Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
US EPR Subcommittee Meeting

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Wednesday, January 12, 2010

Work Order No.: NRC-648 Pages 1-89

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, as reported herein, is a record of the discussions recorded at the meeting.

This transcript has not been reviewed, corrected, and edited, and it may contain inaccuracies.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

+ + + + +

US EPR SUBCOMMITTEE MEETING

+ + + + +

WEDNESDAY

JANUARY 12, 2011

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Dana A. Powers, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

DANA A. POWERS, Chairman

J. SAM ARMIJO, Member

SANJOY BANERJEE, Member

HAROLD B. RAY, Member

JOY REMPE, Member

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

NRC STAFF PRESENT:

SURINDER ARORA, NRO/DNRL

DAVID BROWN, NRO/DSER/RSAC

JOHN COLACCINO, NRO/DNRL

JIM STECKEL, NRO/DNRL

RAO TAMMARA, NRO/DSER/RSAC

DEREK WIDMAYER, Designated Federal Official

ALSO PRESENT:

GREG GIBSON, UniStar

TIM KIRKHAM, UniStar

TED MESSIER, AREVA

DAN PATTON, Bechtel

MARY RICHMOND, Bechtel

TABLE OF CONTENTS

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

(8:40 a.m.)

CHAIRMAN POWERS: The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards, US EPR Subcommittee. I am Dana Powers, Chairman of the subcommittee. ACRS members in attendance are, in principle, Sam Armijo, and Sanjoy Banerjee but they are off getting coffee and they will join us shortly; Harold Ray; Joy Rempe who is our distinguished visitor for this meeting and observer taking notes assessing our performance; Mike Ryan; and Dr. William Shack. Derek Widmayer is the ACRS staff member and is the Designated Federal Official for this meeting.

The purpose of the meeting is to continue our review of the safety evaluation report with open item for the Calvert Cliffs Nuclear Power Plant Unit 3. We will hear presentations on and discuss the first four sections of Chapter 2 entitled Site Characteristics of the Calvert Cliffs SER.

The subcommittee will hear presentations by and hold discussions with representatives of UniStar and the NRC staff and other interested persons

regarding these matters.

The subcommittee will gather relevant information today and plans to take the result of the review of this chapter along with other chapters of the Calvert Cliffs Unit 3 SER with open items reviewed by the subcommittee to the full committee at a future full committee meeting.

And right now, I think that future full committee meeting is tentatively scheduled for March, isn't it?

MR. WIDMAYER: Correct.

CHAIRMAN POWERS: And we may change our mind on that but that is the intention right here. Rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the *Federal Register*. We have received no requests from members of the public to speak at today's meeting.

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 the microphones located throughout the meeting room when addressing the subcommittee. They should first identify themselves and speak with sufficient clarity and

volume so that they may be readily heard.

Copies of the meeting agenda and handouts are available in the back of the meeting room. We have a telephone bridge line with the meeting room today and I understand we have participants from UniStar on the line at various times throughout the meeting. We request that participants on the bridge line identify themselves when they speak and to keep the telephone on mute during times when they are just listening.

Ah, Mr. Surinder you finally showed at our meetings, huh? All rested from you vacation, --

MR. ARORA: Yes, I am.

CHAIRMAN POWERS: -- and ready to go?

We will now turn to Surinder Arora, the NRO project manager for review of the Calvert Cliffs Unit 3 COLA for some introductory remarks.

MR. ARORA: Thank you, Dr. Powers. My name is Surinder Arora and I am the Calvert Cliffs Unit 3 Combined License Application Lead Project Manager for the NRC.

We have brought today Chapter 2 which was call as Group 1 and this comprises of 2.0, Sections 2.0 through Section 2.3. The remaining two sections, which are 2.4 and 2.5 will be presented to the ACRS

later.

I will start the presentation with an overview of the status of the Application for Calvert Cliffs combined license review. My brief overview of the presentation will be followed by UniStar's overview of Chapter FSAR and which then will be followed up by the NRC staff presentation.

We will start with slide number three, which provides the major milestones of the Calvert Cliff Combined License Application.

MEMBER RYAN: Excuse me. Could whoever is on the phone line put your phone on mute because your noise is coming through pretty loudly. Thank you.

MR. WIDMAYER: Oh, that was more than mute.

(Laughter.)

CHAIRMAN POWERS: That will teach you, Ryan.

MEMBER RYAN: That's okay by me.

MR. ARORA: Okay. Slide number three here, which is being projected now provides major milestones of the Calvert Cliff Combined License Application in chronological order. And the last two items on this which are the only ones I am going to discuss are the additions to the table.

In November we were here before the subcommittee and at that time we added to the list Chapters 10, 11, and 16, completed Phase III on them. So as of today before this Chapter 2, we have nine chapters which have already been through subcommittee review.

And then towards the end of the year last year, specifically on 12/20/2010, Revision 7 of the application was submitted by UniStar, which is the current latest revision of record.

The next slide, slide number four, provides currently published milestone dates for the six phases of the application review process. And as I noted on the note underneath the table, these target dates are currently being reviewed in light of the review schedule that we issued for the Design Certification Document which might affect these dates. And we will be reviewing these dates and changing them as necessary.

Slide five, which is my last slide, is giving the chapters that we have already completed and they are by groups as how they were presented to the ACRS committee. And Chapter 2, Group 1 is today's presentation, which will take us to about nine and a half chapters done and will meet the midpoint of the

application having 19 chapters, so we will be at 9.5 at the end of the day today.

CHAIRMAN POWERS: I don't think it is linear.

MR. ARORA: Pardon?

CHAIRMAN POWERS: I don't think it is linear.

(Laughter.)

MR. ARORA: That basically concludes my presentation of the schedules of the project. And I will answer any questions from the subcommittee, if there are any.

CHAIRMAN POWERS: Any questions that people would like to pose to Mr. Arora?

MR. ARORA: If not, then I will turn over the presentation to Mr. Gibson, so that they can start. He can introduce his presenters.

CHAIRMAN POWERS: It's all yours, sir.

MR. GIBSON: Thank you.

CHAIRMAN POWERS: You've got some new faces. You have got one new face.

MR. GIBSON: Well we do and I wanted, therefore, to do an introduction myself. Welcome. My name is Greg Gibson. I am the Vice President of Regulatory Affairs for UniStar Nuclear Energy. My

background, or those of you who don't know me, I have a bachelor's degree from Georgia Institute of Technology in physics. I also have a master's an MBA.

I have 35 years in the nuclear industry. I started out with the Nuclear Regulatory Commission. I had eight years with the NRC right after the TMI.

I then went to Southern California Edison and had the distinct pleasure of working for Harold Ray at San Onofre.

CHAIRMAN POWERS: That is the real reason we cut you a little break. We figure you had suffered enough.

(Laughter.)

MR. GIBSON: I worked for Harold for 23 years. Then I went to South Texas Project where I worked as a Regulatory Affairs Manager for the first submitted COLA application.

And then UniStar made me an offer I couldn't refuse and I moved to Baltimore, where we are heading up the UniStar efforts for the EPR RCOLA and the SCOLAs.

CHAIRMAN POWERS: Now Texas to Baltimore, that must have been a good offer.

MR. GIBSON: But I keep going to the right coast.

But I also have perhaps met many of you through the American Nuclear Society. I have been very active in the Society. I was also the Chairman of the Operations Power Division. I have been several national committee chairmen on organizing committees for the Utility Working Conference and for several of the national meetings.

So with that, I am pleased to be here today. Let me be probably the last person to say Happy New Year but we are very appreciative of the opportunity to come before the committee and to continue with our presentations on the Calvert Cliffs Unit 3 SER.

With that today we are going to be focusing our presentation on Chapter 2.0 through 2.3. As you may recall, as you read through our application, the RCOLA was authored utilizing the standard incorporate by reference. So we have used that from the Design Certification Document.

We will only be talking about information which is either a departure, an exemption, or a site-specific information for the Calvert COLA.

We did have already AREVA come in for the design certification. They met with the ACRS staff on November the third.

So with that, I would like to outline our presentation. I am joined here by Tim Kirkham and Mary Richmond. We also have individuals supporting us from our Bechtel and AREVA team. And Dan Patton is here as is Ted Messier. Pedro Perez and Robert Mickler, I believe are on the telephone. So we will hopefully have them join us, if we need them.

And again, we will be focusing on site-specific information dealing with Chapter 2, which is Site Characteristics.

Again, our FSAR we specifically went through the Design Certification Document and looked for areas where we departed from those. As you will hear later in Chapter 2.3, we actually have three departures, one of which is also an exemption. I don't want to spoil the ending but one deals with wet bulb temperature and two of them deal with chi/Q values. And we will talk about that obviously when we get to Chapter 2.3.

But we do want to tee up our site-specific parameters to discuss them with you and to let you know that they are bounded with the exception of the three cases that we will discuss in detail. They are bounded by the analysis, which is performed by the US EPR and the design certification. And so we will take

each one of these and provide an overview of each one of the individual chapters.

So with that, I would like to introduce Mary Richmond.

MS. RICHMOND: Thank you.

MR. GIBSON: Mary?

MS. RICHMOND: Good morning. I am Mary Richmond with Bechtel. Today, I will be presenting some site-specific information related to Sections 2.1 and 2.2.

I have a master's degree in environmental engineering from Johns Hopkins University and I have over 25 years' experience in the environmental field.

CHAIRMAN POWERS: You must have started at six.

(Laughter.)

MS. RICHMOND: No. The last four and a half years of which I have been working on about six COL and EST applications, with the primary responsibilities in the hazardous analysis work.

First we will be starting with 2.1, which is the geography and demography of the site. The Calvert Cliffs Unit 3 site is located in the southeastern sector of Calvert County. Calvert County is a peninsula. It is bounded by the Chesapeake Bay

on the east and the Patuxent River on the west. Some of the closest metropolitan centers to the site are Annapolis, Maryland, which is 35 miles to the north, Baltimore, which is 60 miles to the north, Washington, D.C., 25 miles to the northwest, and Richmond, Virginia, which is 80 miles to the southwest.

This slide provides a bit of a perspective of the site's location. The site location is represented by the yellow star kind of in the middle there. It just gives you an idea in relation to some of the geographical features we will be discussing today. You can see the Chesapeake Bay on that slide.

MEMBER BANERJEE: Do you have the topography, Mary, somewhere?

MS. RICHMOND: I don't believe we have a slide of the topography. It is basically kind of rolling hills. It's got the cliff down to the Calvert Cliffs, to the Chesapeake Bay from there.

MEMBER BANERJEE: It is pretty flat on top?

MS. RICHMOND: On top is, I would say, gently rolling. Lots of trees.

MEMBER BANERJEE: What is the elevation over the Bay?

MS. RICHMOND: I am not sure what the

elevation is over the Bay.

MEMBER BANERJEE: You are going to -- It is in the report?

MR. GIBSON: Yes.

MS. RICHMOND: Right.

MEMBER BANERJEE: What is the nearest railway line and things?

MS. RICHMOND: There are no rail lines for this site that come within five miles. And when we get into that, I will tell you all the nearest industrial facilities and we will kind of outline that for you in the 2.2 discussion. Okay?

MEMBER SHACK: Elevation ranges from zero meters to 46 meters.

MS. RICHMOND: Thank you. The closest population center to Calvert Cliffs Unit 3 defined by 10 C.F.R. 100.3 is St. Charles. St. Charles has a population of 33,379, based on the 2000 census. It is located approximately 26 miles from Calvert Cliffs Unit 3, which meets the requirements of 10 C.F.R. 100.11(a)(3), which basically stipulates that the population center be at least one and one-third times the distance from the reactor to the outer boundary of the low population zone.

The low population zone for Calvert Cliffs

Unit 3 is a circle with a radius of one and half miles centered on Calvert Cliffs Unit 3. This provides a distance between St. Charles and the site much greater than the required distance in 10 C.F.R. 100.11(a)(3).

And as you will see on the next slide, Calvert Cliffs Unit 3 site also meets the population density criteria found in Reg Guide 4.7. That is, the areas adjacent to Calvert Cliffs Unit 3 don't exceed 500 persons per square mile averaged over any radial distance out to 20 miles at the time of COL approval and within five years thereafter.

And this is a graphical representation of the population density requirements. As you can see, the projected population density for the year 2015 and that is kind of like a greenish line, which is the assumed year of the initial operations, is well below the 500 person per square mile criterion. And the graph also shows the projected population density for the year 2055, which is the assumed ending year of operations. This population density is less than 1,000 persons per square mile and that is a benchmark that is used.

The exclusionary boundary for Calvert Cliff Unit 3 is a circle with a radius of about 0.6 miles. This boundary establishes a radius of at least

a half a mile from any potential release point at the site. The ownership of Calvert Cliffs Unit 3 possesses the authority to determine all activities, including the exclusion and removal of personnel and property.

The control of access will be provided by posting the boundary and performing security patrols. There are no state or country roads or railways which traverse the EAB.

There are portions of the EAB that do extend into Chesapeake Bay. These will be posted by buoys and there is an ongoing agreement so that will be continued with the United States Coast Guard and the Maryland Department of Natural Resources Police.

MEMBER ARMIJO: Do you have peers and landings near the site or at the site?

MS. RICHMOND: Marinas?

MEMBER ARMIJO: They have their own but it is not used too often. There are two marinas within five miles of the site that we did take a look at and screened them in Section 2.2. We did identify two marinas.

MEMBER ARMIJO: Those are for public use or --

MS. RICHMOND: For public use. They are

recreational marinas. Okay?

And now we will be presenting site-specific information relating to nearby industrial, transportation, and military facilities.

The potential external and internal hazards, facilities and activities within five miles and airports within ten miles of Calvert Cliffs Unit 3 were identified. We also looked at facilities at greater distances if they met a significance -- if they were significant and we thought they needed to be looked at.

The transportation routes that we identified were Maryland 2/4, the Dominion Cove Liquefied -- it is a pipeline they have associated with it. It comes within a few miles of the facility. And then we also looked, we identify on-site transport and storage of chemicals related to Calvert Cliffs Units 1, 2, and 3; an external facility, the Dominion Cove Point Liquefied Natural Gas Facility.

