

**NUCLEAR REGULATORY COMMISSION**

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137th Meeting

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
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ADVISORY COMMITTEE ON NUCLEAR WASTE  
(ACNW)  
137TH MEETING  
+ + + + +  
THURSDAY  
SEPTEMBER 26, 2002  
+ + + + +  
LAS VEGAS, NEVADA  
+ + + + +

The Committee was called to order at the Texas Station Hotel, Amaryllis Room, 2101 Texas Star Lane, North Las Vegas, Nevada 89109, at 8:30 a.m., by Dr. George Hornberger, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

DR. GEORGE HORNBERGER, Chairman  
DR. RAYMOND WYMER, Vice Chairman  
DR. B. JOHN GARRICK, Member  
MR. MILTON LEVENSON, Member  
DR. MICHAEL RYAN, Member  
DR. JOHN LARKINS, Executive Director  
DR. SHER BAHADUR, Associate Executive Director

1 ALSO PRESENT:  
2 ACNW STAFF  
3 DR. ANDY CAMPBELL, NRC  
4 JEFF CIOCCO, NRC  
5 PAT MACKIN, NRC  
6 BUDHI SAGAR, NRC  
7 TIM MCCARTIN, NRC

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

(8:30 a.m.)

1  
2  
3 CHAIRMAN HORNBERGER: The meeting will  
4 come to order. This is the second day of the 137th  
5 meeting of the Advisory Committee on Nuclear Waste.  
6 My name is George Hornberger, Chairman of the ACNW.

7 The other members of the committee present  
8 are Raymond Wymer, Vice Chairman, John Garrick, Milton  
9 Levenson, and Michael Ryan.

10 Today the committee will, one, hear  
11 scientific updates on selected activities of the  
12 geologic repository program at Yucca Mountain.

13 Two, reserve time for interactions with  
14 stakeholders and meeting participants. I will add  
15 that I think that our schedule is going to be such  
16 that we will move the timing of that up until  
17 approximately 3:00. I think it is scheduled currently  
18 for 4:15 or 5:15. I forget.

19 And, three, we will discuss proposed  
20 reports by the committee. Howard J. Larson is the  
21 designated Federal Official for today's initial  
22 session.

23 This meeting is being conducted in  
24 accordance with the provisions of the Federal Advisory  
25 Committee Act. We have received no written comments

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1 or requests for time to make oral statements from  
2 members of the public regarding today's sessions.

3 Should anyone wish to address the  
4 committee, please make your wishes known to one of the  
5 committee staff. It is requested that the speakers  
6 use one of the microphones, identify themselves, and  
7 speak with sufficient clarity and volume so that they  
8 can be readily heard.

9 The session this morning continues with a  
10 session that we started yesterday afternoon. We will  
11 hear scientific updates from the Department of Energy  
12 on the Yucca Mountain Program. This morning the topic  
13 or the cognizant member of the committee who oversees  
14 this is John Garrick, and so I will turn the meeting  
15 over to John.

16 DR. GARRICK: Thank you, George. I think  
17 the presentation that we are about to hear are  
18 primarily for information, and to get a head's up on  
19 what has happened, for example, since the final  
20 environmental impact statement that just came out in  
21 February.

22 It also hits on the whole issue of the  
23 Yucca Mount repository. I don't think there are any  
24 preliminary remarks to be made, and I know that Joe  
25 Ziegler wants to kick off the session with a

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1 presentation on the content. So, Joe, if you would  
2 proceed.

3 DR. ZIEGLER: Thank you. Good morning. My  
4 name is Joseph Ziegler, and I am the Acting Manager  
5 for Licensing and Regulatory Compliance for the Yucca  
6 Mountain Project.

7 Basically, I am going to go over very  
8 briefly where the project is today and its status, and  
9 talk about the primary elements that will be the  
10 technical piece to our application, that being the  
11 preliminary design, the preclosure safety analysis,  
12 and a post-closure analysis and safety analysis that  
13 we call the total system performance assessment.

