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NUCLEAR REGULATORY COMMISSION

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ATOMIC SAFETY AND LICENSING BOARD PANEL

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EVIDENTIARY HEARING

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(U) In the Matter of: : Docket No.

GE-Hitachi Global Laser : 70-7016-ML

Enrichment LLC : ASLBP No.

(GLE Commercial Facility) : 10-901-03-ML-BD01

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Wednesday, July 11, 2012

Nuclear Regulatory Commission

Hearing Room T-3B45

11545 Rockville Pike

Rockville, Maryland 20852

BEFORE:

PAUL S. RYERSON, Chairman

JAMES F. JACKSON, Administrative Judge

MICHAEL O. GARCIA, Administrative Judge

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CONTENTS

WITNESS PRESENTATIONS:	PAGE
Topic 1A: Criticality Safety	33
Steven Painter	
Christopher Tripp	
Blake Purnell	
Topic 1B: Chemical/Radiological Hazards Evaluation	109
Merritt Baker	
Topic 2: Licensing an Evolving Design	157
Julie Anne Oliver	
Timothy Johnson	
Brian Smith	
Topic 3: Safety Impact of External Hazards	211
Sui-Min (Simon) Hsiung	
John Stamatakos	
Asadul Chowdhury	

EXHIBIT NO.	IDENTIFIED	RECEIVED
NRC 1 through 117	[previously]	13
GLE 1 through 6	[previously]	13
GLE 8 through 24	[previously]	13

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

(9:01 a.m.)

CHAIRMAN RYERSON: Welcome, everyone. We are here in the matter of GE-Hitachi Global Laser Enrichment LLC, which we will call GLE from now on.

The very first order of business, even before introductions, is, as you know, this is a closed hearing. Any electronic devices must be turned off and immediately handed to the guard. Does anyone have any electronic devices that have survived this stage of the process?

(No response.)

Apparently not. I will get to a number of security aspects of this proceeding in a few minutes, but first let's begin with introductions.

I am Judge Ryerson. I am designated as Chairman of this particular Licensing Board, and I am trained as a lawyer. On my right is Judge Jackson, who is trained as a nuclear engineer. On my left is Judge Garcia, who is trained as a geologist.

Some of the people you will be seeing -- and may already know -- our law clerk, Anne Siarnacki, is on the extreme left. And Andy Welkie, who will be functioning essentially as the clerk of court, is on the extreme right.

I guess with that we should start with the appearances of counsel. First, for the Applicant, GE-Hitachi. Mr. Silverman?

MR. SILVERMAN: Thank you, Judge Ryerson. Good morning. Donald Silverman with the law firm of Morgan, Lewis & Bockius, representing GLE in this proceeding.

MR. MOLDENHAUER: Thank you, Judge. Charles Moldenhauer, representing the Applicant Global Laser Enrichment.

CHAIRMAN RYERSON: Okay. And a special welcome to you, Mr. Moldenhauer. The Board understands that babies have complete disregard for scheduling orders, and the like, and we have made all reasonable efforts -- beyond reasonable efforts to ensure that if there is anything happening on that front during this hearing that we will get word to you as soon as possible.

MR. MOLDENHAUER: Thank you, Your Honor.

CHAIRMAN RYERSON: NRC staff.

MS. SAFFORD: Good morning. Carrie Safford for NRC staff.

CHAIRMAN RYERSON: Thank you.

MS. SIMON: Good morning, Your Honor. Marcia Simon for NRC staff.

MS. ALBERT: Good morning. Michelle Albert for NRC staff.

CHAIRMAN RYERSON: Okay. Welcome, everyone.

Well, the purpose of today's hearing, as you know, is to conduct an uncontested hearing that is required by Section 193(b)(1) of the Atomic Energy Act, and Section 70.23(a) of Title 10 of the Code of Federal Regulations.

This hearing concerns GLE's application for a license to possess and use source byproduct and special nuclear material, and to enrich natural uranium to a maximum of eight percent U-235 by a laser-based enrichment process at a proposed enrichment facility to be located in New Hanover County, North Carolina.

GLE and the NRC staff have agreed on five principal issues that the Board must decide in this uncontested proceeding. I am not going to read them all, but they are set forth in Attachment A to the fourth revised scheduling order that the Board issued on October 5, 2011.

In a nutshell -- and as the Commission has explained -- this Board has what the Commission has called an important but limited role. Our task is to

probe the logic and evidence supporting the findings that the NRC staff has already made, and to decide whether those findings are sufficient. It is not our task to replicate or try to repeat in its entirety all of the efforts that the NRC staff has put in this matter to date.

In the area of NEPA, or the National Environmental Policy Act, the Board's role is somewhat different. There we have the responsibility for the agency, for the NRC, to consider the final balance among the conflicting factors that are contained in the record of proceeding. But even in this area, the Commission has instructed that we do not reconsider the NRC staff's underlying technical and factual findings unless after when we look at the record we find that the staff's review has been adequate or that its findings are insufficiently supported.

I should explain -- and, again, many of you know this -- as in many evidentiary hearings at the NRC, what will happen in this courtroom today and tomorrow, and possibly Friday, is really the tip of the iceberg. We are really near the end of a long process. The process began when the Board was constituted, and we examined the application documents ourselves. With the encouragement of the Applicant,

the Board conducted a site visit of the test loop at the proposed facility in September of 2011. This past February -- February 29 -- the staff issued its final safety evaluation report and final environmental impact analysis.

And the Board looked at those documents, reviewed those documents, and came up with approximately 100 questions or so, which we submitted to both the staff and the Applicant on April 4 of this year. We received answers from the parties to those questions on May 2nd. Those answers are under oath, about 175 pages of answers. As I said, they are under oath, and the Board regards those as just as dispositive as anything that would be said in this courtroom today.

Similarly, after reviewing those answers, the Board identified six principal areas or testimony topics for further testimony. And on I believe -- the last several weeks, actually, there are different dates for some of the delivery of that. But the Board identified those topics on May 16. We received well over 200 pages or so of testimony from the combined parties and over 100 exhibits.

Again, that pre-filed written testimony is submitted under oath, and it is just as persuasive as

if those parties, those witnesses, appeared in this courtroom today and repeated all of those statements, or even adopted them, which we are not going to require, since they are under oath.

Finally, because of the decision in June by the United States Court of Appeals for the District of Columbia Circuit invalidating the agency's Waste Confidence Rule, we have asked the parties to submit their analysis of the significance, if any, of that decision on this proceeding. We received those comments and analyses, and we will be looking at those as well.

Basically, the concept I would like to emphasize is that the Board has reviewed and studied very carefully all of these materials that have come in over the last many months. And these materials really constitute much of the evidence, probably most of the evidence, that we will use in deciding the issues that are before us.

The main purpose of the evidentiary hearing that we conduct today, tomorrow, and perhaps Friday, is to allow the Board to question in person the witnesses who have already submitted their sworn written testimony.

Now, in this context, I want to address an

email that the Board received this past Friday, July 6th, from Mr. Clements of the Alliance for Nuclear Accountability. In his email, Mr. Clements protests the closing of this hearing to the public, and the Board denies this request for several reasons.

The principal ones are, as I just explained, most of the record on which the Board is going to rely is out there in the public. Small portions of the testimony, small portions of the staff documents are not public, but the vast majority is public, and it is out there in the record, in the electronic hearing docket that this agency maintains. It is available for anyone to read.

The Board's eventual decision in this matter will be made public as soon as we finish it, and a version of the transcript of this proceeding, from which any non-public information is expunged, will also eventually be made available to the public. So those are the principal reasons why we are not allowing the public into this aspect of the proceeding.

The reality is that in addition to almost certainly dealing with classified information this morning, there are numerous other categories of non-public information that will be discussed in the

course of the hearing. There is security-related unclassified information. There is export control information. There is information that is proprietary to GLE.

So for all of those reasons, we do not think it is practical to march the public in and out, even if we could identify every moment when that discussion -- those discussions occur. The public would be marched in and out I believe virtually constantly through this proceeding.

Those are the reasons, really, why we are closing this to the public. There are two additional reasons. One is that Mr. Clements -- I mean, reasons we are not granting Mr. Clements' request. The request came in, I believe, three business days before the hearing commenced. Mr. Clements and his group, for whatever reason, chose not to seek to intervene as a party in this procedure, in this proceeding. They chose not to seek to participate as a non-party, which was an option outlined in the original Notice of Hearing.

And, finally, as it turns out, the issue with which they appear to be most concerned -- proliferation -- certainly a very serious issue, but not one that the Commission has asked or authorized

this Board to address. Rather, it is a matter of international policy. It is not before this Board.

So that is -- those are the reasons for the Board's decision not to open this hearing to the public. Any comments from the NRC staff?

MS. SAFFORD: No, Your Honor.

CHAIRMAN RYERSON: Mr. Silverman?

MR. SILVERMAN: No, Your Honor.

CHAIRMAN RYERSON: Thank you. All right. Let's turn, before security matters, to more general points on evidence.

As agreed by both parties during the final pre-hearing conference, we are going to admit into evidence essentially all of the exhibits that have been submitted -- I will get to what they are specifically -- including the sworn written testimony from either party.

Now, this does not mean that the Board necessarily thinks that every single exhibit is necessarily relevant or particularly persuasive. For example, some of the written testimony includes legal conclusions by non-lawyer fact witnesses, which is fine for our purposes here in this type of proceeding, but it is certainly not binding on the Board, who has the ultimate responsibility for determining what the

law is in any particular area.

What it does mean is that in the absence of a jury, the Board really sees no utility in trying to go through document by document, particularly in the absence of any objections, and quibbling over the technical admissibility of any particular exhibit. So absent objection, it is our intention to accept as evidence the following documents that have been previously marked and numbered as follows.

That would be NRC 1 through NRC 117, inclusive, including all subparts.

(Whereupon, the above-referred to documents, previously marked as Exhibits NRC 1 through NRC 117 for identification, were admitted into evidence.)

That would include GLE 1 through 24, inclusive, including all subparts, except for GLE 007, which I think references a staff document or something. But in any event, every GLE exhibit, including all subparts, except for GLE 007.

(Whereupon, the above-referred to documents, previously marked as Exhibits GLE 1 through GLE 6, and GLE 8 through GLE 24 for identification, were admitted into evidence.)

Finally -- not finally, but additionally,

the testimony of the NRC staff witnesses -- GLE numbered its witness testimony as exhibits. The NRC staff submitted it as pre-filed testimony but did not give it exhibit numbers. My understanding is that SECY will be much happier if they have exhibit numbers, so we intend to give them exhibit numbers and admit them all as exhibits.

And also, consistent with fairly common practice on the ASLBP, the exhibit lists were submitted informally to the law clerk. It is the Board's view that the exhibit lists themselves are actually rather helpful as part of the official record. So absent objection, we intend to make the latest version that we have of each party's exhibit list the final numbered exhibit for that party.

So any questions or objections to that approach? Mr. Silverman?

MR. SILVERMAN: No objections from the Applicant, Your Honor. Thank you.

CHAIRMAN RYERSON: Thank you. NRC staff?

MS. SAFFORD: Your Honor, I just had one question about adding the NRC staff testimony as exhibits. Would you like -- will that be done during the proceeding, and then at the conclusion of the proceeding we will submit a final updated exhibit

list, with that testimony included as an exhibit number or --

CHAIRMAN RYERSON: I believe -- and I will look to our clerk to give me a nod if this is acceptable -- that he can handle that. Is that -- yes, we will handle that. And because the transcript of this proceeding will be available, but not available immediately because it has to be reviewed, what the Board intends to do is issue an order that will clarify exactly what has been admitted shortly after the hearing. And if anybody thinks we're wrong about any of it, we've made a mistake, you can move for reconsideration, something like that. So we will make that available long before, I'm afraid, the transcript will be available with another order.

MS. SAFFORD: Thank you.

CHAIRMAN RYERSON: Okay? You're welcome.

MS. SAFFORD: We have no objections to the proposed approach.

CHAIRMAN RYERSON: Thank you. Mr. Silverman, I have one technical request for you, which I will be amazed if you are able to answer on the spot. But just to show how careful the Board is in its examination of these materials, I was looking at the original responses of GLE to our questions, and on

the response to question 18 concerning the safety evaluation report, authorship of the question is attributed to Mr. Hunt, but Mr. Hunt's declaration does not claim responsibility for that answer. I'm sure it is a technical -- I suspect it is a technical glitch.

And if we -- we, frankly, see no reason to require you to find Mr. Hunt and get his revised declaration. But if you can make a representation, either now or later at some point, that he in fact intended to claim credit for the answer on question 18.

MR. SILVERMAN: Yes. One second, Your Honor, if you would, please.

(Pause.)

We will confirm that with Mr. Hunt and get back to you on that. It does appear that he has declared -- made the declaration with respect to two other answers, so it was probably an oversight.

CHAIRMAN RYERSON: I suspected --

MR. SILVERMAN: We will get back to you on that for the record.

CHAIRMAN RYERSON: -- as much.

MR. SILVERMAN: Thank you.

CHAIRMAN RYERSON: Thank you. All right.

I think now we can turn to security. As I have said, portions of this hearing will certainly involve information classified at a level of Secret Restricted Data. It will likely involve a number of other categories of non-public information.

So how do we handle that? The Board has two basic rules that we intend to follow. First, we would like to have, as we get into actually examining witnesses or panels of witnesses, as few people in the room as possible at all times. And, secondly, the Board intends to confine its questions to the person with the lowest -- to the witness, anyway -- well, to the person with the lowest classification level in the room.

In other words, if a panel, for example, has three witnesses, two are cleared at the Q clearance level, one is cleared at the L level, depending on perhaps who has the most information on that panel, the Board will either question the two Q-cleared people first with the L-cleared person out of the room, or, alternatively, question the L first and then dismiss the L and proceed to follow up with the Qs. That is our intention.

In theory, there should be no way that someone who is not authorized at a particular level

can, in that fashion, receive information that they are not authorized to receive. Did you have a comment on that, Mr. Silverman?

MR. SILVERMAN: Yes, Your Honor. The only concern we have -- and I think we can reserve it perhaps until we get there -- is that I completely understand your concern, and it is extremely important.

We have put the panels together for a reason, because it is a really a conglomeration of the knowledge of all of the people. And as I think you know from your experience in these hearings, sometimes one person answers one question, you may ask a followup, and then another panel member is really the best person to answer it.

I can see some logistical problems, particularly I think with Panels 5 and 6. Maybe we can address that a little bit further, but we can certainly try to work with that.

CHAIRMAN RYERSON: Okay. Yes. If there are insurmountable logistical problems, I suspect they will come up tomorrow, because today we have all Q-cleared witnesses with one exception. We have one L clearance I believe, assuming we get through the first three topics today.

What else? Let's see. Principal responsibility will rest with counsel, although the Board will try to monitor it as best we can, to ensure that no one in their group lacks the necessary security clearance and need to know at any particular time. We are certainly aware of the witnesses and their clearance levels. We are going to assume counsel will ensure that there is no one in their group without the adequate clearance level and need to know at any time during the proceeding.

All notes taken during the proceeding will be initially treated as classified and must be appropriately marked and protected, unless they are reviewed by an authorized derivative classifier and said to be not classified.

No classified documents can leave this room. We do have the ability to properly store a limited number of classified documents if someone wants to preserve their own notes. At the end of a session, you can give them to the law clerk, to Anne Siarnacki, a limited amount. We don't have huge room in our safe, but we have a safe that will accommodate classified materials. If you want to do that, it should be in an appropriate envelope, it should have the party's name on it, an appropriate cover sheet,

and appropriate stamps on the documents.

We can also destroy, in an appropriate fashion, any documents that you don't need to keep. Certainly, that is the Board's intention. We are going to probably take some notes for the purpose of asking followup questions, but those -- there most likely will be no need to keep those notes beyond the followup questions to a particular witness. So our intention will be to, at the conclusion of each session, destroy those notes.

The parties may wish to do the same, and we have the capacity to appropriately destroy any notes at the Q clearance level for you, if you wish to do that. You will be asking fewer questions than we will, so your interest may be slightly different.

Although in terms of notes I -- you know, I also emphasize that while lawyers are prone to taking notes, and you will perhaps ask for the opportunity to submit some followup documents of various kinds -- I don't know -- after this hearing, it is, again, as we indicated during the pre-hearing conference, it is the Board's intention to reach a decision which will not have detailed, specific factual findings.

There are five broad issues that the Board

has been asked to address. Again, our role is to review the sufficiency of what the NRC staff has done, a somewhat different role and under NEPA, but similar standards for factual determination. So we do not contemplate lengthy, elaborate, specific, fact findings, which in terms of your note-taking may make it a little easier.

Again, I should indicate that all attendees have responsibility to protect the classified material or other non-public material that is discussed during this proceeding. I will try to remind everyone of that when witnesses leave, but that is obviously very, very important.

This hearing room will have 24-hour guard. The parties can enter I guess after 8:00 tomorrow morning. It is -- if you wish to leave unclassified materials here -- and I don't know how voluminous your materials are -- it's up to you, you can leave unclassified materials here. The room will be guarded. The only ones entering will be cleared ASLBP staff, to fill our water pitchers, and the like, but that is entirely up to you. But the room will be guarded 24 hours.

The witnesses associated with the NRC staff will be able to use whatever rooms the NRC staff

has made available for you, rooms outside of this hearing room. The Board has made available to the GLE witnesses some conference space. Unfortunately -- hopefully, you have been told where it is. It was originally going to be on this floor, but apparently that room was not available.

My understanding is that the first day it will be an uncleared conference room. So obviously the witnesses should be careful not to talk about any classified material among themselves in an uncleared conference room. The second day it will be I believe a secure conference room, and the third day, if need be. However, probably the witnesses will have varying levels of clearance, and so -- also should not be talking about any classified information in the secure conference room.

Unfortunately, also, because it is a secure conference room -- and these are I guess swept periodically for listening devices, or whatever our good security folks do -- it will also be not possible in those conference rooms to bring in cell phones or other electronic devices. So those conference rooms will give you, I'm afraid, the worst of all worlds -- none of the advantages of a secured conference room, but all of the disadvantages.

Mr. Silverman, did you have a comment?

MR. SILVERMAN: A question.

CHAIRMAN RYERSON: Yes.

MR. SILVERMAN: Your Honor, since, you know, Issue 1 of course does involve classified information -- the one I'm most concerned about at the moment -- typically, when we have breaks in these hearings we are able to use the Ante Room over here to my right. And I know this hearing room has been determined by the NRC to be, you know, suitable for classified discussions. May we use that room?

CHAIRMAN RYERSON: No. The adjacent conference rooms have all been swept and are locked, and they cannot be used, I'm afraid.

MR. SILVERMAN: Okay. So if we are going to want to have a conversation on a break, or something like that, with our witnesses, we are just going to have to do it here in the room and --

CHAIRMAN RYERSON: You can do it here in the room or, I mean, if it's not classified, you can do it out in the hall.

MR. SILVERMAN: Sure.

CHAIRMAN RYERSON: But I'm afraid these conference rooms, I wish it were otherwise, but they have all been secured -- swept and secured --

MR. SILVERMAN: Okay. Thank you.

CHAIRMAN RYERSON: -- along the side.

Let's see. Logistics. We will take breaks periodically. I have a feeling that as we shuttle panels in and out we will have more breaks than we want, actually. But if we should be going on for a long period of time, I realize the Reporter and the parties will all want breaks.

We will target roughly noon for lunch. I think we will try to break at a sensible time, depending on where a panel is, so we may break a little before or after lunch.

Mr. Silverman, do you hope to go out of the building for lunch with your group?

MR. SILVERMAN: No. I think we will use the NRC cafeteria.

CHAIRMAN RYERSON: Okay. Well, then, we can probably -- probably limit lunch to an hour, unless I hear a request for slightly more time?

(No response.)

Hearing no requests, we will plan on an hour for lunch.

Let us hope there is no fire alarm or other emergency in the building during this proceeding. If there is, the most important thing is

people. I assume the NRC staff can take its people to wherever your gathering point would be in the event of an emergency. The ASLBP people will have a place to go. And anyone who is not directly associated with the ASLBP or the NRC will hopefully be escorted by the guards to a safe location in the event of an emergency.

What happens if there are classified documents on the table? There are really three options. One is to leave them, which is not a good idea, which should not happen. One is to attempt to secure them, which is a good idea, except that human safety comes before any other safety, any other consideration. So we are not going to try to fumble to open a safe if there is a fire alarm.

I think the only third option is, whoever has custody of any classified documents, and who obviously would, then, have the clearance for them, should bring them with them and keep them secure and out of sight. That is -- I don't see any other practical alternative. Hopefully, we will not have a fire alarm.

With that, any comments from the parties? Mr. Silverman?

MR. SILVERMAN: I don't think so, Your

Honor.

MS. SAFFORD: None here.

CHAIRMAN RYERSON: None from the NRC staff.

All right. Judge Jackson, any comments at this stage?

ADMIN. JUDGE JACKSON: No.

CHAIRMAN RYERSON: Judge Garcia?

ADMIN. JUDGE GARCIA: None.

CHAIRMAN RYERSON: Okay. Well, we are ready to begin with the first panel of witnesses. Our usual course here, I believe -- we may change it for some topics, but our general order, I believe, of presentation will be to start with the Applicant, and then follow up second with the panel for the NRC staff.

So on the Applicant, for Topic 1, which is -- I believe the Applicant has merged 1A and 1B -- we have merely Mr. Painter. Is that correct?

MR. SILVERMAN: Yes.

CHAIRMAN RYERSON: Okay. So at this time, I would ask that all witnesses, other than Mr. Painter, including the witnesses on Topic 1 for the NRC staff, be escorted elsewhere. And the Board will examine Mr. Painter after his -- he will do a

presentation first, I take it, Mr. Silverman? A general presentation before we ask him questions?

MR. SILVERMAN: Yes. And if you wouldn't mind, Your Honor -- this is of course completely at your description, but one small recommendation. He is -- Mr. Painter and all of our witnesses are certainly more than happy to answer questions as they are making those presentations, but I think it would be more efficient, if it's possible, for them to generally get through those PowerPoint presentations and then the Board ask -- that would be our preference.

CHAIRMAN RYERSON: Yes, that's -- I think that is our intention as well.

MR. SILVERMAN: Great.

CHAIRMAN RYERSON: And that way, frankly, we -- when presentations are made, I think we can have all of the panel members present for the presentation, because we are not going to ask questions until we have finished the presentation. And we can eliminate those with a lower security classification.

Yes?

MS. SAFFORD: Your Honor, I have one question. I was unsure in your instructions -- is it possible for the NRC staff witnesses who are also responding to Topic 1 to remain in the room --

CHAIRMAN RYERSON: We would prefer --

MS. SAFFORD: -- and vice versa?

CHAIRMAN RYERSON: We would prefer they not.

So the witnesses -- witnesses other, I guess, than Mr. Painter should be leaving the room at this time. I rely upon counsel to decide who in your party is adequately cleared with -- it should be a Q clearance with Mr. Painter, I believe, and has a need to know. That's up to you. But you are responsible for your party in that regard.

MR. SILVERMAN: May we have one more moment, Your Honor?

CHAIRMAN RYERSON: Certainly.

(Pause.)

MS. SAFFORD: And, Your Honor, may I ask one more clarifying question?

CHAIRMAN RYERSON: Certainly.

MS. SAFFORD: Your request that the witnesses for NRC staff for Topic 1 leave the room, does that also apply to the staff -- the project manager on staff who is supporting OGC, Tim Johnson and Brian Smith?

CHAIRMAN RYERSON: They are witnesses, are they not? Yes.

MS. SAFFORD: Eventually. Not on Topic 1, but --

CHAIRMAN RYERSON: Not on Topic 1. Our preference is that witnesses not sit through other testimony before they -- before they themselves testify, yes.

MS. SAFFORD: Okay.

MR. SILVERMAN: Your Honor? I'm sorry. One of the concerns we have is with respect to at least Issues 2A and 3. You know, we made the decision not to provide testimony. Only the staff provided testimony, to try to, you know, reduce the record at the Board's request, keep it as simple as possible.

But, you know, it is possible that a staff witness may say something that one of our experts might want to clarify, elaborate on, that might be important to the record. If they are out of the room, essentially we are out of the loop completely on those issues. And Mr. Moldenhauer can try to guess if there was an issue or not, but we won't really know.

CHAIRMAN RYERSON: Well, I mean, but these are -- you are speaking of witnesses who will be testifying later on another issue, correct?

MR. SILVERMAN: Well, the people that we would expect who may have knowledge on that, would in

fact be witnesses who would be testifying on other issues.

CHAIRMAN RYERSON: Yes. I -- as you probably know, the practices sometimes differ here at the NRC. But in most courts, witnesses who are about to testify do not hear the testimony of the other witnesses, just because that has some sound reasons for it, and the additional security concerns. Our preference is that the witnesses who are about to testify do not sit through earlier testimony.

MR. SILVERMAN: Okay.

CHAIRMAN RYERSON: Thank you. Okay. So, yes, all the witnesses, except Mr. Painter. And, again, I rely on counsel to ensure that other members of the party are adequately cleared.

(Pause.)

MR. SILVERMAN: Are we on the record, Your Honor?

CHAIRMAN RYERSON: Yes, we are, Mr. Silverman.

MR. SILVERMAN: Okay. So we just wanted to be clear. We have -- this is Don Silverman for the Applicant. We have cleared all of our other witnesses. The only witness that we have in the room is Mr. Painter on Issue 1.

We do have four management representatives who are not witnesses who are here to -- and all have Q clearances. And one in fact is our security manager, who we would like to rely on. And if you wouldn't mind -- thank you -- you know, it's Ms. Pat Jenny here.

And, you know, if she thinks there is a problem coming -- in the other sessions, in particular -- if you don't mind, she may raise her hand. She is very experienced at what is -- where the lines are drawn.

CHAIRMAN RYERSON: Thank you. We will watch for that.

MR. SILVERMAN: Okay.

CHAIRMAN RYERSON: Thank you very much. And I should clarify, Mr. Silverman, that once a witness has testified -- for example, Mr. Painter is not designated for any other matter, and he is Q-cleared. So if -- if it is your judgment that he has a need to know to hear the remaining testimony, it might be helpful to you in connection with the remaining testimony, once he has testified, he is welcome to stay here.

MR. SILVERMAN: Great. Thank you.

CHAIRMAN RYERSON: And that is true of any

witness that you feel has a need -- will assist you and who has already completed testimony.

MR. SILVERMAN: Great. Thank you.

CHAIRMAN RYERSON: And is adequately cleared, right. That will help. Okay.

CHAIRMAN RYERSON: Thank you.

MS. SIMON: Your Honor, may I just note that Catherine Scott from OGC -- we entered her appearance yesterday.

CHAIRMAN RYERSON: I noticed that. Thank you.

MS. SIMON: And she is Q-cleared, and so she will be here as well.

CHAIRMAN RYERSON: Welcome, Ms. Scott.