And we identified two marinas and an airfield within five miles of the site. Each marina screened and so did the airfields. We looked at the chemicals stored at the marinas. Basically it was gasoline, number two fuel and propane. Those chemicals were stored closer in greater quantities.

So that analysis would bound anything stored at the marinas.

MEMBER BANERJEE: Do you have a map showing where these things are, these facilities?

MS. RICHMOND: In the SAR section, we do have a map showing the location of all of the facilities.

MEMBER BANERJEE: Could you just later on give me the number?

MS. RICHMOND: In the SER? Okay. Do you have it? Dan has it.

MR. PATTON: This is Dan Patton from Bechtel. It is in the application. It is figure 2.2.1.

MEMBER BANERJEE: And what is the closest large store of liquefied gases like propane and things?

MS. RICHMOND: The closest, for propane what we did, we analyzed the transport of it on Maryland 2/4. And I believe Maryland 2/4 comes within a mile and a half. Dan, was that --

MR. PATTON: A mile and a half. This is Dan Patton. That is correct. It is a mile and a half.

MS. RICHMOND: Right. So we evaluated the

transport of it because that was the closest.

MEMBER BANERJEE: And that is just propane which is transported by truck?

MS. RICHMOND: Truck. Exactly.

MEMBER BANERJEE: And what is the sort of volume of that? How many gallons?

MS. RICHMOND: We used 50,000 pounds and released the whole quantity. Since it was a liquefied gas, we assumed the rupture and we assumed the immediate detonation of the full load of 50,000 pounds.

MEMBER BANERJEE: Did you look at the vapor cloud as well?

MS. RICHMOND: Yes, we did do a vapor cloud explosion analysis in addition to that.

MEMBER BANERJEE: And what about transport of the vapor clouds?

MS. RICHMOND: Yes. We used ALOHA to disburse and transport it and then it was detonated using the dispersion model.

MEMBER BANERJEE: As long as you are going UFL, LFL?

MS. RICHMOND: Exactly. We did the distance to the LFL for propane also.

MEMBER BANERJEE: Was propane the worst or

were the others?

MS. RICHMOND: We did propane. For transport propane was probably the -- Yes, that was the founding chemical.

MEMBER BANERJEE: Well I don't want to ask you questions which you don't talk about.

MS. RICHMOND: That's okay. We are actually at the slide now. So, we can --

MEMBER BANERJEE: All right. What about butane, then? Was there any butane?

MS. RICHMOND: What we did was a search of all this. Because it is a peninsula, we did a search of all the ports, of all the facilities in Calvert County and Saint Mary's. Otherwise, there really wouldn't be a likelihood of transporting them out.

We did a screening analysis. The commodities going up and down Route 2/4 that we looked at were propane, gasoline, and then there was ammonium hydroxide, 19 percent rate.

MR. PATTON: And aviation gasoline.

MS. RICHMOND: And aviation gasoline.

MEMBER BANERJEE: Of these, propane was the one that had the highest hazard?

MR. PATTON: That is correct.

MEMBER BANERJEE: And it was well below

your 1.5 or whatever?

MS. RICHMOND: It was, yes.

MEMBER BANERJEE: And you used ALOHA and you ignited it?

MS. RICHMOND: Right. For the vapor cloud explosion, we used ALOHA to disperse and ignite the cloud. And then we also did a TNT equivalency detonation right at the source. So we looked at both, two scenarios there.

MEMBER BANERJEE: And the worst case was at the source or after the --

MS. RICHMOND: The travel.

MEMBER BANERJEE: Yes.

MS. RICHMOND: Yes.

MEMBER BANERJEE: And what distance was that on the plant when you got ignition on that?

MS. RICHMOND: Dan, do you have that?

MR. PATTON: This is Dan Patton from Bechtel. The distance from the site is approximately 2,000 feet from the point of the 1 psi threshold to the site, approximately 2,000 feet.

MEMBER BANERJEE: And your ignition, when did you go below LFL in terms of dilution? This was pascal f weather or --

MS. RICHMOND: We did a met sensitivity

analysis. I believe pascal f at one meters per second was our worst case scenario. The distance to the LFL was --

MR. PATTON: The distance to the LFL from the source was 2300 feet.

MEMBER BANERJEE: Seems reasonable.

MS. RICHMOND: Right. It was a pretty conservative analysis.

MEMBER BANERJEE: It is not a very big source. Right?

MS. RICHMOND: Right. And we didn't take in -- We were pretty conservative. We didn't take any topography of the site. So we assumed it was open country. So we didn't use a roughness factor.

MEMBER BANERJEE: Is it fairly open on the highway?

MS. RICHMOND: I think there are some trees, some, but it is not --

MEMBER BANERJEE: But is not big hills or anything?

MS. RICHMOND: No. We don't have cliffs or anything between the road the site.

MEMBER BANERJEE: That was your limiting vapor cloud explosion.

MS. RICHMOND: For the transport on 2/4,

right.

MEMBER BANERJEE: Were there any other sources nearby or heavy gases, heavy liquefied gases, other than that transport line?

MS. RICHMOND: Other than that transport, we have the pipeline.

MEMBER BANERJEE: That is liquefied natural gas.

MS. RICHMOND: Right. Right. For heavy gases, I think that is it. Right? That's it for the heavy gases.

MEMBER BANERJEE: And with the LNG, are you going to talk about the LNG lines?

MS. RICHMOND: We can talk about the LNG, yes.

MEMBER BANERJEE: You are going to.

MS. RICHMOND: Well, I can. This is our slide for hazard.

MEMBER BANERJEE: Oh, okay.

MS. RICHMOND: So, whatever questions.

MEMBER BANERJEE: Oh, then I will ask you the question.

What did you do with the LNG? Did you take into account that it would behave like a heavy gas in the early stages of release?

MS. RICHMOND: Yes because of the aerosolization when we used the ALOHA model.

MEMBER BANERJEE: Does ALOHA take into account the mist that also forms when you have cold gases? I don't know ALOHA at all.

MS. RICHMOND: Yes. It only uses DEGADIS.

MEMBER BANERJEE: It is DEGADIS. Right?

MS. RICHMOND: Right, it is DEGADIS and that is what it does.

In some cases you have to know when you are using the model to make sure that it takes that into account and you can make sure that it uses the DEGADIS model for some of these liquefied gases. So when we are doing that, we always make sure.

It will give you a warning in some cases to make sure that you use. And so we usually do it. We usually run both models and do a comparison. But when we are working with like a liquefied gas we know that as soon as it is released like that, it is going to be heavy because of the aerosol particles in it.

MEMBER BANERJEE: Yes and it will also form mist, which we tend to keep --

MS. RICHMOND: Keep it on the ground for much longer. You are right

MEMBER BANERJEE: -- longer. Right. And

your analysis takes that into account.

MS. RICHMOND: Yes, it does.

MEMBER BANERJEE: And the LNG, you have a source and you have a pipeline. Right?

MS. RICHMOND: Right.

MEMBER BANERJEE: How close are those to the --

MS. RICHMOND: The pipeline came within 1.2 I want to say.

MEMBER BANERJEE: Miles?

MS. RICHMOND: Miles, yes. Yes. And the actual facility is 3.2 miles away.

MEMBER BANERJEE: And how large is the pipeline?

MS. RICHMOND: Thirty-six inch diameter.

MEMBER BANERJEE: Oh, okay. So this is a real pipeline --

MS. RICHMOND: This is a real pipeline.

MEMBER BANERJEE: -- coming to the plant and everything. Okay.

And did you, for the pipeline you took block valves and the amount of stuff between them or what?

MS. RICHMOND: What we did was because the pipeline comes from the Dominion Cove Point Liquefied

Natural Gas facility, we said that it was an infinite reservoir source because of the large tank there.

MEMBER BANERJEE: Okay.

MS. RICHMOND: So we didn't take any of the block valves into account.

MEMBER BANERJEE: So you had a continuous plume?

MS. RICHMOND: Had a continuous, right.

MEMBER BANERJEE: And you ignited that.

MS. RICHMOND: Exactly.

MEMBER BANERJEE: Okay.

MEMBER SHACK: Is there going to be a second pipeline when the expansion is done?

MS. RICHMOND: A second pipeline, yes, when the expansion is finished. It won't go closer than the pipeline than we analyzed. The expansion from what we are aware of, will actually in the vicinity of the site, will actually go further away.

Much of the new pipeline will run alongside it but in the vicinity of Calvert Cliffs, it kind of veers off and comes back around.

MEMBER BANERJEE: And so in this case, was the pressure wave less than the one from the propane or more or what?

MS. RICHMOND: Actually I think the

distance to one psi was 5,808 feet, Dan, for that analysis.

MEMBER BANERJEE: So that was a little closer.

MS. RICHMOND: Right.

MEMBER BANERJEE: And this plume now, you had pascal f type weather, everything?

MS. RICHMOND: Yes.

MEMBER BANERJEE: You took the worst possible --

MS. RICHMOND: Exactly. We did a met sensitivity analysis when we did the run. Right. We usually always do that. We will take the defined pascal classes and we will do a sensitivity analysis to make sure that we have captured the worst case meteorological conditions.

MEMBER BANERJEE: Going towards the plant and everything.

MS. RICHMOND: Right straight toward the plant. We don't take into account the prevailing meteorological conditions. We just say if this is the worst case, the conditions from the receptor straight line to the source.

MEMBER BANERJEE: So with this, the pipeline I guess, you are limited by critical flow as

to what the plume would be. Right?

MS. RICHMOND: Right.

MEMBER BANERJEE: And you did a double-ended guillotine of the pipeline.

MS. RICHMOND: A complete break.

MEMBER BANERJEE: Right. Okay, so I understand that.

With the facility, which is a little further away, of course, did you fail the facility, the largest tank instantaneously or what did you do there?

MS. RICHMOND: What we did, because the facility is much further way, when the Dominion Cove Liquefied Natural Gas went before FIRC, they did a whole risk plan. So they did do a risk analysis where they simultaneously released all the contents of the large tanks. Their distances were much lower than the distance we got from the pipeline because the pipeline is much closer. So we consider the pipeline the bounding case. And that is the only one that we did.

MEMBER BANERJEE: But this potentially could be a larger source if you formed a pool which boiled off.

MS. RICHMOND: Right. And the tanks are burned.

MEMBER BANERJEE: They are burned. So you took that area, or somebody did.

MS. RICHMOND: They did. Right. They did analyze that area when they did the loss of all of times together.

MEMBER BANERJEE: But you didn't do an independent analysis of this?

MS. RICHMOND: We didn't do an independent analysis of that. We did do one for the pipeline but not for the tanks.

MEMBER BANERJEE: How large is the pool radius, do you know?

MS. RICHMOND: The --

MEMBER BANERJEE: Between the berm, I mean it is bermed. Right?

MS. RICHMOND: I know what you are saying. What is the diameter of the berms. Dan has got the report. I know it is towards the back where the modeling is.

MEMBER BANERJEE: And they did this analysis using the usual heat transfer models, --

MS. RICHMOND: Yes.

MEMBER BANERJEE: -- mass transfer models, et cetera, from the pool.

MS. RICHMOND: Right. Exactly.

MEMBER BANERJEE: That you will have in your report.

MS. RICHMOND: Right. It wasn't ALOHA they used. They used a similar model, I think, from Shell to do the analysis.

MEMBER BANERJEE: HEGADAS, probably.

MS. RICHMOND: It was -- It seemed like it was --

MEMBER BANERJEE: Some variation of that.

MS. RICHMOND: Yes. Yes, because it was very similar. They laid out what their assumptions were to what we had done for ALOHA.

MEMBER BANERJEE: Okay. Because the pool can have --

MS. RICHMOND: Right.

MEMBER BANERJEE: -- potentially have a large diameter --

MS. RICHMOND: Right.

MEMBER BANERJEE: -- and have a fairly large evaporation rate.

MS. RICHMOND: And that was limited by the berms.

MEMBER BANERJEE: Right. So that is what limited the evaporation rate. Right?

MS. RICHMOND: Right. And they did do a

complete failure. And actually they went further than what we would have done because were would have taken the largest tank and failed it. They simultaneously failed all seven tanks at the site when they did it.

MEMBER BANERJEE: Well it could happen because these things propagate --

MS. RICHMOND: Right.

MEMBER BANERJEE: -- if it does blow.

MS. RICHMOND: And that is what they did. They did look at that.

MEMBER BANERJEE: Did they also look at BLEVEs?

MS. RICHMOND: They didn't consider that to be the limiting case. They looked at jet --

MEMBER BANERJEE: No, it is too far.

MS. RICHMOND: Right. It is very far. Three miles we are not going to get the BLEVE for the heat. So we didn't go ahead and do that analysis.

They did look at jet fires for the pipeline and that was well within. It was much less than the distance that we got for the one PFI vapor cloud explosion. That was kind of the limiting distance for the pipeline.

MEMBER BANERJEE: So what did they say? It is less than a kilowatt per meter squared or

something like that for these clouds of radiation?

MS. RICHMOND: What they did do is -- Well, they committed, there is, FIRC has a limitation to keep it under I believe nine and a half kilowatts per meter square on their site. What Dominion has committed to doing is to keep it below five kilowatts per meter squared on their site. Now that is three miles away. So there is --

MEMBER BANERJEE: Yes. So it would be less than --

MS. RICHMOND: The thermal radiation from that is not going to be an issue.

MEMBER BANERJEE: Less than a kilowatt per meter squared.

MS. RICHMOND: Exactly.

MEMBER BANERJEE: Just sunlight.

MS. RICHMOND: Right. That is not going to be an issue.

MEMBER BANERJEE: Okay, I think I have got the picture.

MS. RICHMOND: Okay.

MEMBER BANERJEE: You are going to talk about toxic chemicals. Right?

MS. RICHMOND: I can. We did explosions and I think we covered most of the explosions now.