14 If you look on Slide 3, this kind of gives  
15 you a schedule, and you have probably seen this  
16 before, with various checkmarks on it. We have made  
17 significant progress for moving towards a repository,  
18 both technically with our site characterization  
19 activities being wrapped up, and our environmental  
20 impact assessment being completed.

21 And culminating in a site recommendation  
22 by the Secretary of Energy to the President, and the  
23 President making his recommendations, and the State of  
24 Nevada filing their notice of approval, and Congress  
25 taking their action to designate the site.

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1                   We are in what we call the licensing phase  
2 right now, and heading towards the license  
3 application. The next slide, just to put things in  
4 perspective, DOE's highest priority is protecting the  
5 public health and safety, and safety of the workers.

6                   We have been for the most part a science  
7 project up to this point in time, and we have had some  
8 or a lot of interaction with the NRC, and they have  
9 on-site representatives, but there is no real  
10 regulatory direct authority by the NRC right now.

11                  They don't do inspections, and they do  
12 assessments, and they give us feedback and they don't  
13 write violations. We know that we need to instill a  
14 safety conscious culture on our projects similar to  
15 other licensees under the Nuclear Regulatory  
16 Commission, and it is a different culture than just  
17 doing good science, and doing good technical work is  
18 not enough. We know that.

19                  We are in the process of developing a  
20 license application that meets the requirements of 10  
21 CFR 63. We plan to submit that license application in  
22 December of '04, and that has kind of been the  
23 schedule that we have discussed in meetings over the  
24 last year or two, and that has not changed.

25                  We are working on the programmatic

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1 sections currently, and things like the radiation  
2 protection program, and QA program, and we are also  
3 working on the technical feed, and that is what we  
4 will be talking about today, and that being the design  
5 work.

6 And then ultimately the pre-closure and  
7 post-closure safety analyses. Next slide. Just to  
8 give you a little summary for the design. The license  
9 application will have what we call a preliminary  
10 design.

11 That will be a level of design detail  
12 comparable to what you would typically see in a  
13 preliminary safety analysis report for a commercial  
14 nuclear power plant.

15 It includes the basic concepts of  
16 operations that will be in the license application,  
17 and provides a basis for the safety analysis that will  
18 be in the application, and the NRC will ultimately be  
19 able to do their safety evaluation for it so that they  
20 can approve the construction, and hopefully give us  
21 construction authorization in a timely manner.

22 The design has been and will continue to  
23 evolve as far as the level of detail and the specifics  
24 in the design as we learn more and as we move further  
25 in the process.

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1           We have what we call conceptional design  
2           at this point in time. There is some flexibilities  
3           that we have talked about, as far as what was the  
4           highest or the greatest temperature that will ever be  
5           reached within a repository.

6           And we are defining that design to be able  
7           to take it into the license application. We will go  
8           in with one thermal operating strategy in the license  
9           application. We have not made any final decisions on  
10          that yet, or on the specific details of what goes in  
11          the license application.

12          It is looking like it will be the higher  
13          end of the thermal range. In other words, the  
14          temperatures will go above the boiling point of water  
15          in the repository, and the waste packages will be  
16          spaced relatively close together when we begin the  
17          license application, is the way it appears to be going  
18          right now.

19          But again the final decisions have not  
20          been made internally yet, but that is just kind of  
21          giving you a heads up of where we are headed.  
22          Ultimately the design refinements and detail will  
23          continue to evolve after the license application.

24          And we will have enough detail at the time  
25          of construction authorization, which we anticipate

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1 about 3 years after the license application to begin  
2 construction, and then we will work on other details,  
3 not so much important to the safety analysis, but  
4 important to get the project completed and constructed  
5 as we go through the construction activity.

6 And this is pretty comparable to a  
7 commercial nuclear power plant. I have probably  
8 already covered what is on this slide, and I tend to  
9 do that on the first design slide, but again we will  
10 move in greater and greater levels of detail in the  
11 refinement of the design as we go through the process.