MS. SCOTT: Thank you.

CHAIRMAN RYERSON: Welcome, Mr. Painter. If you would raise your right hand, please. Do you swear or affirm that the testimony you are about to give in this proceeding will be the truth, the whole truth, and nothing but the truth?

MR. PAINTER: I do, Your Honor.

CHAIRMAN RYERSON: Thank you. Did you -- Mr. Silverman, did you wish to begin with a presentation by Mr. Painter?

MR. SILVERMAN: Yes, Mr. Painter has his

PowerPoint presentation that he is prepared to provide

CHAIRMAN RYERSON: Okay.

MR. PAINTER: Do Your Honors have copies of the slides?

CHAIRMAN RYERSON: Let's see, these are classified.

MR. PAINTER: Yes, they are.

MR. SILVERMAN: We have one copy, which we can share.

MR. PAINTER: I have two additional copies. Does anybody else need copies?

CHAIRMAN RYERSON: If you have an extra copy or two, we could use it, and we'll return it to you. The recording device is turned off, right? If you can display the copy, that's fine. That's even better.

MR. PAINTER: Your Honor, this is a classified talk -- presentation at the Secret level, in the Restricted Data category. The presentation addresses the Board's pre-filed testimony, Questions 1A and 1B. It's entitled GLE Process Hazard Analysis.

On Slide 2, the agenda is to discuss an overview of the GLE cascade and best handling area, the process hazard analysis methodology, validation experiments, criticality safety hazards, chemical or

radiological safety hazards, and provide a conclusion.

Okay. The next slide -- this addresses the common enrichment cascade components. The UF6 handling components found in the GLE enrichment cascade include the piping systems, compressors and vacuum pumps, cold traps, chemical traps, and large tanks. And all of these components are utilized by other enrichment technologies, and the operating history and failure modes are well understood in the industry.

With respect to the criticality safety hazards of each of these components, they include the buildup of solid uranium materials, either intentionally as in the cold traps and chemical traps or unintentionally in the rest of the components as deposits of material.

The chemical/radiological hazard associated with each of the components involves a system breach that allows the process gas to escape the system.

Okay. The next slide addresses pictorially the cascade.

Below each of those triangles with a stage number is a number that indicates the number of vertical separator modules in each stage. The numbers in parentheses give you an indication of the total number of vertical separate modules in the entire plant.

So our number of equipment -- numbers of equipment are very much reduced from the gaseous diffusion and gas centrifuge technology.

And those are discussed as far as the process description in the testimony.

And the next page, page 5, gives you a conceptual view of the cascade, just so you can kind of get an idea of how the components are arranged and their relative size. The vertical separator modules are the 150-foot tall components running through the center of that diagram.

So you can see their relative size with respect to everything else.

On the second level there, you will see some blue vessels.

Just to give you a general idea, each cascade is roughly the floor area of a football field, and we have modeled the building at 225 feet high. So it is conservatively larger than what you see there.

On the next slide, we like to talk about the vertical separator module. This is the one unique component where uranium enrichment is conducted in the GLE cascade.

The next slide gives you a little more detail on a separator cross-section. My understanding is you have been briefed on this process, so I am just providing an overview here.

That is represented by those blue arrows up there.

It is important to note that UF6 is not ionized to effect separation like some of the other technologies. We are not using an extremely high-powered laser to do this, and there is very little hazard associated with it. All we're doing is increasing that probability for that UF6 to interact with the product collection region.

Okay. The next slide -- the diagram on the left shows the actual arrangement of the process we just discussed, pretty much the way we showed it earlier, is how the equipment will be arranged.

On page 9, discuss the unique attributes of the GLE process.

These are all well -- are all mature and well understood technologies with extensive industry experience backing each.

The interactions between the three are relatively simple, as we have just discussed, and occur in one component that is unique to the laser enrichment process.

The laser enrichment process does introduce a process gas made up of an inert carrier gas and UF6. This is a difference. The carrier gas separation from UF6 utilizes the same cold trap/chemical trap technologies used in the other industries when they are removing lights from their UF6. So there is nothing new there. And the lights, as you might know, are the impurities that leak into the other processes.

Page 10, we will discuss the unique vertical separator module.

We differ in a few ways.

On the next slide, I would like to shift over to the process hazard analysis methodology that we used. The GLE identified the bounding process

description that presented conservative assumptions about system performance, and we followed NRC guidance for identifying actual phenomenon event magnitudes where that was available.

GLE utilized a what-if analysis methodology for its flexibility of use on both hardware systems and the human activities associated with the enrichment facility.

The ISA team utilized ISA team members with core competencies in each of the safety areas, and many of them had UF6 industry experience, direct UF6 industry experience.

The team was briefed on and studied the laser enrichment process as presented in the technical documents, explaining those details, and in the end the ISA team identified similar accidents to those identified with other enrichment technologies, and we believe this was a good indication that the bounding accident sequences were indeed captured.

Moving on to the validation experiment issue, after reviewing the validation report used by GLE, the NRC staff has concluded that it is acceptable. GLE has conservatively ignored the effects of carrier gas

on the effect of neutron submultiplication

factor, which is a factor used in criticality safety for safety determination.

Therefore, GLE does not find any limitations of experimental benchmarks to be any issue.

The next slide moves on to the criticality safety hazards. The team found these are the same as other enrichment technologies. Primarily, we are concerned with unsafe geometries and equipment processing of solid phase uranium, either as normal or abnormal conditions.

We utilized enrichment geometry, mass interaction or moderation, for the criticality safety parameters to control -- to control that hazard. And with the other technologies -- air in-leakage in the system -- which can affect your enrichment, the mass deposition issues and moderation are the most significant hazards to the process.

Next slide addresses the criticality safety IROFS that were unique to the laser enrichment cascade. We basically had four unique IROFS that were -- or two of those are associated with the vertical separator module, which is the unique component. These included active engineering control to monitor the HF in the process gas and to basically close the

feed valves to each vertical separator module when that exceeded a set point.

As an independent control, we have proposed to monitor an independent parameter of oxygen, which is another indicator of air in-leakage into the system, and this acts as your controller function in a similar manner. It would stop feed flow into the vertical separator module, if it not within safe parameters.

In all of the large tanks, obviously we have a concern with, over a lifetime of plant, larger deposits building up. And we have proposed active measuring controls to monitor that EO2 buildup to safe levels of mass. And, again, those will close any valves that allow gas into those tanks if it exceeds those safe masses.

So those are the four unique IROFS that we came up for the process.

On the next slide, there are 13 total IROFS in the cascade area alone -- the four we just discussed and nine others. Those nine others there

are addressed in the bullets and fundamentally address where we have chemical and cold trap technologies, just like we have in the rest of the plant. They address doing maintenance in this area, and they address the enrichment control here as well as in other portions of the plant.

The next slide moves on to the chemical/radiological safety hazards. The primary hazard is UF6 release, just like in the other UF6 enrichment technologies. GLE looked at both the internal and external hazards that resulted in release of process gas, as noted in those two center bullets.

And the team found that the vertical separator module does not create any increased risk of release over components used in other enrichment technologies.

The next slide addresses some other secondary hazards that are also present in the cascade area. And, again, these have to do with the maintenance activities that may go on there, and they are similar throughout the plant and address spills and HF burns during handling of potentially UF6-contaminated materials. And, again, these are the same that we see in the other enrichment technologies for this hazard.

Slide 18 addresses the most significant hazard -- or accidents that we had identified. Just like the other enrichment technologies, the most significant accidents involved uncontrolled fires and impact a large portion of the facility.

And just like the other enrichment technologies, UF6 cylinder rupture during sampling provides the largest single point of release, and that is outside the cascade area. All of these accidents are more severe than any of the accidents we found inside the cascade area.

The next slide addresses the chemical and radiological safety IROFS. Again, unique to the cascade area, there were 13 chemical and radiological safety IROFS -- I'm sorry, identified in the cascade area, we had 13. None of these are unique. They were all similar IROFS that we found for any of the UF6 handling operations, and we utilized sense and flee as a second bullet, reduce exposures in a release scenario.

We have a plug removal procedure in effect all through the plant that handles process gas. Any time we have a rupture of any system, we want to shut down any pressure sources in the plant, and that is a dual high-pressure interlock that shut down -- shuts

down and isolates equipment. Our fire protection program IROFS on combustible control limits and the automatic sprinkler system are applicable through all areas in the plant.

And in this particular area, we share a low-temperature takeoff station, which has a couple IROFS there because it is a confined space, if there is a small release inside that we want to prevent worker exposure by opening that up.

And then, the last -- or the next slide there addresses quite a few IROFS identified for handling material outside the systems to address worker safety. I won't cover each of those.

Finally, on page 21, addresses the overall advantages that we see with this process. We do use a lower concentration process gas, because of the conditions needed in the enrichment process. Portions of the process operate below atmospheric -- well, all of the process operates below atmospheric pressure.

We have smaller quantities of equipment overall, which should reduce our overall failure potential. We have fewer high-speed components with catastrophic failure modes, such as compressors and

centrifuges, things like that that just don't exist in this process. And we have fewer operating units at the higher enrichments, because of this high Beta factor that this plant provides.

The other advantage is that the UF6 remains in the UF6 chemical form throughout the process. We are not changing chemical states or using something that is -- there is not a lot of experience with.

And the last slide just is a conclusion. The design evaluated was conservatively defined to identify bounding accident sequences. The process hazard analysis was conducted by knowledgeable personnel having both experience -- I'm sorry, expertise in their individual fields and the UF6 or uranium operations.

Permits used in the cascade area have similar identical counterparts in other enrichment technologies. There are several advantages to the laser enrichment technology that make it inherently safer than the other laser enrichment technologies.

And, overall, the accident sequences in IROFS are bounding of conservatively identified conditions that should remain valid with final design of the cascade.

And that concludes my presentation on this topic.

CHAIRMAN RYERSON: Thank you, Mr. Painter. If you'll bear with us one moment.

(Pause.)

We have been going slightly over an hour, so we will take a very short five-minute break now, and then begin with questions of Mr. Painter.

Thank you.

Oh, I should remind everyone to secure -- anyone who is leaving the room who has possession of classified information obviously should secure the information.

Thank you.

(Whereupon, the proceedings in the foregoing matter went off the record at 10:05 a.m. and went back on the record at 10:15 a.m.)

CHAIRMAN RYERSON: As I look around the room, I am just confirming that we have essentially the same people who were here before or other people I know to be Q-cleared and have a need to know. So with that, I just would remind the parties of your responsibility as well to ensure that your group has the adequate clearance and need to know at all times.

Mr. Painter, I remind you you are under

oath, and we will begin our questions with Judge Jackson.

ADMIN. JUDGE JACKSON: Thank you. You know, it appears that the safety analysis can be framed by breaking the facility into two parts -- the cascade region, which is fairly unique, and what I would call the balance of plant, everything else outside the cascade region.

And it appears that the underlying logic is that in the balance of plant, that is where the largest hazards would be, both from a criticality and perhaps radiological or chemical hazardous release viewpoint. But that looks a lot like any other enrichment facility, and perhaps other UF6-based fuel cycle facilities.

And, therefore, the hazards are understood and their control is understood, because this is -- the rest of this facility looks like many other facilities where there is a long operational history. Would that be reasonable?

MR. PAINTER: Yes, that's reasonable.

ADMIN. JUDGE JACKSON: And then, in the cascade area, I believe you are arguing that even though there isn't this long operational history at full scale with this type of technology that there are

some similarities to operations in earlier enrichment plants, but the argument also is that the hazards tend to be lower in the cascade area. Is that kind of the overall logic, as you see it?

MR. PAINTER: Well, the hazards are roughly identical. There are certain elements that allow them to be a little lower initially, but in general they are identical. You have a release hazard of UF-6 and HF that affects a worker, in large enough quantities could affect public depending on what the release is. We didn't necessarily credit that for the safety, though.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: Because the hazard is still there. We have to deal with that hazard.

ADMIN. JUDGE JACKSON: The hazard is there, but I guess if you looked at the risk it would --

MR. PAINTER: The risk can be perceived less, but as far as anybody's safety analysis all of our release calculations assumed a starting condition of pure UF-6 gas at I believe 133 degrees Fahrenheit, which is where our operating pressures will be and operating temperatures. So we didn't credit the fact that it would be a process gas mixed within a lot less

UF-6 in a release point. We assumed from that calcs -- because you have to remember there is a product -- pure UF-6 product pipe in that node. And that became the basis for all of our calculations, as far as release points.

ADMIN. JUDGE JACKSON: Fair enough.

MR. PAINTER: So we didn't go back, for example, and say, "Yes, this was only 10 percent." We didn't reduce any of our release quantities because of the UF -- or the carrier gas that is mixed with it. All of those calculations use that pure UF-6 highest temperature condition for the release calculations.

ADMIN. JUDGE JACKSON: Fair enough. Well, our objective is just to, given that framework, to probe the logic with you somewhat. And let's start by inserting just a couple of questions related to the balance of plant, everything outside of the cascade region.

And in response to earlier questions of the Board, and in your testimony, let me just ask this to be explicit. As you went through the accident sequences at this facility and you looked in detail at the balance of plant, did you see any designs -- were there any designs or processes that are significantly different from earlier practice at other enrichment

plants that have been licensed?

MR. PAINTER: Well, certainly we are -- in comparison with the gaseous diffusion plant, we have elected not to use steam autoclaves which introduces a significant hazard when we are liquefying UF-6 in cylinders. We have elected to use processes similar to the newer gaseous diffusion plants where the cylinder is heated with air, hot air. That can be viewed as a significant change from gaseous diffusion.

ADMIN. JUDGE JACKSON: Well, if you could just perhaps focus more on the recently licensed gas centrifuge plants. How about -- how would your answer be?

MR. PAINTER: I don't have a tremendous amount of knowledge of the gas centrifuges. I do know they are using the low temperature takeoff stations to remove uranium directly from a gaseous state like we have chosen to do. And I know that they are using hot air for sampling. But beyond that, I am not sure there would be any more significant differences.

ADMIN. JUDGE JACKSON: Okay. From the viewpoint of criticality safety, would you consider any of the differences significant?

MR. PAINTER: No. They will have to address mostly removal of contaminant gases like we

do, and that is where you get into changing states of the material outside of the process gas system. They will have to deal with using cold traps, chemical traps, and those same technologies to do that.

ADMIN. JUDGE JACKSON: Okay. I guess it's --

MR. PAINTER: And I wouldn't think those would be any different than what we are proposing to utilize.

ADMIN. JUDGE JACKSON: Okay. A similar question for the release of radiological hazardous effluents. Anything there in the design of this new plant that would --

MR. PAINTER: Well --

ADMIN. JUDGE JACKSON: -- be significantly different from --

MR. PAINTER: -- from a release --

ADMIN. JUDGE JACKSON: -- say centrifuge plants?

MR. PAINTER: Right. From a release point, my understanding of centrifuges is they have a pretty significant failure problem with the centrifuges themselves disintegrating occasionally. We don't have any high-speed components like that that provide that kind of a source term.

ADMIN. JUDGE JACKSON: And right now I am really trying to focus you away from the cascade area. I'm just right now talking about balance of plant.

MR. PAINTER: The only other issue on balance of plant is, if you assume that the top of their cascade where they release any contaminant gases from the plant, ours will be configured a little bit different because we are a closed loop system.

We will have a two-step cleanup of our carrier gas. The first step cleans up the carrier gas utilizing chemical traps to remove HF and UF-6. If there are high levels of contaminants gases from air in-leakage, those are cleaned up in a separate stage, and then that material is released to the stack. And I would assume the other technologies similar to gaseous diffusion basically take those air products right off the top, clean them, and then release them.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: So we are one step removed there. That is I assume what you mean "balance of plant," anywhere else in the plant the release points are going to be from evacuation stations. They are typically cleaned with a cold trap and/or chemical trap and released to wherever their stack point is. And we plan to do the same thing.

ADMIN. JUDGE JACKSON: Okay. That's good. Let me ask about the identification and analysis of potential accident sequences. And, again, I am still thinking about balance of plant. Part of the logic or the argument is that because there are a lot of similarities the -- I believe the argument is -- you can tell me if this is correct -- that the safety analysis is informed by many years of operational experience with handling UF-6 tanks and connecting and disconnecting and carrying out the various operations that you have to.

I guess my question is, how does that experience come into play when you are doing the ISA, when you are doing the accident characterization? How do you know you are capturing this world of experience out there?

MR. PAINTER: Well, the process hazard analysis, we utilized a "what if" methodology up front with the level of detail we had in the design at this point, which utilized quite a few staff members who have expertise in each of the safety fields of criticality safety, industrial hygiene.

We had security personnel involved, chemical engineers involved, experts on our technology as well as a number of those, including myself, had

expertise at the gaseous diffusion plant, and we had some that came from gas centrifuge backgrounds.

So they have all been around those activities, several of them quite a few years, and have a good understanding of many of the pitfalls of those technologies, you know, personally been around the plant when we have had plug pipe releases at the gaseous diffusion plant. We know for a fact that's a hazard and has to be addressed. We know from the history of looking at the various industries that has been a common event that had to be dealt with.

Beyond that, the "what if" process systematically looked at what design we had, and we gave everybody the opportunity to identify, you know, potential accidents that they see based on those design descriptions.

ADMIN. JUDGE JACKSON: Okay. Thank you. That's good. I'd like to now turn our attention to the cascade area of the plant. And I guess a good way to frame some questions would be if we could put up or look at one of the charts that you have just shown. Let's see if we can -- page 8, if we could project that.

All right. Thank you. I would like you to please characterize the status of the design when

the ISA was done, perhaps around the timeframe of when the staff came in and did a vertical slice review. I think we are talking about 2010. And we can use this chart. Does this basically depict the design that was examined at that time?

MR. PAINTER: This is the current point design in the ISA summary, yes, sir.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER:

ADMIN. JUDGE JACKSON: Right. I wanted to ask you specifically about that in just a sec. But to begin, as far as the diameter, the composition of the gas, the carrier gas, the UF-6, all of those things were basically fixed at this point, or have they been changing?

MR. PAINTER: Well, the data that we used is projected from the data that the Australians provided in the technology. And currently this is the design we have evaluated. And, obviously, as they implement this design, the engineers are going to see places to optimize, but those will come forth later on in changes to that design.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: This is currently the design

that our safety basis is built on.

ADMIN. JUDGE JACKSON: This is your safety basis. Now, you mentioned that --

MR. PAINTER: Yes.

ADMIN. JUDGE JACKSON: -- a system that would collect the material from the top of a --

MR. PAINTER: Yes, sir.

ADMIN. JUDGE JACKSON: -- given separator module is obviously not shown here.

MR. PAINTER: That is not shown here.

ADMIN. JUDGE JACKSON: Nor is the system that collects that into what I believe you called the collection vessels.

MR. PAINTER: That's correct. That's not shown here.

ADMIN. JUDGE JACKSON: Were those designed at that time? Where they considered in the safety evaluation?

MR. PAINTER: The design function is designed. I mean, we understand the design function of those vessels.

ADMIN. JUDGE JACKSON: Okay. Let me just pursue that. In your testimony earlier, I believe you said that in looking at the release of hazardous effluents that you didn't see that this system

introduced any new I would think leakage paths. Would that be fair to what --

MR. PAINTER: Well, we have places where the system can be breached. Like all of the other technologies, there is no -- there are none that are necessarily worse.

ADMIN. JUDGE JACKSON: Okay. But --

MR. PAINTER: That's what that statement is.

ADMIN. JUDGE JACKSON: So I guess I'm saying, did you have enough of the design that, for example, you looked at the potential breach of one of these vessels when your --

MR. PAINTER: Yes, sir.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: There is a quantity that would be released if there was an upset to those vessels. That's correct.

ADMIN. JUDGE JACKSON: Okay. Now, you have talked about in your testimony, and in the pre-filed testimony, about the idea of making bounding calculations, bounding analyses, to try to get a handle on, say, criticality safety.

Now, it's my understanding -- and this is what I'd like to ask you -- that a bounding accident

-- in fact, if you wanted to just tell me what you considered some of the most challenging accident sequences would be from the viewpoint of criticality safety, maybe we could start from there.

MR. PAINTER: Well, the ones I listed in my testimony really address places where the process is putting together materials that will give you a clear path to criticality like cold traps, chemical traps, which exist in this node. I think we talked about doing maintenance. Well, again, we've got processes where personnel are actually breaching a system where there may or may not be material, and then handling that afterwards. I consider that a high hazard, rather high risk --

ADMIN. JUDGE JACKSON: Let's come back and --

MR. PAINTER: -- but where there's --

ADMIN. JUDGE JACKSON: -- just look at this separator module now. It is -- in looking at the ISA summary, it appears that you did do an analysis where --

MR. PAINTER: Yes, sir.

ADMIN. JUDGE JACKSON:

MR. PAINTER: That's correct.

ADMIN. JUDGE JACKSON:

MR. PAINTER: Yes, sir. Where we looked at is a couple of accidents with the separator itself.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: -- the criticality safety evaluation was done on that, and that particular accident generated the need to provide moderation control of the gas that is coming into the vessel, so that those would remain subcritical.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: So you are creating a scenario here where you have potentially a moderator

issue. You have an upstream, again, process event and enough fissile material that you have a potential criticality path.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: And that is addressed with those IROFS.

ADMIN. JUDGE JACKSON:

MR. PAINTER: Right. You have to have --

ADMIN. JUDGE JACKSON: -- that leads you to a criticality. How did you analyze that? How did you -- did you do a Monte Carlo calculation to look at the level of moderation it would take in that accident condition to --

MR. PAINTER: Yes, sir. That was done in the CSA by the GLE staff to come up the set points for the HF concentration. So an analysis was done using their JAMR Code initially. There is more complexity there, obviously, but the analysis was done to address that.

ADMIN. JUDGE JACKSON: So did you just address this geometry, or was there anything included

that regarded the collection of the product? And I don't know if it's close enough to these collection vessels for there to be interplay?

MR. PAINTER: The collection vessels are down on the sides of the units. You're talking about interaction with those vessels as well?

ADMIN. JUDGE JACKSON: I'm just wondering if in --

MR. PAINTER: Right.

ADMIN. JUDGE JACKSON: -- if you did -- in the Monte Carlo calculations if you just basically did a --

MR. PAINTER: Well, he did an array of the vertical separators in the plant.

ADMIN. JUDGE JACKSON: Okay. You did an array of the separators?

MR. PAINTER: Yes.

ADMIN. JUDGE JACKSON: And do you know if it included the presence of the collection tanks that could maybe accidentally also be --

MR. PAINTER: Well --

ADMIN. JUDGE JACKSON: -- filled?

MR. PAINTER: -- the way those are configured, they are always isolated either from one side of the system to the other.

So I do not believe that the analysis filled all of the vessels at one time.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: If it -- even if it did not, the HF limits that we have applied will address that particular scenario.

ADMIN. JUDGE JACKSON: Okay. So those HF limits were determined on the basis of --

MR. PAINTER: They have been --

ADMIN. JUDGE JACKSON: -- Monte Carlo calculations.

MR. PAINTER: Yes. They have been much reduced from where actual critical occurs with respect to our upper subcritical limit.

ADMIN. JUDGE JACKSON: Oh, okay.

MR. PAINTER: WE don't -- you have to almost be swimming in HF, you know, to start seeing serious problems. We are not going to let the plant start swimming in HF.

ADMIN. JUDGE JACKSON: Right.

MR. PAINTER: So the limits we have chosen

are well enough above where we would expect operationally to see the plant at, and that was based on impurities in cylinders, for example, of incoming cylinders. But it's set low enough that it would be a meaningful IROFS.

ADMIN. JUDGE JACKSON: All right. Well, from the Applicant's viewpoint, then, let me ask you about experimental validation of those calculations. Do you know if there were any unique experiments to this kind of composition and geometry that were referred to for experimental validation?

MR. PAINTER: Well, the validation covers validation of the cross-sections associated with hydrogen and fluorine and uranium and the enrichment range we are dealing with, which is normally all that is done in this particular case.

That was addressed separately in the CSA. There are no validation experiments that -- in our -- with the materials we need to look at that are associated with process gas, the process gas we use.

There were calculations done on the CSA to address these issues and the area of applicability of the validation. Those are presented in the CSA, and I

believe they were provided to the NRC staff when they asked those questions.

ADMIN. JUDGE JACKSON: You would expect that there would be some --

MR. PAINTER: Yes, we would. We would expect --

ADMIN. JUDGE JACKSON: -- there would be some energy -- neutron energy issues that would come into the cross-section averaging and --

MR. PAINTER:

ADMIN. JUDGE JACKSON: Did you say that there would be additional CSAs done or --

MR. PAINTER:

The problem is, there really is no benchmarks for that. So it wasn't credited in the analysis.

ADMIN. JUDGE JACKSON: Yes.

MR. PAINTER: We assumed the material was HF/UF-6. And the other thing you have to understand is we filled that region probably grossly with uranium beyond what the plant will probably allow us to sustain operationally. I mean, you are putting quite a bit of material in; you want a separator to see that analysis.

MR. SILVERMAN: Judge Jackson, may I for one second? Just so the record is clear -- and I know you have an excellent Court Reporter -- I just wanted to ask if you wouldn't mind if Mr. Painter would just -- sometimes he is not letting you finish your question. I would rather he let you finish your question, and then answer. So I'm just asking him to please do that, and there will be a clearer record.

Thank you.

ADMIN. JUDGE JACKSON:

MR. PAINTER: With respect to the final design, the ISA team will evaluate the final design to validate all of our conclusions. So at that time, we would be doing extra evaluation of all aspects of the plant, if that's what you are looking at.

ADMIN. JUDGE JACKSON: Let me try that question again, though.

MR. PAINTER: Well, I'm sure that we will have the ability to do that. We have not specified what those are, so -- in the current design.

And we have to control all of that throughout the whole facility.

ADMIN. JUDGE JACKSON: All right. So it leads to the two IROFS where you are going to look at HF and oxygen.

MR. PAINTER: Those are what we are looking at right now, that's correct. And, again, the point is to make sure, no matter what the failure is, that we -- when it happens, it isn't a safe configuration, by applying IROFS, by limiting the moderation that goes into that vessel.

ADMIN. JUDGE JACKSON: Do you consider this to be the bounding criticality accident for this system?

MR. PAINTER: It is one that we believe has a credible path to criticality, yes.

ADMIN. JUDGE JACKSON: Are there any others that you identified besides this?

MR. PAINTER: We looked at system breaches in it from the normal conditions, and we looked at a number of other -- well, most system breaches led to the radiological hazard. But most of the buildup on the crit safety issue is associated with this accident.

ADMIN. JUDGE JACKSON: Okay. I would like to just follow up a little bit on the second part of your testimony, getting away from the criticality safety and into the release of hazardous materials. And I think you had a bullet on one of your slides that basically said that it didn't introduce new

release points. I wanted to follow up on that.

