bay 6

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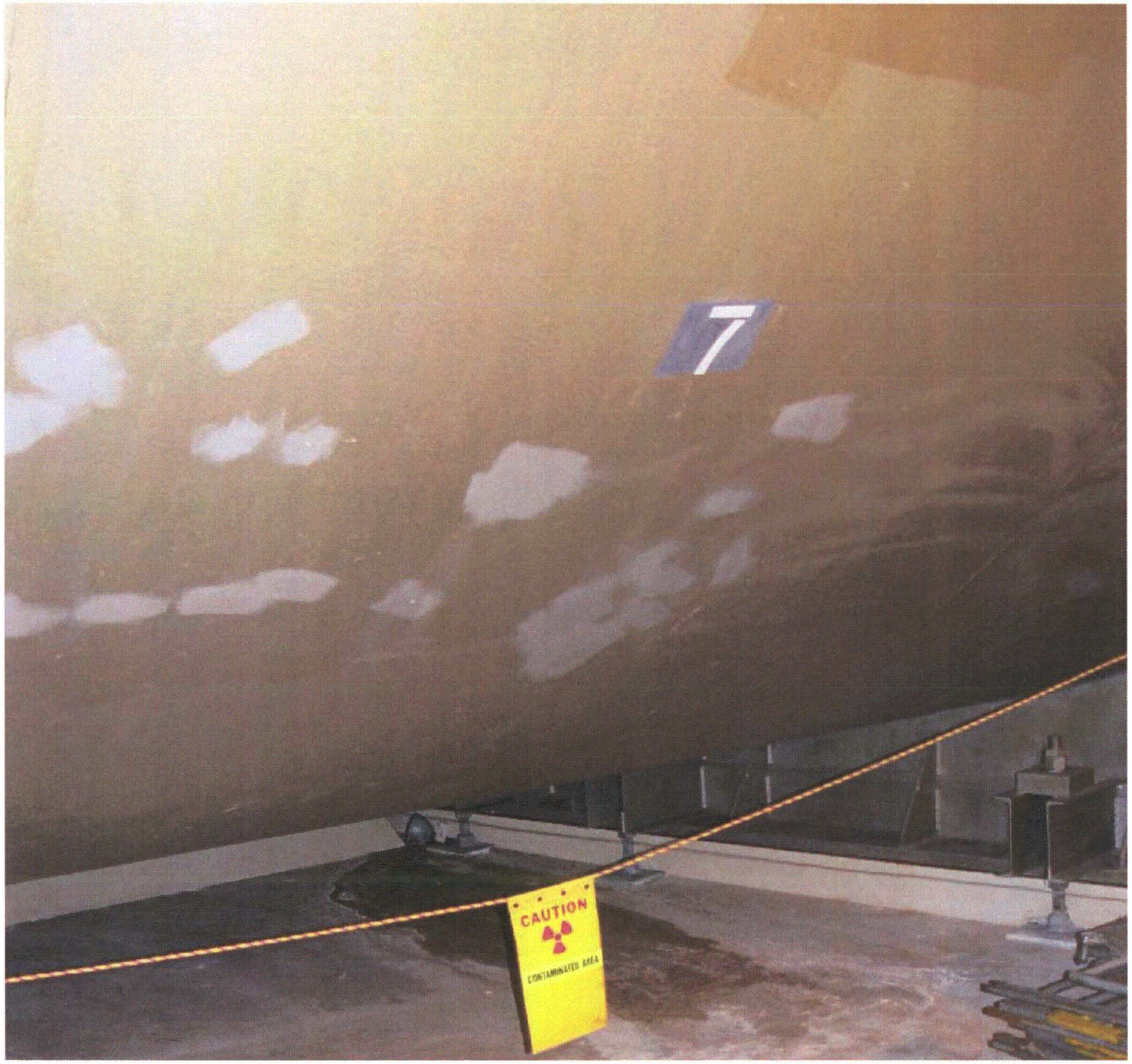
Containment Inservice Inspection
Torus Room Floor

Bay 7



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Containment Inservice Inspection

Torus Room Floor

Bay 8

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Containment Inservice Inspection