12 We have not made final decisions on some  
13 things, but a lot of that is going through the  
14 administrative process, which can lead to changes  
15 internally on what we decide to go forward with.

16 We are looking at trying to be more  
17 efficient in our subsurface repository, where we can  
18 reduce the amount of excavation required for the same  
19 amount of inflation of space. So there is some  
20 efficiencies being looked at there.

21 We are considering modular construction.  
22 where we don't build up surface facilities before we  
23 do any handling or emplacement. There is no need to  
24 do that actually. So we can level out the costs going  
25 out into the future.

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1           Those are the types of things that we are  
2 looking at. As we look at these different design  
3 details and refinements, and we consider environmental  
4 impacts as we made the decisions, because it is part  
5 of the decision-making process in moving forward.

6           And we really have not seen anything that  
7 would substantively change the environment impacts  
8 that we have evaluated so far. Once we have our  
9 design, then basically we have to go to our safety  
10 analysis, first at pre-closure, and again this is  
11 pretty common for commercial nuclear facilities and  
12 other facilities.

13           And a quantitative analysis, which looks  
14 at potential events during the operations, and event  
15 sequences, which describe the site and the design, and  
16 which describe the potential events and the  
17 probabilities of the currents.

18           We assess the adequacy of the facilities,  
19 and the systems to perform that are intended to deal  
20 with those event sequences. Identify any limits on  
21 the design or operations that might be required as far  
22 as operational limits or operational practices, and  
23 describe means to mitigate or prevent accidents that  
24 could lead to a radiological release.

25           We will iterate that if we see things that

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1 could lead to a release, and we will know what  
2 sequences that lead to the greatest probability of  
3 release, or the greatest magnitude of release.

4 We will iterate that back to our design  
5 organization, and if there are fixes that can be made  
6 to actually lower the probability or lower the level  
7 of release, if it makes sense, we will incorporate  
8 those as we refine the designs.

9 Similarly on the next slide, Slide 8,  
10 total system performance assessment, which is a long  
11 term safety analysis, or waste isolation analysis I  
12 presume. It is once we have our preliminary design,  
13 we go through and do that analysis.

14 We will incorporate any scientific data  
15 and information that we have collected, because we are  
16 in an ongoing data collection and analysis phase from  
17 a scientific point of view.

18 We will quantify and validate our starting  
19 point, and the second bullet there is what we call the  
20 supplemental science and performance analysis, and the  
21 final environmental impact statement models.

22 That is the model that we call the revised  
23 supplemental model in the SR documents, and that we  
24 believe is our best set of information, and what would  
25 be most likely or expected to happen.

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1           There is some model elevation and things  
2           that would have to be done for some of those inputs as  
3           we go into the license application, and some of the  
4           science and testing work that we are doing right now  
5           is for model validation purposes.

6           In addition to that, we have a series of  
7           key technical issues that we are working on that have  
8           been identified by the NRC, and there are 293  
9           agreements associated with those key technical issues.

10           Of the 293, 20 something odd plus percent  
11           of those have been closed by the NRC to date, and we  
12           have a process of a schedule to work closure of those  
13           additional agreements out as we head towards a license  
14           application, and we expect most of those agreements to  
15           be completed for license application.

16           We also are going to improve the treatment  
17           of features, events, and processes, and again per the  
18           regulation, it calls to evaluate features, events, and  
19           processes, that could lead to event sequences, and  
20           that could cause potential releases from a repository.

21           The work there is largely the same work  
22           that is associated with resolving the key technical  
23           agreement issues, and the agreement items associated  
24           with them.

25           And then we will perform our licensing compliance

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1 analysis, and we will evaluate those base performance,  
2 and the word objectives is probably not right. It is  
3 requirements in the regulations that we have to meet,  
4 and that is the 15 milligram all pathways dose in the  
5 groundwater protection standards in 10 CFR Part 63.