There are some unique things about these separator modules. I would think that one of them might be you have to get the laser light in somehow, so you are going to have to have some kind of laser windows. Did you look at -- for example, that is kind of the unique thing. Did you look at accident sequences, then, that could introduce leakage paths?

MR. PAINTER: Yes, sir. All -- we looked at a number of accident sequences. And you are correct; the laser window would be a place, like any other place, that a path could occur at. The windows are rated the same as the rest of the vessel. And while it may be the -- one of the weakest points -- like I say, it may be -- it is just one of many places where a breach could occur. I mean, it depends on the type of vent you're looking at.

ADMIN. JUDGE JACKSON: Okay. That kind of would lead me to one more question.

MR. PAINTER: I mean, I could have a missile event that interacts anywhere in the vessel. I can have a human impact event that happens any place in the vessel, you know.

ADMIN. JUDGE JACKSON: Well, you could tell from the Board's initial question set --

MR. PAINTER: Right.

ADMIN. JUDGE JACKSON: -- and the fact that this topic is here, that we were concerned about assuring that the safety analysis in this region was --

MR. PAINTER: Yes, sir.

ADMIN. JUDGE JACKSON: -- carefully done, because of the fact there isn't a lot of operational history. And if I just ask you about the windows, for example, that is probably an area where you don't have a lot of history in these conditions. Would that be fair?

MR. PAINTER: It is fair that our technologies wouldn't routinely use something like that. That's correct.

ADMIN. JUDGE JACKSON: Did you have -- did you try to introduce a conservatism, then, to maybe compensate for the lack of a lot of operational failure data?

MR. PAINTER: We just assumed they would fail under the conditions of the design.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: I mean, they have a certain rating like any other component. We assumed they failed and that we could create those conditions.

ADMIN. JUDGE JACKSON: Yes, that's a bounding kind of event.

MR. PAINTER: Yes.

ADMIN. JUDGE JACKSON: I just wondered in a probabilistic analysis if you would --

MR. PAINTER: No, we didn't try to --

ADMIN. JUDGE JACKSON: -- measure any --

MR. PAINTER: -- credit that it would only fail so often or -- we assumed it failed if we exceeded the pressure rating of the window or the vessel.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: Just like we assumed the rest of the vessel would fail.

ADMIN. JUDGE JACKSON: Let me ask you a similar question, then, about the collection vessels there.

So could there be leakage paths there as well that could be introduced?

MR. PAINTER: Well, normally that -- well, of course you could have an event that ruptures that vessel.

So, I mean, that's the way it normally is --

ADMIN. JUDGE JACKSON: Examined that relate to that component?

MR. PAINTER: I can't remember exactly what we came up with that, no.

ADMIN. JUDGE JACKSON: Okay.

MR. PAINTER: I just --

ADMIN. JUDGE JACKSON: Do you see what I'm -- what I'm driving at is that --

MR. PAINTER: Overpressurizing that unit?

ADMIN. JUDGE JACKSON: -- this is a different looking system.

MR. PAINTER: Yes.

ADMIN. JUDGE JACKSON: And I assume that you went -- did you go over each potential release point that might be different?

MR. PAINTER: We went through each component, that's correct.

CHAIRMAN RYERSON: If I can just interrupt and make the same point that Mr. Silverman made. When we have normal conversations, we always overlap each other, and it is very awkward in a court setting to

remember that the Reporter cannot take down two voices at the same time.

Thank you.

ADMIN. JUDGE JACKSON: Yes. Thank you for that reminder. I'm sure I am guilty as charged.

You went over, basically, the unique aspects of this new cascade design, and then looked for release points. Is that correct?

MR. PAINTER: That is correct.

ADMIN. JUDGE JACKSON: Okay. It sounds like your bottom line from Chart 16, in your last bullet you basically said, "There is no increased risk for breach," and that conclusion is based on looking at accidents, examining each potential new release point in this design, is that right?

MR. PAINTER: Yes, Your Honor.

ADMIN. JUDGE JACKSON: I guess my last question, then, we talked about the status of the design in 2010 when the ISA was completed and when the staff reviewed it. What are the important design changes that have occurred since then? And do any of them impact the hazard evaluation, either criticality or effluent release?

MR. PAINTER: The current design -- the integrated safety analysis has locked down where it is

right now. There are efforts to provide more data for the engineers to effect that design, both in approving the efficiency of it and manufacturability of it. None of those designs have been reflected as a formal change for us right now to evaluate. When those are, we have a production management program that will identify the change according to CFR 70.

It will do the safety analysis on that change and then do the review to determine whether an amendment is needed and a new review by NRC needs to be done on whatever impact those changes have.

ADMIN. JUDGE JACKSON: Thank you.

MR. PAINTER: You're welcome.

ADMIN. JUDGE JACKSON: That concludes my questioning.

CHAIRMAN RYERSON: Thank you, Judge Jackson. Judge Garcia, did you have questions at this point?

ADMIN. JUDGE GARCIA: Thank you, Mr. Painter. I enjoyed your presentation -- clear and concise -- about this exciting new process. If I could borrow the diagrams, please. You gave us the impression that these designs have involved materials that were recently obtained from Australians through licensing. Is that correct?

MR. PAINTER: We assume GLE has purchased that technology, yes.

ADMIN. JUDGE GARCIA: Okay, good. Thank you. And I wondered in your designs here, at what level in development were they created in terms of, are these preliminary design figures that you have shown us?

MR. PAINTER: This would be the conceptual designs to apply the technology in a manner that will achieve the final effect.

ADMIN. JUDGE GARCIA: Right. So we have this on page 4, that conceptual design. What date would you put on that design?

MR. PAINTER: We probably developed that about the time that we turned the application in, just to kind of give a 3-D model of how the equipment could be configured.

ADMIN. JUDGE GARCIA: And what date would that be?

MR. PAINTER: Summer of 2009 I believe is when we turned everything in.

ADMIN. JUDGE GARCIA: So this is a simplistic representation of what final design might be.

MR. PAINTER: Very much so.

ADMIN. JUDGE GARCIA: Thank you. Likewise, if we flip to page 5, this cartoon, at what level was this designed? At what time was this --

MR. PAINTER: I'm sorry. I got the wrong pages. I was referring in my last answer to page 5.

ADMIN. JUDGE GARCIA: Okay. So do you want to go back and correct your --

MR. PAINTER: Yes. The other one was done much earlier, because this is the diagram we used for the integrated safety analysis. I mean, I don't know what else to say about it. It was done as one of our cornerstones.

ADMIN. JUDGE GARCIA: Okay. Typically, when designs of this sort are given, charts, figures of -- there are captions that help explain what is in the figure. It was certainly helpful for you to tell us what some of these things were in terms of what is in the parentheses. But I would certainly expect that when you provide these kinds of charts and figures that you would indicate on them what they are referring to and not leave it for us to wait for your testimony.

So moving on to Figure 5, at what point was this developed?

MR. PAINTER: You're talking about page 5?

ADMIN. JUDGE GARCIA: Right, page 5.

MR. PAINTER: This was developed, like I say, the summer that we turned in the application.

ADMIN. JUDGE GARCIA: So no scale is given on this figure. Can you help us understand what the scale is here? You said something about a football field.

MR. PAINTER: Yes. The area is roughly the area a football field would have, just to give you an indication. The vertical separator modules are about 150 feet tall, the center modules. The building, however, is modeled at 225 feet tall.

ADMIN. JUDGE GARCIA: And what are these size estimates based on?

MR. PAINTER: The vertical separator modules are based on the analysis done for the cascade and have quite a number of parameters associated with them, including laser efficiency, the unit efficiencies. The particular sizes of the components are based on being able to transport these from where we have them manufactured to the site. For example, all of our tanks are designed to be small enough to fit on a tractor-trailer. The separator elements themselves are also designed to that size.

ADMIN. JUDGE GARCIA: Okay.

MR. PAINTER: So we had limiting sizes we were looking at, so we could manufacture the facility.

ADMIN. JUDGE GARCIA: Okay. When we visited the facility last year -- yes, last year -- and we thank GE-Hitachi for allowing that visit -- it was my impression that the -- there had been improvements in the efficiency of design. Is that correct?

MR. PAINTER: There has probably been some proposed, but there is no formal change request right now to change the design from what we have presented.

ADMIN. JUDGE GARCIA: I understand that. It was your previous testimony. I'm asking --

MR. PAINTER: Yes.

ADMIN. JUDGE GARCIA: -- if the efficiency has been improved over the last few years since this design was made.

MR. PAINTER: Are you referring to the vertical separator module itself? It is my understanding we have got some methodologies we want to apply to eliminate or improve the removal in the product collection region. They are doing feasibility studies to see if that will be feasible, but I -- to my knowledge, they haven't actually given anybody a design that we can evaluate to look at what the

changes are.

ADMIN. JUDGE GARCIA: So the process is still in the --

MR. PAINTER: Yes.

ADMIN. JUDGE GARCIA: -- design stage.

MR. PAINTER: Right.

ADMIN. JUDGE GARCIA: Okay. So we are -- this conceptual model is still the current thinking.

MR. PAINTER: Yes, sir.

ADMIN. JUDGE GARCIA: Okay. Moving on to page 7, at what level was this -- what time was this diagram constructed?

MR. PAINTER: This has always been available to us.

ADMIN. JUDGE GARCIA: So, again, this is an early conceptual?

MR. PAINTER: Yes.

ADMIN. JUDGE GARCIA: And does this accurately reflect the separation process?

MR. PAINTER: To my knowledge, it does.

ADMIN. JUDGE GARCIA: Okay. So you expect to be able to separate all of the uranium 235 from the uranium 238 during this separation process.

MR. PAINTER: It is not an all process where you probabilistically provide conditions to

collect more of the U-235 in that one region. The collection is not 100 percent.

ADMIN. JUDGE GARCIA: Right. Does this diagram show 100 percent?

MR. PAINTER: You can interpret it as such. It is really not intended to.

ADMIN. JUDGE GARCIA: Okay. But it is shown as --

MR. PAINTER: Well, it was meant to be conceptual, but it is not a 100 percent process.

ADMIN. JUDGE GARCIA: So -- okay. The diagram on page 8, is that, likewise, early conceptual?

MR. PAINTER: Yes, sir.

ADMIN. JUDGE GARCIA: And has the design changed since this was made?

MR. PAINTER: No. Not since this was done, no.

ADMIN. JUDGE GARCIA: Okay. At what point will humans be involved in this cascade system? What will be their role?

MR. PAINTER: Do you mean as far as operation or maintenance? Well, obviously, in operation and maintenance, the human factor will be involved. We expect, obviously, a control room for

the process to oversee the parameters. We expect to have to do maintenance on components and deal with both hazards of criticality safety and chemical/radiological safety dealing with these systems.

ADMIN. JUDGE GARCIA: Okay. Do you see any greater risk in dealing with this vertical separation module than in any other system?

MR. PAINTER: I don't see any greater risk. I mean, it is still a process gas system that has the same potential hazards in it that any of the other systems have.

ADMIN. JUDGE GARCIA: Okay. I have no other further questions at this time.

CHAIRMAN RYERSON: Thank you. Mr. Painter, turning specifically to the cascade area in the proposed facility, is it possible for you to estimate at the present time roughly what percentage of the design you would consider to be complete?

MR. PAINTER: I am not the best qualified person to do that. I have been involved with the integrated safety analysis exclusively, and I am not briefed routinely on some of the plans being worked on.

CHAIRMAN RYERSON: Who would be the best

person to ask that question?

MR. PAINTER: Julie Oliver would be able to answer that.

CHAIRMAN RYERSON: And I take it that would be the same answer for the percentage of the overall facility that is presently completed -- Ms. Oliver?

MR. PAINTER: Yes, Your Honor.

CHAIRMAN RYERSON: Okay. Thank you.

I have no further questions. Judge Jackson?

ADMIN. JUDGE JACKSON: No further questions.

CHAIRMAN RYERSON: Judge Garcia?

(No response.)

Is that the end of the testimony from Mr. Painter, Mr. Silverman?

MR. SILVERMAN: Can I have one minute with Mr. Painter, please?

CHAIRMAN RYERSON: Certainly.

(Pause.)

MR. PAINTER: Your Honor, I have one minor correction to my testimony. It's on page 43, the answer to question 30 -- or answer 34. In the second line I refer to activated alumina as trapped media,

that should be hydrated alumina. Just a little technical --

CHAIRMAN RYERSON: Thank you, Mr. Painter.

All right. If Mr. Painter is not scheduled to testify on another topic, he is welcome to stay if he would be helpful, and in your view that would be a need to know reason, Mr. Silverman. He is welcome to stay as far as we're concerned. He has a Q clearance, and he can stay through as much of the remaining testimony as he wishes.

Thank you very much. You may step down.

(Whereupon, the witness was excused.)

MR. SILVERMAN: Thank you, Your Honor.

CHAIRMAN RYERSON: We are ready for the staff witnesses. And just to confirm, it will be Christopher Tripp and Blake Purnell, initially on Topic 1A. Is that correct?

MS. SAFFORD: That's correct. And Merritt Baker on Topic 1B.

CHAIRMAN RYERSON: Okay. They all have Q clearances. Does it make the most sense to split them up or take them together?

MS. SAFFORD: Bring them all down -- I would like to bring them all down together. We could --

CHAIRMAN RYERSON: All together and we'll do 1A and 1B at the same time. And they are all Q-cleared. Okay. That's fine.

We'll take a short break. Does anyone know how long it will take to --

MS. SAFFORD: Five minutes.

CHAIRMAN RYERSON: Five minutes.

MS. SAFFORD: I just have to run upstairs and get them from the conference room.

CHAIRMAN RYERSON: Excellent. We will reconvene at 11:10.

MS. SAFFORD: Okay. Thank you.

CHAIRMAN RYERSON: Thank you. Let me remind everyone to secure any classified materials that you have.

(Whereupon, the proceedings in the foregoing matter went off the record at 11:02 a.m. and went back on the record at 11:18 a.m.)

CHAIRMAN RYERSON: I apologize for the slight delay there. The classified aspects of the reporting system required a little bit of attention. We can't proceed without the Court Reporter, who is more important than any of us here.

NRC staff, there are two parts of your presentation. And what I am thinking, given that we

are approaching the lunch hour, unless you prefer otherwise, it might make the most sense to have both your presentations in order, 1A and 1B, and then we will give -- have questions for the witnesses on both panels or putting the panels together on those topics, most likely after lunch. Does that timing sound right to you?

MS. SAFFORD: Yes, that sounds fine.

CHAIRMAN RYERSON: Okay. All right.

MS. SAFFORD: Your Honor, if I could, I would just like to make one quick motion for the record.

CHAIRMAN RYERSON: Yes.

MS. SAFFORD: I would like to request that the record remain open until after the parties have had an opportunity to review the transcript, so that our panelists here who were not able to sit in and listen on the Applicant's testimony will have an opportunity to review, and, if additional testimony is required, we would have an opportunity to submit that on the record.

CHAIRMAN RYERSON: Yes. We certainly will keep the record open pending the transcript corrections. And as we discussed during the pre-hearing conference, we will have to figure out a way

to do that. The easiest thing may be to have representatives of the parties who are properly cleared come in and look at the transcript together and hopefully agree upon any necessary changes. And I emphasize "necessary." It is always tempting to want to make grammatical changes in transcripts, and the like, but really in 35 years in practice I think there were one or two occasions when a "no" or a "not" was omitted, and those are about the only substantive changes that I ever recall that were necessary.

So we have, just to -- we have a panel which consists of Mr. Tripp, Mr. Purnell, and Mr. Baker. Correct? Gentlemen, would you raise your right hands? Is the testimony you are about to give in this proceeding -- or, sorry, do you swear or affirm that the testimony you are about to give in this proceeding will be the truth, the whole truth, and nothing but the truth?

ALL: Yes.

CHAIRMAN RYERSON: Thank you. All right. So we will begin with a presentation on Topic 1A, which will be by Mr. Tripp?

MR. TRIPP: Okay.

CHAIRMAN RYERSON: Is that correct?

MR. TRIPP: Yes.

CHAIRMAN RYERSON: Thank you.

MR. TRIPP: Okay. Thank you, and good morning. I will be presenting a discussion of criticality safety review. This review was done by Mr. Blake Purnell and myself. Blake was the reviewer during most of the technical review. He left to get a different position shortly before the technical review was done, and so I have worked mostly on the follow up to that, finishing the SER, and so forth.

The purpose of our testimony -- we are going to review some key aspects of the safety review, specifically addressing the topics of -- yes, Slide 3, that were specifically asked about in the Board's questions.

CHAIRMAN RYERSON: And if I can just interrupt you -- I'm sorry, Mr. Tripp -- I would emphasize for the witnesses to be sure to identify the exhibit you are referring to by number each time. I'm not sure we always did that in the morning, and it makes for a much more clear record if you are certain to do that. I think you just did that with this particular one, but just as a reminder.

Thank you.

MR. TRIPP: Okay. I may need counsel's assistance in doing that.

Okay. On Slide 4, first, we wish to present a discussion of the regulatory requirements pertaining to criticality safety. In particular, all of Part 70 will apply to criticality as well as other hazards, chemical and radiological hazards. But the ones that are most pertinent to criticality safety are on this slide, Slide 4.

The first is 70.24, which requires that there be criticality accident alarm system in facilities having more than a critical mass of material, which this facility certainly will. And if you have an alarm system, you are also required to have emergency response procedures to provide things like medical care, and so forth.

10 CFR 70.61, the performance requirements, there are two parts -- two performance requirements that pertain to criticality. One is 70.61(b), which requires high consequence events be made highly unlikely. Criticality is generally considered a high consequence event and -- although it does pertain to other hazards as well, whereas 70.61(d) only pertains to criticality. It requires that all processes be subcritical under normal and credible abnormal conditions.

It also requires that the controls that

you use be in place to prevent criticality. So criticality has to be prevented as opposed to other types of hazards, which can also be mitigated. And then, there is 70.61(d), which requires any physical item, engineered item, or administrative requirement used to meet 70.61(b) or (d) be designated an item relied on for safety.

70.62 is the -- requires the safety program, an integrated safety analysis, to be performed. So reviewing criticality accident -- accident sequences is an important part of doing the ISA. The part of the criticality or the part of the safety program that pertains to criticality is referred to as the nuclear criticality safety program, similar to fire protection or radiological protection program. But it has a criticality safety focus.

10 CFR 70.64, the baseline design criteria, pertain to new facilities or new processes in existing facilities. The part of that that pertains most specifically to criticality is 70.64(a)(9), which requires that the design provide for the prevention of criticality, and in particular meeting the double contingency principle.

That is also something that has met my existing facilities, but it is only required under the

rule for new facilities. And 70.64(b) requires defense-in-depth, which the double contingency really addresses that, because that is a particular form of the defense-in-depth principle.

And then, 70.72 pertains to facility changes, and there are -- so we would be concerned about changes that could have an impact on the criticality safety basis.

Okay. Next slide, please.

Now, the regulatory guidance that is available for that is primarily NUREG-1520, standard review plan for a fuel facility. Chapter 5 addresses the criticality safety program, and Chapter 3 addresses the -- how you perform an ISA, not just for criticality but for other hazards, but certainly including criticality.

The revision that was in place when the license application was submitted was Revision 0. So although that has since been revised, we are going by the version that was in place at the time of submittal.

Since NUREG-1520 was issued in 2000, there have been a number of issues that have come up where -- areas where we defined more guidance being necessary. So we have issued a number of interim

staff guides, the so-called ISGs. And two of these are of particular importance to criticality. One pertains to the ISG-3, to the performance requirements, and how the requirement to be subcritical under normal and credible abnormal conditions, and to show that criticality will be highly unlikely, how that interacts or how that plays out when you also have double contingency principle.

So there is a series of different requirements, so ISG-3 is meant to explain how the three of those work together to meet the rule harmoniously. And ISG-10 pertains to, how do you justify the minimum out to the subcriticality?

We also regulate -- a lot of emphasis is put in the criticality safety program on meeting various industry standards. And there is a whole series of E&S 8 standards that pertain to criticality. These are endorsed in NRC Regulatory Guide 3.71. And there are also a number of technical reports. The one that we used for this one in particular is NUREG-6698, which talks about how you perform a criticality safety code validation.

This is discussed somewhat in the standard review plan, but in a lot more detail than NUREG-6698. So that establishes the regulatory framework for the

criticality safety review. The things that were reviewed were basically the GLE license application, particularly Chapter 5, which corresponds to Chapter 5 of the standard review plan, the ISA summary as it pertains to criticality, the validation report which pertains to the monitoring of subcriticality.

And also, there was onsite ISA documents which compromise the much larger picture of the safety basis of the facility. The ISA summary is -- basically just tells you the results of the ISA, but there is a whole suite of other documents onsite. And a sample of those is part of an onsite vertical slice review that was done during the review.

Next slide.

CHAIRMAN RYERSON: That would be Slide Number 6?

MR. TRIPP: Slide 6, yes.

CHAIRMAN RYERSON: Thank you.

MR. TRIPP: Okay. The conduct of the review -- the review basically consisted of two parts. The first was a programmatic review where we looked at the description of the NCS, the nuclear criticality safety program, in the license application Chapter 5, and compared their commitments against the acceptance criteria in the standard review plan. So that was a

programmatic review pertaining to their overall methodology for ensuring criticality safety at their facility.

Then, there was the technical review, which entails reviewing the design, reviewing the accident sequences, and the items you rely on off of safety in the ISA summary, which is really the implementation of the program and the application of the program to the current facility design.

So that was done -- we reviewed a description of the various parts of the ISA summary, the process description, the accident sequences, and IROFS, and so forth. And the goal of that was really to determine whether the Applicant's design was correctly implementing a criticality safety program.

And as I have indicated here, it's supplemented by performing the vertical slice review, where we looked at individual sequences, and from a high level did the calculations and other technical documents backing up those sequences, and so forth.

Okay. Slide 7.

So that sort of gives you an overview of the overall criticality safety review. Now, the Board had asked questions about unique aspects of the facility, because this is a new technology that is

being used here for the first time. And, really, the unique part of the facility is really the heart of the enrichment process, the cascade and gas handling area. As everyone knows, it is based on a laser-based separation.

And the other parts of the facility that support that that I will talk about in a minute really are not that much different from other processes that you have at other fuel facilities.

Slide 8.

Now, there are three basic commercial technologies, either in use or being planned in the United States. These are the laser enrichment, gas centrifuge, and gaseous diffusion. The gaseous diffusion and gas centrifuge are in use at the moment. We have a much longer history with diffusion, although centrifuge technology has been used elsewhere in the world for a long variety of time.

And the laser process, while it is new, only really differs in the actual physical process used to perform the enrichment itself.

The enrichment part of the process is referred to as a cascade in all types of facilities, because there is a certain amount of enrichment that occurs and there is a series of stages that you go

through. So it is referred to as a cascade.

The other areas of the plant are similar to all of the types of enrichment facilities. You have cylinder enrichment -- I mean, cylinder receipt and handling, either feeding of natural or depleted uranium. This is because all three processes are based on UF-6 gas.

There is a cylinder feed of the UF-6 -- cylinder where the UF-6 is converted into a gas for the enrichment process. After enrichment, you have a product stream where the gas is converted, again, into a solid. And the tails, which is the leftover depleted stream, that also has to be stored in cylinders.

And then, there may be a product blending and sampling area, where different streams are combined to get the proper -- the desired enrichment for that particular campaign.

Slide 9.

Now, the part that we want to leave you with, that we were asked about, what were the dominant hazards, and the dominant hazards are -- really occur where the physical conditions that you have are amenable to having criticality. You have to have large quantities of uranium. It has to be in a form

-- as you know, you have to have a critical mass of uranium in a fairly compact volume in order to attain criticality. So only a solid or a liquid phase is amenable to that. You can obtain criticality with a UF-6 gas as long as it maintains in the gas phase.

So, therefore, it is only really in the product area where you have -- product or blending areas where you have enriched uranium, you have large quantities, and it is condensed into a solid or potentially a liquid form. In this facility, it would be solid, because it is being desublimed directly from the gas to a solid phase.

So that occurs outside the enrichment part. And in the other parts of the plant, that is the same as what is used in other -- both fuel fabrication and enrichment facilities. So that is where the dominant risk occurs.

In the cascade itself, which is the unique part of the process, we considered the risk to be very low, primarily because UF-6 is in a gaseous state. Also, the amount of material in each stage is low; it's not generally sufficient to form criticality. And, in addition, moderator, such as liquid water, has to be excluded from the process in order for the process to work. And low enriched uranium needs

moderator in order to reach criticality. So not only don't you have the right density and mass of material, you also don't have the moderator that is necessary.

And for those reasons, we consider this -- the enrichment portion to be the lowest risk part of the facility.

We did look at some hazards. We looked at the possibility of over-enriching, and there are various scenarios where material can reach a higher enrichment than is designed. But, again, as long as moderator is excluded and it is maintained in the gaseous phase, it is not going to lead to accidental criticality.

And we also looked at the possibility of getting moderator into the cascade, such as through air leakage into the equipment, because the equipment is normally at subatmospheric levels. We will talk about that a little bit more in the next slide, on Slide 10.

So there really are no unique hazards at the laser enrichment facility than you would have at another enrichment facility. Even the process of --

CHAIRMAN RYERSON: Excuse me. We are on Slide 10 now, right?

MR. TRIPP: Slide 10, yes.

CHAIRMAN RYERSON: Thank you.

MR. TRIPP: Okay. So you would have the same hazards. Even the over-enrichment hazard you have at other enrichment facilities. The exact physical mechanism that you use to perform the enrichment -- and the means of preventing over-enriching -- may vary. But the fact that over-enriching is a hazard is something that the other facilities also have to cope with.

Now, there are really no unique design features that are significantly different from the other enrichment processes. In criticality safety, we typically approach it a little differently than some of the other disciplines, in that we are looking at what conditions -- first, start by looking at what conditions are necessary for criticality to occur.

So we will look at what parameters are being controlled and to what values. And in the enrichment and gas-handling area, the primary parameters that are being controlled are enrichment moderator, geometry, and volume. I lumped geometry and volume together, because they both rely on limiting the dimensions of process equipment.

For enrichment, the control is basically through monitoring the process. Process flows,

temperature pressure, those kinds of parameters are monitored very closely, and -- because the amount of enrichment efficiency, the amount of enrichment you get in each stage, will depend on those kinds of parameters.

So for product quality purposes, they need to monitor continuously the state of the process. And this is really done at the other enrichment facilities as well. The details may vary, but the fact that you are monitoring process conditions associated with the UF-6 gas is the same. So the overall strategy is the same, although the specific controls may vary somewhat.

So the process is continuously monitored for enrichment. There is also enrichment sampling that takes place before the UF-6 gas is desublimed into a solid, which is where the hazard of criticality then becomes more credible.

Moderation control is primarily through the passive gas boundary. That is, because the equipment is maintained at subatmospheric pressure, in most cases they have to maintain a boundary that keeps the gas in and keeps the atmosphere out.