Torus Room Floor

Bay 9

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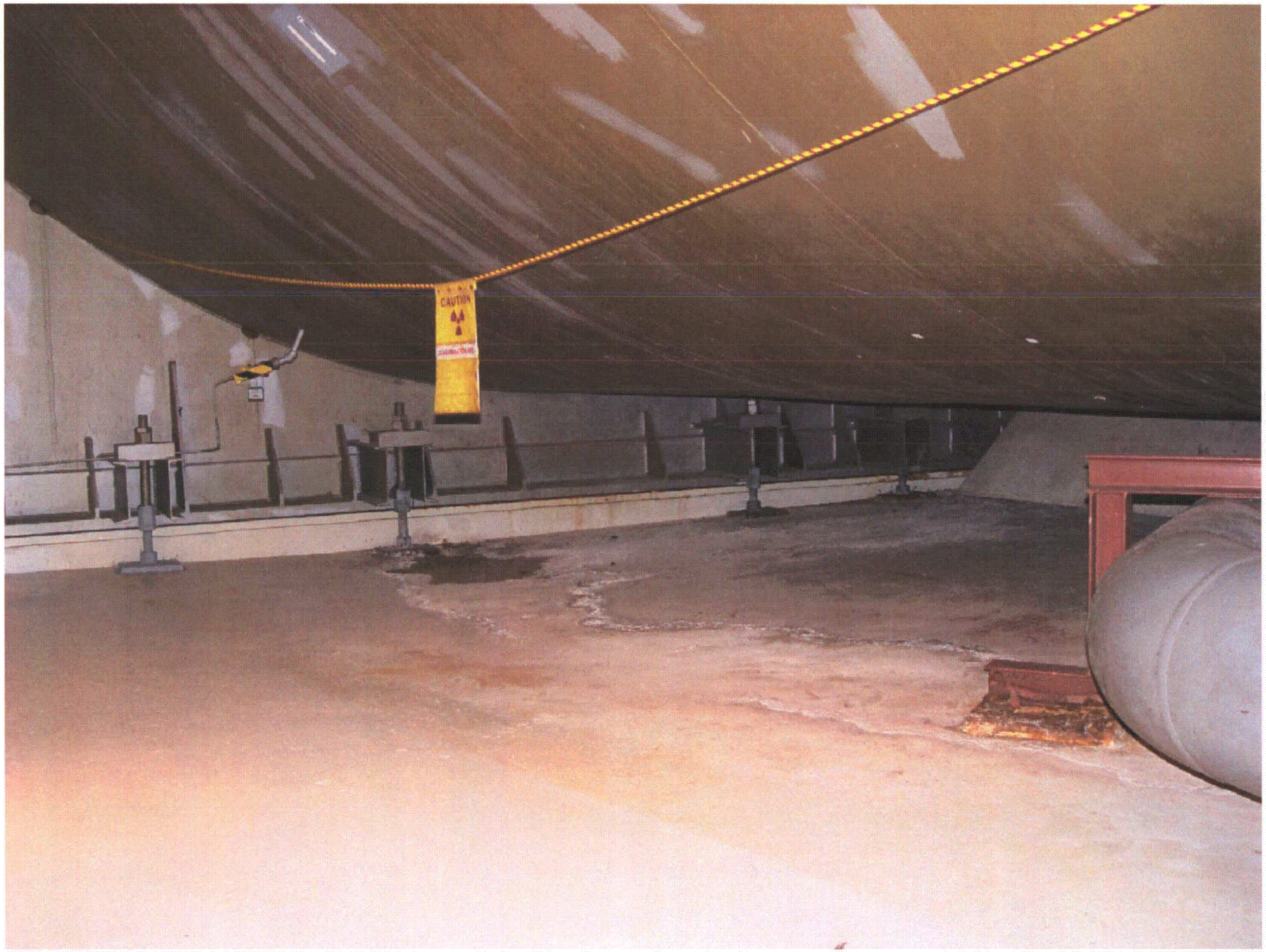
Containment Inservice Inspection
Torus Room Floor

Bay 10

Containment Inservice Inspection

Torus Room Floor

Bay 11



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Containment Inservice Inspection
Torus Room Floor

Bay 12

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Containment Inservice Inspection
Torus Room Floor

Bay 13

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Containment Inservice Inspection
Torus Room Floor

Bay 14

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Containment Inservice Inspection
Torus Room Floor
Bay 15