6 We will also demonstrate the importance of  
7 multiple barriers, but the engineered barriers are  
8 natural barriers in the repository system, and I think  
9 there is not specific barriers as we define them, and  
10 I think we talked about those in the site  
11 recommendation report.

12 On the next slide, the documentation  
13 milestones, and we will create intermediate reports  
14 and products that will feed to the license  
15 application, and the first one of those leading there  
16 is the total system performance assessment license  
17 application methods and approach document that was  
18 issued by our management contractor, BSE, this month.

19 The following products, process model, and  
20 extraction analysis and modeling reports, AMRs, which  
21 is probably the term that you have heard the most  
22 often, are to be updated by June of next year.

23 The FEPs database, looking at the  
24 features, events, and processes, and documenting those  
25 features, events, and processes, will be completed in

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1 about a year from now.

2 The license application and model  
3 analysis, and modeling port, that is the approach  
4 document on how will modeling be done, and what QA  
5 methods will be applied to it, will be done at the end  
6 of next years.

7 And by May of '04, the license application  
8 will have a complete documented report, probably  
9 several volumes, that will talk about the telesystem  
10 performance assessment that we will use in the license  
11 application.

12 And that is the document that will have  
13 the dose curves and the results in it. To summarize,  
14 on the last slide, we have developed our plans and  
15 schedules to submit a license application to the NRC  
16 in December of '04.

17 That presumes an adequate budget, you  
18 know, and our funding, even though there is a nuclear  
19 waste fund with many billions of dollars in it, the  
20 funding is appropriated by Congress each year, even  
21 though most of the money comes out of that fund.

22 Since we are under annual appropriations,  
23 at some point in time, if we don't get the requested  
24 monies that it takes to get to these schedules, we may  
25 not make it.

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1           Of course, we will try to prioritize it in  
2 every way possible to meet these schedules. The focus  
3 for the license application is going to be a progress  
4 towards the completion of the preliminary design, and  
5 we will track that through interim design reviews.

6           We have a formal interim design review  
7 schedule for January of '03 is the next one, and our  
8 preclosure safety analysis that we will develop  
9 figuratively with the design, and see improvements and  
10 refinements that we can make and that make sense, we  
11 will incorporate those as we go.

12           The total system performance assessment,  
13 we will focus on enhancing our confidence and  
14 adequately representing the uncertainty that we  
15 predict in the future for 10,000 years.

16           And we will also continue our science  
17 testing and performance confirmation programs, and not  
18 just the license application, but throughout the  
19 process, to license the construction through  
20 operations, with an ongoing performance confirmation  
21 and test and analysis program.

22           And it is kind of an exciting type of  
23 program, and getting into the site recommendation  
24 phase, and we will hear a little bit more about some  
25 of these topics later on today. And I will entertain

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1 any questions that have.

2 DR. GARRICK: Ray, do you have any  
3 questions?

4 VICE CHAIRMAN WYMER: No.

5 DR. GARRICK: George.

6 CHAIRMAN HORNBERGER: I take it that your  
7 design timing now, that what you called, I think, the  
8 conceptual design is the design that was used for,  
9 let's say, TSPASR; is that correct? That has not  
10 changed?

11 DR. ZIEGLER: The basic design has not  
12 changed. For TSPASR, which was done, what, about a  
13 year-and-a-half ago, that particular document, there  
14 were some refinements to that that were made in the  
15 SSPA analysis and the EIS analysis, that we think were  
16 improvements, even though the validated models that  
17 would have to exist to take it down to LA, for some of  
18 those, parameters don't exist yet.

19 CHAIRMAN HORNBERGER: Yes, but my  
20 recollection is that there were refinements in the  
21 models, but the design for the repository did not  
22 change?

23 DR. ZIEGLER: The design really has not  
24 changed. It depends on your perspective. We define -  
25 - well, for instance, subsurface layouts. We define

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1 a fairly large subsurface layout, and exactly where  
2 within that potential footprint we end up going, I  
3 would call that a refinement.