UF-6 is also strongly fluorinating. When UF-6 reacts with water, it will form UO2F2 deposits,

and the water will be dissociated. It will form HF primarily. And that is really a function of the chemistry of UF-6. It is sort of technology-independent.

But that fluorinating environment means that instead of having liquid water accumulating in the cascade, when it reacts with the UF-6, most of it is going to be eliminated as HF gas. And, again, we monitor conditions within the cascade. There is a significant amount of water intake that is going to show up as increased pressure, and so on, in the cascade.

And then, geometry and volume are primarily through the dimensions of passive equipment, spacing between them, and so forth. So that would be more of a passive control.

So the overall criticality safety strategy that is outlined on Slide 10 is really the same as you'd have for any other enrichment facility.

Slide 11.

So the finding they are required to make -- and this is part of the review -- is that we have reasonable assurance that -- a reasonable assurance of safety and regulatory compliance with all of the regulatory requirements that I indicated on an earlier

slide.

And reasonable assurance that we have identified all of the important accident sequences is really based on a number of things. First of all, we have to have confidence in the ISA methodology. The methodology being used for laser enrichment is the same as it -- or similar to what is being used at other fuel facilities. I believe it is essentially the same as what is currently being used at the Global Facility.

So the overall methodology, which is described in Appendix A of Chapter 3 of the standard review plan, is essentially what is used at most of the fuel facilities, including this one. So that defines the overall methodology, and there is various commitments to how they evaluate consequences, likelihood, and how they determine what management message to apply, and so forth.

So overall we have confidence in the methodology, and we obtain more confidence in that by reviewing the ISA summary. So look at the higher risk sequences in more detail, and also, when we did the vertical slice review. And that is really to validate the methodology, that they are implementing it correctly.

There is also the fact that the industry has a lot of familiarity -- and not only the industry but this licensee in particular, the existing licensee at the site -- has familiarity with handling of UF-6 gas. The gaseous process of handling of cylinders, and so forth, is something that is done commonly throughout the industry.

So although the enrichment technology is new, the technology involved with handling where the dominant risks are located is not new.

Slide 12.

There is also the criticality safety program. The program consists or includes a number of technical practices for how you decide what kind of controls to establish, preference for engineering controls over administrative, how you -- the fact that you want to rely as heavily as possible on passive geometry, how you model different parameters when you establish your models for your criticality calculations, and so forth.

And the focus is really on identifying what parameters you are going to control, and establishing enough controls to ensure you meet the double contingency principle. This is a very deterministic approach that goes in parallel with

performing the ISA.

But the deterministic approach assumes that if you have a failure, or if control over a given parameter is lost, then the value of that parameter goes to the most reactive credible value, without taking into consideration what the likelihood of that is. And so, therefore, that drives you to consider in your models very conservative assumptions.

This produces large safety margins. For instance, assuming the highest facility enrichment everywhere in the facility, or neglecting neutron absorbers, or there is any number of these. If you don't control geometry, it typically assumes the worst-case geometry, which would be a spherical geometry, and so on.

So this leads to very large safety margins. And we did review the program, and it is -- meets the same standard as other criticality safety programs that are out there.

On Slide 13, I will reiterate that we considered that the risk of criticality in the cascade gas handling area was low. Although it was low, because it is new, we did look at a couple of different scenarios. One was the over-enrichment scenario, and there is various ways that process

parameters can get out of bounds and the enrichment can increase.

But only one scenario is identified that could increase the bounding enrichment that was used throughout the plant. All of the criticality calculations assumed an eight weight percent enrichment, even though they are only authorized to withdraw product at five weight percent. And the difference in reactivity from going from five to eight produces a large safety margin.

The only means of exceeding that was by taking a product cylinder and feeding it back in as a feed cylinder. Now, that would require violation of controls as material control in moving cylinders around. You'd have to lose track of cylinders, bring it back, and feed it -- the wrong cylinder into the feed process.

But in addition to those sort of administrative requirements of tracking cylinder movements and accounting for material, the valve designs on the cylinders are different. So it was designed so that it would be physically impossible to connect a feed cylinder or a product cylinder to the feed process. So there is a passive design that prevents that as well, and that was the only means

that was identified that could indicate exceeding the eight weight percent. Even if you did exceed it, you are still dealing with a gas, you still don't have the moderator that would be required for criticality.

Moderation-intrusion scenarios were also considered. These are prevented primarily by the passive design that maintains the pressure boundary of the gas. As I indicated, UF-6 is strongly fluorinating and will react with water to transport the hydrogen away as HF gas. So the chemical and physical nature of UF-6, constant monitoring of the process, so if the process were to get out of bounds, it would be quickly identified.

And it would require that the process be severely out of bounds for a long period of time. Because of the low throughput required, it would take a very long period of time to accumulate enough material at the right enrichment to have a criticality concern.

And in addition, they have also committed to performing periodic NDAs to look for these UO2F2 deposits that are the product -- the byproduct of the reaction of UF-6 with water. And that is something that a lot of the other enrichment facilities don't do, because they don't consider it necessary because

it is such a low risk and such a long-term process.

And in looking at the vertical slice review, there were no other significant concerns identified in this area.

Slide 14.

In terms of criticality code validation, which we took to be the intent of the Board's question -- please pardon me if we got this wrong, but we interpreted the question to be, where there any unique aspects associated with the validation of the criticality codes? And the short answer is: no.

We do validate the code, so if there are areas in the cross-sections they will be detected when we calculate benchmark experiments that are known to be critical. Whatever the deviation from the k effective of 1, that is applied as a correction to the calculated value for other calculations that have been done.

There were no unique code validation issues. And the basic reason for that is, again, it is a UF-6 process. The physical systems that are associated with that UF-6/UO2F2 solids and solutions, and so forth, which would be an absolute bounding worst-case scenario, those are all things that are handled not only at other enrichment facilities but at

other fuel fabrication facilities as well.

So those are all things that have been benchmarked over and over again at different facilities, and it is the same physical system, it is the same fissile material that is being considered. And so, therefore, there are no unique validation issues.

So are there any questions?

CHAIRMAN RYERSON: I think we have agreed we will hold the questions, Mr. Tripp, for you and Mr. Purnell, until this afternoon, and we will go on to the formal presentation on 1B, which is by Mr. Baker.

MR. BAKER: Okay. Good morning, and thank you, Your Honor.

We are on Slide 3, Andy.

Again, the purpose of my testimony is to discuss key aspects of the staff's review and some of our findings, with emphasis on important accident sequences, differences between GLE and other enrichment facilities, sequences posing the greatest threat, and our basis for concluding the probability is adequately small.

Slide 4.

In this case, some of the applicable regulations repeat, and some are a little bit

different. The performance requirements in 70.61(b) specify that high consequence events will be made highly unlikely, and this aspect of the regulation states, "A chemical, high consequence criteria outright," and this would be a sequence that could endanger the life of a worker or could pose a serious risk to a member of the public. Also, consequences specified for radiation safety, 100 rem to the worker or 25 rem to the public.

Similarly, intermediate consequences should be made unlikely, also defined for chem as "could lead to a serious long-lasting effect to a worker or a mild transient effect to a member of the public."

Rad criteria, 25 rem to the worker, five rem to a member of the public.

Again, similar to criticality, 70.61(e) requires that all controls used to either mitigate the consequence or adjust and reduce the likelihood will be made items relied on for safety.

Following that, 70.62 requires the establishment of a safety program. And from a chemical safety point of view, they need to record and maintain process safety information and maintain records of failures. Again, they need to conduct and

maintain an integrated safety analysis, and that ISA must identify radiological hazards, chemical hazards from licensed material, chemical hazards produced from licensed material, and a third type, chemical hazards, that could affect the safety of licensed material.

Following that, 70.65 specifies the contents of the ISA summary, including a description of the site, including a description of the site boundary, description of each process in sufficient detail for the review to be performed. And, finally, a definition -- the applicant defines "unlikely," "highly unlikely," and "credible" as used elsewhere.

Slide 5.

The applicable guidance documents -- again, we followed NUREG-1520, the standard review plan -- in this case, Chapter 3 in its entirety for the integrated safety analysis, and Chapter 6 in its entirety for the chemical safety program. It specifies what we would expect for process descriptions, calculation consequences, and assumptions.

In addition, there is NUREG-1513, the ISA guidance document. It describes how an appropriate application would perform the ISA. It does not emphasize any method over another.

Three other guidance documents include NUREG-1391, chemical toxicity of uranium hexafluoride; NUREG-5659, control room habitability; NUREG-6410, fuel cycle facility analysis handbook. Those were all used by the staff when we calculated independently some worst-case scenarios.

Slide 6.

We reviewed the license application in its entirety using NUREG-1520. From my review -- again, we used Chapter 3 for the integrated safety analysis and Chapter 6 for chemical safety. We reviewed the Applicant's ISA summary in its entirety, particularly their methodology, the process descriptions, the descriptions and lists of items relied on for safety.

We reviewed this summary for completeness, all of those pieces that must be contained in an ISA summary. We examined the appropriateness of their techniques and assumptions.

In the onsite team review, we performed what we call a horizontal slice, and we would take certain processes or scenarios and follow the ISA methodology all the way through. This horizontal review used our experience with other plants, and then the existing test loop.

Slide 7.

Some specifics on the applicant's ISA methodology, they broke down in the -- their ISA summary each building or system into its lowest possible description -- a subsystem or a node. And that gave us sufficient detail to examine, you know, what would hazards be at each point in the process.

They did use one of the commonly used methodologies, a "what if" checklist methodology. They had a team of a wide range of experiences in disciplines, including a team leader who was trained in the methodology itself.

I would emphasize this is what if/checklist. Following this team brainstorming type review, they have a pre-printed checklist with some key words -- pumps, compressors, piping, and so forth -- to force them after the brainstorming, free-flowing scenario development, to go through a discipline list.

They came up with three unmitigated consequence categories -- three being high, two being intermediate, one being low. They used the same regulatory criteria for high and intermediate as the performance requirements in 70.61.

They developed three likelihood categories -- three being the most likely. This is how to describe. The most likely, category three, also

called not unlikely; category two, unlikely; category one, highly unlikely.

Then, they printed an unmitigated risk matrix where they multiplied the consequence and the likelihood together, so the so-called worst-case scenario would be the highest consequence, and the least attractive likelihood a nine. Then, there are sixes and fours, and so forth.

Their methodology required them for nines and six indexes to develop IROFS, something to mitigate the consequence or reduce likelihood. In addition, they performed a quantitative risk assessment detailing the likelihood of failure of any of these systems or items relied on for safety.

This is called a semi-quantitative risk index approach, and it was identical to an example in Appendix A of NUREG-1520.

Slide 8.

For each system, again, the Applicant provided a description of the scenario, a description of initiating or contributing conditions, a description of preventative or mitigating controls, and an event tree showing the likelihood determination as you would go through the possible failure of any of these controls.

Following that, there was a description of the management measures that would be applied to the items relied on for safety. These management measures -- calibration training, and so forth -- ensure that the likelihood index for that item relied on for safety is at the reliability that was calculated.

Slide 9.

All of their hazards were identified in accordance with this ISA methodology -- high, intermediate, or less than intermediate. When they calculated consequence, they used variables of quantity released, the location of the release, physical properties -- gas or liquid -- the presence or absence of a worker, distance to the member of the public, if that was the scenario, ambient conditions, time of exposure, and so forth.

Again, the staff did some independent modeling of some scenarios, not just to check their arithmetic but independent modeling of selected scenarios determined by the staff based on our experience.

Again, those are in what we call Appendix A of the non-public version of the SER. And I apologize, I don't know the exhibit number for that document.

Slide 10.

How did we identify the important accident sequences? The staff examined all of the high and intermediate consequence scenarios. That is, high and intermediate consequence scenarios into unmitigated stake. Eventually, they were all mitigated down to highly unlikely or unlikely.

We do have confidence, again, in the depth and thoroughness of the ISA commitments, staff's experience with these processes in other enrichment facilities. In our onsite trip, we performed what we called a vertical slice review, and we would delve into the underpinnings, the calculations themselves, the models they used. We had access to all of the available piping drawings, electrical drawings, logic drawings, for instrument loops. And we examined them for appropriate and reasonable conservatism.

Again, we verified that they used appropriate techniques and valid assumptions. So we concluded that the plant design itself was based on safety first, and a preference for passive safety features, and the administrative management structure described in the license application was determined to support the reliability of these safety controls, and a continuing thorough design as we reviewed it.

Slide 11.

Differences in design features and hazards from other types of gaseous diffusion plants. We can say that all of these enrichment plants handle UF-6 using similar methods. They all have similar enrichment assays, up to five percent. They all have the same general structure -- feed, withdrawal, tails. They all have cylinder storage. They all have sampling.

Compared to the gaseous diffusion plants, there are actually fewer hazards. No large rotating equipment, no large lube oil reservoirs, reduced risk from fire. Again, compared at least to the gaseous diffusion plants, there is a smaller inventory in the cascade.

All of these gaseous diffusion plants, centrifuge plants, the laser enrichment facility, all of their enrichment facilities operate at a subatmospheric or nearly atmospheric condition that increases safety quite a bit.

There is no high enriched attributes here. There is no high enriched attributes in the GDPs or the centrifuges. But for -- compared to general fuel cycle experience, hazards from high enrichments are not credible. There is no solution chemistry, there

is no uranium recovery likely of the fuel -- fuel manufacturing plants would use.

Slide 12.

The staff's judgment of accident sequences posing the greatest threat included UF-6 feed product and tails withdrawal, blending sampling in the cylinder yard. The cylinder yard made the list, because that is simply where the greatest quantity of UF-6 is stored.

The other subsystems represent places judged to be a high threat. That is when the system is open for connecting or disconnecting. There may be places, such as sampling, where the UF-6 is withdrawn as a liquid. And the toxicity of a liquid UF-6 is greater than that of gaseous UF-6.

So those are the places and the reasons we felt the greatest threats resided.

Slide 13.

We determined that the risks were adequately small, reasonable assurance of safety was presented. The controls were the same as or similar to the other enrichment facilities. The laser physics are understood, and, in fact, the laser itself doesn't create new types of hazards from a chemical or radiological viewpoint.

Throughout the application and the ISA, the Applicant committed to national standards, national codes for NFPA, electrical code, and so forth. The commitments and the design was consistent with other known industry practices.

And I believe Chris mentioned this -- this is a new facility. The baseline design criteria applies, and they are required to use defense-in-depth in their design.

And I believe that is the close of my portion of question 1.

CHAIRMAN RYERSON: Thank you, Mr. Baker. Thank you, Mr. Tripp, for your presentation as well.

We are just about right on schedule. I would suggest we give ourselves a little over an hour and reconvene promptly at 1:15 here in the conference room.

Anything, Mr. Silverman, that you want to say at this point?

MR. SILVERMAN: No. No, Your Honor.

CHAIRMAN RYERSON: NRC staff?

MS. SAFFORD: Nothing at this point, Your Honor.

CHAIRMAN RYERSON: Okay. Judges?

(No response.)

Okay. I once again will remind everyone of your responsibility to protect classified information. If you have notes that you would like destroyed in a proper fashion, as we leave, you may give them to the law clerk, Anne Siarnacki. And, similarly, she is prepared to put in a secure location over the lunch hour a reasonable, limited amount of classified material, if you want to use her for that purpose.

I think that's it. We will see you at 1:15.

Thank you.

(Whereupon, at 12:08 p.m., the proceedings in the foregoing matter recessed for lunch.)

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

(1:16 p.m.)

CHAIRMAN RYERSON: Welcome back, everyone. I think we have one or two people who were not in the room before, but I -- everyone is cleared and has a need to know, as far as the parties are concerned?

MR. SILVERMAN: Yes, Your Honor. We have, for the Applicant, two people additionally who could have been here this morning, but they are Q-cleared, have a need to know, and are non-witnesses.

CHAIRMAN RYERSON: Okay. Thank you, Mr. Silverman.

MR. SILVERMAN: Thank you.

CHAIRMAN RYERSON: Just on a housekeeping detail, I believe -- and we should have this on the record -- that our first witness this morning, Mr. Painter, when he went through his presentation was actually using what has been previously identified as GLE Document or Exhibit 002. Is that correct, Ms. Safford?

MR. SILVERMAN: That would be --

MS. SAFFORD: GLE Exhibit?

CHAIRMAN RYERSON: Sorry.

MS. SAFFORD: No, that's okay. I can probably help you confirm if --

MR. SILVERMAN: I am 99 percent sure that is right.

CHAIRMAN RYERSON: GLE, yes. Mr. Silverman, that is correct.

And for the two NRC witnesses, the first witness was Mr. Tripp, who was dealing with NRC 110 --

MS. SAFFORD: Yes.

CHAIRMAN RYERSON: -- and Mr. Baker, NRC 11.

MS. SAFFORD: Yes.

CHAIRMAN RYERSON: Okay. And if either the witness or the counsel would make a point of identifying an exhibit before a presentation, that way the record will be clear.

Gentlemen, we have Mr. Tripp and Mr. Baker and Mr. Purcell. In the witness box, you are reminded you are still under oath. And we will begin -- I think what we will do -- all three of you are welcome to sit up there. We will go through probably in order, Topic 1A, and then follow Topic 1B. But that's the order we will proceed in.

Judge Jackson will begin questions on Topic 1A.

ADMIN. JUDGE JACKSON: Thank you, Judge Ryerson.

I believe I would like to reference these questions more to your pre-filed testimony. It runs in parallel, obviously, with your PowerPoint presentation. But sometimes it is easier, and there is a little more detail in the pre-filed testimony.

So I would like to ask you a few questions that focus on the cascade region of the facility. And if we could go to page 7 of your pre-filed testimony, down at the bottom of the page, bottom couple of sentences, where it says, "The staff" -- you see that I guess, the end of the third line from the bottom.

It says, "The staff did not consider the product collection process to present any unusual hazards that warranted a detailed review."

Could you comment on that, please?

MR. TRIPP: Well, I will start I guess. The fact that you simply have -- it's true that you can have criticality in gas, and you need it in a more condensed form, like a solid or liquid.

You still don't have the presence of moderator.

ADMIN. JUDGE JACKSON: Now, you certainly do have it in a storage cylinder, I agree.

MR. TRIPP: Well, not necessarily. And since it's in the gaseous diffusion process, they -- it tends to be a fairly leaky process, and there are some fairly large deposits.

ADMIN. JUDGE JACKSON: Would that be correct?

MR. TRIPP: Yes. They are all part of the process.

ADMIN. JUDGE JACKSON: Well, I guess it is a matter of interpretation.

MR. TRIPP: Correct.

ADMIN. JUDGE JACKSON: Okay. If you go on, that same spot, it says, "Because the enrichment cascade relies primarily on moderation and enrichment control, as long as these parameters are maintained within the safety limits, criticality cannot occur."

For this particular system, I guess I would like to ask you, what is the basis for that statement?

MR. TRIPP: Well, it is not really dependent on the system. It is just based on the physics of criticality. The low enriched material requires moderator in order -- to criticality, because of the neutron cross-sections that are involved.

ADMIN. JUDGE JACKSON: I hear you. Are you saying because you could look at those mass limits, and in that geometry, and just based on analogy with other systems you would know that to be subcritical? I mean, there is still a basis for a judgment --

MR. TRIPP: Yes.

ADMIN. JUDGE JACKSON: -- that you didn't have to -- that you believe criticality can be precluded.

In the ISA summary, as you know, there is an accident discussed where there is buildup of the solid phase material in the separator, and subsequent loss of moderator control that did lead to the potential of criticality. Is this not part of your thinking here?

MR. TRIPP: I'm not intimately aware of a lot of the individual accident sequences.

Are you able to answer that?

MR. PURNELL: Can you restate the question? I'm not quite sure what you are --

ADMIN. JUDGE JACKSON: Well, I -- the statement is made in the pre-filed testimony that criticality basically is not possible, and I was referring to kind of a bounding accident situation that is in the ISA summary

And then, that, in conjunction with loss of moderator control, led to a situation where criticality would have to be considered.

MR. PURNELL: I mean, the statement in the testimony is that as long as those parameters are maintained. So, I mean, the -- in this case, the accident scenario is when they are not maintained.

ADMIN. JUDGE JACKSON: Right.

MR. PURNELL: So, I mean, it was considered, and I believe there's IROFS in this case to prevent criticality. So --

ADMIN. JUDGE JACKSON: Yes, there are IROFS to prevent that

It just seemed like -- in the staff's pre-filed testimony, it didn't seem to address that kind of bounding incident. And I was curious if the staff had considered that as part of their going through the accident sequences and --

MR. PURNELL: I mean, certainly, in what would be the horizontal slice of the review, I looked at all of the criticality accident sequences that were in this portion of the ISA summary. So, I mean, I can't speak to detail at this point on --

ADMIN. JUDGE JACKSON: Okay.

MR. PURNELL: -- you know, a specific accident sequence, but it certainly wasn't reviewed.

MR. TRIPP: I also don't think it is -- it is not our position -- at least we don't intend to

leave the impression that criticality is impossible, it can't occur. Rather, that we think this part of the facility is relatively low risk. Certainly, there are scenarios that could potentially lead to criticality, but there are controls in place.

ADMIN. JUDGE JACKSON: All right. I guess I was just looking at the totality of that statement that the staff made, and it seems to be saying that there wasn't anything unusual.

But I guess it is a matter of interpretation.

Also, on that same page, if we move up the page to your answer 13 to question 13, question 13 says, "Are there design features that pose potential criticality safety hazards that different significantly from those in the gas centrifuge?" And so on. And your answer is, "No. Criticality control in the enrichment cascade is based primarily on moderation and enrichment control." That is what you just stated.

And it says certain components also rely on geometry or volume and interaction control. Could you comment on what those components are and how the geometry and volume control comes into play?

MR. PURNELL: I mean, examples would be like piping would be a geometry control. But more specific than that, I -- you know, I --

ADMIN. JUDGE JACKSON: I guess I was trying to -- let me ask the question -- in trying to focus on the cascade region --

MR. PURNELL: Right.

ADMIN. JUDGE JACKSON: -- would there be anything in the cascade region where you would consider that the ultimate control might be there is only so much room to --

MR. PURNELL: I believe there are --

ADMIN. JUDGE JACKSON: -- contain material.

MR. PURNELL: -- spots in the cascade region as well that control was in part based on geometry. I agree that the bulk of the cascade geometry isn't a fact. In other words, you know, it is basically not a control for crit safety concerns. It is the moderation control/enrichment control that is more important.

ADMIN. JUDGE JACKSON: Okay.

Would that be an example of what you -- what the staff had in mind in -- as volume control?

MR. PURNELL: I'm not aware of such a sequence. So I can't really speak to that one. It doesn't sound familiar to me, so --

ADMIN. JUDGE JACKSON: Okay. Well, we could pull that up and look at it. It is in the ISA summary that the Board was supplied that came along with the application.

Let's go to page 10 of your pre-filed testimony. I would like to ask you a little bit about criticality code validation, and on the top of page 10, in answer 17 -- you are very good at pulling those up, thank you -- you see there are no criticality code validation issues that are unique to the cascade area.

I guess I am a little surprised by that also.

Why wouldn't you have code validation issues associated with geometry, neutron energy spectrum, issues like that?

MR. TRIPP:

So it is a material that is commonly handled. In fact, it is commonly handled at the Global facility it is collocated with. And I believe that they have the same code validation for that, so they have to validate it for use of solid UF-6 at the fuel fabrication plant.

And solid UF-6 is something -- it is -- you know, it is only a concern if there is moderator present. So you have a thermalized spectrum. And it is something that is commonly encountered and benchmarked across the industry.

ADMIN. JUDGE JACKSON: Isn't geometry a factor in code validation, however, one of the factors?

MR. TRIPP: It is a relatively minor factor that really only typically becomes an issue when the geometry effects the neutron spectrum.

ADMIN. JUDGE JACKSON:

MR. TRIPP: Well, there may be some possible minor effects of the cross-sections from that

-- for those types of effects. I think in general we were looking at the whole picture, looking at the amount of safety margin that they have --

ADMIN. JUDGE JACKSON: Okay.

MR. TRIPP: -- for instance, due to modeling at eight weight percent, and so forth. Also, the other materials that are present --

ADMIN. JUDGE JACKSON: Okay.

MR. TRIPP: -- are not being credited. The neutron absorption properties are not being taken into account, which also contributes to the large safety margin.

ADMIN. JUDGE JACKSON: Okay. Let's talk for a minute about your horizontal/vertical reviews. They seem to be an important part of your gaining confidence that all of the criticality accident sequences were identified. How did that work, and how does that give you the confidence you need to be able to assert that all of the important sequences have been identified?

MR. PURNELL: So I guess I will start with the horizontal slice review is basically a review of the ISA summary that was submitted as part of the application. Basically, what I did was, you know, start with reading, you know, process descriptions.

Obviously, some processes, you know, have no crit safety concern like the laser itself. You know, there's no material even there. Depleted uranium areas don't have any crit safety, the natural uranium areas don't have any crit safety concerns. But basically verifying -- and there's no real mechanism to get enriched material into those areas, you know, that -- so at that level, that's all I did for those parts.

And then, the bulk of the process, you know, I did read all of the sequences and such and review all of the sequences. And I was also involved in the Eagle Rock Enrichment Facility, so a lot of the areas were, you know, similar except for the cascade region. So, you know, I could kind of cross-verify the -- you know, the sequences, you know, were similar -- similar types of accident sequences for both. So I was very familiar with the Eagle Rock.

So, then, the cascade region was where it went a step further, and that's what the focus of the vertical slice review was, which was done onsite basically looking at supporting documents, the ISA documents themselves. The main focus of that was on enrichment control, because the ISA summary did not identify any enrichment control IROFS. And so I was

trying to understand why that was the case.

Basically, in order for there to be no IROFS, they basically have to show that, you know, there is no credible sequences needing such enrichment controls.

And then, in this case, since the bulk of the facility is based off of eight weight percent in the safety analysis, you know, it is -- verifying that assumption was important. You know, if that couldn't be supported, then a lot of their analysis would be problematic.

In this case, it was -- you know, based on the vertical slice review, they did review -- or did do a number of analyses of process upsets. And I was able to conclude that, yes, there are no credible sequences that give some -- above eight weight percent, assuming the, you know, plant is designed to produce five weight percent material, which is their -- the takeoff that they intend to do.

ADMIN. JUDGE JACKSON: Let me ask you a quick question about enrichment control. One of the unique aspects of this facility is the ability to have much more enrichment occur at a given stage, right? I mean, many fewer stages that -- we had testimony to that effect earlier today. Does that in any way --

does that in any way complicate enrichment control, the fact that in a single stage you can have a substantial jump in enrichment as opposed to requiring hundreds of stages?

MR. PURNELL: Really, what, you know, I looked at was, you know, how does a process upset affect, you know, your final outcome. So, yes, a process upset can potentially have a larger change in enrichment. I mean, it is difficult, though, to compare to a centrifuge plant. I didn't, you know, go into that kind of detail for a centrifuge plant.