But the analysis that we did demonstrates that an overpressure of 1 psi won't exceeded for any safety-related structure for any of the postulated event scenarios that we considered.

We also looked at flammable and explosive vapor clouds that delayed ignition category in 1.2.6. We looked at the flammable distance to the lower flammable LFL. We also looked at the distance of 1 psi for the traveling vapor cloud. And for the pipelines, we also presented the jet fire distance on the thermal clouds.

MEMBER BANERJEE: On the pressure wave calculation, --

MS. RICHMOND: Right.

MEMBER BANERJEE: -- as you know with unconfined vapor cloud explosions, it depends on the degree of partial confinement.

MS. RICHMOND: Right. We assumed, we conservatively -- What we did is we assumed that it was going to detonate.

MEMBER BANERJEE: Completely --

MS. RICHMOND: We just detonated.

MEMBER BANERJEE: Oh, you detonated it.

MS. RICHMOND: Yes. So we were very conservative for a worst-case scenario. We detonated

it. We didn't --

MEMBER BANERJEE: That is very conservative.

MS. RICHMOND: Yes. Yes because that is never going to happen. But that is what we do and it meets that then we know we are good.

MEMBER BANERJEE: Yes, that is very conservative.

MS. RICHMOND: Yes.

MEMBER BANERJEE: Okay.

MS. RICHMOND: And we also looked at toxic chemicals and our analysis demonstrate that a toxic vapor cloud involving any of the identified chemicals would not affect the safe operation of Calvert Cliffs Unit 3.

MEMBER BANERJEE: What was the nearest source?

MS. RICHMOND: I believe ammonium hydroxide storage from the Calvert Cliffs Unit 1 was the bounding case in this.

MEMBER BANERJEE: I noticed your HCl was higher. Where did that come from?

MS. RICHMOND: Actually, our hydrochloric acid stored at Unit 1 and the analysis that we performed show there was not going to be an issue with

the hydrochloric acid. I think that was primarily a difference in the way that -- I think the NRC had a bit of an issue when they did hydrochloric acid.

Now when we did our analysis, it is a solution, sort of a solution. So we took into account that it was a solution. And I am not positive but the NRC might have --

MEMBER BANERJEE: Vaporized it.

MS. RICHMOND: Yes.

MEMBER BANERJEE: And so the hydrochloric acid and what was the other one?

MS. RICHMOND: The one, our bounding case was --

MEMBER BANERJEE: Ammonium hydroxide?

MS. RICHMOND: -- ammonium hydroxide.

MEMBER BANERJEE: Okay.

MS. RICHMOND: That was our bounding case.

MEMBER BANERJEE: And what was the -- it was just the materials stored at the other site.

MS. RICHMOND: Exactly in Unit 1.

MEMBER BANERJEE: There were no other sources of toxic materials.

MS. RICHMOND: Right. Exactly. There was nothing else within five miles than those chemicals stored at 1 and 2.

MEMBER BANERJEE: What about along this road? Are there any toxic chemicals transported?

MS. RICHMOND: We looked at ammonium hydroxide for the chemical transported along 2/4. And from the SARA reports, it was concentration strength of 19 percent that we looked at going up and down 2/4.

MEMBER BANERJEE: There was no liquid ammonia transported.

MS. RICHMOND: No anhydrous ammonia transported. There is some transported by barge along the Chesapeake Bay and we did look at that.

MEMBER BANERJEE: And how far is that?

MS. RICHMOND: To the navigable waterways, 11,678 feet.

MEMBER BANERJEE: That's a long way.

MS. RICHMOND: That's a long way. Right. And the anhydrous ammonia was the limiting chemical there. And we did look, when we looked at the anhydrous ammonia, we did the analysis. We had also screened out on the Reg Guide 178 criteria, we talked to the Army Corps of Engineers, that is where we got the data from for the barge transport, and they told us it was less than five shipments per year and the screening criteria is 50.

MEMBER BANERJEE: And there is not

chlorine --

MS. RICHMOND: It couldn't give us exact numbers.

There was no chlorine. We looked at a couple different years.

MEMBER SIEBER: So they don't use chlorine as a biocide in the plant either.

MS. RICHMOND: Sodium hydrochloride.

MEMBER SIEBER: Okay.

MEMBER BANERJEE: All right. So the ammonium hydroxide presumably was not a problem at the control room or anything. Was it higher than the toxicity --

MS. RICHMOND: It was higher outside but we were able at the end to screen that one out.

MEMBER BANERJEE: How much higher was it?

MS. RICHMOND: Dan's got the numbers.

MR. PATTON: This is Dan Patton from Bechtel. The ammonium hydroxide from the Unit 1 source was higher than the IDLH. It was approximately 700 parts per million in the control room is what we had calculated.

MEMBER BANERJEE: Outside?

MR. PATTON: No, inside as well.

MEMBER BANERJEE: Inside.

MR. PATTON: We were able to disposition that through a probability analysis. It is a double-walled tank and we looked at the failure probability of the double-walled tank and we were able to screen it out from that standpoint.

MEMBER BANERJEE: But at the outside of the control room, it was what? You said inside the control room was 700.

MS. RICHMOND: Outside. Right. What was outside the control room? Do you have that number?

MR. PATTON: I don't have that number right with me.

MEMBER BANERJEE: Well you took into account all the --

MS. RICHMOND: We did not. That analysis was extremely conservative, which is probably why the NRC didn't have a problem with it. We didn't take into account the double-walled tank going into the analysis. We didn't take into account it is stored in a tank farm and there is a sump.

Also, the way it is stored, the tank is here and there is buildings between it where the Unit 3 site was.

MEMBER BANERJEE: You didn't take building --

MS. RICHMOND: We didn't, no, or the topography. We didn't take any of that into account when we did the model.

MEMBER BANERJEE: Oh, you just did a plume.

MS. RICHMOND: We did a straight shot plume from the tank to --

MEMBER BANERJEE: That is pretty conservative.

MS. RICHMOND: Extremely. Exactly.

MEMBER BANERJEE: But with that, you came well above the IDLH.

MS. RICHMOND: Exactly.

MEMBER BANERJEE: And the mixing into the control room, how did you do that?

MS. RICHMOND: We used ALOHA to do that.

MEMBER BANERJEE: Does ALOHA have a module to do that?

MS. RICHMOND: Yes, it does. You provide ALOHA with the input for the air exchange rate per hour and then we will give you the indoor concentration.

MEMBER BANERJEE: And then the staff did some confirmatory calculations, right, on this?

MS. RICHMOND: Right.

MR. STECKEL: Yes.

MEMBER BANERJEE: And that was the limiting. There was nothing else.

MS. RICHMOND: That was. For our analysis it was. I believe they had a different limiting case in their analysis.

MEMBER BANERJEE: Well we will hear from you guys.

MS. RICHMOND: We will hear from them.

MEMBER BANERJEE: You used HABIT, I take it.

MR. BROWN: This is Dave Brown from the staff. Yes for this chapter when we are doing this review, we used ALOHA as the applicant did to do some confirmatory calculations. The Containment and Ventilation Systems Branch does use HABIT when evaluating control room habitability.

MEMBER BANERJEE: But did you --

MR. BROWN: So there is a handoff here between our branch in that --

MEMBER BANERJEE: Right.

MR. BROWN: -- we are looking at what is the concentration at the intake. Then if it exceeds the IDLH, we hand off to the Containment and Ventilation Systems Branch and they do the

habitability review.

MEMBER BANERJEE: We will hear from both of you. Right?

MR. BROWN: I'm sorry?

MEMBER BANERJEE: We will hear from both sides.

MR. BROWN: Yes.

MEMBER BANERJEE: Okay.

MR. BROWN: Today we are just talking about Chapter 2.

MEMBER BANERJEE: Right.

MR. BROWN: You know, Chapter 6 would be a different presentation.

MEMBER BANERJEE: You take it to the intake and then from the intake to the interior we want to know really what is happening inside.

MR. BROWN: So if I could just, I will just elaborate.

MEMBER BANERJEE: Yes.

MR. BROWN: Questions came up about hydrochloric acid. The only one from our point of view when we did the Chapter 2 review, which was an onsite chemical the spill of which resulted in an IDLH greater than IDLH concentration at the control room intake. So we just notified the Containment and

Ventilation Systems Branch, hey guys, take a look at this one.

MEMBER BANERJEE: And they took a look and you are going to tell us about what happened.

MR. BROWN: And the result that I believe the applicant came up with it was 17 parts per million inside the control room. And the evaluation of that is the other branch, Chapter 6.

MEMBER BANERJEE: Well we will hear from you. Right?

MR. BROWN: I'm sorry?

MEMBER BANERJEE: We are going to hear from you.

CHAIRMAN POWERS: Not today.

MR. BROWN: Not today.

MEMBER BANERJEE: Oh, not today. Okay.

MR. BROWN: That's Chapter 6.

MEMBER BANERJEE: All right.

MR. BROWN: I'm not aware of any issues with that review but it is a different branch that would report back on that.

MEMBER BANERJEE: All right.

MS. RICHMOND: Okay?

MEMBER BANERJEE: Mary, the interrogation is over.

(Laughter.)

MS. RICHMOND: All right, next slide.

We also looked at airway hazards for the site. We identified two airways, V31 and V93, which pass closer than the two statute miles. The nearest edge will pass closer than two statute miles to the edge of Calvert Cliffs Unit 3 site.

We also identified two airports within ten miles, Captain Walter Francis Duke Regional Airport and the Patuxent River Naval Air Station. And both of these airports had operations above the significant levels identified in NUREG-0800.

Therefore what we did in the hazards analysis is we did a determination of the total frequency of aircraft impact into the facility. This calculation was based on the DOE standard.

The results that we got indicated that further evaluation beyond a frequency evaluation was warranted to account for core damage and containment release frequencies in the analysis. Further evaluation was conducted in Chapter 19 where PRA was performed and it was concluded that the aircraft crash could be screened out for the Calvert Cliffs Unit 3 design.

And I will turn it over to Tim.

MR. KIRKHAM: All right. For those of you who haven't heard my story before, I am Tim Kirkham. I am a health physicist for UniStar. Quick background: Purdue University; 30 years of health physics rad protection technical and management experience at Southern Company, Savannah River, Exelon and Constellation for the quick and dirty.

Okay, slide 21, John. A COL item request that we provide site-specific regional climatology characteristics for the new reactor. Several parameters are presented in the design envelope table of the Calvert Cliffs 3 FSAR but five of those are of interest to Chapter 2.3. The five are listed here.

The values on the left column are the EPR values and on the right are the Calvert 3 values. You can follow down this chart.

CHAIRMAN POWERS: Where did those come from?

MR. KIRKHAM: Table 2. --

CHAIRMAN POWERS: No, no, no. Where did you get the entries?

MR. KIRKHAM: Oh. I thought you wanted to know where the table came from. Where did the --

CHAIRMAN POWERS: It's a good answer. I liked it.

(Laughter.)

MR. KIRKHAM: Be more specific.

CHAIRMAN POWERS: Well how do you know that there is 38 pounds per square foot for your snow load?

MR. KIRKHAM: Those were calculated by our meteorological folks.

MR. MESSIER: Yes, using the Interim Staff Guidance on snow loads.

CHAIRMAN POWERS: Yes, you are still not helping me. You had to use some data someplace.

MR. MESSIER: Yes. You can follow along in that guidance using --

COURT REPORTER: Can you use the microphone?

MR. WIDMAYER: And you said introduce yourself. I'm sorry.

MR. MESSIER: Oh, I'm sorry. I'm Ted Messier from AREVA, one of our meteorologists. And we followed along with Interim Staff Guidance on calculating snow loads, which looks at historical snow fall and snow pack information at the site and determine --

CHAIRMAN POWERS: How do we know that the historical information is going to be applicable to

the period of operation of this plant?

MR. MESSIER: Well, we did look at the possibility of the climate changing, sir. And we looked at the IPCC report, the U.S. Government Report on Climate Change and they seemed to indicate, although there was some uncertainty, much more uncertainty for precipitation than for temperature, that the amounts of precipitation in the wintertime looked like they would increase but the snow volumes would decrease as time went on. So it sounds like we are going to get more in the form of liquid, rather than frozen participation.

So we look at that and say --

CHAIRMAN POWERS: And they have to be off by how many degrees for that to change?

MR. MESSIER: Well, I guess that depends on where you are on average temperature. I mean, I can't answer that question.

CHAIRMAN POWERS: I think it is like a half a degree. It will change from being --

MR. MESSIER: Well, will it change? Sure.

CHAIRMAN POWERS: Their average temperature has to be off just a little bit and they will change it over.

No, the question is, you guys want to

operate this plant for roughly 60 years. I have all kinds of people, whether I believe them or not, they are still telling me that we are getting this climate change. Now the people I do believe are the people that tell me that we go through cycles for things like hurricanes. And the reason I believe them is they have a lot of data and it sure looks like cycles to me.

You take 50 years' worth of history in most cases and in some cases you go all the way up to a hundred. When you take 50, you are not getting a full cycle. And they have actually two cycles going on, a 26 year and a 62 year, something like that. I can't remember all the details.

The question is, should we modify that history to take into account those cycles? Because they were about data, at least. I mean, it is not speculation. You know, it is not somebody carrying a sign that says that the world is going to come to an end. It is data on hurricanes. Should we take that into account when we do these projections? The guidance doesn't require you to but should the guidance be changed?

The answer is no. We have already done it.

(Laughter.)

MR. MESSIER: Yes, certainly that is outside the scope of --

CHAIRMAN POWERS: Yes but we are all friends here and you will give me your keep and professional insight.

MR. MESSIER: I guess our bottom line is though is just that the comfort level that we have with regard to significantly being below the snow loading that we have that the EPR was designed for, for our particular site and perhaps at other sites it might be higher, but at least for Calvert being at 38 pounds per square foot is certainly well below the 100 psf value that was analyzed for. And so we haven't done a sensitivity analysis, I don't believe.

But certainly we have met all the requirements for the regulations.