4 It is the same basic block of rock, and it  
5 is the same horizon in the rock, but the exact  
6 location or any more detail definition of that  
7 location will be defined for the LA as we go forward.

8 Just remember that we called it a flexible  
9 design, and where we could put the waste package  
10 further apart or closer together, and right now what  
11 we envision, even though they have not formally  
12 approved our process yet, is that the waste packages  
13 will be closely spaced, which was the same as the  
14 modeling that was done for the TSPSAR.

15 They will be essentially in the same  
16 locations, even though the exact locations within that  
17 repository block may be modified a little bit as we  
18 refine it. But I would call that a design change,  
19 versus a refinement, for that.

20 And the same basic waste package design,  
21 maybe with a few minor tweaks to it, and the modular  
22 concept, which is what I think we will probably go  
23 with, is a little bit different, but it is not  
24 changing what we were doing. It is more like looking  
25 at 3 or 4 buildings instead of one big one. So

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1 basically it is the same design.

2 CHAIRMAN HORNBERGER: Conceptually, are  
3 your designs at least at this point still include a  
4 drip shield?

5 DR. ZIEGLER: Yes.

6 CHAIRMAN HORNBERGER: And no backfill?

7 DR. ZIEGLER: Yes. Yes, the basic  
8 conceptions haven't changed.

9 CHAIRMAN HORNBERGER: They haven't  
10 changed?

11 DR. ZIEGLER: What we believe we are going  
12 to take into the license application is hot, which  
13 means that it gets up above the boiling temperature of  
14 water, you know, for a thousand to fifteen-hundred  
15 years or so, and then comes back down.

16 And to change that, we would have to  
17 modify our application.

18 CHAIRMAN HORNBERGER: So I take it then  
19 that you have won the NWTRB over to the hot  
20 repository?

21 DR. ZIEGLER: Won the NWTRB over? I am  
22 not claiming that everybody agrees that that is the  
23 way to go. We will also identify expansion areas,  
24 such that should a decision be made that it should be  
25 a cooler temperature, and that we should not allow it

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1 to go above the boiling point of water, or whatever  
2 the chosen temperature would be, that we could move  
3 the waste packages further apart.

4 So that there will be areas identified for  
5 expansion that could accommodate that, but that would  
6 require a modification to what we currently intend to  
7 apply for.

8 DR. GARRICK: I know that we are going to  
9 hear more about this in the next presentation, but  
10 let's continue to see if there are some questions at  
11 this point. Milt.

12 MR. LEVENSON: I have a question about  
13 slide five, and I don't know if we can get that up on  
14 the screen or not. I realize that the diagram there  
15 is a cartoon, and it is not to scale, but it seems to  
16 me that it is intended to define the concept or the  
17 philosophy that you are using, and as such it bothers  
18 me somewhat because even though it is not to scale, it  
19 implies that the preliminary design will not be  
20 completed until half-way between construction and  
21 receiving material.

22 Is that really the intent, that even a  
23 preliminary design won't be finished by LA?

24 DR. ZIEGLER: I don't think so. I think  
25 the preliminary design is what we are going to take

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1 into the LA, and we will continue to refine that as we  
2 go through the process, and I guess I would like some  
3 indulgence, and like what you pointed out, it is a  
4 cartoon.

5 MR. LEVENSON: And also that the detail  
6 design continues all the way to permanent closure?

7 DR. ZIEGLER: That is probably if you  
8 think about the way -- think the way that a commercial  
9 nuclear power plant operates today, is that they will  
10 start construct, and you refine designs, and most of  
11 those have been going through modifications ever since  
12 they have been going on.

13 MR. LEVENSON: But that has nothing to do  
14 with licensing. The plants all during their lifetime,  
15 there are modifications, and there are upgrades, and  
16 I have never heard them referred to as design of the  
17 original plan.