But, you know, like I say, I confirmed that there was no process upsets in there that would lead to greater than eight weight percent final product. So there was, you know, quite a few different upsets they looked at. Obviously, you know, some were larger than others, but none exceeded the eight weight percent.

ADMIN. JUDGE JACKSON: Okay.

Do you --

MR. PURNELL: I don't remember --

ADMIN. JUDGE JACKSON: Okay.

MR. PURNELL: -- if I looked at that or not.

ADMIN. JUDGE JACKSON: Okay. Well, I think my remaining questions probably relate to Topic 2, and so I think I will wait, and we will talk about future analyses and design changes when we address that in Topic 2. So I'm finished.

CHAIRMAN RYERSON: Thank you, Judge Jackson.

Judge Garcia, did you have questions?

ADMIN. JUDGE GARCIA: Yes. Thank you.

Mr. Tripp --

MR. TRIPP: Yes?

ADMIN. JUDGE GARCIA: -- I want to discuss briefly your page 13 of your oral testimony. And particularly what I wanted to start with was the selection of the value of eight percent uranium 235 as a subcritical point. How was that selected?

MR. TRIPP: The eight weight percent was what the Applicant had used as a bounding enrichment for its criticality analyses.

ADMIN. JUDGE GARCIA: Now, you accepted that value and just used it in your analysis.

MR. TRIPP: Well, we reviewed what was submitted to us, and they submitted -- they have calculations, and they based their facility design on eight weight percent enrichment.

ADMIN. JUDGE GARCIA: To your knowledge, is there any reason that that is a particular important value?

MR. TRIPP: No. No.

ADMIN. JUDGE GARCIA: So it could have been 10 percent, it could have been seven.

MR. TRIPP: Right. The higher value that they use, they obviously would have to design the plant more conservatively. So that was probably something that they felt that they could guarantee that they wouldn't exceed, but yet would not be overly restrictive.

ADMIN. JUDGE GARCIA: Okay. Very good. So based on your analysis, that eight percent value is one that is a comfortable one for the plant.

MR. TRIPP: Correct.

ADMIN. JUDGE GARCIA: Okay. Very good.

Mr. Purnell, you had mentioned that you looked at horizontal and vertical slices in your reviews, and I wondered the depth of your reviews. Did you make independent calculations in these

reviews? Or did you just review their calculations?

MR. PURNELL: Well, the horizontal slice is the ISA summary. So I didn't do any independent calculation. It is all this risk method that Nick talked about.

ADMIN. JUDGE GARCIA: Okay.

MR. PURNELL: So it discusses accident sequences, and then, you know, what controls are on them, which you can discern what are the controlled parameters. So, and the vertical slice, now, I didn't do any independent calculations on that either. That was reviewing their onsite documents.

ADMIN. JUDGE GARCIA: So it is your testimony, though, that you feel comfortable in your analysis of the risks involved, and that they are low?

MR. PURNELL: Yes.

ADMIN. JUDGE GARCIA: Okay. Thank you.

CHAIRMAN RYERSON: Thank you, Judge Garcia.

Mr. Tripp, are you in a position to estimate what percentage of the facility design is presently complete?

MR. TRIPP: No, I wasn't involved enough in the review to --

CHAIRMAN RYERSON: Okay.

MR. TRIPP: -- ascertain that.

CHAIRMAN RYERSON: And that would be true of any aspect of the facility, instrumental and control, for example?

MR. TRIPP: Correct.

CHAIRMAN RYERSON: Okay. Is the design complete?

MR. TRIPP: To the best of my knowledge -- this is second-hand from discussion with the other reviewers -- the answer is no.

CHAIRMAN RYERSON: Okay. But you found it -- what you looked at -- to be sufficient to assess the risks of criticality, I take it.

MR. TRIPP: Yes. I believe that Mr. Purnell would be -- he actually did the vertical slice review -- would agree with that.

CHAIRMAN RYERSON: Okay. But you participated as well in that --

MR. TRIPP: Not in the actual review. A review is essentially complete when there was a change in the reviewer.

CHAIRMAN RYERSON: I see. Okay. So I will address my question to Mr. Purnell. You are satisfied that the design is sufficiently complete for you to evaluate the risks of criticality.

MR. PURNELL: Yes.

CHAIRMAN RYERSON: Okay. The one reason I ask is that I know, Mr. Tripp, you are familiar with a procedure here at the NRC called a differing professional opinion?

MR. TRIPP: Yes.

CHAIRMAN RYERSON: And could you describe that procedure?

MR. TRIPP: Yes. If a staff member has a different technical view, there are procedures to try to resolve it through collegial interactions with staff and management. If that fails, you have the option of writing a differing professional opinion which then goes to an independent panel of experts for resolution.

CHAIRMAN RYERSON: And in connection with another enrichment facility, you exercised that prerogative, am I correct?

MR. TRIPP: Yes.

CHAIRMAN RYERSON: That was in 2006 in connection with the United States Enrichment Corporation facility.

MR. TRIPP: Correct. Correct.

CHAIRMAN RYERSON: Okay. Are you aware that that -- that your document is Exhibit 22, NRC

Exhibit 22 in this proceeding?

MR. TRIPP: No, but I'm aware that the subject has come up.

CHAIRMAN RYERSON: Okay. Thank you. You know, you stated in that document -- what is identified as NRC Exhibit 22 -- and I will just read from page 7 very briefly. "Without a sufficiently complete facility design, it is obvious that all accident sequences have not been identified, and all needed IROFS have not been established. Thus, new hazards will arise, or new controls will be established, as the facility is constructed. These may or may not be adequate.

"We would, therefore, not have the same level of reasonable assurance of adequate protection as we would if we were confident that the ISA summary was completed and based on a nearly complete design."

I take it that your views today with respect to the proposed GLE facility take into account your views with respect to the USEC facility?

MR. TRIPP: My role in the review is rather unique, since I didn't participate in the actual technical review, I helped complete the SER. So my views on GLE is that I haven't looked at enough of the design to render an opinion.

CHAIRMAN RYERSON: Okay.

MR. TRIPP: I trust Mr. Purnell's judgment when he tells me that it was sufficiently complete. My views have not changed since 2006.

CHAIRMAN RYERSON: Your views about the level of detail required to make the judgments required under NRC regulations has not changed.

MR. TRIPP: Correct.

CHAIRMAN RYERSON: I will get to Mr. Purnell in a moment. But just so I am clear, your views were not accepted, I believe, by the relevant Division Chief or Division Director. And there was an appeal to the Executive Director for Operations at the NRC with respect to that. Was there?

MR. TRIPP: Yes.

CHAIRMAN RYERSON: Okay. Has the issue that was raised in that appeal ever been addressed at the Commission level, to your knowledge?

MR. TRIPP: To my knowledge, no.

CHAIRMAN RYERSON: Okay. But you are applying the same standards personally -- speaking as somebody who is a witness today, you are applying the same standards that you would have applied in 2006, even though through the appeal process it was determined that perhaps a somewhat different standard

applied. Is that question clear?

MR. TRIPP: It is. The situation that came out -- the resolution of the DPO was somewhat unclear. It was upheld in that they didn't say that a fatal error had been made during the USEC licensing, so that was allowed to stand. But there were actions that came back that the Office Director had directed us to look at our guidance to specifically address this issue.

When we revised our standard review plan in 2010, it was supposed to be -- specifically address the level of detail issue. So, in my view, that was sort of a tacit acknowledgement that the issue was -- guidance on the issue was inadequate up to that point.

Now, my opinion, in the 2010 revision it didn't really address it adequately. So we are currently undergoing another revision. And I don't think the question of what level of detail is needed to license a new facility has ever been truly resolved.

CHAIRMAN RYERSON: Okay. Mr. Purcell, are you aware of the background of the revisions to -- is it NUREG-1520? Is that what we are talking about?

MR. PURNELL: It was undergoing revision about the time I left. I think that it actually did

get issued shortly after I left, within a few months. So I was aware, but, you know, obviously, I didn't, you know, ever look at the final -- what was finally approved.

CHAIRMAN RYERSON: Okay. But just so I'm clear, it is your professional opinion, having looked at the design detail that is available now, that criticality risks are consistent with the determinations that you are required to make under NRC guidance and regulation.

MR. PURNELL: Yes.

CHAIRMAN RYERSON: Okay. Okay. Judge Jackson, any further questions on criticality?

ADMIN. JUDGE JACKSON: No. No.

CHAIRMAN RYERSON: Judge Garcia?

ADMIN. JUDGE GARCIA: No.

CHAIRMAN RYERSON: You are welcome to stay in the box, if you'd like, or step down. We will move on to Topic 1B, and we will have Judge Jackson.

ADMIN. JUDGE JACKSON: I think the underlying logic for this topic sounds a lot like criticality safety in that it -- I believe that the analysis shows -- and both the Applicant and the staff assert -- that the greatest hazards from the viewpoint of potential release of radiological or chemical

materials occur in balance of plant, perhaps related to disconnection and connection of tanks and those kinds of operations. Would that be correct?

MR. BAKER: That is correct.

ADMIN. JUDGE JACKSON: And similarly, that the balance of plant, as we said before, looks a lot like any other enrichment facility or facility that is handling UF-6. Is that correct?

MR. BAKER: That is correct.

ADMIN. JUDGE JACKSON: All right. Just to be explicit, then, in your review of the facility and the accident sequences, did you see anything that was significantly different from existing, say, centrifuge facilities?

MR. BAKER: Not that was significantly interesting or surprising, no.

ADMIN. JUDGE JACKSON: Okay. Well, as was the case before, I would like to, then, talk about the cascade area. Again, I could refer to your pre-filed testimony for some of these questions. Let's go to page 5 of the pre-filed testimony, down about a third of the way up from the bottom, and you talk about conducting the horizontal review and the vertical slice review for hazardous release, which is similar to what we have just been discussing for criticality.

Is that correct?

MR. BAKER: I would clarify that for chemical safety and radiological safety they would be releases compared to deposits --

ADMIN. JUDGE JACKSON: Right.

MR. BAKER: -- which seem to be the focus of the --

ADMIN. JUDGE JACKSON: Exactly.

MR. BAKER: -- criticality questions. But almost entirely related to releases.

ADMIN. JUDGE JACKSON: Okay. So, again, this is a place where the staff comes in and looks at the accidents -- release accidents, leakage points that have been identified, and then tries to become convinced that this has been comprehensively looked at and evaluated.

MR. BAKER: That's correct.

ADMIN. JUDGE JACKSON: Okay. Could you give me some examples of some of the potential hazardous material release scenarios that would be specific to this laser-based process?

MR. BAKER: Well, again, there are no scenarios specific to the use of lasers for the excitation step. I can say in our review we paid quite a bit of attention to sampling steps where a man

is present. Okay? In rad safety and chem safety, an operator needs to be present for the hands-on work, if that answers your question.

ADMIN. JUDGE JACKSON: Well, the reason -- here again, the reason the Board is pressing on the cascade area, just because this is the new unique area for which we don't have a lot of operational experience on saying that, as you look at these accident sequences, where there are things that were unique to this type of a cascade.

Let me give you just a simple example that comes to mind. This separator has to have windows to let laser light in, I assume.

MR. BAKER: Right.

ADMIN. JUDGE JACKSON: Well, you don't have a window like that in other facilities, not a laser window. So that would be an example of a potential penetration or a leakage point that would be unique to this facility. So that is what I'm asking, are there things that are specific to this facility that you looked at to make sure that somebody has thought through each thing that can go -- could potentially go wrong?

MR. BAKER: I'm sorry. I do understand the nature of your question now. And, yes, there are

those types of places, and it is our advantage that those types of scenarios were identified and reviewed in our review of the test loop that already exists that we have seen. And the types of controls they use -- pressure switches and alarms and duplicate pressure switches and alarms -- we had seen before.

And I'm sorry for the confusion, but they did not surprise us that they used those types of switches and alarms again.

ADMIN. JUDGE JACKSON: Okay. Let me ask about the product and tails collection vessels. Did you look at -- did those raise any concerns about potentially new release points?

MR. BAKER: They did not.

ADMIN. JUDGE JACKSON: Okay.

MR. BAKER: Not particularly different, no.

ADMIN. JUDGE JACKSON: Okay. Anything else come to mind, then, that was unusual to this system?

MR. BAKER: Nothing comes to mind that was unusual. I will say that in our vertical slice review

we spent time with maintenance activities and laboratory activities, again, where there was hands-on presence of an operator.

ADMIN. JUDGE JACKSON: Okay. Well, you see why the Board is asking these questions. We are just -- we are trying to gain assurance that what was unique about this facility and what is new about it has been carefully and methodically reviewed. That is the --

MR. BAKER: And it was. Thank you.

ADMIN. JUDGE JACKSON: That's the reason we are asking these questions.

Let's see. On page 6, up near the top of the page, there is a sentence that starts, "The horizontal review -- the horizontal review utilized the staff's experience with similar facilities and processes to ensure that credible accident sequences were considered."

I'm just saying that in those cases where there was something new, like a laser window, did you pay particular attention?

MR. BAKER: Again, that statement refers more specifically to withdrawal and sampling in cold trapping. We had brought to the team our most experienced enrichment plant review staff, and that is

why we were not surprised. And, again, my answer to your question about the separator and windows, and so forth, is that we had seen them and reviewed them and had hands-on operating experience with the real system in the test loop in the adjacent GFA facility. So we were not -- we were not surprised.

ADMIN. JUDGE JACKSON: Okay. Just another question, if we go to page 11. Here I believe the staff explicitly describes, you know, how you could determine that all important sequences had been identified.

As pointed out, then, over on page 12, that each accident sequence included an initiating event frequency. Okay. That is part of the -- part of what you had to look at. I guess my question here is, when you are looking at a first-of-a-kind facility, where you don't have a lot of operational history to base a failure rate on or something, did you -- do you look for added conservatism to compensate for that?

MR. BAKER: We look for realistic conservatism. We did not see any unusually optimistic likelihoods for initiating events. Initiating events were fairly standard -- operator error, corrosion, equipment failure, and so forth.

ADMIN. JUDGE JACKSON: Okay. Could you characterize the pressure in this cascade area versus, say, a gas centrifuge cascade, maybe in one of the centrifuge modules?

MR. BAKER: Cascade as slightly lower pressure or slightly higher pressure?

ADMIN. JUDGE JACKSON: Right. I mean, this is --

MR. BAKER:

ADMIN. JUDGE JACKSON:

MR. BAKER: Yes.

ADMIN. JUDGE JACKSON: -- region. Does that pose concerns for you to -- in terms of in-leakage that would --

MR. BAKER: We did not characterize it as more prone to in-leakage. From the chemical safety review, we were predominantly concerned with out --

ADMIN. JUDGE JACKSON: Out-leakage, yes.

MR. BAKER: And, again, places where it was deliberately opened and allowed to go to ambient pressure.

ADMIN. JUDGE JACKSON: Okay. So you are convinced that in your review that all of the

important hats where you could create effluent sources for either radiological or hazardous materials have been identified.

MR. BAKER: I would say, yes, thank you.

ADMIN. JUDGE JACKSON: You are comfortable with --

MR. BAKER: We are comfortable, yes.

ADMIN. JUDGE JACKSON: -- with that review.

Thank you.

CHAIRMAN RYERSON: Judge Garcia, any questions?

ADMIN. JUDGE GARCIA: Yes, thank you.

If we could refer to the oral testimony, in particular page 10. It was your evidence that you have gone through and identified all of the important accident sequences. And as part of that testimony, you had mentioned that you examined all of the drawings that were available. And I wonder when you did that examination.

MR. BAKER: I would make a tiny clarification that we did not examine all of the drawings.

ADMIN. JUDGE GARCIA: Okay.

MR. BAKER: We had the opportunity to

examine all of the drawings, and that took place in the vertical slice review on the site in September. There were --

ADMIN. JUDGE GARCIA: September of?

MR. BAKER: 2011.

ADMIN. JUDGE GARCIA: Thank you.

MR. BAKER: There are a number of 8-1/2 by 11 drawings in the application that we utilized for distances, and so forth.

ADMIN. JUDGE GARCIA: Okay. What I am particularly concerned about is whether you have confidence that the design has evolved to a point where you have a clear understanding of all of the chemical and other hazards that might be present in this plant.

MR. BAKER: Yes. We are comfortable with the level of design as it applies to chemical and radiological hazards. We found that the design is changing quite slowly.

ADMIN. JUDGE GARCIA: Okay. Does this also apply to where operators are needed in this plant or facility?

MR. BAKER: Yes. We are comfortable that there are no unreviewed new operator locations.

ADMIN. JUDGE GARCIA: Okay. Very good.

Last thing, I wanted to ask you whether the use of a laser poses any special hazard at this facility.

MR. BAKER: Not with respect to chemical or radiological hazards. It is almost entirely an industrial hazard.

ADMIN. JUDGE GARCIA: Okay. All right. Thank you.

CHAIRMAN RYERSON: Mr. Baker, we have no further questions for you or for Mr. Tripp or Mr. Purnell. We thank you for your testimony. You are free to step down. And if you would like to stay, I think everyone has a Q clearance? You are not testifying on another subject, I believe, as far as I am aware, so you are free to go or stay, as you wish.

(Whereupon, the witnesses were excused.)

I guess we will take a very brief break and start again at 2:15. We will start with -- on Topic 2, licensing and evolving design, again, with the GLE witness. It is just one witness, Ms. Oliver.

MR. SILVERMAN: Your Honor, it is Ms. Oliver.

CHAIRMAN RYERSON: Oliver.

MR. SILVERMAN: Could we just have a couple of extra minutes to chat with our -- some of the folks who are in the audience, before we move on

to 2B?

CHAIRMAN RYERSON: What time would you like to start?

MR. SILVERMAN: What time do you have now, five after?

CHAIRMAN RYERSON: Just about.

MR. SILVERMAN: Just if you could give us about 15 minutes, I think that will be good. I mean, that's --

CHAIRMAN RYERSON: So we will start --

MR. SILVERMAN: -- we'll get Ms. Oliver up here.

CHAIRMAN RYERSON: -- at 2:20? 2:25? Whatever you need, Mr. Silverman.

MR. SILVERMAN: Yes. Yes.

CHAIRMAN RYERSON: 2:20?

MR. SILVERMAN: 2:20 would be fine.

CHAIRMAN RYERSON: Okay. Again, I remind everyone of your responsibility to protect any classified information. And if the law clerk, Anne Siarnacki, can be helpful in holding anything for you, or destroying any notes that you don't need, we are happy to do that.

See you at 2:20.

(Whereupon, the proceedings in the

foregoing matter went off the record at 2:05 p.m. and went back on the record at 2:21 p.m.)

CHAIRMAN RYERSON: We have one more housekeeping detail. Since visitor badges do not contain anyone's name and the guards have a list of names to allow into the room, be sure that anyone that has a visitor's badge brings some ID when they come to testify. That will simplify getting them into the hearing room.

All right.

MS. SIMON: Excuse me, Your Honor.

CHAIRMAN RYERSON: Yes.

MS. SIMON: We would like to correct a statement that Mr. Baker made with regard to when the on-site review took place.

CHAIRMAN RYERSON: Yes.

MS. SIMON: I believe he stated September 2011. The actual date, which is in Chapter 3 of the SER is October of 2009.

ADMIN. JUDGE GARCIA: That's what I thought.

CHAIRMAN RYERSON: Okay. Thank you.

All right. We are up to Topic 2, starting with Ms. Oliver, and if I can ask you to raise your right hand.

And do you swear or affirm that the testimony you are about to give in this proceeding will be the truth, the whole truth, and nothing but the truth?

MS. OLIVER: I do.

CHAIRMAN RYERSON: Thank you.

And I believe we're going to start with a presentation from you.

MS. OLIVER: Yes, sir.

CHAIRMAN RYERSON: Okay. Thank you.

MS. OLIVER: Good afternoon. Today I'm going to discuss Topic 2B, which has to do with licensing and evolving design. So on Slide No. 2 --

CHAIRMAN RYERSON: And if we could identify, this is probably an exhibit. If counsel could identify the exhibit number.

Oh, it's up there in the right-hand corner. Twenty.

MS. OLIVER: Twenty.

CHAIRMAN RYERSON: Exhibit 20. Sorry.

MS. OLIVER: So I have three topics that I'd like to talk about this afternoon. The first has to do with the level of design that was submitted with the GLE Commercial Facility Application.

The second has to do with the Configuration

Management Program that GLE has established.

And the third is the NRC approved change criteria.

On Slide 3, so to address the level of design that GLE submitted with the license application, the level of design was consistent with the guidance in NUREG-1520, which meant that the design was sufficient to perform the safety basis, develop the integrated safety analysis, and provide a definition of a safety basis for the facility.

In general, the design was at the component level for safety systems, and at the process level for non-safety systems.

The design is based on conservative and anticipated bounding assumptions. These assumptions are documented and tracked. For example, when an accident analysis was performed on a specific piece of equipment, the amount of material that was assumed to be released was the maximum amount of material that could be held in that piece of equipment. That is an example of a conservative assumption that was used.

And as you know, the staff has determined that the level of design, which was submitted, is adequate for its safety review.

On Slide 4, to discuss the configuration management program, in accordance with 10 CFR 70.72, GLE has established a Configuration Management Program to evaluate, implement and track changes. This is a formal process which is in place, and we've identified it in two areas. One is 70.72, and then the second is in Section 1.2.5.5 of our license application.

The 70.72 covers changes to the facility, as defined in the regulations, and then the license application section has criteria for other pieces of the license application that may fall outside of the scope of the 70.72 requirement.

If we do have potential design changes, these require a change request. A change request begins a formal work flow process which is electronic. It requires a team of managers and subject matter experts to review and approve the change prior to implementation. The first step in the review process is to have a qualified integrated safety analysis reviewer and a license application reviewer to evaluate whether or not that change needs prior NRC approval before implementation.

On Slide 5, we discuss a little bit more about the NRC approved change criteria, and again,

these are defined in two locations in the GLE documentation: in the license application as well as in 70.72.

So based on the criteria, design changes which are consistent with the established safety basis are bounded, and there are no safety implications. So in simple terms, if you think of the safety basis as a box, as long as the change remains within the box, we can implement that change without prior NRC approval. However, if the change puts us outside of that safety basis box, prior to implementation we have to go to the NRC for approval.

So to summarize, the GLE Commercial Facility, should the design evolve, it will be properly managed within the bounds of the safety basis. It will be documented and tracked, and when applicable, we will send it to the NRC for review and approval prior to implementation.

That completes my presentation.

CHAIRMAN RYERSON: Thank you.

Judge Jackson, questions?

ADMIN. JUDGE JACKSON: Just a quick question. We've gotten some information about the status of the design, and so I won't have to go into that with you. But in your pre-filed testimony, on

the third page, it basically makes the statement near the bottom of the page, "It is unusual at best for a license applicant to have a complete design at the time it submits its license application, and the design evolution after license submittal and even after license approval is the rule and not the exception in NRC practice."

MS. OLIVER: Un-huh.

ADMIN. JUDGE JACKSON: On the other hand, as it goes on to say at the top of the next page you need enough information so that you can have identification of all of the IROFS, right, and possible accident sequences?

So it's a matter of balance. I guess my question is: how do you know, in your view, that you have a complete enough design that you have not missed some accident sequences that might pop up as the design evolves?

MS. OLIVER: I'm to refer to the first full paragraph on page 3 of my testimony.

ADMIN. JUDGE JACKSON: Okay.

MS. OLIVER: Where we discuss that the design is based on conservative and anticipated bounding assumptions, including such things as system descriptions, system interfaces, and so forth.

So this is from 10 CFR 70.22, and so based on my experience with applications for enrichment facilities as well as other types of field facilities, a design needs to be complete enough to establish the safety basis, as well as to, like you refer to, assure yourself that you've identified all of the accident sequences.

At the GLE Commercial Facility we did do the design, and we did use conservative assumptions, you know, like I discussed in my presentation where, you know, if we had a component that released materials as the accident sequence, we don't just stop there and assume that it's normal operating. We go above and beyond that to make sure that our conditions are conservative.

So to answer your question fully, in my opinion, if you can come up with that safety basis based on a certain percentage level design, then that is adequate.

ADMIN. JUDGE JACKSON: So you've used the word "conservatism." If you feel like you've conservatively looked at what would be bounding conditions, then if you tweaked the design and you're in that envelope --

MS. OLIVER: Exactly.

ADMIN. JUDGE JACKSON: -- where you've evaluated and identified accident sequences that would bound any variations --

MS. OLIVER: Exactly.

ADMIN. JUDGE JACKSON: -- then you would say that that's adequate.

MS. OLIVER: And that's exactly what we did, un-huh.

ADMIN. JUDGE JACKSON: Okay. That was my question.

CHAIRMAN RYERSON: Judge Garcia.

ADMIN. JUDGE GARCIA: Good afternoon. I'd like to ask you two questions in particular. One has to do with how the process of uranium enrichment has changed since the staff made their visit to the facility in 2009.

MS. OLIVER: Okay. The design that we submitted with the license application in 2009 has not evolved.

ADMIN. JUDGE GARCIA: Has not evolved.

MS. OLIVER: Has not evolved. So today the design that we intend to build is the design that is described in our commercial facility license application.

I'd like to caveat that with as you know

from visiting our site, we are looking at some optimization of the process. So some of the things that we're looking at include optimization of the separation technology as well as improvement of our lasers. But to date we have not made any decisions on whether or not those are going to go forward and be incorporated into the design.

ADMIN. JUDGE GARCIA: Interesting. So my second question follows from that in the sense that at what level do you feel the design is at at this point. Is it 50 percent complete?

MS. OLIVER: I can't really quantify what level the design is at, but given my personal background, having looked at some of the applications for the other enrichment facilities, one of the things that we did before we prepared this license application for Global Laser Enrichment was we took the applications for the other enrichment facilities which had been licensed previously in the past few years.

So we looked at the USEC ACP applications. We reviewed the LES National Enrichment Facility applications, and what I can tell you is that I think that the level of design that we've submitted is about the equivalent to what USEC submitted in their

ACP application.

ADMIN. JUDGE GARCIA: And what estimate would you have for that?

MS. OLIVER: I couldn't quantify that, but like I said, you know, we did it in accordance with the guidance so that we could do the safety basis calculation.

ADMIN. JUDGE GARCIA: So in broad terms could you say this is a preliminary design? Is it a mature design?

MS. OLIVER: In broad terms, what we usually call this is our baseline design.

ADMIN. JUDGE GARCIA: Okay.

MS. OLIVER: And we have several steps that we have to go through to get to our final design. So we still have to get to a conceptual and then a final design before we construct the facility.

ADMIN. JUDGE GARCIA: And in how many months do you anticipate having that final design?

MS. OLIVER: I would have to check on that and get back to you.

ADMIN. JUDGE GARCIA: Okay. But it's not this year?