CHAIRMAN POWERS: Yes.

MR. MESSIER: That is what we are basing. We are certainly monitoring what the staff is proposing and any new rulemaking that would come down.

We are aware of the climate studies and we are very sensitive to this.

MR. KIRKHAM: Any other questions or shall I move on?

CHAIRMAN POWERS: I am still struggling here but you guys aren't going to give me the answer. Nobody will answer my question.

MR. MESSIER: I will say, sir, that as part of the Interim Staff Guidance 07, you do look at a hundred year return period, snow pack, and snow fall events. So there is a recurrence interval beyond the 50 years' historical data.

CHAIRMAN POWERS: Yes, you get -- for some of the things you get, you actually get at least a cycle in the data. In some cases you don't. And what I don't see is people actually projecting out. And I mean I could understand an argument saying I can't project what I don't know. But the things that you do know where you have got data, I am wondering why we don't project forward and see.

Now, Greg is absolutely correct. I look at your numbers and in most cases, you have got a lot of margin and I am not going to believe my projects too much. And so, you know, how cares? So why didn't you do that, Greg? Keep me happy here.

(Laughter.)

CHAIRMAN POWERS: Go ahead, Tim.

MR. KIRKHAM: Okay, next slide, please.

The meteorological program for Calvert

Cliffs 3 utilizes the tower and data from the Unit 1 and Unit 2 site.

CHAIRMAN POWERS: You keep that -- Those towers are continuously operating?

MR. KIRKHAM: Yes.

CHAIRMAN POWERS: Yes.

MR. KIRKHAM: And when that tower --

CHAIRMAN POWERS: Bad sites for COL for early site permits that don't have their towers operating continuously.

MR. KIRKHAM: Yes. Well, this is used for Unit 1 and 2 and for EP purposes, it has to stay operational. And when that tower was installed, it did meet the Safety Guide 23 requirements and the met program was maintained in accordance with the guidance given in Safety Guide 23.

Next slide.

CHAIRMAN POWERS: So you have a pretty good wind rows.

MR. KIRKHAM: Yes. The tower still meets the requirements of the new guide, Reg Guide 1.23, which superseded Safety Guide 23 except for that the original tower did not have atmospheric moisture data. And that was because Unit 1 and Unit 2 didn't have a cooling tower so they didn't need the data.

The tower is not at approximately the same elevation as Calvert 3. It is about 40 feet difference. The inspections were performed at that tower every five years, as opposed to the new guidance of very three years. There originally was no windshield on the precipitation gauge and the data sampling rate does not match the new revision of the Reg Guide, ten seconds versus five seconds.

Any questions on any of the met program?

The Calvert Cliffs Unit 3 buildings will not impact the met measurements due to their distance from the tower, which is another 2,000 feet further than Unit 1 and Unit 2. The tower has been upgraded to meet the more recent requirements, except that the tower elevation will not be changed and the sample frequency will not change because we did meet the data recovery goals greater than 90 percent.

Any questions on that?

A COL item asked the applicant to describe the means for providing Ultimate Heat Sink makeup sufficient for water lost through a 30-day period, even though the COL item as listed in Section 2.3, this is more appropriately discussed in Chapter 9 and, therefore, we will defer this topic until that presentation.

The applicant is asked to confirm that the site-specific chi/Q values are bounded by the EPR FSAR at the exclusionary boundary, the low population zone and the control room.

This chart shows the comparison of the short and long-term disbursement factors for Calvert Cliffs Unit 3, the site versus the EPR data. For design basis accident, short-term chi/Qs, the values are bounded except for the zero to two hour LPZ value. For long-term chi/Q, it is not bounded in the northeast sector. These two departures will be expanded upon in the next couple slides.

Conservative estimates of accident chi/Q values for the EAB, LPZ, and control room, are bounded by the EPR FSAR except for the zero to two hour LPZ value. The EPR value was 1.75E-04 and the Calvert Cliffs 3 value is 2.15E-04. Therefore, site-specific chi/Q values were used to calculate worst case accident conditions, as opposed to using the EPR data. The calculations will be shown in a later slide but did show that we still meet 50.34 and GDC 19 criteria.

MEMBER BANERJEE: Let me just ask Mary. When you did your calculation and used your pascal f conditions, --

MS. RICHMOND: Right.

MEMBER BANERJEE: -- what were the sort of chi/Q values, effectively because it doesn't come out that way, but was there any deviation from --

MS. RICHMOND: I don't know what ALOHA calculated. We don't get really a printout of that.

MEMBER BANERJEE: I realize you didn't get -- Yes.

MS. RICHMOND: Yes, so we didn't do a comparison based on those chi/Q values that they get for doses.

MEMBER BANERJEE: So this --

MS. RICHMOND: I mean, those are it is kind of separate because that is mainly through the radiation.

MEMBER BANERJEE: I realize that it is not easy and ALOHA will not automatically calculate this.

MS. RICHMOND: Right.

MEMBER BANERJEE: But this corresponds to some form of f weather I would think. Right?

MS. RICHMOND: Well, when they -- I will let Tim --

MR. KIRKHAM: Yes, I'm trying to find some data.

MS. RICHMOND: Right.

MR. KIRKHAM: So your question is an

average chi/Q value?

MEMBER BANERJEE: No, the two-hour value or whatever. I am looking for a worst condition in you calculations.

MS. RICHMOND: When it would be lined up with that one?

MEMBER BANERJEE: Yes. Was it lining up or not?

MR. KIRKHAM: So for short-term I am trying to find. I have got data for long-term here but I can't find short-term data. Ted, do you have any of that data for the --

MEMBER BANERJEE: It is just that this is the actual meteorology for the site.

MS. RICHMOND: Right.

MR. MESSIER: This is Ted Messier from AREVA. Your slide does show the 0-2 hour value chi/Q value.

MR. KIRKHAM: I guess it does on the --

CHAIRMAN POWERS: No. You have got zero to two hours on here.

MR. KIRKHAM: Yes, good point. I guess we have already got it in the slide. So yes, we will get there and then if that doesn't answer your question.

MEMBER BANERJEE: It doesn't answer my

question because my question is related to the calculations.

MR. KIRKHAM: Okay.

MEMBER BANERJEE: But we can look at that later. Go ahead. I don't want to interrupt you.

MR. KIRKHAM: Anything else on 27? Okay, 28.

Right here is the dose calculations. This is the radiological consequence table from Chapter 15. The dose values shown in this table use the actual site-specific chi/Q values from Calvert Cliffs Unit 3. As you can see, all offsite design basis accident doses are still within the acceptance criteria. The acceptance criteria is in the right-hand column.

CHAIRMAN POWERS: You know, the thin that surprises you about this is that the LOCA is so high, relative to the others. Why is that? Is it the concentration in the containment building?

MR. KIRKHAM: I did not do the calculation. So I don't know the --

MR. GIBSON: Yes, unfortunately we have the containment section that we would have to have an evaluation for. We didn't have the people here for that. It's an excellent question. Can we get back with you on that?

CHAIRMAN POWERS: Yes, if you can. Just what I am wondering, it simply has to be the concentration.

MR. GIBSON: It is probably a larger source would be my guess.

CHAIRMAN POWERS: Well you have got a bigger source, a higher concentrations of the containment. Your leak rate is about the same for all these things. So I am assuming it is the concentration of the containment.

MR. KIRKHAM: Yes, all of the other sources are going to be a smaller growth source.

CHAIRMAN POWERS: Of course if you had a safety grade spray in there, you wouldn't have that problem.

(Laughter.)

MR. KIRKHAM: Sandra can answer that.

CHAIRMAN POWERS: We will put that on our Sandra to do list but you might just check to see.

MR. KIRKHAM: Okay, we will.

CHAIRMAN POWERS: I mean, I am looking for an answer that consists of yes, it is the containment concentration that is causing the problem or not.

MR. KIRKHAM: Yes, sir.

CHAIRMAN POWERS: I don't need a very

detailed answer, in other words.

MR. KIRKHAM: Okay, good question. Slide 29.

The second departure that we took in Section 2.3 is the difference in the EPR maximum average annual chi/Q in a given setting.

CHAIRMAN POWERS: I love these chi/Q values that are out to three significant digits.

MR. KIRKHAM: You want accuracy.

MEMBER RYAN: That's just precision. That is not accuracy.

MR. KIRKHAM: That's true.

CHAIRMAN POWERS: Actually you just did it to get balance in the slide. That's all. Right?

MR. KIRKHAM: Three figs look good. Right? So --

CHAIRMAN POWERS: You have more faith in these numbers than I do. Okay?

MR. KIRKHAM: I can tell you when we use them in a real accident, we are not going to go out that far.

CHAIRMAN POWERS: You think not.

MR. KIRKHAM: We will round that to five.

CHAIRMAN POWERS: The northeast sector of the site has the maximum average chi/Q value of 5E-06

versus the EPR of 4.98E-06. Not much difference but it still exceeded the envelope.

This departure is justified due to Calvert Cliffs Unit 3 maximum value occurring at two-tenths of a mile into the Bay where no one is living. Calvert Cliffs 3 also will have complete control over any potential habitation in the area of that Bay. All other sectors are bounded by the EPR value.

The next slide is a repeat of a slide before. The sectors are hard to see but it is in the northeast sector is where the prevalent wind directions are. And there are actually five sectors where there is nobody. So that is why it is okay.

CHAIRMAN POWERS: In truth, there are a whole lot of approximations built into this chi/Q formulation that your site doesn't really match. But we assume that the acceptance criteria keep us safe.

MR. KIRKHAM: True. We are to provide chi/Q values for each cumulative frequency distribution that exceeds the median value. The cumulative frequency distributions were calculated in using AEOLUS-3. Reg Guide 1.145 methodology and seven years of met data were used for the calculations.

Right here is the table from the FSAR that shows the 50th percentile chi/Q value for the

appropriate reporting times that were required to calculate.

The development of long-term site-specific estimates for routine releases is also requested. Those estimates were developed in accordance with Reg Guide 1.111; 1.145 and Reg Guide 1.112 methodologies. The data developed is in a format such that it can be used with Reg Guide 1.109 for the appropriate dose calculations.

Annual average chi/Q and D/Q values for 16 radial sectors was determined as requested in the DCD. parameters are listed here for how the dispersion and deposition values were determined.

The Calvert Cliffs Unit 3 EPR document also lists other locations of interest in the tables, such as nearest resident and nearest garden.

Any questions? That is it for this chapter. If not, I turn it back over to Greg.

MR. GIBSON: Thank you. As we presented, we had 14 COL information items and three interface items that we presented in our three sections, four sections, 2.0 through 2.3. We had three departures of which one of them was an exemption to tier one from the US EPR which we have discussed, all three being in meteorology, one with wet bulb temperature and too

with the chi/Q values as Tim discussed. We have had no ASLB contentions on these items and all responses with one exception have been provided with the NRC, which is RAI 261 which we have scheduled for the end of this month.

MEMBER BANERJEE: What is that RAI?

MR. GIBSON: That's a good question. Please.

MR. BROWN: This is Dave Brown from the staff. This is an RAI pertaining to trees that are in the vicinity of the met tower. The applicant has committed in the FSAR to evaluating whether those trees were too close, too tall. And we would ask for the results of their evaluation.

MEMBER BANERJEE: Which reminds me when we speak about trees, forest fires were not a problem there?

MS. RICHMOND: They weren't. There was a 1,000 foot distance on three sides of clear distance and then the other side had how much distance, Dan? There were three sides had a thousand feet. The other distance was --

MEMBER BANERJEE: Was it less or more?

MS. RICHMOND: It was less, yes. And it was the distance between the site and the Bay that had

the less distance.

MR. PATTON: This is Dan Patton. It was over 260 feet.

MS. RICHMOND: Right.

MEMBER BANERJEE: And so how did you determine that a fire at that distance would not --

MS. RICHMOND: We did it based on the exclusion zones. Maryland Department of Natural Resources has wildfire, you know, from the source to that distance and I believe DNR gave a distance of how much?

MR. PATTON: Thirty feet and 75 feet for a pine forest.

MS. RICHMOND: For pine. And then we also compared it to California's exclusion zones, which is 100 feet, I believe, just to be sure. And so we had so much more distance there that we qualitatively --

MEMBER BANERJEE: This was mainly pine forest?

MS. RICHMOND: I'm not sure the trees --

MEMBER BANERJEE: What is the nearest point?

MS. RICHMOND: The nearest point for some of it was 260 feet.

MR. PATTON: Two hundred sixty feet.

MEMBER BANERJEE: What trees were there or whatever it was?

MS. RICHMOND: I'm not sure the type of trees that are there at 260 feet.

MEMBER SIEBER: It is trees or grassland or how would you characterize the surrounding area?

MS. RICHMOND: Well it is clear the thousand feet on three sides and then the other side is clear up to 260 feet.

MEMBER BANERJEE: Right. That is the nearest approach.

MS. RICHMOND: Right.

MEMBER SIEBER: No growth? It is just dirt?

MS. RICHMOND: It appears to be.

MR. KIRKHAM: Short grass.

MEMBER BANERJEE: No structures in-between. Nothing.

MEMBER SIEBER: Grass that is unmowed I know from experience burns very fast.

MR. GIBSON: Okay. Again, for RAI 261, I have had my memory refreshed, that does deal with the trees and the influence potentially on the met tower. We do have Pedro Perez on the telephone line, I believe. We are going to be making the submittal on

the 31st and we have confirmed that in fact it is not a negative influence on the met data and that we have our data and our explanation for the validity of the data that will be provided on the 31st, if it is of interest to the committee.

MEMBER BANERJEE: I think from my point of view it would be interesting to rationalize the offsite hazard calculations with actual meteorology at some point and show that.

I think you have enough margin so there is no issue.

MS. RICHMOND: Right.

MEMBER BANERJEE: But at least we should know how it compares.

MS. RICHMOND: Well if anything, if you are going to take the actual met conditions into account and you are looking at the wind rows, you are going to get a much lower number than you will higher.

MEMBER BANERJEE: Right.