18 This says that we are not going to have a  
19 finished detailed design ever. Are we discussing the  
20 philosophy as indicated in this, and not what kind of  
21 work goes on.

22 Presumably there is continuous monitoring  
23 and you make modifications, and they may or may not  
24 require a license adjustment. But the idea that -- I  
25 mean, if I take this at some kind of a single

1 significant figure of scale, which maybe it isn't, I  
2 don't think I would start building a house with as  
3 small a fraction of the detailed design completed as  
4 is indicated here.

5 DR. ZIEGLER: I would agree with that, and  
6 I think Jim Gardiner is going to talk more about the  
7 design later, but there was no intent to imply that  
8 there won't be a final detailed design before a  
9 license is received, because there will be.

10 MR. LEVENSON: Well, I guess we will get  
11 into this more later, but I think this as a concept,  
12 I find it fairly disturbing, because the fact that  
13 decisions haven't yet been made is perfectly  
14 acceptable. You have not submitted an LA.

15 But the implication that the bulk of the  
16 detail design comes after construction starts, I think  
17 we have got some discussion.

18 DR. ZIEGLER: That is probably a  
19 misrepresentation of what will actually happen to it.

20 DR. GARRICK: Mike.

21 DR. RYAN: No questions.

22 DR. GARRICK: I guess since you are in  
23 management, I guess it is appropriate to talk a little  
24 bit about schedule.

25 DR. ZIEGLER: Yes.

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1 DR. GARRICK: As I see it, the Department  
2 is still optimistic about the schedule for the license  
3 application.

4 DR. ZIEGLER: In December of '04.

5 DR. GARRICK: Right. Is there a time well  
6 in advance of that date that if it becomes obvious and  
7 apparent that that schedule is not reachable that that  
8 will be disclosed?

9 I am thinking again of a credibility  
10 issue. Schedules in most industries, most major  
11 projects are pretty darn important, and yet DOE  
12 doesn't have the best reputation in the world for  
13 meeting schedules.

14 What is the strategy here? Is the  
15 strategy here to wait until the license application  
16 date comes, and then find out that you are not ready,  
17 and then go for a new schedule?

18 I am thinking of all the people and  
19 regulators, and everybody that is involved here, and  
20 the impact that schedule instability has on their  
21 activities. Could you comment a little bit on DOE's  
22 strategy with respect to managing a schedule?

23 And we are all very much aware that you  
24 don't have complete control of it, and that anything  
25 that is under regulatory process, and anything that is

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1 under conditions of possible legal actions, and so  
2 forth, there are some things that are clearly beyond  
3 your control.

4 But on the other hand, I think the issue  
5 is important enough to at least understand what your  
6 strategy is relative to schedule management.

7 DR. ZIEGLER: Right now we have got a  
8 resource loaded schedule that gets us to 12/04. Now,  
9 there is not a lot of contingency built into that  
10 schedule. Truthfully, I think that -- well, I am the  
11 licensing manager for DOE, and I believe we can meet  
12 a 12/04 schedule.

13 There are no technical issues that I think  
14 would prevent us from getting to a 12/04 license  
15 application. Now, some of the process issues that you  
16 mentioned may do that, you know, but as far as what  
17 would DOE as far as how we would announce, or any  
18 delays in the schedule, that kind of goes into policy  
19 decisions out of our headquarters group.

20 But I would think that if we know that we  
21 can't meet the schedule, then we would announce that  
22 we know that we can't reach the schedule. That is not  
23 the case today.

24 And again looking at the key technical  
25 issues and the agreements associated with them, we are

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1 on a path, and we are making steady progress, and we  
2 are on schedule for resolving those that we have  
3 agreed to with NRC to date.

4 Maybe with the exception of one, but I  
5 think there is one or two that we are ahead of  
6 schedule on. So I know of nothing that would prevent  
7 us from getting to a December '04 schedule from a  
8 technical perspective.

9 And it is really hard to project what is  
10 going to happen with the budget, and what is going to  
11 happen with the litigation, and what is going to  
12 happen with the factors that we don't have any control  
13 over.