MS. OLIVER: No, it's not this year.

ADMIN. JUDGE GARCIA: Okay.

CHAIRMAN RYERSON: Judge Jackson, a question?

ADMIN. JUDGE JACKSON: I've got a follow-up question to something you said. When we visited, it seemed as though you were still working on the product and tails collection system. Do you consider that a baseline design, for example, I guess the product collection vessel and maybe the delivery to that?

Is that a design that's completed at this stage?

MS. OLIVER: What we have is the commercial facility. What you've looked at in our license application is what we're calling our baseline design, and like you pointed out, we are looking at other options to optimize that process, but right now they have not been finalized and incorporated into a design.

ADMIN. JUDGE JACKSON: Okay. Thank you.

CHAIRMAN RYERSON: Ms. Oliver, you referred to two kinds of changes in the design; is that correct?

MS. OLIVER: Yes, sir.

CHAIRMAN RYERSON: And some changes GLE may make on its own, subject, I guess, to an eventual

review by the NRC.

MS. OLIVER: Right.

CHAIRMAN RYERSON: And other changes require NRC approval before they're made. Can you estimate at this point how many changes in total you would guess or estimate will occur between now and final plant construction?

Are we talking about four changes, three changes, 100 changes?

MS. OLIVER: Could you repeat the "between now and"?

CHAIRMAN RYERSON: Between now and the completion of plant construction.

MS. OLIVER: I really couldn't estimate how many changes we have, but I can say that we have been looking at what some of the other facilities have been experiencing, and what we've tried to do as far as incorporating lessons learned from those facilities is to try to capture everything, make sure that we have everything documented today, work it through our change process so that we can minimize those amount of changes as we start construction.

CHAIRMAN RYERSON: But just to approximate what an actual number of changes would be, would you be surprised if it's fewer than ten changes?

MS. OLIVER: I would be surprised if it was fewer than ten.

CHAIRMAN RYERSON: Would you be surprised if it's over 100 changes?

MS. OLIVER: I would say I'd be surprised if we had over 100 changes.

CHAIRMAN RYERSON: So somewhere between ten and 100 perhaps.

MS. OLIVER: Yes, sir.

CHAIRMAN RYERSON: Okay. And when GLE obtains NRC approval before making a change, is that a license amendment or are there different ways of obtaining NRC approval?

MS. OLIVER: We would have to go through the license amendment process. So we would have to build in ample time for the NRC review and approval prior to implementing that change.

CHAIRMAN RYERSON: Okay. So the only types of changes that the NRC approves involve license amendments; is that correct?

MS. OLIVER: I believe that's correct, according to the regulations. If you want to change something in 70.72 or the way we have described in our license application, we would have to submit an amendment application.

CHAIRMAN RYERSON: And there would be an opportunity for intervenors to participate on that?

MR. SILVERMAN: Your Honor, could I speak to that?

CHAIRMAN RYERSON: You have a view, Mr. Silverman. You may answer the question.

MR. SILVERMAN: I think we're getting pretty close to legal questions. I mean, I agree with what Ms. Oliver said so far, and I mean, there is a change process in the regulations which specifies criteria when an applicant or licensee may make changes without prior approval.

CHAIRMAN RYERSON: Right.

MR. SILVERMAN: If those criteria produce a conclusion, and there's usually a procedure in place to make sure you're following those criteria, the change is outside that box, outside, you know, the boundaries of the design as it exists; then a license amendment application is filed and there is an opportunity to request a hearing with the NRC.

CHAIRMAN RYERSON: Right.

MR. SILVERMAN: There is not necessarily a right to a hearing, but there is an opportunity to request a hearing by members of the public.

CHAIRMAN RYERSON: Complying with the

contention admissibility requirements or no?

MR. SILVERMAN: Yes, contention admissibility and standing.

CHAIRMAN RYERSON: And standing, yeah. So essentially, again, two types of changes, some of which could be made unilaterally by the company, although they have to give notice eventually of those changes?

MS. OLIVER: That's correct.

CHAIRMAN RYERSON: Either may answer. Yeah.

MS. OLIVER: That's correct, yes.

CHAIRMAN RYERSON: Okay.

MR. SILVERMAN: Yes.

CHAIRMAN RYERSON: But any that require -- I'm just confirming my own understanding that any changes that are preapproved by the NRC would be in the form of a license amendment, which affords the public an opportunity to intervene.

MR. SILVERMAN: That is my understanding because there's a separate licensing action by the NRC.

CHAIRMAN RYERSON: Right, yeah. I mean obviously thus far there has not been great interest in intervention, but that opportunity would exist.

Okay. Judge Jackson, any further questions?

ADMIN. JUDGE JACKSON: No further questions.

CHAIRMAN RYERSON: Judge Garcia?

ADMIN. JUDGE GARCIA: No questions.

CHAIRMAN RYERSON: All right. Ms. Oliver, unfortunately, because you are so capable in so many areas, you're going to be testifying again. So we have to ask you to leave the room as you stand down, but on this topic we are done.

MS. OLIVER: Okay.

CHAIRMAN RYERSON: Thank you for your testimony.

MS. OLIVER: Okay. Thank you.

(Whereupon, Ms. Oliver was excused.)

CHAIRMAN RYERSON: So our next panel will be the NRC, Timothy Johnson and Brian Smith.

MS. OLIVER: Yes, that's correct, and I can go get them and it will take me a few minutes to bring them back down.

CHAIRMAN RYERSON: Okay. Why don't we reconvene at quarter of?

Thank you.

(Whereupon, the proceedings in the

foregoing matter went off the record at 2:40 p.m. and went back on the record at 2:47 p.m.)

CHAIRMAN RYERSON: Please be seated.

So we have in the witness box Mr. Johnson. Welcome.

MR. JOHNSON: Yes.

CHAIRMAN RYERSON: And Mr. Smith.

MR. SMITH: Yes, sir.

CHAIRMAN RYERSON: Welcome. If you would raise you right hands, do you swear or affirm that the testimony you are about to give in this proceeding will be the truth, the whole truth, and nothing but the truth?

MR. JOHNSON: Yes.

MR. SMITH: Yes.

CHAIRMAN RYERSON: Thank you.

All right. My understanding is we will begin with a presentation by one or both of you.

MR. JOHNSON: Both, Your Honor.

CHAIRMAN RYERSON: Both of you. All right. Please proceed.

MR. JOHNSON: All right. I will begin. My name is Tim Johnson. I'm the Licensing Project Manager for the GLE Project, and with me is Brian Smith, who's the Chief of the Uranium Enrichment

Branch.

And our discussion today will deal -- could I have the next slide please?

CHAIRMAN RYERSON: And we should indicate that the slides are all part of what's been previously marked as NRC Exhibit 112.

MR. JOHNSON: Okay. Can we have the next slide? Yes, that one.

Our objective today is to discuss the staff's approach for reviewing the design of the proposed facility; to talk about the level of detail needed for the review and approval; discuss the evolving aspects of the design; and also how we will ensure that future design changes meet our regulatory and licensing requirements.

Can I have the next slide, please?

This slide presents the key regulations that address a licensing review pertinent to facility design. The first one here is 10 CFR 7.22(a)(7). This particular regulation is in a section called "Content of an Application," and it is a very general requirement for the applicant to provide information on equipment and facilities at their proposed facility.

The next one is under Section 70.23, which

is a section that discusses approval of an application, and in (a)(3) of that section there's a specification that an application would be approved if the proposed equipment and facilities are adequate to protect health and human lives, danger to the life and property. This is, again, a fairly general requirement.

The next regulation is 70.62(a) through (c), and in these particular sections they establish a need for the applicant to provide a safety program; maintain/process safety information related to hazards of the facility; have an integrated safety analysis, or ISA, of appropriate detail for the complexity of the process, and one that identifies the hazards, the accident sequences, consequences and likelihoods, and any items relied on for safety to mitigate or prevent those accidents.

The next regulation listed is 70.64, and this is a regulation that defines baseline design criteria. These are very general design requirements for new facilities, and they include things like fire protection, chemical safety, and so forth.

The next item listed is 70.65(b), and this is a requirement for providing information in the ISA summary in sufficient detail to understand and

process hazards. Again, this is a fairly general requirement.

And the last regulation listed, 70.72, is a requirement that allows a licensee to make changes to its ISA summary if it meets certain conditions without NRC approval. If certain conditions are met, then the requirement is that the licensee would need to request an amendment to make those changes.

In general, these regulations that I've listed are focused on providing sufficient detail to understanding processing hazards and enough detail to understand the function of an item relied on for safety with respect to the performance requirements, and again, these are focused on a very general nature, and they do not require a final design level of detail to be submitted with the application.

These regulations also allow for changes in the design features and a process for evaluating those changes to determine whether or not specific NRC approval is required.

And, again, I want to emphasize here that the integrated safety analysis was never intended to be a static document, but that over the course of construction and operating period, there would likely be changes based on new technology, for example, or

new information that becomes known to the applicant or licensee or the NRC.

So, again, the process for change is one that is expected for the facility, and that there was never any expectation when Part 70 regulations were promulgated that this integrated safety analysis would be a static document.

Can I have the next slide, please?

For our license review of facility design components, the principal guidance document we used is NUREG-1520, which is our standard review plan for fuel cycle facilities, and this provides guidance to NRC staff on the scope of the review, the areas that would be reviewed, and the acceptance criteria that we would use for licensing a fuel cycle facility.

And this is somewhat generic guidance that was intended to be applicable to facilities that may include different functions. We use it for enrichment plants. It was used for the other gas centrifuge plants that we license. We've used it here for the GLE facility, and we also use it for other uranium fuel cycle facilities.

Can I have the next slide, please?

And this standard review plan we feel is applicable to the GLE facilities because the hazards

here are similar to the hazards at other uranium-based fuel cycle facilities. For example, all of these facilities involve handling uranium hexafluoride cylinders; processing uranium hexafluoride either as a gas and sometimes as a liquid and as a solid; the use of autoclaves and heating treaters (phonetic) for feeder and sampling uranium cylinders; nuclear criticality conditions; equipment decontamination operations; and laboratory activities.

All of these activities are similar between all of our fuel cycle facilities, and especially the enrichment plants, and therefore, we deem that the GLE facility, because of similar hazards, the standard review plan was applicable to them.

Now, what we do for different facilities is we inform the review based on the relative risk in each facility. An example of that is not all of our nuclear criticality, for example, is an issue that may require a much more intense review if the facility is proposing to, say, use high enriched uranium, and we do have two fuel fab. facilities that do use high enriched uranium, and so the level of review that we would give that particular area for those kinds of facilities would be much more rigorous

than what we would do for a facility that's proposing, say, less than ten weight percent assay uranium.

And so in that way we basically inform the review with respect to the overall hazards and the specific activities that are being proposed by an applicant.

With respect to the standard review plan, the hazards and plant functions that GE is proposing is very similar to the other enrichment plants that we've licensed. They all handle uranium hexafluoride using similar methods. They all have similar enrichment assays. In other words, they're all under ten weight percent. So in that respect GE is very similar to the other enrichment facilities, the principal difference is in the cascade and the function and enrichment technique that is being proposed here as opposed to gas centrifuge, which was in the other enrichment facilities that we approved.

I do want to mention that we do have a separate standard review plan for the mixed oxide fuel fabrication facility, and this was developed principally because of the significant difference in hazards. In this facility, the applicant is proposing to use weapons grade plutonium in different

processes. For example, one of the prime differences is a mixed oxide fuel fabrication will use an aqueous polishing process to purify the plutonium before it goes into the fuel fabrication lines.

So these are very different functions and operational processes, and we felt that because of that a separate standard review plan would be necessary for that facility.

The next area I'd like to talk about is the level of detail that we used in our review, and I think you're aware that enrichment facility licenses are combined construction and operational licenses, and so we really don't expect the final level of design detail to be available prior to the construction and, therefore, prior to licensing.

So in that respect, what our focus is on is what the regulatory requirements are for level of detail. And as I mentioned earlier, the focus of that is on a sufficient level of detail for us to understand the processes, the process hazards, and enough detail for us to understand the function of IROFS with respect to their use in meeting the performance requirements.

As I mentioned before, the regulatory requirements related to facility design are focused

on a sufficient level of detail, and these requirements don't require a final design detail at the license application stage.

And a reason we can do this is somewhat twofold. One is that our review is focused on programmatic requirements and the use of industry codes and standards, and by programmatic requirements, I'm talking about the programmatic commitments in, say, a radiation safety program, to have a program that addresses ALARA, that addresses effluent controls, addresses requirements to meet the Part 20 worker and public dose requirements.

It also implies the use of standard industrial codes and standards, and our focus in the review was really on looking at the proposed processes and equipment that would be used and insuring that they reference appropriate codes and standards that will ultimately generate a plant that can operate safely.

An example of this might be pressure vessels. At this stage, we don't really need to know the size and volume of a pressure vessel, but if we know that it's going to be designed to the ASME Boiler and Pressure Vessel Code Section 8, then that gives us a great deal of confidence that when the

pressure vessel is actually built and put into service, that it will have been designed properly; it will have been fabricated properly; it will have been inspected and tested properly to meet our overall safety requirements.

So in that respect, if we have a commitment to use a particular code and standard, the final design detail which might include sizing or actual selection of manufacturers' models and model numbers of specific components really isn't necessary as long as we're assured that an appropriate design code and standard is being applied to those components. Then we're satisfied that the plant can operate and be constructed in accordance with our safety requirements.

And another aspect of this is -- and this relates to a specific regulatory requirement that's unique to enrichment facilities -- with respect to other materials facilities, and this is a requirement for a construction inspection to occur after the facility is constructed but before we authorize operations, and the intent of this inspection is for us to insure that the construction has been done in accordance with the requirements of the license.

So it's at this stage that the inspector

would come on site, would look at the actual example is a pressure vessel to ensure that it has been designed with the ASME Section 8 standards, has appropriate code stamps and so on on it before we authorize the operation of this facility.

So it is through this inspection process that we insure that the facility is actually built in accordance with the commitments that the applicant made in its license application.

On the next slide I'd like to talk about the staff policy guidance that relates to level of design detail, and our policy guidance comes from a memorandum that was signed out by Robert Pierson, who at the time was the Director of our Division of Fuel Cycle Safety and Safeguards, and in it he presented what the regulatory requirements are related to design detail for a license and an ISA summary.

And basically this memorandum stated that a final design level of detail was not necessary for an application, and this was supported by the specific regulatory requirements that I talked about previously.

And this approach we've used for evaluating our other enrichment plants, the LES plant, the USEC, American Centrifuge Plant, and also for the Areva

Enrichment Facility.

Could I have the next slide, please?

During the USEC licensing, we did have a differing professional opinion on this area, and the issue was whether or not the Pierson memo and the guidance in the standard review plan complied with Part 70. And after the DPO process, there was a decision made by Michael Weber, who at the time was the Director of the Office of Nuclear Material Safety and Safeguards. His decision was that both these documents did comply with Part 70.

The individuals presenting a differing professional opinion appealed that decision to the Executive Director of Operations who in his decision affirmed that of Mr. Weber in his.

One of the aspects of this that continued on was the recommendations made by both Mr. Weber and EDO to revise the standard review plan in this next revision to incorporate some guidance related to level of detail, and those revisions were made in Rev. 1 to NUREG-1520, which was issued in 2010.

MR. SMITH: Okay. The NRC expects changes to be made to the baseline design of the facility both while it's being built and after it's operating. Actually we expect, as Tim mentioned earlier, all

licensees to make changes to the facilities over time, and our regulatory framework has addressed that through the requirements in 10 CFR 70.72, which includes the facility change process, which includes criteria under which a licensee can evaluate a proposed change to determine whether it is one they can make on their own or whether it requires an amendment to be submitted to NRC for approval.

And the types of changes that are evaluated for this process include changes to the site, structures, processes, systems, equipment, components, computer programs, and activities of personnel.

We've seen some licensees evaluate hundreds of changes each year through this process. As Tim mentioned earlier, we see the ISA and ISA summary as a living document that's modified as necessary each time one of these changes are made to the facility.

For this proposed facility, we believe the likely changes are expected to be in the design of the cascade. We know that they are still continuing to work at their test loop to determine the best or optimum separator and cascade design.

Because of the fundamentals of the design as we know it now, we don't believe that any changes

will have a significant impact on safety.

Next slide, please.

Uranium hexafluoride, or UF-6, is the form of uranium that's primarily used at this facility. UF-6 is most reactive when it's in its liquid form, and there is one system at this proposed facility that uses liquid UF-6, and that's their sampling system. The sampling system is used to liquefy a product cylinder, homogenize its contents, and to remove a small sample for product QA purposes.

The system as it is designed now will be contained within an autoclave that's designed to meet ASME pressure vessel codes and standards.

We believe the primary facility hazard is in this sampling system where it contains this liquid UF-6, these liquid cylinders. We do not expect any significant changes in this sampling system.

The majority of the remainder of the facility will use UF-6 in either solid or gaseous form, and the primary systems here are the feed withdrawal and blending systems, and because these systems are designed similarly to decisions at other facilities, we don't expect any significant changes to be made in the design as it is now.

If changes are made, we don't expect it to

have any major impact on the overall risk of the facility because of the use in gaseous or solid forms.

Next slide.

Tracking of design changes: as I mentioned earlier, 70.72 has other requirements in it. In particular, it requires a configuration management program be established, and this program provides oversight and control of design information and safety control and tracks modifications to the facility.

It also contains the criteria by which licensees evaluate changes determined if an amendment is required to be submitted to NRC for approval. If an amendment is submitted to the NRC for approval, that change cannot be implemented until that approval is granted.

It also contains, 70.72, that is, contains a requirement for an annual report to be submitted within 30 days at the beginning of the year that summarizes all of the changes that were evaluated through this process. It also includes a requirement that the updated ISA summary page changes be submitted for review.

We, the NRC staff, review those changes as

they come in, and the region will also perform an inspection each year to look at the change process to make sure they're implementing it appropriately.

Next slide, please.

Ten CFR 70.72 does not allow for changes to the license application. Therefore, GLE has asked for a separate authorization for a similar process to be able to change their license application. It contains criteria by which they will review a proposed change simply to determine if it creates a decrease in the effectiveness of that commitment. If it does, then it would require an amendment request to the NRC for approval.

It also requires periodic reports to be provided on those changes that have been made in accordance with this process, as well as to provide updated pages changes to the license application reflecting those changes.

The agency issued a regulatory guide, 3.74, in January of this year that addresses 70.72 and also includes some guidance on a change process like this for the license application, and we believe that the proposed process by GLE is consistent with this guidance.

And that concludes our testimony.

CHAIRMAN RYERSON: Thank you, Mr. Smith, and thank you, Mr. Johnson.

Judge Jackson, do you want to begin?

ADMIN. JUDGE JACKSON: Let me say kind of at the outset that the Board appreciated some of the background information that was provided in the pre-filed testimony and in the exhibits that address the issue of how much detail is enough and some background on how that policy came to be. That was helpful. We appreciate it.

We don't have to have a complete design, a detailed design. I mean, that's what you're saying, and that's the policy. On the other hand, you have to have some design, and there's still a judgment call involved in this; is that right?

MR. SMITH: Yes, sir.

ADMIN. JUDGE JACKSON: Yes, you have to balance some factors. Now, you mentioned the balance of plant quite a bit and mentioned the similarity to other facilities, and we've discussed that here earlier today, but if you look back at the cascade facility.

Please just go through and summarize then the basis for your making the judgment call of what you have is enough. What were some of the key

factors that went into that balance?

MR. JOHNSON: Well, I think the key factors flow from the regulatory requirements that may be enough detail presented for us to understand the processes that are being used and the hazards that would exist with those processes, and that we understand the items that they've chosen as IROFS sufficiently for us to find that they will be effective to either prevent or mitigate accidents that could affect the performance requirements.

So, again, we're looking for enough information for us to understand what they're trying to do in the hazards that are presented by those processes.

ADMIN. JUDGE JACKSON: Okay.

MR. JOHNSON: And, again, another key thing is that we're looking for them to commit to particular codes and standards so that we can insure that if the components are procured and fabricated in accordance with those codes and standards, that we will have confidence that the facility can be constructed and operated safely.

So I think the key thing here that we focused on in the review is commitments to codes and standards, and I gave an example of pressure vessels,

for example, and similar examples for instrumentation and controls, for example, that we have commitments from the applicant to use standard regulatory guides and standard IEEE, Institute for Electrical and Electronics Engineers, standards applicable to instrumentation and controls, and these standards kind of flow out of requirements that were originally developed for reactor facilities.

So we're confident that if equipment is procured in this way, that the facility can be operated safely.

MR. SMITH: With respect to the cascade itself, what you were asking about, they do describe the cascade, the separator design and its various other components within the ISA summary in a level of detail such that we were able to understand its functioning, the safety hazards associated with it, and the safety controls that are being applied to it to ensure that it operates in a safe manner.

ADMIN. JUDGE JACKSON: Okay. The other couple or two IROFS that relate back to moderation control, right, I mean, there's an HF and an oxygen IROFS to limit those in the separator. Do you have to assure yourself that those IROFS can be effective?

I mean, there is perhaps a time delay

involved in that or a certain level they can achieve. I just wondered how you knew that given any design changes, that those IROFS would be adequate.

Is that the kind of balance you have to make? You look at the IROFS. You look at the hazards, and you say, "We think we understand what they are, and we think that the mitigation steps are adequate." Is that --

MR. SMITH: Yes, sir.

ADMIN. JUDGE JACKSON: Is that the key to making this balance as far as you're concerned in the cascade region?

MR. JOHNSON: I think one of the key aspects of the cascade is with the codes and standards that are applied to it, we expect that it will be leak tight, and you know, in order for moderators to get into the facility, it's going to have to enter in through some kind of leakage.

I mean, GE has their own inventory investment objectives here, too, because the facility really won't operate correctly if water or moderator gets into the facility, into the cascades.

So that and the fact that when we look at the process conditions, which are generally subatmospheric, that the components are designed to

appropriate codes and standards to insure their leak tightness and integrity, those are the things that, you know, are key to insuring that the moderator controls that will be put in place will be effective.

ADMIN. JUDGE JACKSON: Okay. Let's talk about what happens down the line. The design being worked on, at some point it will be finalized. It gets down to the point where it's time to build something. According to the testimony, there is a role in a final review that relates to the inspection process and the ORR process; is that correct?

MR. SMITH: Yes, sir. As Tim mentioned, there's a requirement in the regulations that specifically requires -- that's only NRC -- to perform an inspection to verify the facility was constructed in accordance with the requirements in the license.

ADMIN. JUDGE JACKSON: Right. And so that includes a final look at criticality safety in the as-built --

MR. SMITH: Yes, sir.

ADMIN. JUDGE JACKSON: -- configuration?

MR. SMITH: Yes, sir. We look at not only the construction of the facility, but also the programs that are there to insure the safety of the

facility, including the criticality safety program, the radiation safety program, the emergency preparedness program, the transportation of materials. We look at all of those programs to make sure we're comfortable with their level of implementation and their readiness to start operations before we authorize them to start plant operations and enrichment.

ADMIN. JUDGE JACKSON: But it is a two-aspect review. I mean, our programs, you're trying to make sure that the programs and processes are in place, but there's also a look at the design itself, is there not?

I mean, there's two parts to this.

MR. SMITH: Like from a criticality safety standpoint, I'm not a specialist, but instead of just looking at the controls that are in place, they'll look at the safety evaluations, the nuclear criticality safety evaluations, analyses and evaluations, that are developed to insure that the safety controls are appropriate. They will do a detailed look at those as well.

ADMIN. JUDGE JACKSON: Okay. How does the NRC assure that this safety function has adequate technical capability?

Let's say you have a fairly important and perhaps subtle criticality safety issue that you want to be assured of. How do you know these teams, in essence, will have enough technical capability to, say, land the same level of assurance that you get in the licensing process?

Do you see what I'm saying? You're going through a pretty rigorous process to make this decision to recommend whether or not to issue a license, and there's a lot of review, and now I'm envisioning here is an inspection team showing up to take a look at this.

Is there an ongoing role for the people that are involved in the licensing and perhaps know the issues to make sure they're being addressed properly, or is it just turned over to the inspectors and you hope that they get the right people on the team

MR. JOHNSON: An example of the criticality area, the way the criticality function is set up is that criticality inspection is done by the same people that do reviews. So, you know, hopefully the reviewers of the license application would be available also in the future to participate in these inspections.

So I think we have a fairly good confidence that the people that understand the criticality issues are going to be the same ones that do the inspections. And, again, they're going to be looking at the overall programs, and as Brian mentioned, calculational bases that were used for the design and so forth to make sure that not only the programmatic, administrative requirements are met, but also the technical design elements are met.

MR. SMITH: Actually, as a result of the DPO that was mentioned earlier, we recognized at that time that we probably would need to have some of the same technical reviewers involved in the inspections, the readiness review inspections. And I can tell you from a supervisor's standpoint who works on the budget, we actually budgeted some additional FTE to allow for our technical staff to go out and assist in some of these inspections.

And we did that with the LES facility. Several of our technical reviewers did go out and participate in some of the inspections.

ADMIN. JUDGE JACKSON: So is this something that's assured or is it just kind of left up to the good judgment of the people in the inspection process?

Or I guess I'm saying who ultimately bears the responsibility down the line as this design finalizes and the last look is taken before a facility is built or operated.

MR. SMITH: Region 2 is the part of the NRC that will authorize the operations. They're responsible for the inspections, and they do that in conjunction with the Headquarters office. There are certain licensing reviews that we have to complete near that time as well. Decommission financial assurance is one of those typically that comes in the plant at the very end. There may be some last minute licensing amendments that have to be processed as well.

We've been through the process with LES. We're going through the process now with MOx, the MOx facility and its construction inspection. We've got a good working relationship with Region 2, and so like I said, we had it built in the budget, some additional FTE to allow for the participation in these inspections going forward.

ADMIN. JUDGE JACKSON: Okay. So you feel that it's a very rigorous and careful process?

MR. SMITH: Yes. A little more detail is that Region 2 has developed what we call an

inspection manual chapter that addresses the construction inspection and the readiness reviews for these new facilities and lays out all the various inspection procedures that are to be met or to be followed during that time, and I think it includes some coordination with us in that inspection manual chapter.

ADMIN. JUDGE JACKSON: Okay. Thank you.

CHAIRMAN RYERSON: Judge Garcia.

ADMIN. JUDGE GARCIA: As you might have gathered from our questioning, the Board is very concerned about the licensing of this facility in terms of the type of facility that's being built. We feel it's sufficiently different than the ones that have been previously built, and therefore want to be assured that the NRC staff has taken every consideration in the evaluation.

So what I'd like to start off by asking is: what role have you gentlemen played in the current design of the facility?

MR. JOHNSON: Well, we have not performed a design consulting role with GE. Our review has been oriented toward does the proposed design that was described in the application and the ISA summary, did that meet our regulatory requirements.