MS. RICHMOND: I mean, we have done worst case to do the external hazards as were required.

MEMBER BANERJEE: How did you establish that worst case? You just took f weather with one --

MS. RICHMOND: No, no. We used about ten different met conditions, f being one of them, the

most stable. We did f and one, one and a half. We did some d, c, we even did some a and b. And we did a comparison and we took the worst of each of those.

MEMBER BANERJEE: Well f is expected to be worst. Right?

MS. RICHMOND: In most cases it is expected to be the worst. There are some cases if the cloud has to travel a greater distance, we may find that something with a little bit more wind speed to hurry up and get it there might be a little bit worse. But in most cases, yes, your f is going to be the worst. But we verify that when we do the met sensitivity analysis.

MEMBER BANERJEE: So the real issue is whether the -- If you take any f weather and look at chi/Q for it at 1 meter per second or whatever you were doing, then does it correspond more or less with what they have got? Because in the end, you have a table that you can look at distance what happens to chi in the dispersion coefficients. It is clear for each weather condition, I am sure you could have a table look up or have a little simple relationship.

MS. RICHMOND: Right.

MEMBER BANERJEE: The distance and you know, the usual stuff, two powers, a coefficient and a

power. So, that gives you a number which you could find out whether it corresponds to what they measure. If it is worse, less dispersion, great you don't have to worry. If it is more than their number, then we need to look a little bit more. It may not be a significant effect because I think you have a sufficient module.

MS. RICHMOND: Right. And I think if anything you are going to find that we do less dispersion because they are taking into account some real met conditions when they do the chi/Qs and we are doing straight line. We are not saying the percentage of time from each directional source like they take it from the chi/Qs. So I think --

MEMBER BANERJEE: That would be reassuring, of course, if you find that. That is nice. You are saying that plume meander and stuff like that --

MS. RICHMOND: Right.

MEMBER BANERJEE: -- gets into --

MS. RICHMOND: Right.

MEMBER BANERJEE: I agree with you but I would like to know the numbers, too. Just make assurance doubly sure that you are conservative compared to that.

CHAIRMAN POWERS: How very Shakespearean.

MEMBER BANERJEE: Huh?

CHAIRMAN POWERS: Make assurances doubly sure.

MR. GIBSON: Okay. With that, that concludes our presentation. I want to thank you Dr. Powers and committee members. Again, we have a great site if you would ever like to come out and visit us.

CHAIRMAN POWERS: You know, we really ought to do that at some point.

MR. GIBSON: We would like to host you.

MEMBER BANERJEE: Especially in the summer.

MR. GIBSON: It's a little cold now.

CHAIRMAN POWERS: All right. Any questions you would like to pose to this distinguished panel? Mary, your maiden voyage was just fine. We are dying to know what Bechtel is but --

(Laughter.)

CHAIRMAN POWERS: Is it a new company that they have --

MS. RICHMOND: Brand new.

CHAIRMAN POWERS: You know, they are always changing the names on these.

Why don't we take a break until, well,

let's go to quarter after.

(Whereupon, the foregoing meeting went off the record at 9:54 a.m. and went back on the record at 10:14 a.m.)

MR. ARORA: Good morning again. Surinder Arora, lead project manager for Calvert's Unit 3 application. And to kick off the staff's presentation, I would like to introduce Jim Steckel. He is the chapter project manager for Chapter 2.

CHAIRMAN POWERS: We have seen him once or twice.

MR. ARORA: He has been here.

CHAIRMAN POWERS: Probably trying to pick up girls.

MR. ARORA: He was actually my backup last time, Dr. Powers.

MR. STECKEL: Good morning to the whole committee. I am Jim Steckel and I am the Chapter PM for Calvert Chapter 2. I have also been recently designated chapter PM or in the process of transitioning into Chapter 2 PM for EPR as well.

CHAIRMAN POWERS: Did you commit some crime that won this award?

MR. STECKEL: I didn't step backwards.

CHAIRMAN POWERS: That will teach you to

stand in the halls outside the manager's office.

MR. STECKEL: But I had the pleasure of actually managing through this technical staff this chapter so far and section 2.1, 2.2, and 2.3. And the technical reviewer names are in front of you here, Mr. Dave Sisk. He completed the review of the geography and demography portion 2.1. Rao Tammara, he commandeered the nearby transportation industrial and military facilities Section 2.2 and Mr. Dave Brown here to my right. He completed the meteorology section 2.3.

And so I would like now to introduce Mr. David Brown who will be the presenter for all three of these sections. Thank you.

MR. BROWN: Good morning. Thank you, Jim. I am also the acting branch chief for the siting and accident consequences branch, which is one of the reasons I will just be presenting the summary of our review.

CHAIRMAN POWERS: So both of you don't know how to duck is what you are telling me.

MR. BROWN: We both have not learned. However, I know how to ask for help so Rao and David are with me on the side.

So just I want to provide a very brief

overview by way of introduction. On the sections 2.0 site characteristics, the staff had no questions. There are no open items.

On section 2.1 on geography and demography, again, no questions, no open items.

CHAIRMAN POWERS: Can I ask you how you do these geography and demography reviews? Did you look in apps or --

MR. BROWN: I will get to that and I will look forward to your questions.

Nearby industrial transportation and military facilities, we did have seven questions, all of which were satisfactorily resolved so there are no open items at this time.

And meteorology with 71 questions, there are still two open items remaining. Next slide.

So as I covered in my overview, this part of the -- What we want to cover in today's presentation is just Sections 2.0 to 2.3. This section, these sections address 14 COL information items from the PRDC. There were, as UniStar presented, three departure requests and one exemption request in those sections.

So what the review is comprised of is confirming that all those information items are

addressed, that there is an appropriate justification for the departures and exemptions and that the remaining information is provided in sufficient level of detail to meet our acceptance criteria. So that will go to the first section. Next slide.

In doing the review of geography and demography, we do this review generally by comparing to other sources of information. We use online maps. We sometimes use U.S. Census bureau data to confirm some of the figures that the applicant provides and we compare that to what the applicant has provided in the FSAR and to our acceptance criteria. We use sometimes the same sources of information but other times independent sources.

Did you have further questions about that approach?

CHAIRMAN POWERS: No, I am just curious. I mean, one would be tempted to go for a drive, I think, than actually look at what they were doing.

MR. BROWN: Yes.

CHAIRMAN POWERS: But I mean all you can do is just what you say, look at the sources of information available to you and those that they have used.

MR. BROWN: As a practical matter, we

often get an opportunity to visit the site not always because we are doing the Section 2.1 review but because we may be assisting with the environmental review, doing that sort of thing. So for example, I have been to the site for that reason.

And so the staff, there were no open items so the staff concludes that the information provided in this section is acceptable and inside evaluation factors are met. Next slide.

Again, this section addressed the nearby industrial, transportation, and military facilities, including the hazards posed by those facilities. And there the staff is normally we perform the review by doing independent calculations of hazards, including you know, as we have discussed already, using the ALOHA code to estimate dispersion downwind, that sort of thing. There were seven questions, all of which were satisfactorily resolved. And so there are no open items.

CHAIRMAN POWERS: The military and aircraft, military facilities and whatnot, you need to understand what the prognostication is on these facilities. Do you get information from the military on what they are going to do with their facilities in the area?

MR. BROWN: I don't believe we, NRC, independently can confirm information provided from the FSAR regarding military flights. The applicant did describe the normal routine at, in this case, Patuxent River Naval Air Station. But Rao did you want to add to that?

MR. TAMMARA: Yes. We have a contact from the FAA.

MR. WIDMAYER: Introduce yourself.

MR. TAMMARA: My name is Rao Tammara. I do the review of the 2.2. We have one person in the FAA we request for each site what will be the total number of sites flying within the five or ten miles of the each site. And he compiles the information and provides us the total number of flights by category, commercial, military, civilian, small, large. So there are six designations of the flights which are flying within the five miles and ten miles of each site.

And what I usually do is take that information and make a conservative calculation using within five miles first all the flights and see whether that would give us the required acceptable probability. This is for the aircrafts, of course.

But in this case, also we got that

information and there are no other military facilities like storage or manufacturing or whatever it is. It is only naval base aircraft flights information I have. And I compared that one in calculating the probability but that is addressed in Chapter 3.6 aircraft impacts. It is only identification here that has been performed. But the actual analysis and results are presented in Section 2.615.

CHAIRMAN POWERS: The real question I have is you can get data on what things are today but I am really asking about what things are going to be for up to about 60 years from now. And how do you do that?

MR. TAMMARA: Okay. What I do is usually I request five years of data and look at that data and see what is the increment within that five years. And I come up with a linear average and take that and project into future what would be the potential incremental on a straight-line basis because there is no other information available. And also apply that one and see whether it would fly. But that only I do if the five mile total conservative estimate is not satisfied because otherwise it is already built in conservative. Some is included in accounting for all the flights within the five miles, which is probably unrealistic from the probability sense because we are

only interested in large commercial flights potential.

So that is the engineering judgment applied. And also I look at that way by projecting what was the data I have for the last five years.

CHAIRMAN POWERS: That is sort of a linear projection, as you say, is the only thing you can do in the absence of additional information. I mean, it is the only thing that is justifiable when you have --

MR. TAMMARA: Yes because the other one is whatever you were doing it against.

CHAIRMAN POWERS: The additional information that you might have access to is if you found out well the Navy is going to make that base 50 times larger than it is now and it is in their long-range plan. Do you try to get that kind of information?

MR. TAMMARA: If that is available in the literature but not really spending time to get that kind of information.

CHAIRMAN POWERS: Yes. Our experience, I think, with the early site permits was we didn't get much going that way anyway. I mean, when you ask, you just got nine answers and nothing currently forecasted well. What does that mean, you know.

MEMBER RYAN: On the other side of it,

having to check to make sure your linear projections doesn't stress the airport's limit for capacity.

MR. TAMMARA: Sometimes, yes.

MEMBER RYAN: Because you can project up to a point where they can't handle all the airplanes.

MR. TAMMARA: That is true. In the case of Vogtle, we had the problem in ESP when we projected it was -- They were expanding, already in the process of expansion. So we compared that one and it was over burdened. But --

MEMBER RYAN: But I mean the point is you look at that to make sure your estimates are capped no the top.

MR. TAMMARA: Right. Right.

MEMBER RYAN: Okay.

MR. TAMMARA: But only in the case of exceedance, not acceptable probability. We will make some more judgments, whether it is really valid or realistic, or whatever it is. But if it is within the limit, no matter what you calculate, we say hey, it is okay, even if I have that conservatism, it is still acceptable.

MEMBER RYAN: Well I know Augusta, for example, has one main runway that can handle jet traffic and that is it.

MR. TAMMARA: That is what happened. That is what I am saying.

MEMBER RYAN: Yes.

CHAIRMAN POWERS: They could build another runway.

MEMBER RYAN: Not any time soon.

CHAIRMAN POWERS: David, go ahead.

MR. BROWN: Okay. We discussed this a little bit earlier. For this section, all of the siting requirements are met. I just bring up the fact that there was this hydrochloric acid stored onsite for Units 1 and 2 that if spilled could result in exceeding the IDLH value at the control room intake. Then, you know, it is just a function for my branch to go ahead and say alert the containment branch. Hey, take a look at this and see if it is still okay.

MEMBER SHACK: It wasn't clear, you know, when I read the licensee's report, it indicates that the hydrochloric acid level at the intake is below the limit.

MR. BROWN: Right.

MEMBER SHACK: And you have an RAI and you guys don't seem to come to agreement. Was there something wrong with our analysis that you couldn't get everybody to agree on an analysis with consistent

values?

MR. BROWN: There is an RAI and then of course an RAI response. And then sometimes it is just a question of did that response and the associated commitment to revise the FSAR get rolled into Rev 6 of the FSAR. Maybe it got rolled in to Rev 7. So it depends on what version you are looking at right now. But Rev 7 just came in in December.

MEMBER SHACK: Well I wasn't looking at Rev 7.

MR. BROWN: Okay.

MR. TAMMARA: That is captured -- That will be captured in Rev 7.

MEMBER SHACK: Okay. Well then we have to --

MR. TAMMARA: Because the RAI has been answered and that RAI has the 52.9 at the outset. But they gave an argument even though it is exceeding that much, it is going to down in the control room.

MR. BROWN: Actually the control room was fine.

MEMBER SHACK: Okay but you do agree now on the intake.

MR. TAMMARA: Right. Right. That is correct.

MR. BROWN: Yes.

MEMBER SHACK: Okay.

MR. TAMMARA: So that is why we turn it over to the control room habitability people who will run the HABIT model to see whether they will agree with the applicant's analysis.

MR. BROWN: Okay. Then in meteorology we are looking at the regional climatology and site meteorology monitoring program and dispersion parameters. The staff performs this review by certainly comparing information in the FSAR to regulatory guides. For example, we have a design basis tornado regulatory guide. It is a matter of simply making sure the applicant has identified the correct design basis tornado.

We also look at other various sources of information with regard to regional climatology, National Climatic Data Center's databases and NOAA's databases.

The staff also generally independently calculates the dispersion parameters to compare it with the applicant's.

In this review we did have 71 RAI questions and there are two remaining open items that I have outlined here that we discussed earlier. The

applicant is aware that south of the tower there is a tree line that may need to be reexamined to see if it has an undue influence on the tower. And as I said this morning, they completed that analysis but we haven't seen it. It is coming in later this month. So we will complete that review and decide whether to close this open item.

There is also another issue with regard to the departure from this temperature parameter for the Ultimate Heat Sink. EPA has a site parameter value of 81 degrees, non-coincident wet bulb temperature. The site characteristic here at Calvert Cliffs is 85 degrees. So they just need to identify that departure and have all of the appropriate cross-references to the justification for why that is okay. So that is an open item in our review for now.

I think that is it, if there are no questions on that.

CHAIRMAN POWERS: My question remains on looking at site meteorology. You look at historical data.

MR. BROWN: We look at historical data.