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Containment Inservice Inspection
Torus Room Floor

Bay 16

Back

Containment Inservice Inspection
Torus Room Floor

- **Concrete Cracking**
  - Pilgrim built to ACI 318-63 concrete code.
  - ACI 318 and NUREG/CR-6927 recognize concrete will crack under shrinkage, temperature and tension loading.
  - Design of concrete structures assumes cracking, and reinforcing steel is added to ensure structural integrity.
  - ACI 318 requires reinforcing steel to minimize cracking.
- **Leaching and Efflorescence**
  - Very limited leaching and efflorescence noted.
  - NUREG/CR-6927 notes this is unlikely to be an issue for high quality, low permeability concretes.

Containment Inservice Inspection
Water on Torus Room Floor

- **Concrete Water Chemistry**
  - Minimum degradation threshold limits for concrete established:
    - Acidic solutions with pH < 5.5
    - Chloride solutions > 500 ppm
    - Sulfate solutions > 1500 ppm
  - Pilgrim groundwater is non-aggressive to base-mat:

Date	pH	Chlorides (ppm)	Sulfates (ppm)
11/27/05	6.2	420	16
6/13/06	6.3	210	<5

  - Torus Room Floor Water Samples:

Date	pH	Chlorides (ppm)	Sulfates (ppm)	Calcium (ppm)
3/89	8.76	120		292
4/99	9.5			
2/07	9.45			
3/07	9.29	560	9.1	6.8

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Containment Inservice Inspection
Water on Torus Room Floor

- Assessment Findings
  - Groundwater migration is highly localized.
  - Path is through vertical joints and zones most likely weakened by tensions generated during setting and hydration following the construction.
  - Localized zones are discontinuities equivalent to a vertical cylindrical hole of a maximum diameter of 4 mm (1/6th in).
  - The localized calcium leaching does not affect the overall structural performance of the slab.

Containment Inservice Inspection

Water on Torus Room Floor

- Assessment Recommendations:
  - Calcium leaching may have degraded the grout in the annular space between the 3 in. diameter hole and the 2 in. diameter Williams rock anchors. An inspection of the grout and bolt is recommended.
- Assessment Conclusion:
  - The highly localized nature of the zones through which water penetrates, does not compromise the overall structural performance of the Torus base mat. It does not affect the bulk integrity of the concrete slab or the overall compressive and bending load bearing capacity of the reactor foundation.
  - Non-aggressiveness of ground water verified.
  - Condition of Anchor Bolts to be verified.

Containment Inservice Inspection
Torus Room Floor

- Verify Condition of Torus Hold Down Bolts (by sample)
  - Prior to Period of Extended Operation
- Determine Additional Actions Based on Torus Hold Down Bolts Inspection and Water Chemistry
  - Prior to Period of Extended Operation
- Monitor Chemistry Of Groundwater
  - Every Five Years
- Monitor Chemistry of Water on Floor
  - Prior to Period of Extended Operation
  - Once in First Ten Years
- Inspect Structure in Accordance with Structures Monitoring Program
  - Every Five Years

Reactor Vessel Neutron Fluence

OI 4.2

- Lack of benchmarking data to support plant specific fluence calculations for use in TLAAs

Reactor Vessel Neutron Fluence

- Current Licensing Basis
  - 10 CFR 50 App. G requirement for current operation
  - Current P-T curves valid through Cycle 18 (2011 RFO)
  - Commitment to Submit Action Plan for Resolution by September 15, 2007
  - Commitment to submit RG 1.190 calculations by June 8, 2010

Reactor Vessel Neutron Fluence

- Current Actions
  - Evaluate TLAAs to determine limiting Fluence
    - Limiting Beltline Adjusted Reference Temperature
    - Upper Shelf Energy
    - RPV Internals
    - RPV Welds
    - RPV nozzles near beltline
  - Core Shroud Fluence Limiting based on BWRVIP-35
  - Limiting Fluence values will not be challenged

Reactor Vessel Neutron Fluence

- Future Actions
  - Benchmark Computer Code using Pilgrim or other BWR3 Dosimetry Data
    - Previous commitment to submit action plan by September 15, 2007
  - License Condition to submit calculations consistent with RG 1.190 by June 8, 2010 which demonstrate limiting fluence values will not be reached during period of extended operation.

Questions