But in terms of, you know, how the facility is designed, that's up to the applicant and ultimately the licensee, and if they make changes to it, they'll have to follow the regulatory processes for those changes, of which we will evaluate on an inspection basis whether or not those change processes are being performed properly.

ADMIN. JUDGE GARCIA: So up to this point you've not played a role in the design.

MR. JOHNSON: No, this is GE's design. Our role has been to evaluate that design in terms of whether or not it meets our regulatory requirements.

ADMIN. JUDGE GARCIA: I see.

MR. SMITH: I have to agree with Tim, Mr. Johnson on that. Our role is strictly the evaluation of their design against our regulatory requirements.

ADMIN. JUDGE GARCIA: Okay. So you both feel there's adequate information at this point to be able to feel that the facility is safe.

MR. JOHNSON: Yes, based on our review of the application and the ISA summary, we felt that a sufficient amount of information was provided to meet the regulatory requirements and for us to identify what the hazards are and how the applicant was proposing to treat those hazards.

MR. SMITH: I agree. I agree with Mr. Johnson.

ADMIN. JUDGE GARCIA: Thank you.

No further questions.

CHAIRMAN RYERSON: Mr. Johnson, let me start with you, if I may. Are you in a position to estimate in rough terms what percent of the design of the facility is complete at this point?

MR. JOHNSON: I would say it's probably at maybe a 40 percent level. There's substantially a lot of detail design left to do, for example, sizing components or procuring components, writing the specifications for those, and so on. So I think that a great deal of work is still left for the engineers at GLE in order to complete this, but again, our emphasis was looking at whether or not we had enough information to understand what their proposed processes were going to be and the hazards that would result from those processes.

CHAIRMAN RYERSON: And I think it's clear that you anticipate further changes. My understanding is there are two kinds of changes. There are changes that do not require preapproval by the NRC, and then there are other changes that do require preapproval by the NRC. Am I correct?

MR. JOHNSON: Yes. We expect those changes to be made. We've seen those with Louisiana Energy Services, for example, as they go through construction. They've made a number of changes to their facility, some of which have required them to submit license amendments. We expect the same thing here.

But as Brian talked about, we expect these changes to be primarily focused on the cascade design itself, which we feel really isn't the riskiest part of the facility. The riskiest part of the facility involves those systems that have large quantities of uranium hexafluoride, and especially in the sampling system where the uranium hexafluoride would be in the form of a liquid.

CHAIRMAN RYERSON: Would you expect, therefore, that most of the changes in the cascade area would not require prior NRC approval?

MR. JOHNSON: It's hard to say at this point, to speculate, but I think the change process will allow us to look at that. Under 70.72 and the license application authorization change process, the licensee will be required to report to us the changes that they've made to give us an opportunity to review those and look at them in more detail as a part of

our inspection function.

But I suspect that the changes will be similar to what we're seeing with Louisiana Energy Services where most of the changes that are done do not require submittal of an amendment.

CHAIRMAN RYERSON: I know you can't estimate with specificity, but can you estimate roughly the total number of changes, including both kinds, those that require NRC approval and those which do not at least initially. How many changes; are we talking about ten changes or 100 changes? What's your best guess?

MR. JOHNSON: Well, we are probably talking several hundred changes over the course of a year. You know, it's very hard for me to speculate, but in terms of LES, LES has -- you know, during the height of its design program, completing the final decision, you know, they were submitting hundreds or not submitting, but they were going through this process hundreds of times and maybe there were 50 changes that came in requiring an amendment.

CHAIRMAN RYERSON: I mean, again, I'm not holding you to an estimate obviously, but it would be your guess or your estimate that the majority of changes would not require license amendments.

MR. JOHNSON: That's my expectation based on our experience with LES.

CHAIRMAN RYERSON: But the changes that do require license amendments afford an opportunity for public participation; is that correct?

MR. JOHNSON: Well, if the changes don't involve sensitive or classified information, they would be submitted as public documents, and our reviews would be done with a safety evaluation report on those that would be publicly available. But I suspect that the changes related to the cascade system would be primarily classified and would not be subject to public disclosure.

CHAIRMAN RYERSON: And what happens to the changes that the applicant is authorized to make unilaterally on its own? My understanding is there's an annual summary of those that the NRC gets; is that correct?

MR. JOHNSON: Well, it's more than just that. It is an annual summary under 70.72, but it's also an evaluation process. They have to document what the change is, how they evaluated it, specifically describe why it meets the regulatory requirements under 70.72 not to submit the changes in amendment, to keep those records, to make them

available to NRC inspectors to look at, as well as that reporting requirement.

MR. SMITH: Can I clarify that just a second?

CHAIRMAN RYERSON: Certainly, Mr. Smith.

MR. SMITH: The report that's submitted is a summary. It discusses in a high level what that change was. It doesn't go into all of the detail that Mr. Johnson said, but the review that we do from the Headquarters perspective is we'll review. We'll read through all of those changes, whether it's 50 or 200 or 500, and we'll pick out a sample of those, 15 or 20 or some, depending upon the number that were submitted, and ask for the facility change package from the licensee so that we can review it in more detail. So we'll look at the information that Mr. Johnson has mentioned to give us confidence that they are doing things the way they're supposed to.

CHAIRMAN RYERSON: At the time that a change is initiated unilaterally by the applicant, is there any reporting at that time or just annually?

MR. SMITH: Just annually.

MR. JOHNSON: Under 70.72, it's an annual reporting requirement.

CHAIRMAN RYERSON: Okay.

MR. JOHNSON: But I think another thing to point out here is that in the review of the application, one of the key things we looked at was the qualifications of the people, the managers and people doing the critical reviews, that they are capable of doing that.

So part of this process is we're assuming that they are going to have qualified people in accordance with their commitments that they made in their license to manage this program and to carry it out in accordance with the regulation.

So we're not just letting people do this willy-nilly. It's with people that are qualified, that meet the commitments that the applicant made in its license.

CHAIRMAN RYERSON: Yes, and I'm not suggesting that you do this willy-nilly. I'm sorry if I gave that impression. I'm just trying to establish what the procedure is so I understand it.

Mr. Smith.

MR. SMITH: Yes, sir. Just one more thing to add to that is in the time from about a year or two leading up to the point where they start operations, there will be a lot of communications between our Region 2 office, the inspectors, and the

licensee, what construction is going on in the next month, what activities. We can to come out and look at those.

And just for example with respect to all the changes to the ISA summary, in the year prior to LES starting operations, they actually submitted those changes to us four times during the year leading up to that. So we were aware of all the different changes that were going on on the site.

CHAIRMAN RYERSON: As the NRC staff becomes aware of the changes, most likely in the annual reporting as I understand it. What happens if someone concludes that one change should not have been made unilaterally? It should have been approved by the NRC. It should have been the subject of a license amendment.

What happens procedurally within the NRC staff at that point?

MR. JOHNSON: Well, it would go into enforcement space. There would be a notice of violation that the process wasn't conducted properly, and there would be detailed discussions with the licensee on what needs to be done to correct that situation, whether they need to come in for an amendment. If the change ultimately isn't approved,

it may result in having to refit, you know, part of the facility.

CHAIRMAN RYERSON: Thank you.

Let me turn to a slightly different subject, and again, I'll start with you, Mr. Johnson, if I may. My understanding of the history of the so-called Pierson memorandum, which is NRC Exhibit 21, is as follows:

The memorandum was drafted by Mr. Pierson and what it does is set forth Mr. Pierson's view of the level of detail required to satisfy the Part 70 requirements of NRC regulations in order to comply with what's required for license, and some members of the staff disagreed with that assessment, issued what's called a differing professional opinion. That differing professional opinion was the subject of a panel, which is the way this works at the NRC, and then the panel apparently agreed with Mr. Pierson.

There was then an appeal to an office director who agreed with Mr. Pierson, with some caveats, with some limitations and suggestions perhaps for further work, and then it eventually went to the Executive Director of Operations, who again basically agreed with Mr. Pierson but with some suggestions as to how NUREG-1520 might be amended,

and it was amended.

My question for you is this: has the interpretation of Part 70 that appears in the Pierson memorandum ever been -- has the Commission ever faced that interpretation? Has it ever ruled on the interpretation of Part 70 that's in the Pierson memorandum, to your knowledge?

MR. JOHNSON: No.

CHAIRMAN RYERSON: It has not ruled. It has not.

MR. JOHNSON: The Commission, the DPO process didn't go to the Commission level. It went the original decision after the panel met. The original decision was made by the Director of the Office of Nuclear Material Safety and Safeguards. That decision was appealed to the Executive Director of Operations, and that was the final decision that was made.

CHAIRMAN RYERSON: Okay. Thank you.

And I'll turn to NRC counsel. That's your understanding as well, correct?

MS. SAFFORD: That's correct.

CHAIRMAN RYERSON: All right. Thank you.

MR. SILVERMAN: Your Honor, may I have a moment? Can we take a one-minute break on this?

CHAIRMAN RYERSON: Go ahead.

MR. SILVERMAN: Thank you.

(Pause in proceedings.)

CHAIRMAN RYERSON: Mr. Silverman, did you have a comment now?

MR. SILVERMAN: No. Thank you. Thank you.

CHAIRMAN RYERSON: Okay. And, Ms. Safford, you have no further comment?

MS. SAFFORD: No further comment.

CHAIRMAN RYERSON: Thank you.

All right. Well, gentlemen, Mr. Johnson, Mr. Smith, thank you for your testimony. You may step down. I think you're both Q cleared, and you're not testifying on any other topic.

MR. JOHNSON: Oh, I am. I'm testifying on two more.

CHAIRMAN RYERSON: Oh, Mr. Johnson is, yes.

MR. JOHNSON: Two more topics.

CHAIRMAN RYERSON: Mr. Smith is not?

MS. SAFFORD: Mr. Smith is finished, yes.

CHAIRMAN RYERSON: He's finished. So Mr. Smith gets the pleasure if he would like to of sticking around and watching. It's up to him or counsel, and, Mr. Johnson, I'm afraid we'll have to ask you to step out for a while until we get to you

on some of the other topics, but thank you.

(The witnesses were excused.)

CHAIRMAN RYERSON: All right. Well, I think we're in pretty good shape. Hopefully we'll finish Topic 3, which is what we planned to do. We only have one panel on Topic 3, which is the NRC staff's panel, and I see here for the first time we have one witness who does not have a Q clearance. We have one L clearance.

My suggestion would be at least for the initial presentation there is no reason that I see why all three can't make the initial presentation, and frankly, I can ask you now. Would it make more sense after the presentation for the Board to speak first with the L cleared witness and then dismiss him and then see if there are any follow-up questions for the Q cleared witness?

MS. SAFFORD: I think that would be preferable. Mr. Stamatakos, who has the L clearance, will also be the presenter.

CHAIRMAN RYERSON: Okay. Yes, that was unclear. It looked like all three might be. My suggestion would be that we have all three witnesses come in for the presentation, and then we will ask our questions of Mr. Stamatakos --

MS. SAFFORD: Stamatakos.

CHAIRMAN RYERSON: -- and then excuse him, and if we have any further questions for the Q clearance -- we may not -- but we can just ask them individually after he's been excused.

MS. SAFFORD: Okay.

CHAIRMAN RYERSON: All right. So why don't we reconvene at -- oh, let's take ten minutes this time -- 3:55, and we will resume.

(Whereupon, the proceedings in the foregoing matter went off the record at 3:45 p.m. and went back on the record at 3:57 p.m.)

CHAIRMAN RYERSON: Please be seated.

All right. We are back in session, and we have three witnesses, and I'm afraid I may do some violence to the names, but let me try here. Mr. Stamatakos.

MR. STAMATAKOS: Stamatakos.

CHAIRMAN RYERSON: Stamatakos. Mr. --

MR. CHOWDHURY: Chowdhury.

CHAIRMAN RYERSON: -- Chowdhury, and Mr.?

MR. HSIUNG: Hsiung.

CHAIRMAN RYERSON: Hsiung.

If you would raise your right hands, do you swear or affirm that the testimony you're about to

give in this proceeding will be the truth, the whole truth, and nothing but the truth?

MR. STAMATAKOS: I do.

MR. CHOWDHURY: I do.

MR. HSIUNG: I do.

CHAIRMAN RYERSON: Thank you.

And it's our understanding you're going to begin by giving us a presentation.

MR. STAMATAKOS: Yeah.

CHAIRMAN RYERSON: Please proceed.

MR. HSIUNG: Okay. This presentation is on the topic of the safety impact of external hazards identified in the May 16 order. This order focused on three natural phenomena natural hazards. These hazards are related to flooding, including hurricane surge and tsunami inundation; high winds, including tornadoes; and earthquakes.

My name is Simon Hsiung and will be making first part of presentation for this particular topic, and I have my left-hand side Dr. Stamatakos that is responsible for the seismic aspect of the hazard review and also support the review of tsunami hazards.

And on my right-hand side is Dr. Chowdhury, is doctor engineer (phonetic) responsible for the

(unintelligible) aspect of design related review.

CHAIRMAN RYERSON: And if I could interrupt you for a moment, would counsel represent what exhibit that is? We're dealing now with Exhibit NRC 113.

MS. SAFFORD: This is NRC 113, yes.

CHAIRMAN RYERSON: Thank you very much.

I'm sorry.

MR. HSIUNG: Okay. The next slide, Slide 3.

And the purpose of this presentation is to provide a summary of the GLE's assessments on flooding, high winds and earthquake hazards, and secondly, discuss the basis for the staff to conclude that GLE's assessments were acceptable.

Next slide, please.

And the purpose of the staff's evaluation is to determine whether the relevant or regulatory requirements in 10 CFR 570 have been met, and specifically 70.62(c)(iv) requires an applicant to assess potential accident sequences caused by the credible external events, including natural phenomena hazards in its integrated safety analysis, and 70.64(a)(2) requires to be specifically designed to provide adequate protection against natural

phenomena, with the consideration of the most severe documented historical events for the site; and 70.65(b)(1) requires an applicant to provide a general description of the site with emphasis on factors that could affect the safety of the facility.

And the ultimate goal of the review is to ensure that the applicant's assessment complies with the performance requirements in 70.61(b) and (c) to review the risk of events that could have significant impacts on workers and the public.

Now, specifically, 70.61(b) requires high consequence events to be highly unlikely, and 70.61(c) requires intermediate consequence events to be unlikely.

Next slide, please.

The staff in conducting the review, the staff used the extended review plan, NUREG-1520, to guide the review of flooding, high winds, and earthquake hazards. Specifically, staff should determine whether the applicant characterized these hazards with sufficient detail to support assessment of their impacts on facility safety in the likelihood of an occurrence and to determine whether the applicant identified all the design basis related to these hazards; determine whether the applicant

documented which events are considered incredible; and provide a basis for the determination; and also, lastly, determine whether the applicant assessed the events that could occur without adverse impacting safety.

In doing staff guidance, ISG-4 provides further guidance for the staff to review the natural phenomenon hazards. This ISG specified that deterministically defined events, such as the probable maximum flood or safety shutdown earthquakes, can be used in place of purely probabilistically defined, highly unlikely events, and maybe in staff's opinion may be preferable depending upon the quality of the historical data.

In addition to the standard review plan and the ISG-08 (phonetic), the staff also used other applicable NRC guidance documents to review flooding, high winds and earthquake hazards. Specifically, staff used Regulatory Guide 1.59 to review GLE's assessment of flooding hazard, and NUREG/CR-4461 to review GLE's assessment of tornado hazard.

Besides the NRC guidance documents, staff also used well established standards from external sources to review GLE's design of structures. High density (phonetic) important to rely on for safety

against flooding, high winds, and earthquake hazards, and here the external common standards that we have been referring to including DOE's Standard 1020 and American Society of Civil Engineers 4305; also that American Institute for Steel Construction, N-690, and lastly is American Concrete Institute 349.

The first two are codes. DOE Standard 1020 and ASCE 4305 will be used by the applicant to develop the seismic design spectrum for earthquake design purposes, and either one of them probably will be used, and AIC, the N-690 is intended the use by the applicant for steel structure related construction and for ACI-349 for the concrete structure design and construction.

The last two are current standards that really are in the nuclear graded codes that have stringent requirements and (unintelligible) requirements that didn't go along with that. So it's different from that, the ordinary type of codes for the commercial facility.

Next slide, please.

Starting from this slide that we discussed the staff evaluation of the three specific hazards that have been identified by the court order and the presentation materials organized in a way that for

each of the hazards the first we discuss a brief summary of GLE's assessment and followed by the bases that staff relied on for their conclusion on GLE's assessment.

And starting from this slide, to assess the flooding hazard GLE considered several measured causes for flooding: river flooding, local heavy rainfall, hurricane and tsunami. GLE used the probable maximum flood or rainfall in the watershed of nearby rivers to assess river flooding, and GLE used the probably maximum precipitation to assess local heavy rainfall induced flooding. And GLE used the probable maximum hurricane surge to assess hurricane induced flooding. And GLE used information regarding to topography and geographical locations of the site and its surrounding areas to assess potential flooding of a tsunami.

In this slide we'll discuss the river flooding hazard. Other flood hazard causes will be discussed in the subsequent slides.

For river flooding hazard, GLE used the method suggested in Regulatory Guide 1.59 to assess the probable maximum flood discharged from the rivers due to the probable maximum flood and the discharged capacity of these rivers by comparing this to GLE

concluded that the maximum probable flood will be a hazard to the proposed facility. So considering the topography of the site, GLE selected the design basis (unintelligible) for the probably maximum flood to be 28 feet above mean sea level, above the facility floor level, and GLE has conducted some of the hazard analysis or risk analysis in its ISA summary, ISA integrated safety analysis, and concluded even that the facilities flooded with three feet of water and the consequence is low and was well within the acceptable risk. And that's been documented in the ISA summary.

Next slide, please.

And staff found GLE's assessment acceptable because GLE used the probable maximum flood as a basis to characterize highly unlikely events. Regarding to river flooding, that is consistent with ISA. There were eight. The selected design basis flood is conservative because the proposed site and the surrounding area are relatively flat with gentle sloping surfaces at gradients less than two percent, with very little lift, and the facility is situated at the local high point, which is about 100 feet above the mean sea level.

Because of this topography, a large flat

area surrounding the facility site available to accommodate the flood water. Consequently a rise of flood water above the 25 feet elevation of the facility is no expected, and certainly above the design basis flood is highly unlikely in this case.

Because the general area is largely relatively flat, a rise of flood water will be slow, and therefore, input time is available for the operational personnel to take mitigating actions.

In addition, a design including of flood hazard considerations that confirm with the appropriate codes and standards will provide sufficient design margin to resist flood hazard. And this design margin results from significant reserve strengths (phonetic) associated with the design analysis, low combination, and the design itself.

Next slide, please.

In assessing the local rainfall hazard, DOE estimated the probable maximum precipitation due to local heavy rainfall for various durations using the NOAA, National Weather Service's methodology, and based on these estimates, DOE concluded that because of the facility floor is at that local high point, rainfall will drain in all directions to lower elevations, and so therefore, probable maximum

precipitation will not flood the facility.

The staff accepted the DOE's assessment because DOE used the probable maximum precipitation as a basis to characterize the highly unlikely events or local rainfall hazards. This approach is consistent with ISG-08.

And staff agrees with DOE that the probable maximum precipitation will not flood the facility because of the site and the surrounding area is relatively flat, and the facility is located in the local high point.

In addition, possible flood from the probable maximum precipitation responded (phonetic) by the design basis flood DOE selected, which is at 28 feet above mean sea level.

Next slide, please.

Regarding the potential flood from hurricane surge, and GLE used the probable maximum hurricane surge provided in Regulatory Guide 1.59. According to Regulatory Guide 1.59, the probable maximum hurricane surge at the coastal area near Wilmington area is between 17.6 feet and 21.9 feet, and GLE used the larger value for conservatism.

The staff found GLE's assessment acceptable because GLE used the probable maximum hurricane surge

as the basis to characterize the highly unlikely events associated with the hurricane induced flood hazard. This approach is consistent with ISG-08.

In addition, the GLE's assumption that this surge level would reach the site without dissipation is conservative. Even with this assumption, the probable maximum hurricane surge remains below the ninth (phonetic) basis of flood level, you know, which is 28 feet compared to approximately 22 feet.

Next slide please.

For tsunami hazard, DOE concluded -- GLE, excuse me, concluded that tsunami reaching far enough inland to impact the facility is highly unlike, and GLE made this conclusion based on the fact that the proposed site lies approximately ten miles west and 26 miles north of the Atlantic Ocean and the proposed elevation of the facility is located at 25 feet above mean sea level. Therefore, the proposed site may be characterized as inland that is not accessible to flooding of a tsunami.

This conclusion is really based on a NUREG that NRC put together. That's NUREG/CR-6966, and also based on the FEMA characterization in terms of where the tsunami hazard will have to be considered.

Next slide, please.

In general, the staff agreed with the GLE's assessment. In addition, plate tectonics' condition along the Atlantic seaboard are not conducive to forming large earthquake generating a tsunami. In addition, Atlantic Coast of North Carolina is not a subduction zone and there are no large submarine volcanoes offshore, and the only perhaps active subduction zones in the Atlantic Ocean that are anywhere close to the North Carolina coast are along the Caribbean Seas, and they are having relatively low frequency tsunami occurrence in this region relatively compared to Pacific Ocean.

So recorded tsunami from the Caribbean Sea, subduction zones cause only very localized flooding of the Caribbean islands only. So, therefore, these subduction zones are too distant to have a significant impact to the North Carolina coast.

Now, even assuming there's a large tsunami were to reach the North Carolina coast, for this large tsunami to inundate the facilities is highly unlikely because the facility is more than ten miles from the coast and is situated 25 feet above the main sea level.

Inundation even with large tsunami events remain relatively closer to the shoreline. For

example, the tsunami inundation from the Great Japan Earthquake reached about 4.9 miles inboard (phonetic), and tsunami inundation from the Sumatra earthquake reached only about 3.1 miles inland.

Fractures have been discovered along a 25 stretch of the Continental Shelf off of Virginia and North Carolina. Our study suggests that these fractures, even though remotely could trigger a landslide generating a tsunami with the surge wave size similar to a storm surge off Category 3 or 4 hurricane, and for this possible event, you know, the surge responded by the estimated probable maximum hurricane surge.

Next slide, please.

The review regarding the high wind hazard, based on the historical data, the highest (unintelligible) wind ever recorded for the region was approximately 107 miles per hour, and no hurricane winds with strengths equal to or greater than Category 3 hazards have ever been recorded in the region. So DOE examined this through historical high wind records, and it's like the Category 4 hurricane with a wind speed of 157 miles per hour as the design basis wind for the facility.

GLE also used the NUREG/CR-4461 to assess

the tornado hazard and estimated the highly unlikely tornado hazard wind speed is around 112 miles per second for the facility.

Next slide, please.

The staff found that using the historical wind information to characterize the highly unlikely events regarding the high wind hazards is consistent with ISG-08. So it is, therefore, acceptable. The estimated highly unlikely tornado wind speed for the site is consistent with that in the NUREG/CR-4461 and is bounded by the design basis wind speed.

The staff found GLE's design basis wind speed conservative because that no hurricane winds with winds equal to or greater than Category 3 events have ever been recorded in the area. So using Category 4 hurricane as a design basis wind for the site is bounding in the conservative from that perspective.

In addition, the hurricane weakens as it moves inland because it loses its fuel supply from the warmer ocean water. For example, when Hurricane Fran, a Category 3 hurricane, made landfall at North Carolina coast near Cape Fear, you had a wind speed of 126 miles per hour. By the time it reaches Wilmington area its wind speed reduced to 86 miles

per hour, equivalent to a Category 1 hurricane.

So from this perspective, the design basis wind is conservative as well because it did not consider the weakening mechanism of the hurricane.

Furthermore, the design for wind loads using appropriate codes and standards will provide the structures, items relied on for safety with sufficient design margin to withstand wind loads, and this will add additional conservatism to the safety.

So in essence, in general the design basis for the wind and the flood that developed by and selected by the GLE, the applicant, is, in general, conservative based on the historical data that's available for the site.

The next two slides related to seismic hazard, Dr. Stamatakos will give the talk, and Dr. Chowdhury will support from the structure aspect.

CHAIRMAN RYERSON: Thank you.

MR. HSIUNG: Thank you.

MR. STAMATAKOS: Well, good afternoon. In terms of the GLE assessment for earthquake hazard, I took a slightly different approach in the end compared to the hazard that Simon just talked to. The approach for seismic hazard was more probability based than performance based, which the GLE defined

as failure probability ten to the minus four highly unlikely performance objective for seismic design. They did not use the methods in ISG-08 that's more deterministic methods in ISG-08 to define highly unlikely events. I'll explain why in the next slide.

Instead, GLE developed their seismic design ground motion based on USGS 2500 year ground motion return period ground motions properly modified for the site swell condition, and they combined that then with a selection of appropriate design analysis and design methodology either using DOE-1020 or ASCE-4305 to construct and design the facility such that the combination of the initial seismic hazard selection plus the amount of extra capacity by using these nuclear grade design methodologies give them assurance that they'll be able to meet their performance objective of ten to the minus four.

So on Slide 15, in this case using the methodology, the more deterministic methodology in ISG-08 actually led to a smaller ground motion than would be accepted. That methodology calls for looking at the largest regional earthquake combined with the largest local earthquake to develop a design spectra that constituted a repeat of the Charleston earthquake with a magnitude of about seven and a

local earthquake with a magnitude of about five. But that resulting ground motion then calculated in probability space really resulted in an earthquake that had a return period of about 1,000 years.

So taking a more conservative approach, the combination of using the 2,500 year USGS ground motions with the nuclear grade construction methodology that I discussed in using the DOE or the ASCE methodologies results in structures, IROFS, that will be able to withstand ground motion at least equal to the 10,000 year return period earthquake.

So using appropriate codes and standards for seismic design would provide the structures with the sufficient capacity to withstand ground motions that are even less likely than the design. Therefore, IROFS DOE identified would be constructed with sufficient capacity to withstand ground motions that are substantially less than the 2,500 year return period ground motion.

The risk reduction factors for the facility is estimated to be at least a factor of four, leading to the failure probability of ten to the minus four, smaller and consistent with DOE's definition of highly unlikely.

And finally, we would argue that they even

made the additional capacity beyond the highly unlikely failure probability, even in the event of ground motions that are well beyond the design basis and even less than the ten to the minus four. The IROFS in the building may not be so severely damaged, and they could maintain their safety functions even for those beyond design basis.

So that concludes our presentation.

CHAIRMAN RYERSON: Thank you.

Judge Garcia.

ADMIN. JUDGE GARCIA: Were we going to follow a protocol in terms of questions of witnesses, in terms of starting with the last witness first?

CHAIRMAN RYERSON: Very good point. What we've decided is, just to avoid any possibility of a security problem, since two of you have Q clearances and one has an L, we will start with you, Mr. Stamatakos, and then we will excuse you and if we have further questions of the other witnesses, we will then proceed to them.