CHAIRMAN POWERS: And what we are really interested, we are not the least bit interested in history. We are interested in the future.

MR. BROWN: Correct.

CHAIRMAN POWERS: And how do we know that history is going to repeat itself and not be different, especially when we have pretty clear evidence that we have weather cycles on the East Coast, on the Atlantic Coast? So what do you do on that?

MR. BROWN: Well certainly it depends on which parameter we are looking at. But if we were to look, for example, at site temperature values, you know, what our regulations currently require is that hey look at historical data with appropriate margin to account for uncertainty. And so we are basically asking the applicants to give us a 100 year return period temperature when it is a site safety temperature. They are comparing that with maximum values and choosing the larger of the two over long periods of record.

So, I hear you. We are going back in time looking for maximum values or 100 year return period values. And then we are also asking the applicants to discuss climate change in their applications. And so there is a section in 2.3 just on climate change in which they look at, I think it is a Maryland Department of Natural Resources report on expected

changes in Maryland. For example, for temperature, an expected increase of three degrees Fahrenheit by the middle of this century. But there is no formal way for us to take that information and sort of do a regulatory check.

MEMBER ARMIJO: There is a great uncertainty in climate change projections. And I don't understand how the NRC could use that information which in some cases are totally dependent on the models used. There is a lot of uncertainty in a number of the inputs and really no validation by any careful review by people who are not promoters of climate change ideas. I just wonder how the NRC or whether the NRC should really get involved in that, other than what is based on data.

I think Dr. Powers mentioned if you have data going back 100 years instead of 50 years, why not use that simply because it is there. It is real. But these climate change projections, as best I can tell, are based on very complex models, which as far as I can tell, don't predict, you know, haven't been tested sufficiently.

CHAIRMAN POWERS: They are just like our thermal hydraulic models.

MEMBER ARMIJO: No. I think our thermal

hydraulic models are a lot better. But anyway, I am talking --

CHAIRMAN POWERS: Oh, yes? I'm talking to people worried about natural convection in the ESBWR and see if there is enough data.

MEMBER ARMIJO: Well, we passed on that. I am just wondering. That sounds to me -- I just don't know how you propose to use that.

MR. BROWN: Right. It's not, in my review for this application, what I am looking at is what are the margins between the site parameter values for meteorology that define the engineering design values for the EPR and the site characteristics.

For example, we saw this morning the difference between the 100 pound per square foot snow load and design value for the EPR and the site characteristic was 38. You know, the difference between 100 pounds per square foot and 38, something like that. There was considerable margin there. And so just qualitatively looking at the discussion of climate change to see if there is any significant reduction in that margin and the answer is no. So we don't take it any further.

MEMBER ARMIJO: It is sort of a very top level qualitative evaluation.

MR. BROWN: Right. A very high level. If I saw something that would be reason for concern, the margin was very small now and I expected changes in the future, then perhaps I would raise that as an issue.

CHAIRMAN POWERS: And it seems to me that I would use the information I have on the Atlantic Coast weather to say okay is a 50-year database good? No. Is 100-year good? Yes because it covers a cycle.

And again, is there any if verily I get a three degree f change in either direction, is it going to impact the 38 pounds per square foot versus the 100 pounds per square foot limit? No. Good. Yes, we'll think about it. And I think that is what you are asking me to do there.

MR. BROWN: Were there an issue like that, I would go back and ask for additional information. If we thought it was necessary, perhaps additional margin in design but it simply has not occurred.

CHAIRMAN POWERS: Yes, I mean it is a much more rational thing. The Reg Guide says 50 years. Therefore, 50 years is all we are going to think about.

MR. BROWN: Yes. I mean, to a certain

extent yes. As a licensing branch chief I have to pay attention to what the rules in our guide say but we certainly think beyond that.

CHAIRMAN POWERS: Good.

MR. BROWN: Okay. If there are no further questions, I think I can go to the next slide. It is just my conclusion slide that says that we found that the details about geography, demography, nearby hazards and meteorology, with the exception of those two open items are acceptable. I am happy to take any additional questions on meteorology or the other two subjects, if you have any.

CHAIRMAN POWERS: Do the members have any questions they want to pose on this area?

I think that one of the issues that continues to perplex me a little bit it is outside really the scope of the SER. So you can tell me to go ask somebody else if you want to. When we use chi over two kinds of methodologies, we really are looking at a flat earth kind of world and we don't have a flat earth kind of world here at this particular site.

In fact this dispersion analysis is pretty pathological because it has large bodies of water on it and rolling hills and lots of trees and cleared areas. And just about everything that you don't want

to see in those kinds of models. Well why do we do that?

I mean we know the chi/Q kind of methodology is a little bit suspect for these kinds of things. We kind of think we abound things by taking conservative values for the chi/Qs but how do we know?

MR. BROWN: There are certain affects, especially at this site, you know, with things we looked at toward the end of the SER. On meteorology there is the discussion on the possible effects of land breezes and sea breezes and what that can do. And so we took at a look at it. And we just, we don't see a level of significance associated with those effects to cause us to go off and do more sophisticated modeling.

CHAIRMAN POWERS: Even if we do more sophisticated modeling, I think inherently the difficulty is we just don't have a lot of validation for those models.

MR. BROWN: But the straight line dispersion modeling.

CHAIRMAN POWERS: No matter how sophisticated you get, when you come down and say okay what is my comparison of predictions against data for any of these models, it is very thin.

MR. BROWN: It is very thin, which is why we sort of have a belts-and-suspenders approach to regulating this, which is we have meteorological monitoring and we have radiological environmental monitoring to sort of, you know --

MEMBER RYAN: I guess I will pick on the numbers on this slide 29 that the applicant showed that four significant visits. It just doesn't make any sense. I mean, this is 5.0, maybe just five, 0.5.

MR. BROWN: It is 5.0.

CHAIRMAN POWERS: How about less than ten?

MEMBER RYAN: But I guess my point is it would probably be helpful to have some kind of guidance on certainty analysis or on certainty representation when you do these things because that, I mean frankly, doesn't pass the laugh test to say those are different or they are the same. So --

MR. BROWN: I agree that we could probably add guidance to that portion of our SRP about reasonable levels of uncertainty.

MEMBER RYAN: And gain, frankly it would be helpful to the applicant. If you calculate 5.1 and you know --

MR. BROWN: It is 5.0.

MEMBER RYAN: -- it is 5.0. It is 5.0.

You know, you are done.

MR. BROWN: Right.

MEMBER RYAN: But it kind of gets away from a little bit of hand wringing about pencil-whipping some numbers.

CHAIRMAN POWERS: Well maybe it is something that you log into the lessons learned sort of thing.

MEMBER RYAN: Yes. But some kind of treatment of or at least discussion of how do you deal with significant digits or a decision. And then you know, how do you evaluate against, you know, if it is 5.0 plus or minus 0.2 am I still okay. I would say sure.

MR. BROWN: There are two things going on there. First of all, there is an inappropriate level of precision and I don't disagree. We have to review what is provided.

There is also, with such a small difference between the site parameter for the design center and the site characteristic, can't we just bump up the site parameter a little bit more and it is not a departure at all?

MEMBER RYAN: And that gets into what I call numerical narcosis. So something that was a

little bit more rigorous on how to deal with that without creating the appearance of an incorrect number higher than it should be or lower than it should be or whatever would be helpful. And that is maybe a lesson learned probably broader than just atmospheric dispersion calculations, too.

MR. BROWN: It could be. But I agree.

MEMBER RYAN: Okay, thanks.

CHAIRMAN POWERS: Any other questions for the speaker?

MEMBER RYAN: Nice job.

CHAIRMAN POWERS: No?

MR. ARORA: Thanks Dave and Jim. That completes our presentation, Dr. Powers.

CHAIRMAN POWERS: Well thank you very much and welcome back.

And with that, I think I will adjourn this subcommittee meeting.

(Whereupon, at 10:44 a.m., the foregoing meeting was adjourned.)

UNISTAR NUCLEAR ENERGY

Presentation to ACRS
U.S. EPR™ Subcommittee
Calvert Cliffs Nuclear Power Plant Unit 3
FSAR Chapter 2, Site Characteristics
Sections 2.0 through 2.3
January 12, 2011

Introduction

- RCOLA authored using ‘Incorporate by Reference’ (IBR) methodology
- To simplify document presentation and review, only supplemental information, or site-specific information, or departures/exemptions from the U.S. EPR FSAR are contained in the Calvert Cliffs Unit 3 COLA
- AREVA U.S. EPR FSAR ACRS Meeting for Chapter 2 – Site Characteristics occurred on November 3, 2009

Introduction

- Today's Presentation was prepared by UniStar and is supported by AREVA (U.S. EPR Supplier), Bechtel and ALION Science and Technology.
  - Tim Kirkham (UniStar - Senior Health Physicist)
  - Mary Richmond (Bechtel - Senior Environmental Engineer)
  - Dan Patton (Bechtel - Nuclear/Environmental Engineer)
  - Ted Messier (AREVA - Meteorologist/Principal Scientist)
  - Pedro Perez (AREVA - Supervisory Engineer-Radiological Engineering)
  - Robert Mickler (ALION - Program Manager)
- The focus of today's presentation will be on site-specific information that supplements the U.S. EPR FSAR.

Chapter 2, Site Characteristics
Section: 2.0
Site Characteristics

Presented by Greg Gibson
UniStar-Vice President of Regulatory Affairs

Chapter 2, Site Characteristics Agenda

- Section 2.0 Site Characteristics
  - COL Information/Interface Items
- Section 2.1, Geography and Demography
  - COL Information Items
- Section 2.2, Nearby Industrial, Transportation and Military Facilities
  - COL Information/Interface Items
- Section 2.3, Meteorology
  - COL Information/Interface Items/Departures/Exemptions
- Conclusions

Chapter 2, Site Characteristics
Section 2.0 Site Characteristics
COL Information/Interface Items

- Calvert Cliffs Unit 3 FSAR has reviewed and compared the site-specific parameters and characteristics to determine if they are within the bounds of the assumed parameters and characteristics as shown in U.S. EPR FSAR Table 2.1-1.
  - Calvert Cliffs Unit 3 site-specific parameters or characteristics outside the bounds of the conservative limiting assumptions are presented in Calvert Cliffs Unit 3 COLA.
    - Justification of the acceptability of these conditions is provided in the associated chapter/section of the Calvert Cliffs Unit 3 COLA as listed in Chapter 2 of the FSAR and will be discussed and presented to ACRS with the appropriate COLA chapter.
    - Section 2.3 of this presentation will discuss the items that relate to the Chapter 2 subject matter.

Chapter 2, Site Characteristics
Section: 2.1
Geography and Demography

Presented by Mary Richmond
Bechtel - Senior Environmental Engineer

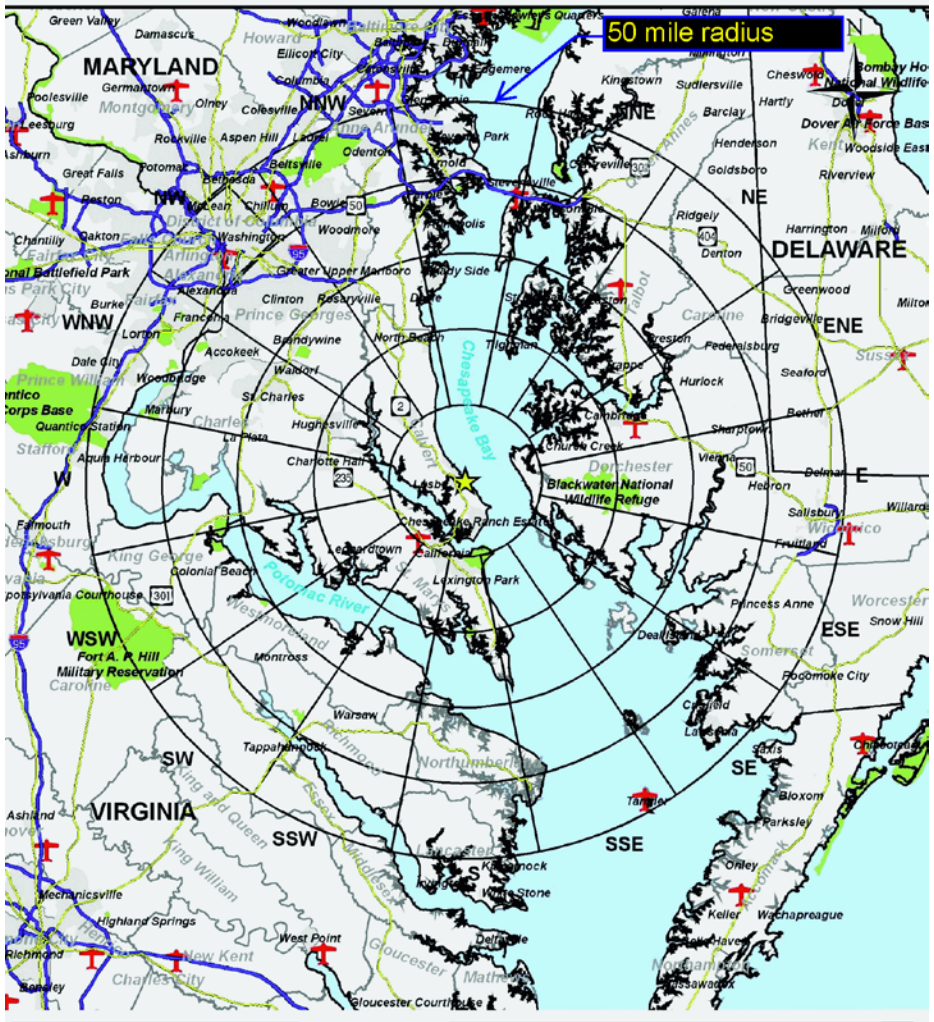
Chapter 2, Site Characteristics Agenda

- Section 2.0 Site Characteristics
  - COL Information/Interface Items
- Section 2.1, Geography and Demography
  - COL Information Items
- Section 2.2, Nearby Industrial, Transportation and Military Facilities
  - COL Information/Interface Items
- Section 2.3, Meteorology
  - COL Information/Interface Items/Departures/Exemptions
- Conclusions