14 So that probably doesn't answer your  
15 question satisfactorily, but I would have to speculate  
16 on what I am going to do if I don't meet the schedule,  
17 and when we are going to announce it.

18 DR. GARRICK: But you think that if there  
19 is a schedule change that that will be so announced  
20 well in advance?

21 DR. ZIEGLER: I would hope so, but I am  
22 probably not going to be the person to make that  
23 announcement.

24 DR. GARRICK: I think probably the  
25 committee has some questions about design, but we will

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1 defer those until the next presentation, except that  
2 I understand that Milt now has one he wants to ask.

3 MR. LEVENSON: On the last of your backup  
4 slides, which is the schedule, the first bullet at the  
5 top, the interim design review be completed, and that  
6 is three months from now.

7 DR. ZIEGLER: Yes.

8 MR. LEVENSON: Has that been started?

9 DR. ZIEGLER: We have done a lot of design  
10 studies, and I think there are going to be some  
11 recommendations pretty soon. We have got a baseline  
12 change proposal in from our management contractor that  
13 goes into it.

14 MR. LEVENSON: Yes, but this says design  
15 review. So presumably the interim design, if you are  
16 going to have a review finished three months from now,  
17 the interim design isn't finished yet, right?

18 DR. ZIEGLER: The interim design is not  
19 complete, but there are elements that have been  
20 studied, and proposed path forward. It is my  
21 understanding, and Jim Gardiner is going to have to  
22 help me here, because he is going to talk about design  
23 later, is that there is various design review steps  
24 that we go through.

25 So this doesn't imply that the preliminary

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1 design is complete at the time of the review. I think  
2 it is just a progress report just more than anything  
3 else.

4 MR. LEVENSON: Then I think that helps.  
5 That's fine. Maybe I need to ask a different  
6 question. I interpret this kind of a schedule for a  
7 project like this when it says there is a design  
8 review, that that is a rather formal thing after the  
9 design has been done, as opposed to the conventional  
10 checking and things which go on all along the way. Is  
11 that the case here?

12 DR. ZIEGLER: Well, I would ask Jim. Am I  
13 right? Is this a current status preliminary review?

14 DR. GARDINER: Yes.

15 MR. LEVENSON: You have to use a mike and  
16 identify yourself.

17 DR. GARDINER: Since we have a very formal  
18 design process, we are going to monitor this very  
19 closely because of all of the quality assurance and  
20 other aspects that need to be factored in.

21 So we have a series of design reviews, and  
22 that is one of the reasons it says interim up there,  
23 and as the status of the subsurface, and stages of the  
24 surface repositories get designed, we are going to  
25 look at those packages as soon as we can.

1 We are going to do formal reviews on them  
2 to make sure that they meet the standards that they  
3 should, and yes, design will be continuing at that  
4 point in time, and we will probably have three, maybe  
5 four, of these interim design processes, before we get  
6 to the point where we have a sufficient license  
7 application design to submit.

8 MR. LEVENSON: Could you state your name?

9 DR. GARDINER: Yes, my name is Jim  
10 Gardiner, and I am with the Department of Energy. I  
11 work in the Office of Project Execution. Suzy  
12 Millington is the manager of that.

13 And my area of work is the surface  
14 facilities for the repository.

15 MR. LEVENSON: Does that mean that the  
16 sequence, like the second interim design review, is  
17 just to cover things that weren't covered in the first  
18 one, as opposed to the system that I am used to, where  
19 a second design review means that you corrected things  
20 that came up in the first review?

21 What is the concept of these sequential  
22 reviews here? Are they all bits and pieces?

23 DR. GARDINER: Well, like I said, we are  
24 trying to make sure that our design process is fully  
25 functional, and it is passing the test that we are

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1 going to impose upon it. And, yes, when we have a  
2 second interim license, we are also going to bring in,  
3 and we will be discussing, the design review elements  
4 that we discussed the first time.