MR. STAMATAKOS: Yes, sir. I understand. Yes, sir.

ADMIN. JUDGE GARCIA: First I'd like to start with the choice of the magnitudes for the earthquakes for both local and distant. How were

they chosen?

MR. STAMATAKOS: Well, the magnitude for the Charleston event is estimated, since there were no recordings; the magnitude for the Charleston event is estimated based on number of different methodologies. I think the most recent ones involve trying to scale the size and distribution of the Paleolithic liquefaction features associated with those events, you know, based on more modern earthquakes, the distribution of those giving a sense of what magnitude generated that distribution of Paleolithic liquefaction event.

It's also based on an interpretation from the felt records of how far back in the 1890s did people feel shaking, what kind of shaking, reconstructing the damage levels for the earthquake, and then interpolating that back to a magnitude.

So the estimates range from about 6.8, I think, to 7.3 or 7.4, depending on which method you use and the uncertainty that's involved.

The local earthquake magnitude five was selected. It's actually much larger than any of the recorded historical local earthquakes. So using felt records from the historical earthquakes back into the 1800s, estimates for the local earthquakes are up to

about magnitude 3.5. So conservatively if you take magnitude five for the local earthquake, you combine those to develop deterministic design spectrum, and that's the method that was used in the ISG.

ADMIN. JUDGE GARCIA: Great. Thank you.

Is a single event, such as the Charleston one, sufficient to base your design characteristics on?

MR. STAMATAKOS: Well, no, and the design characteristics aren't based on that. So instead what we and GLE worked through in the analysis was to instead use the probabilistic based USGS natural hazard map ground motions, which are larger than the ground motions you get from the single earthquake based approach. For the 2500 year ground motions are the starting point for the seismic design, and so you used the national USGS hazard maps to determine what those ground motions are, and then amplify them for the site soil conditions in this case because the soils are a little softer than were used in the analysis for USGS, and so that becomes the basis for the input design ground motions.

ADMIN. JUDGE GARCIA: Are there records of larger events related to the Charleston area?

MR. STAMATAKOS: No. There is evidence for

a repeat of Charleston-like earthquakes in South Carolina dating back several thousand years, and those all come from Paleo-liquefaction studies and carbon dating of material in those Paleo-liquefaction features, but there's no evidence for significantly larger events.

There is a lot of debate about the size of the New Madrid events in the mid-continent, and the largest of those events is considered possibly a magnitude of 8.3, but not for Charleston.

ADMIN. JUDGE GARCIA: Okay. If we can turn our attention to local events, the earthquake here in the Virginia area in 2011 was a bit of a surprise, although geologists like yourself may have anticipated there might be another one, having had a history of them in the past. And I wondered if you looked back to Wilmington, I'm somewhat surprised at earthquakes in that region, and I wondered if you could tell us if anything is known about why there were earthquakes in that region since I'm not aware of any surface faults that are mapped.

MR. STAMATAKOS: Yes. Well, it's very difficult at all of these United States to pinpoint what causes these earthquakes. Even the Charleston earthquake zone and the New Madrid earthquake zone

are well hidden and well covered, and the features that get formed by them are quickly eroded.

So there is not a good understanding of what the sources are, especially for those small earthquakes. Now, the Mineral, Virginia earthquake, 5.8, was, yeah, a little bit of a surprise especially because it was a little bigger than a lot of the past events, but that part of Virginia, the Virginia seismic belt, has experienced a much higher incidence of small magnitude, five, four and five earthquakes, than certainly the North Carolina.

There are background earthquakes in North Carolina like much of the rest of the Eastern United States, and then there are these pockets of slightly higher seismicity and the central Virginia belt is one of them.

ADMIN. JUDGE GARCIA: There are many areas across the world that have infrequent events that may be broken by long periods of quiet or moderate earthquakes. Is this an area that's possibly likely to have a future larger earthquake?

MR. STAMATAKOS: It is, and it's accounted for in the USGS model. So in the USGS model, in addition to modeling repeat earthquakes of Charleston or small local earthquakes, the USGS model

incorporates lower term period, high magnitude events, up to magnitude 7.5 in there, and they randomly float that earthquake in their probabilistic analysis.

So it contributes. It's probably one of the reasons why the USGS curve is significantly higher than the hazard you get by simply looking at historical events.

ADMIN. JUDGE GARCIA: Are you aware of any trenches or other investigations done in the Wilmington area to assess the history of --

MR. STAMATAKOS: No.

ADMIN. JUDGE GARCIA: -- such earthquakes?

MR. STAMATAKOS: No, none, and it would be very difficult because finding features that are responsible for small magnitude events, especially on the coast of the Eastern United States it's extremely difficult.

ADMIN. JUDGE GARCIA: Okay.

MR. STAMATAKOS: I think the only way or the dominant way that earthquakes are studies in Eastern United States is from studies of Paleo-liquefaction features.

ADMIN. JUDGE GARCIA: Okay. Well, turning to that subject for a moment, it's my understanding

that there were two wells drilled on site, and one of them identified the potential for liquefaction at the site; is that correct?

MR. HSIUNG: Yes.

MR. STAMATAKOS: Yes.

MR. HSIUNG: No, just only a very small mineral pocket, you know. I don't remember or recall exactly the depth of it, but in that only the smaller one. Now, yes, they committed to do additional investigation. If they find out that's the only location, they can design for it to avoid the impact of that particular area. It's a very small area, yes.

ADMIN. JUDGE GARCIA: So is the geology still relatively unknown in that region in terms of knowing how extensive that surface is, the liquefaction?

MR. HSIUNG: I cannot answer that question. I'm sorry, Your Honor.

ADMIN. JUDGE GARCIA: Okay.

MR. CHOWDHURY: I could answer.

ADMIN. JUDGE GARCIA: Yes, please.

MR. SMITH: The liquefaction was limited to soil, not rock, and soil will be sitting over the rock, and soil is not a sort of related to geologic

structure, and also as Simon mentioned, that this is localized, and if it is localized, this could be mitigated through design of the foundation, so structural design of the foundation.

ADMIN. JUDGE GARCIA: Yes, that's certainly generally true, but the rock in this area is really soft sediment. There's no hard rock anywhere near the surface based on the logs that are presented and the testimony. So I think it's misleading to suggest that the foundation is hard at any reasonable depth underneath the facility.

So I guess it would be interesting to know what more we can learn about the liquefaction potential for this site.

MR. HSIUNG: Right. And so far for the limited number of the core that's in, you know, the bore holes that's been examined, you know, three of them actually within that (unintelligible) and the others surrounding that, the area they are investigating for the potential site, and all of them based on the criteria that have been used to determine whether the liquefaction potential is there or not, most of them exceeding the number. Only that particular location is slightly below.

You know, so now if the additional bore

hole drilling investigations show perhaps there are additional areas that would be identified with liquefied potential area as well, then what option can be done is that the design would go with the deep square footing (phonetic). So you're going to have the pile put in to bypass the region and sitting into the soil or maybe the soft rock way below that, you know, to avoid the potential effect of the liquefaction.

You know, that can be done from engineering point of view.

ADMIN. JUDGE GARCIA: Right. Has the applicant filed with the staff their plans for additional borings?

MR. HSIUNG: I think GLE probably will be better to answer that. So far I do not know. We haven't seen the plan yet, you know, but the plan is that once that they've been filed and that's been done, we will do the review again to those investigation results, to make sure that they actually, indeed, verified it or if it's not, then need to go back and re-examine the design. We have been looking at the design. We'll take that into consideration to make sure that it's taken care of.

ADMIN. JUDGE GARCIA: Very good. Who is

your expert on tsunamis?

MR. STAMATAKOS: Me.

ADMIN. JUDGE GARCIA: Okay. Thank you.

What would you say was the local potential source for tsunamis in the Wilmington area?

MR. STAMATAKOS: The local source would be the submarine landsides from sediment off on the continental shelf.

ADMIN. JUDGE GARCIA: Right. Recently it has been identified that a number of large tsunamis have been generated by landslides. Previously it was thought landslides would only generate small such events. The exhibit that was given to us -- pardon me while I try to find the number of it -- Exhibit NRC-038, Driscoll, *et al.*, 2000, had suggested only a small tsunami might originate from such a landslide.

MR. STAMATAKOS: Right.

ADMIN. JUDGE GARCIA: Has that been reassessed based on newer evidence?

MR. STAMATAKOS: Well, the newest analysis of landside generated tsunamis particularly by NRC is in the NUREG/CR-5966, which we did not submit. But the understanding of landslide generated tsunamis is, although recognized that that's a growing issue, not well enough documented for us to really understand

the impacts.

One thing that I think is well known about landslide generated tsunamis is that the impacts remain, although they can be quite severe, locally. The general consensus is that they don't, unlike earthquake generated tsunamis, impact large areas regionally.

ADMIN. JUDGE GARCIA: So it would have to be the coast adjacent to where the slide originated.

MR. STAMATAKOS: Right. So our assessment initially is that the likelihood of a landslide generated tsunami and the likelihood of a landside generated tsunami being located close enough to affect the site are so small that they would fall well below the highly unlikely.

ADMIN. JUDGE GARCIA: The cracks are identified in the Driscoll, *et al.*, paper. Aren't they just south of the Wilmington site?

MR. STAMATAKOS: I have to go back and look at the --

MR. HSIUNG: Actually I think it is east of the Wilmington site.

MR. STAMATAKOS: Yes, right.

MR. HSIUNG: Stretching from Virginia to North Carolina. So it's not quite south. In the

general area.

ADMIN. JUDGE GARCIA: East along the continental margin.

MR. HSIUNG: Yeah, right, right.

ADMIN. JUDGE GARCIA: South of the Wilmington area.

MR. HSIUNG: Right, right.

ADMIN. JUDGE GARCIA: Okay.

MS. SIMON: Your Honor, if I could just interject for a second, Dr. Stamatakos mentioned NUREG/CR-6966. It wasn't submitted as an exhibit for Topic 3, but it was submitted as an exhibit supporting our responses to the questions. It's NRC-093, just for your reference.

CHAIRMAN RYERSON: Thank you.

ADMIN. JUDGE GARCIA: That's great. Thank you.

Did you complete your answer?

MR. HSIUNG: Me?

ADMIN. JUDGE GARCIA: Well, whoever was last speaking.

MR. HSIUNG: Oh.

ADMIN. JUDGE GARCIA: Yes?

MR. HSIUNG: Yes. We were talking about that's east of that, and that particular report, as

we mentioned in the presentation, that generated a hurricane 05-like surge, and that can be accommodated by -- actually bounded by the probable maximum hurricane surge.

So in that sense for the tsunami to affect the site is highly unlikely.

CHAIRMAN RYERSON: And, again, it may be out of an abundance of caution on this topic, but we probably should limit the testimony to Mr. Stamatakos for the time being, and then we will excuse him, and if there's follow-up information, we'll get it from the other two witnesses.

Thank you.

ADMIN. JUDGE GARCIA: What is the potential source for distant tsunamis?

MR. STAMATAKOS: Well, unless we restart the Wilson cycle, I don't anticipate a subduction related tsunamis in the Atlantic. There is this 2001 study that suggested, you know, catastrophic collapse of the Easter Island as a distant, again, landslide generated tsunami.

ADMIN. JUDGE GARCIA: Which island?

MR. STAMATAKOS: This is the War, Simon -- Steve Ward and Simon Day's (phonetic) study, and I don't remember the name.

ADMIN. JUDGE GARCIA: Canary Island.

MR. STAMATAKOS: Canary. Excuse me. What did I say?

ADMIN. JUDGE GARCIA: Easter.

MR. STAMATAKOS: Oh, Canary. I apologize.

ADMIN. JUDGE GARCIA: Wrong ocean.

MR. STAMATAKOS: Yeah, getting late in the day. The Canary Islands, and so there is an analysis that they did that suggested the potential for catastrophic Atlantic Ocean tsunami, but I think more recent studies and re-analysis of their initial work showed that, in fact, even in that case the effects on the Atlantic Seaboard would be quite small, under three meters.

ADMIN. JUDGE GARCIA: And which studies were those? Did you provide that --

MR. STAMATAKOS: Well, they are discussed in length in the NUREG/CR-6966, but in particular there was one study of that re-analysis that was performed by a scientist named Charles Matter, and that was published also in 2001, but I would refer you to that more detailed discussion that's in the NUREG/CR about the underlying differences that Ward and Day used, shallow water equations, shallow water wave equations, when they did their analysis, and if

you use, I think, more appropriately intermediate deep water, you get much greater dispersion of the waves and effects are mitigated substantially by time the tsunami could reach the Atlantic Seaboard.

ADMIN. JUDGE GARCIA: There was a study published in 2002 based on landslide on the Hawaiian Islands, suggested waves 50 meters high would arrive in California. So --

MR. STAMATAKOS: Is there any historical evidence for those large a --

ADMIN. JUDGE GARCIA: There's no evidence in California of waves arriving. The Australians have claimed waves arrived there from some of the Hawaiian tsunamis, but not California.

MR. STAMATAKOS: And I would also, you know, point out in reference to either the local or distant tsunamis, there's not a very strong record on the Atlantic Seaboard for geologic --

ADMIN. JUDGE GARCIA: That is important.

MR. STAMATAKOS: -- tsunamis.

ADMIN. JUDGE GARCIA: In that regard, are you familiar with the Lisbon 1755 earthquake?

MR. STAMATAKOS: Yes.

ADMIN. JUDGE GARCIA: And that margin is now recognized as a subduction zone rather than some

other type of margin.

MR. STAMATAKOS: That I was aware. I knew --

ADMIN. JUDGE GARCIA: That has recently been recognized. Was there a tsunami generated by that?

MR. STAMATAKOS: Yeah, that one, I believe that's one of the five biggest, deadliest tsunamis in human history that we know of, and I think that's an earthquake generated landslide tsunami. So it has an earthquake and a subway landslide together, and it had localized very devastating impact.

ADMIN. JUDGE GARCIA: All right. If you had a tsunami generated locally, how much warning would the operators of the plant have before the wave arrived?

MR. STAMATAKOS: If there was a local landslide and local earthquake, not -- not -- minutes.

ADMIN. JUDGE GARCIA: Yeah, minutes, right. Whereas a distant event, such as Lisbon?

MR. STAMATAKOS: Well, if there was sufficient recording in the Atlantic Ocean to be able to identify that a tsunami was on the way.

ADMIN. JUDGE GARCIA: Okay.

CHAIRMAN RYERSON: Judge Jackson, do you have any questions for Mr. Stamatakos at this point?

ADMIN. JUDGE JACKSON: I'm not sure. The thrust of this topic is defining the environmental hazards and not so much the response, but I wanted to ask a question about structural, seismic structural response, and I don't know. Are you the expert on that?

I thought you were. If you are, then we can go ahead.

CHAIRMAN RYERSON: Yeah, I think I'm finished at this level. So for purposes of today, we'll continue doing what we've been doing, which is we will excuse you, Mr. Stamatakos. Thank you very much for your testimony.

And do we have -- on the NRC staff do we have some L cleared personnel?

MS. SAFFORD: We do have one attorney who needs to leave the room.

CHAIRMAN RYERSON: Will leave. Okay. We'll talk about tomorrow after the testimony. We may make some modification.

(The parties left the room.)

CHAIRMAN RYERSON: All right. Shall we go through the same? Judge Garcia, did you have further

questions for either of these gentlemen?

ADMIN. JUDGE GARCIA: Yes.

CHAIRMAN RYERSON: Well, why don't you start then?

ADMIN. JUDGE GARCIA: In the testimony, you referred to sea level in several different ways, sometimes mean sea level, sometimes low tide. Is there a benchmark that's typically used for this evaluation?

MR. HSIUNG: Typically when we refer to the elevations like that or we use the mean sea level --

ADMIN. JUDGE GARCIA: right.

MR. HSIUNG: -- and for this particular hurricane surge, the calculation and everything else is based on the mean low water.

ADMIN. JUDGE GARCIA: Yeah.

MR. HSIUNG: So for this case here at Wilmington area, the difference is about 2.3 feet, which is the mean sea level is a little bit higher than the mean level water. That's the difference.

ADMIN. JUDGE GARCIA: That's the average, but it could be different depending on the season. If you have spring tides --

MR. HSIUNG: Yes, for the tides and everything else, there are different averages. They

call it actually mean high water. Also really the average is a high water, and mean sea level is that the water level that average of every, I think, every hour, you know. They average it out and come up with the water level.

And mean low water, yes, they average out the low water, and they have other terminology as well, you know, they use in general. But you know, important to remember is that if you look at the mean low level, low water, and the mean sea level, so for this problem maximum hurricane is measured about 21.9 feet, mean low water, which means that you calculated the -- assuming that mean sea level then actually is high, is about 19 or 18.5 feet above mean sea level will be the surge.

So it will be relatively smaller size compared, you know, to the site 25 feet. You know, so GLE using 22 feet as a basis to calculate this estimate. So it is conservative from that perspective.

ADMIN. JUDGE GARCIA: Well, in the spirit of being conservative, certainly it's good to use the worst case, and I wondered in terms of the tide --

MR. HSIUNG: Yeah.

ADMIN. JUDGE GARCIA: -- if we should be

using a different aspect of the tide, and particularly concerning the worst case for the tide.

MR. HSIUNG: Yeah. Certainly is, right.

ADMIN. JUDGE GARCIA: The low water point.

MR. HSIUNG: For this case here, this particular regulatory guide, using mean low water is the basis, yeah.

CHAIRMAN RYERSON: Judge Jackson.

ADMIN. JUDGE JACKSON: I believe Mr. -- is it Chowdhury?

MR. CHOWDHURY: Chowdhury.

ADMIN. JUDGE JACKSON: Yes. Could you tell us what's the status of the seismic design of the cascade hall.

MR. CHOWDHURY: They did not do the detailed design of the structure yet.

ADMIN. JUDGE JACKSON: Okay.

MR. CHOWDHURY: However, they have provided the subject that Dr. Stamatakos mentioned, and then GLE used Department of Energy Standard 1020 or ASC Standard 4305 to convert the seismic hazard into design basis less (unintelligible).

ADMIN. JUDGE JACKSON: Okay.

MR. CHOWDHURY: And those two standards, DOE standard and ASC standard, they are parallel, and

both are consensus standards and used extensively for new facilities.

Having developed the seismic design spectrum, then the GLE made the commitment in the license application that for steel structure they would be using American Institute of Steel Construction Standard N-690 that is for the design of Napier (phonetic) facilities of steel structures, and for the concrete structures they would be using ACI-349 on the concrete structure design. Again that is Napier facility design.

So concrete design, for commercial structures, it is ACI-318. So ACI-349 is based on 318, but more stringent requirements for Napier facilities.

Similarly, for steel structures AC Standard N-690 is based on AISC (phonetic) specification for commercial structure, but with more stringent requirements for Napier facilities. So based on their seismic characterization of the site, use of DOE or AC standard to convert the seismic hazard into seismic response spectrum and then designing AIAC (phonetic) N-690 steel structures and ACI-349 for concrete structures, we have confidence that they will be able to, when they do the detail design, they

will be able to do the design that is acceptable.

ADMIN. JUDGE JACKSON: We talked about a standard for the steel structure, and you are saying that will be applied to the design of the components within the very tall components within the cascade are.

MR. CHOWDHURY: Ah, yes.

ADMIN. JUDGE JACKSON: Is that correct?

MR. CHOWDHURY: That is correct.

ADMIN. JUDGE JACKSON: Because I had the idea from what you said that that steel structure might almost be for a building structure and not necessarily for components and plumbing and --

MR. CHOWDHURY: Okay. Here the important structure is the structures relied on for safety.

ADMIN. JUDGE JACKSON: Yes.

MR. CHOWDHURY: And that is a three story building, which is a process in building.

ADMIN. JUDGE JACKSON: Yes.

MR. CHOWDHURY: Is the IROFS structure, and that is a steel frame structure. So it is made of steel frame.

ADMIN. JUDGE JACKSON: Yes.

MR. CHOWDHURY: And it has got metal

siding, and so stability of the steel structure is the IROFS safety function, and that concrete structure with a concrete foundation.

So here, NRC's review, design review is for the design of the items important for safety, the structure, which is a steel frame structure with concrete foundation system.

ADMIN. JUDGE JACKSON: Okay. Would the NRC also be reviewing the seismic analysis of the components within the building?

MR. CHOWDHURY: There will be some IROFS mechanical system and who should be sitting on the foundation and that foundation would be designed based on ACI-349.

ADMIN. JUDGE JACKSON: Okay. What about a separation module? Would that be considered an outside of the review of the safety?

MR. CHOWDHURY: Could you please repeat that question?

ADMIN. JUDGE JACKSON: Seismic evaluation?

MR. CHOWDHURY: What separation?

ADMIN. JUDGE JACKSON: I'm talking about the separations module, a structure within the building.

MR. CHOWDHURY: Okay.

ADMIN. JUDGE JACKSON: There are a number of very tall structures. I'm just wondering does the NRC review the structures.

MR. CHOWDHURY: Yes. The installed structure is a three story building, about 200 feet high, 40 feet wide, and stability, stability of the structure is the IROFS function so that the structure that (unintelligible) and damage those IROFS equipment inside the building. So that safety function is the stability of the steel frame structure.

ADMIN. JUDGE JACKSON: The detail design is not done and that's something that will be evaluated in the future?

MR. CHOWDHURY: Yes. Normally for facilities like these, the construction is based on design basis, design criteria, and the commitment to use appropriate codes, recent codes and standards.

Then when they will make the detail designs, NRC reviews and also some of those reviews will take place during the construction inspection.

ADMIN. JUDGE JACKSON: Okay.

MR. CHOWDHURY: But the government will still review that detail design.

ADMIN. JUDGE JACKSON: All right. Thank

you.

MS. SIMON: Your Honor, Brian Smith has indicated to us that the design of the separator modules is not within the review area of Dr. Chowdhury's.

ADMIN. JUDGE JACKSON: That was my question, one of my questions. Thank you.

CHAIRMAN RYERSON: Since it is late in the day, I'll ask one or two questions that will betray the fact that I'm not the technical member of this Board, and I think they are addressed to Mr. Hsiung, weather related issues, and I will confess this may be inspired by the fact it hit 106 degrees Fahrenheit last Saturday in Washington.

Given the possibility of changing weather patterns and, therefore, the limited usefulness perhaps of looking at historical data, how are you confident that -- and again, I'll go to a nontechnical aspect -- how are you confident that a facility to be constructed near something called Cape Fear should not be analyzed from a Hurricane 5 level?

MR. HSIUNG: Well, I think that's, Your Honor, a very good question, and so far because of the IGOA (phonetic) saying that we should look at the historical data, and if you're looking at a Hurricane

5, it's going to land somewhere. It's going to travel inland. So it's going to dissipate. So whether the ultimate wind speed reaching the site will be greater than that design basis of wind or not, the probability is low, but I cannot say highly unlikely, but the thing is there is such a thing called the integrated safety analysis. Once that should happen, and pretty sure that the structure is constructed with sufficient capacity, okay, can actually resist a wind speed beyond that.

You know, so you're probably looking at minor damage of the structure inside that. Once that happens, and I think the agency will need to go back as requested, required in ISA. They had to do an ISA analysis, looking at the consequences and see whether there is any additional hazard will need to be identified.

Then based on that information, then they will -- you will determine whether that any improvement to the structure and reinforcement of the structure will have to be made or not.

CHAIRMAN RYERSON: Thank you.

Judge Garcia, did you have another question?

ADMIN. JUDGE GARCIA: You covered it.

CHAIRMAN RYERSON: I did? Sure.

Judge Jackson?

ADMIN. JUDGE JACKSON: No other questions.

CHAIRMAN RYERSON: Well, gentlemen, thank you for your testimony. You are excused, and I guess for the rest of the proceeding you are not witnesses, I believe, on any other topic. So in consultation with counsel, you are free to come back and watch or not, as you see fit.

Thank you for your testimony.

MR. CHOWDHURY: Thank you.

MR. HSIUNG: Thank you, Your Honor.

(The witnesses were excused.)

CHAIRMAN RYERSON: A couple of things, and feel free to step down. Tomorrow, and this is for both counsel, we can continue to proceed the way we have in terms of handling security levels. It will be a little more awkward tomorrow because we have more of a mix on the subject matter, and I suspect the likelihood that classified information will come out tomorrow is lower based upon the topics.

Now, there are other categories of non-public information as well, but in terms of classified information, I think the risk that it's coming out is lower.

So while the Board has not really discussed it, and I'm not sure how we would come out, if counsel would like to talk about that tonight or after this session is over, if you have a proposal that is agreed upon, and I suspect that a proposal that is agreeable to Ms. Jenny might be presumptively all right to the Board, we can see whether there's an easier way to deal with this as we get into the area where there are more mixes of clearance levels of the various witness panels.

I think that is pretty much it. Again, I will remind everyone of your obligation to keep confidential classified information of all kinds. I again offer Ms. Siarnacki's willingness and eagerness to destroy any notes that you've made that you don't need so that you don't have to bother classifying them or to preserve overnight if you wish a limited number of classified documents.

I think tomorrow morning we begin with GLE on Topic 4, and I believe the witnesses would be Ms. Oliver again and Mr. Crate, if I'm pronouncing it correctly.

MR. SILVERMAN: Ms. Oliver and Mr. Crate, yes.

CHAIRMAN RYERSON: Each of whom has a Q

clearance.

MR. SILVERMAN: Yes.

CHAIRMAN RYERSON: So we will plan to reconvene at 9:00 a.m. Is there anything else, Mr. Silverman, tonight?

MR. SILVERMAN: No. No, Your Honor.

CHAIRMAN RYERSON: NRC staff?

MS. SAFFORD: Your Honor, I just had one quick question. Our witnesses from today, the majority of our witnesses from Topics 1 through 3 are not overlapping with 4 through 6.

CHAIRMAN RYERSON: Correct.

MS. SAFFORD: Would it be helpful to the Board if we had them remain in the building tomorrow in case issues came up addressing their Topics 1 through 3?

CHAIRMAN RYERSON: It would probably be helpful should that happen, but I'm not sure the Board needs to insist on it. If they want to leave, that's probably okay.

MS. SAFFORD: Okay. Thank you.

CHAIRMAN RYERSON: Either way is fine.

Okay. Thank you. See you tomorrow.

(Whereupon, at 5:03 p.m., the hearing in the above-entitled matter was adjourned, to reconvene

at 9:00 a.m., Thursday, July 12, 2012.)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
GE-HITACHI GLOBAL LASER ENRICHMENT FACILITY LLC (GLE Commercial Facility)	)	Docket No. 70-7016-ML

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **OFFICIAL TRANSCRIPT OF THE EVIDENTIARY HEARING HELD ON WEDNESDAY, JULY 11, 2012** have been served upon the following persons by Electronic Information Exchange.

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Dated at Rockville, Maryland
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