Chapter 2, Site Characteristics
Section 2.1, Geography and Demography
COL Information Items

- Location
  - Calvert County, Maryland
    - Southeastern sector of Calvert County, west bank of the Chesapeake Bay
  - Peninsula bounded by
    - Chesapeake Bay on the east
    - Patuxent River on the west
  - Closest metropolitan centers
    - Annapolis, Maryland – 35 miles north; Baltimore, Maryland – 60 miles north
    - Washington, D.C. – 45 miles northwest; Richmond, Virginia – 80 miles southwest

Chapter 2, Site Characteristics
Section 2.1, Geography and Demography
COL Information Items

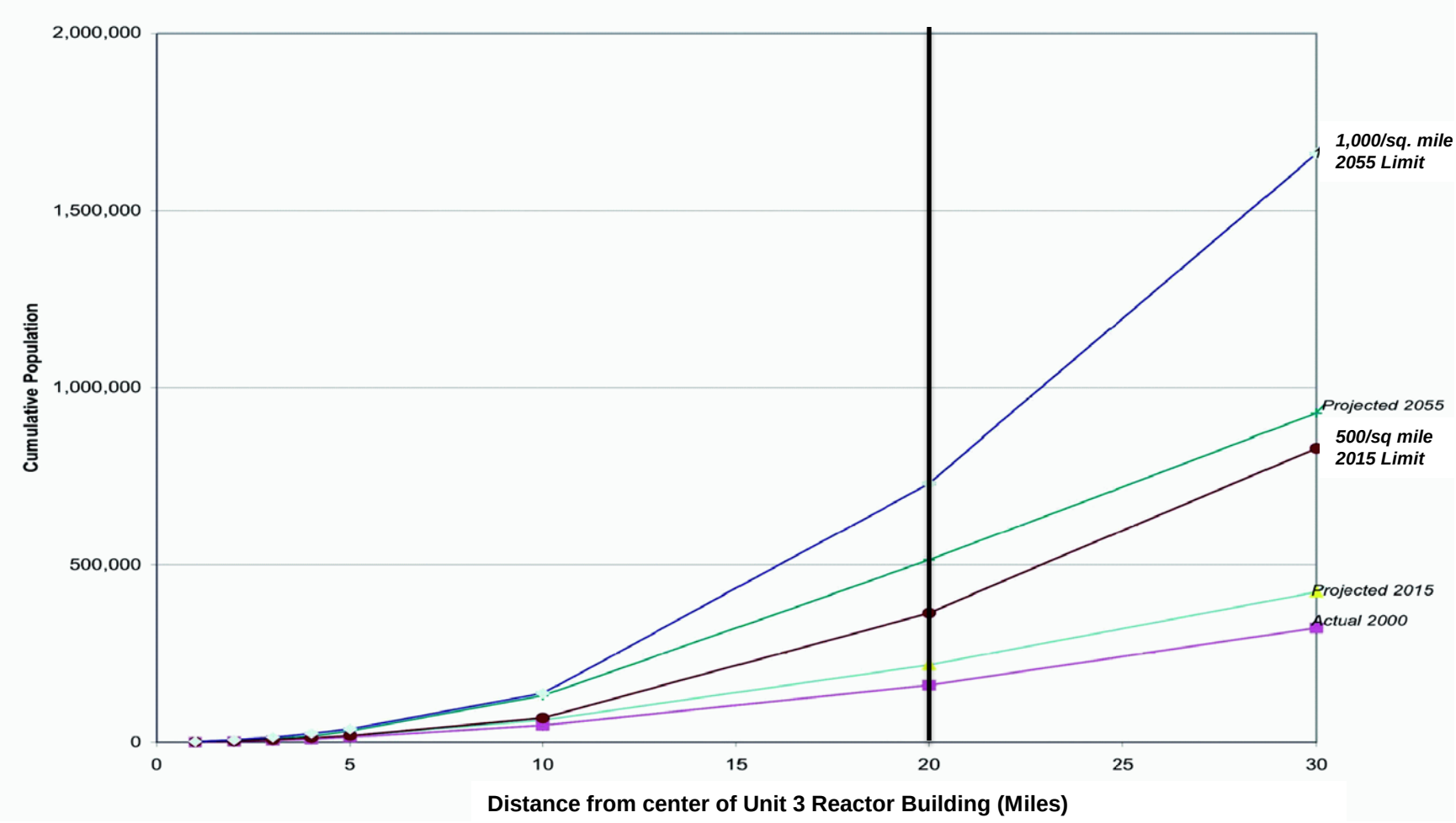


Chapter 2, Site Characteristics
Section 2.1, Geography and Demography
COL Information Items

- Population
  - Closest population center per 10 CFR 100.3
    - St. Charles – 33,379 (2000 census)
    - Meets requirement of 10 CFR 100.11(a)(3)
      - The distance between St. Charles and the site is approximately 26 miles.
      - Therefore, it meets the requirement that the population center distance be at least one and one-third times the distance from the reactor to the outer boundary of the LPZ (the radius of the LPZ 1.5 miles).
  - Population density per Regulatory Guide 4.7
    - The areas adjacent to Calvert Cliffs Unit 3 do not exceed 500 persons/ square mile, averaged over any radial distance out to 20 miles, at time of COL approval and within 5 years thereafter.

Chapter 2, Site Characteristics
Section 2.1, Geography and Demography
COL Information Items

Population Compared to NRC Siting Criteria



Chapter 2, Site Characteristics
Section 2.1, Geography and Demography
COL Information Items

- Exclusion Area Boundary (EAB)
  - Circle with a radius of approximately 0.6 miles, the boundary establishes a distance of at least 0.5 miles from each potential release point
  - Possess the authority to determine all activities including the exclusion and removal of personnel and property
  - Control of access will be provided by posting the boundary and performing security patrols
  - No state or county roads or railways traverse the EAB
  - Portions that extend into Chesapeake Bay will be controlled through the use of buoys with postings that define the restrictions for the area
    - Access enforced by the United States Coast Guard and the Maryland Department of Natural Resources police

Chapter 2, Site Characteristics
Section: 2.2
Nearby Industrial, Transportation and Military Facilities

Presented by Mary Richmond
Bechtel- Senior Environmental Engineer

Chapter 2, Site Characteristics Agenda

- Section 2.0 Site Characteristics
  - COL Information/Interface Items
- Section 2.1, Geography and Demography
  - COL Information Items
- Section 2.2, Nearby Industrial, Transportation and Military Facilities
  - COL Information/Interface Items
- Section 2.3, Meteorology
  - COL Information/Interface Items/Departures/Exemptions
- Conclusions

Chapter 2, Site Characteristics
Section 2.2, Nearby Industrial, Transportation and Military Facilities
COL Information/Interface Items

- Nearby Industrial, Transportation and Military Facilities
  - Potential hazards were identified
    - Nearby transportation routes Maryland highway 2/4, Chesapeake Bay navigable waterway, and Dominion Cove Point Liquefied Natural Gas (DCPLNG) facility pipeline
    - Nearby chemical and fuel storage facilities (DCPLNG)
    - On-site chemical storage at Calvert Cliffs Units 1, 2 & 3
    - Nearby marinas and airfields

Chapter 2, Site Characteristics
Section 2.2, Nearby Industrial, Transportation and Military Facilities
COL Information/Interface Items

- Potential hazards were evaluated
  - Explosions
    - The analyses demonstrated a peak positive overpressure of 1 psi will not be exceeded for any safety-related structure for any of the postulated event scenarios.
  - Flammable/Explosive Vapor Cloud (Delayed Ignition)/Jet Fire
    - The analyses demonstrate that ignition of a flammable/explosive vapor cloud involving the identified chemicals or a jet fire from the pipeline would not affect the safe operation of Calvert Cliffs Unit 3.
  - Toxic Chemicals
    - The analyses demonstrate that a toxic vapor cloud involving the identified chemicals would not affect the safe operation of Calvert Cliffs Unit 3.

Chapter 2, Site Characteristics
Section 2.2, Nearby Industrial, Transportation and Military Facilities
COL Information/Interface Items

- Aircraft/Airway Hazard Analysis
  - Airways V31 and V93 pass closer than 2 statute miles to the nearest edge of Calvert Cliffs Unit 3
    - A calculation based on DOE-STD-3014-2006 was performed and indicated further analysis required.
    - Therefore, further evaluation was conducted in Chapter 19, where a PRA was performed taking into account core damage and containment release frequency.
    - Based on a comparison of this analysis to NUREG-0800 and ANSI/ANS-58.21-2007, it is concluded that the aircraft crash can be screened out for the Calvert Cliffs Unit 3 design.

Chapter 2, Site Characteristics
Section: 2.3
Meteorology

Presented by Tim Kirkham
UniStar- Senior Health Physicist

Chapter 2, Site Characteristics Agenda

- Section 2.0 Site Characteristics
  - COL Information/Interface Items
- Section 2.1, Geography and Demography
  - COL Information Items
- Section 2.2, Nearby Industrial, Transportation and Military Facilities
  - COL Information/Interface Items
- Section 2.3, Meteorology
  - COL Information/Interface Items/Departures/Exemptions
- Conclusions

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items/Interface Items

U.S. EPR FSAR Design Parameter	Calvert Cliffs Unit 3 Site-Specific Characteristic Value
Snow/Ice Load on Roofs of Safety-Related Structures	
< 100 psf	38.0 psf
Maximum Wind Speed other than Tornado	
< 145 mph	95 mph
Tornado	
< 230 mph 1.2 psi at 0.5 psi/sec pressure drop	200 mph 0.9 psi at 0.4 psi/sec pressure drop
Air Temperature (0% Exceedance Values for Safety-Related HVAC Systems)	
115° F (dry bulb temp) / 80° F (coincident wet bulb temp) -40° F (dry bulb temp) (minimum temp)	102° F (dry bulb temp) / 80° F (coincident wet bulb temp) -0° F (dry bulb temp) (minimum temp)
81° F (non-coincident wet bulb temp) for UHS Design only	Not bounded: 85° F (non-coincident wet bulb temp) Departure is addressed in Chapter 9, Section 9.2.1 for UHS Design
Air Temperature (1% Exceedance Values for Non Safety-Related HVAC Systems)	
100° F (dry bulb temp) / 77° F (coincident wet bulb temp) -10° F (dry bulb temp) (minimum temp)	93° F (dry bulb temp) / 76.8° F (coincident wet bulb temp) 14° F (dry bulb temp) (minimum temp)

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items

- Onsite Meteorological Measurement Program
  - Utilizes the existing operational meteorological measurement program and equipment (tower) established for Calvert Cliffs Units 1 and 2.
  - Existing Calvert Cliffs Units 1 & 2 installed prior to Regulatory Guide 1.23, Revision 1 and met requirements for Safety Guide (SG) 23.

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items

- Preoperational Meteorological Monitoring Program
  - Meets the current requirements of Regulatory Guide 1.23, Revision 1, Meteorological Monitoring Programs for Nuclear Power Plants, except for
    - No atmospheric moisture measurements (required for plants utilizing cooling towers). For Calvert Cliffs Unit 3 Preoperational Data, alternate sources of moisture data were used.
    - Tower not sited at approximately the same elevation as finished plant grade of Calvert Cliffs Unit 3.
    - Tower, guyed wires and anchors were inspected every 5 years as required by SG 23, instead of annual for guyed wires and every 3 years for anchors and tower as required in RG 1.23, Regulatory Position C.5.
    - No wind shield originally installed on the precipitation gauge.
    - Sampling rate is 10 seconds versus 5 seconds by RG 1.23.

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items

- Operational Meteorological Monitoring Program
  - Calvert Cliffs Unit 3 buildings are greater than a factor of ten times their respective heights away from the meteorological tower, and as such are not expected to impact the meteorological measurements.
  - Upgraded tower meets the current requirements of Regulatory Guide 1.23, Revision 1, Meteorological Monitoring Programs for Nuclear Power Plants, except for
    - Tower is not sited at approximately the same elevation as finished plant grade of Calvert Cliffs Unit 3. Tower is located on level 40 feet higher than Calvert Cliffs Unit 3 grade, intervening terrain profile has a gentle slope which is an insignificant impact on dispersion conditions.
    - Sampling rate is 10 seconds versus 5 seconds by RG 1.23. Sampling rates used for the Calvert Cliffs Units 1 and 2 exceed data recovery standards and have not been shown to have impact on data quality.

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items/Interface Items

- Makeup for the Ultimate Heat Sink (UHS) Cooling Tower is sufficient to meet the maximum evaporative and drift water losses
  - This COL information item is related to the UHS Cooling Tower 24 hr and 72 hr site-specific meteorological data and will be discussed with the UHS design information in the Chapter 9 presentation.

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information/Interface Items/Departures/Exemptions

Dispersion Factors

Short-Term Dispersion Site Parameters for Design-Basis Accident Releases	Result of Comparison to U.S. EPR FSAR
EAB and LPZ χ/Q Site Parameter Values	Bounded except for 0-2 hr value for the LPZ; departure justified by meeting dose limitations
Control Room χ/Q Site Parameter Values	Bounded

Long-Term Dispersion Site Parameters for Routine Releases	Result of Comparison to U.S. EPR FSAR
Maximum annual average χ/Q at or beyond the site boundary	Not bounded; departure justified by meeting dose limitations

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information/Interface Items/Departures/Exemptions

- Site specific χ/Q values:
  - Conservative estimates of atmospheric Accident values for the EAB, LPZ and Control room are presented in the U.S. EPR FSAR and bound the Calvert Cliffs Unit 3 values except for the 0-2 hour value for the LPZ.
  - The U.S.EPR FSAR provides the Accident χ/Q of 1.75E-04 sec/m^3 at the LPZ - 1.5 miles during the 0-2 hr period. The corresponding calculated site-specific short-term atmospheric dispersion factor for Calvert Cliffs Unit 3 is 2.151E-04 sec/m^3 which exceeds/departs from the U.S. EPR value.
  - The site-specific Accident Dispersion factors were used in calculating doses from accident scenarios specified in Chapter 15. Doses are within the limitations of 10 CFR 50.34 and GDC 19.

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information/Interface Items/Departures/Exemptions

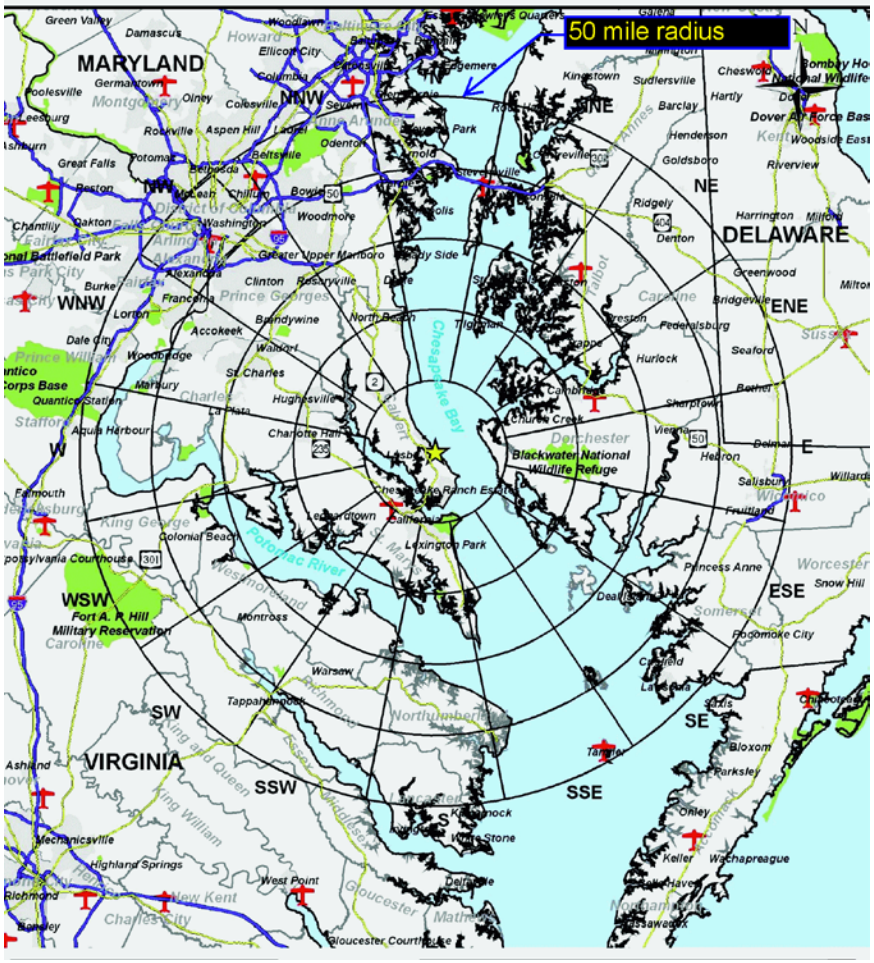
Table 15.0-2— {CCNPP Unit 3 LPZ Radiological Consequences of U.S. EPR Design Basis Accidents}

Design Basis Accident		Offsite Dose CCNPP Unit 3 LPZ rem (TEDE)	Acceptance Criterion rem (TEDE)
LOCA		9.1	25
Small line break outside of Reactor Building		0.4	2.5
SGTR	Pre-incident spike	0.3	25
	Coincident spike	0.3	2.5
MSLB	Pre-incident spike	0.1	25
	Coincident spike	0.2	2.5
	Fuel rod clad failure	2.6	25
	Fuel overheat	2.8	25
RCP locked rotor/broken shaft		0.9	2.5
Rod ejection		3.4	6.3
Fuel handling accident		1.2	6.3

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information/Interface Items/Departures

- Site specific χ/Q values (continued):
  - The Calvert Cliffs Unit 3 site-specific calculated maximum annual average χ/Q value exceeds the 4.973E-06 sec/m^3 value of the U.S. EPR FSAR in the Exclusion Area Boundary for the northeast sector.
  - The Calvert Cliffs Unit 3 site-specific χ/Q value of 5.039E-06 sec/m^3 is computed for the EAB, 0.22 miles offshore in the northeast sector, which is located in the Chesapeake Bay.
  - Dose limits of 10 CFR 50 Appendix I will not be exceeded due to :
    - There are no persons residing in the northeast sector.
    - Other sector average values are bounded by the U. S. EPR values.

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information/Interface Items/Departures



Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items

- χ/Q values for each cumulative frequency distribution exceeding the median value (50% of the time) were developed
  - Utilized AEOLUS-3 (a software package for the determination of atmospheric dispersion and deposition of nuclear power plant effluents during continuous, intermittent and accident conditions)
  - Used RG 1.145 methodology
  - Seven years of site meteorological data from Calvert Cliffs Units 1 & 2 (2000-2006)

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items

Table 2.3-116—{50th Percentile χ/Q Values}

Time Period	χ/Q (sec/m³)	Receptor
0-2 hours	8.079E-05	EAB
0-2 hours	1.527E-05	LPZ
2-8 hours	1.181E-05	LPZ
8-24 hours	9.391E-06	LPZ
24-96 hours (1-4 days)	6.607E-06	LPZ
96-720 hours (4-30 days)	3.987E-06	LPZ
annual average	2.150E-06	LPZ

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items

- The site-specific, long-term diffusion estimates for routine releases were developed
  - Realistic estimates of transport and diffusion characteristics determined using AEOLUS-3
  - Implements RG 1.111 (atmospheric transport methods) and 1.145 guidance (models for accident consequence assessment)
  - Data gathered in accordance with RG 1.23
  - RG 1.112 was followed to determine points of release and characteristics
  - Calvert Cliffs Unit 3 FSAR presents the site-specific normal effluent annual average (undecayed, undepleted, mixed mode release) χ/Q values
  - Data presented can then be used in performing RG 1.109 doses to individuals

Chapter 2, Site Characteristics
Section 2.3, Meteorology
COL Information Items

- Atmospheric dispersion (χ/Q values) and deposition (D/Q values) for 16 radial sectors to a distance of 50 miles were determined
  - Seven years of meteorological data from onsite tower used
  - Release point of 203 feet above grade (stack height)
  - A conservative (low) stack flow rate of 242,458 ft^3/min was used
  - The Calvert Cliffs Unit 3 FSAR presents the site-specific normal effluent annual average atmospheric dispersion (χ/Q) and deposition factors (D/Q) for a mixed mode release from the Calvert Cliffs Unit 3 stack for 16 radial sectors to a distance of 50 miles.
  - Locations of interest (i.e., site boundary, nearest resident, nearest garden) were derived from the annual Calvert Cliffs site land use census and regulatory guidance.

Chapter 2, Site Characteristics Agenda

- Section 2.0 Site Characteristics
  - COL Information/Interface Items
- Section 2.1, Geography and Demography
  - COL Information Items
- Section 2.2, Nearby Industrial, Transportation and Military Facilities
  - COL Information/Interface Items
- Section 2.3, Meteorology
  - COL Information/Interface Items/Departures/Exemptions
- Conclusions

Conclusions

- Fourteen COL Information Items and Three Interface Items, as specified by U. S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 2, Sections 2.0 through 2.3
- Three Departures/ One Exemption in Section 2.3 from the U.S. EPR FSAR for Chapter 2 of the Calvert Cliffs Unit 3 FSAR
- No ASLB Contentions
- Responses to all RAIs have been submitted, except for RAI 261, which is scheduled for 1/31/11.

Acronyms

- ACRS – Advisory Committee on Reactor Safeguards
- ASLB – Atomic Safety & Licensing Board
- COL – Combined License
- COLA – Combined License Application
- DCPLNG – Dominion Cove Point Liquefied Natural Gas
- EAB – Exclusion Area Boundary
- FSAR – Final Safety Analysis Report
- ft/min – feet per minute
- hr – hour
- IBR – Incorporate by Reference
- LOCA – Loss of Coolant Accident
- LPZ – Low Population Zone
- NRC – Nuclear Regulatory Commission
- mph – miles per hour
- MSLB – Main Steam Line break
- psf – pounds per square foot
- psi – pounds per square inch
- RCOLA – Reference COL Application
- RCP– Reactor Coolant Pump
- SER – Safety Evaluation Report
- SG – Safety Guide
- SGTR – Steam Generator Tube Rupture
- TEDE – Total Effective Dose Equivalent
- UHS – Ultimate Heat Sink

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Presentation to the ACRS Subcommittee

UniStar Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3
COL Application Review

Safety Evaluation Report

CHAPTER 2: SITE CHARACTERISTICS

January 12, 2011

Order of Presentation

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- **Surinder Arora** – Calvert Cliffs COLA Lead PM
- **UniStar** – RCOL Applicant
- **Jim Steckel** – Chapter 2 PM
- **Dave Brown** – RSAC Branch Chief, Chapter Presenter

Major Milestones Chronology

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

07/13/2007	Part 1 of the COL Application (Partial) submitted
12/14/2007	Part 1, Rev. 1, submitted
03/14/2008	Part 1, Rev. 2, & Part 2 of the Application submitted
06/03/2008	Part 2 of the Application accepted for review (Docketed)
08/01/2008	Revision 3 submitted
03/09/2009	Revision 4 submitted
06/30/2009	Revision 5 submitted
07/14/2009	Review schedule published
09/30/2009	Revision 6 submitted
04/12/2010	Phase 1 review completion milestone
Nov. 2010	ACRS reviews complete for Chapters 4, 5, 8,**10**, **11**,12, **16**, 17 & 19
12/20/2010	Revision 7 submitted

Review Schedule
(Public Milestones)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Phase - Activity	Target Date
Phase 1 - Preliminary Safety Evaluation Report (SER) and Request for Additional Information (RAI)	April 2010 (Actual)
Phase 2 - SER with Open Items	April 2011
Phase 3 – Advisory Committee on Reactor Safeguards (ACRS) Review of SER with Open Items	July 2011
Phase 4 - Advanced SER with No Open Items	January 2012
Phase 5 - ACRS Review of Advanced SER with No Open Items	May 2012
Phase 6 – Final SER with No Open Items	July 2012

NOTE: The target dates shown above are currently being reviewed and are subject to revision.

ACRS Phase 3 Review Plan

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

FSAR CHAPTERS BY COMPLETION DATES

Chapter(s)	Issue Date	ACRS Meeting
8	1/6/2010	2/18/2010
4	3/24/2010	4/20/2010
5	3/22/2010	4/20/2010
12	3/19/2010	4/20/2010
17	3/12/2010	4/20/2010
19	4/19/2010	5/21/2010
10	6/11/2010	11/30/2010
11	10/30/2010	
16	10/11/2010	
2 (Group 1)	10/29/2010	1/12/2011
1, 2 (Group 2), 3, 6, 7, 9, 13, 14, 15, 18	Various	Meeting dates not yet finalized

Staff Review Team

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- **Technical Staff**
  - **David Sisk, NRO/DSER/RSAC (FSAR Sec. 2.1)**
  - **Rao Tammara, NRO/DSER/RSAC (FSAR Sec. 2.2)**
  - **Dave Brown, NRO/DSER/RSAC (FSAR Sec. 2.3)**

Overview of Staff's Review

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
2.0	Site Characteristics	0	0
2.1	Geography and Demography	0	0
2.2	Nearby Industrial, Transportation, and Military Facilities	7	0
2.3	Meteorology	71	2
Total		78	2

COL Review Topics of Interest

Chapter 2.0 – Site Characteristics

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

CCNPP Unit 3 COL Application Review

- COL application includes site-specific information on the following:
  - FSAR Section 2.1: Geography and Demography
  - FSAR Section 2.2: Nearby Industrial, Transportation, and Military Facilities
  - FSAR Section 2.3: Meteorology
- COL FSAR Sections 2.1-2.3 address 14 COL information items
- COL application contains three departure requests and one exemption request from the U.S. EPR DCD in Section 2.3: Meteorology
- COL application review included:
  - Confirming all COL information items identified in U.S. EPR DCD are addressed
  - Evaluating departures and exemptions
  - Determining whether the COL FSAR information provided a sufficient level of detail

COL Review Topics of Interest

Section 2.1 - **Geography and Demography**

United States Nuclear Regulatory Commission
Protecting People and the Environment

- Summary of FSAR
  - Addresses site location and description, exclusion area authority and control, and population distribution

- Results of Evaluation
  - The staff concludes that the information provided meets site evaluation factors and radiological consequence factors in 10 CFR Parts 52 and 100

COL Review Topics of Interest

Section 2.2 – Nearby Industrial, Transportation, and Military Facilities

- Summary of FSAR
  - Addresses locations and description of nearby industrial, transportation and military facilities, and the potential hazards from these facilities, including the effects of toxic vapors or gases, explosions, fires, and missiles

- Results of Evaluation
  - Staff reviewed the COL information items, and finds that the applicant meets the siting requirements in 10 CFR Parts 52 and 100
  - The potential concentration of HCl at the control room ventilation system intake exceeds IDLH values. The staff's evaluation of this condition is evaluated in SE section 6.4

COL Review Topics of Interest

Section 2.3 - Meteorology

- Summary of FSAR
  - Addresses regional climatology, site meteorology, meteorological monitoring program, short-term and long-term atmospheric dispersion parameters

- Open Items
  - Effect of nearby tree line on meteorological monitoring program
  - Description of the departure from the site temperature parameter for the ultimate heat sink

Staff Findings

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

The COL FSAR for Calvert Cliffs Unit 3 Provides:

- Sufficient details about geography, demography, nearby hazards, and meteorology, with the exception of two open items in meteorology

Acronyms

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- COL – combined license
- FSAR – Final Safety Analysis Report
- IDLH – Immediately Dangerous to Life and Health
- RAI – request for additional information
- RG – Regulatory Guide
- UHS – Ultimate Heat Sink