5 We want to make sure that the integration  
6 is proper, and we want to make sure that what items in  
7 our -- that what items that are left, and what we call  
8 to be determined items that are maybe still pending at  
9 the time of the first review have been resolved and  
10 have they have adequate documentation so that they are  
11 complimentary to both our first and second reviews  
12 that we perform.

13 MR. LEVENSON: Do you care to make a guess  
14 at the final one, which is your design and  
15 verification for a license application, how long a  
16 process that is, and is that a separate formal one, or  
17 is that just another piece of an ongoing program?

18 DR. GARDINER: Okay. One of the benefits  
19 that we have in doing interim reviews, and that is  
20 getting all of the organizations better able to  
21 perform reviews in a more efficient manner.

22 So when that review comes along, we should  
23 have gone through this process a couple of times,  
24 which means that we can proceed and do a better job on  
25 that final license application review.

1 MR. LEVENSON: So all of these are then  
2 more or less in-house reviews by the people involved,  
3 as opposed to anywhere along the line here? Is there  
4 an external or independent review before you submit  
5 your license application?

6 DR. GARDINER: Yes, there is going to be  
7 independent reviews and at the interim reviews, we  
8 will also have people from the various stakeholders.  
9 There will be representatives from the NRC and  
10 representatives from QA and the State, et cetera.  
11 They are free to come in and observe those interim  
12 reviews.

13 MR. LEVENSON: I am not sure that the NRC  
14 will participate in your internal review of anything  
15 prior to a license application, in the sense of review  
16 that we are talking about here. I don't think that is  
17 necessarily appropriate.

18 DR. GARDINER: Well, the term review --

19 MR. LEVENSON: Maybe as observers, but --

20 DR. GARDINER: Yes, that is the correct  
21 term. Excuse me.

22 DR. GARRICK: Thanks. Thank you All  
23 right. I understand that we now have a speaker on  
24 rebase lining. Oh, I'm sorry, are there any questions  
25 from the staff?

1 MR. LEE: Mike Lee, ACNW staff. If I  
2 understand correctly then, aside from letting the  
3 issue, the KTI resolution process proceed, there are  
4 no other issues that you have to get resolution with  
5 the NRC staff?

6 DR. ZIEGLER: There are no other issues.  
7 Well, I am in licensing, and I don't like to use words  
8 like no and all, but by judgment is that there are no  
9 show stoppers, and that the technical issues that  
10 exist are the technical issues that exist.

11 I know of no significant new technical  
12 issues in anything that has come up recently that  
13 would make us think that we can't meet a December '04  
14 license application.

15 MR. LEE: Sure. And along that same line  
16 then are there any critical issues that you have to  
17 take before the TRB?

18 DR. ZIEGLER: Critical issues? We take  
19 the -- well, I think this issue of hot versus cold  
20 will continue to be a source of opinion, different  
21 technical judgments and opinions.

22 And I think that we are accommodating in  
23 our design the ability that if needs to change for  
24 whatever reason back to where we don't allow a  
25 temperature to get above boiling, you know, post-

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1 closure, then we will be able to make that change.

2 There may be a cost in the schedule  
3 associated with that, but if you are asking me to  
4 predict the way that these expert panels are going to  
5 do, and the expert panels are experts, and have very  
6 good credentials, and very strong opinions.

7 So right now we plan to go forward with a  
8 higher temperature license application. And I am  
9 saying that, and I want to always hedge that, but that  
10 has not been formally approved yet by the DOE process.  
11 But that appears the way that we are going.

12 And will it change? We will see. You  
13 know, there is a process in the regulations where  
14 modifications could be made, and if they need to be  
15 made, the physical layouts and things are such that  
16 that modifications could be accommodated.

17 MR. LEE: And my last question is has the  
18 NWTRB identified a role, or in terms of a schedule for  
19 submitting a license application, are you going to  
20 have to get denied from them before you submit to the  
21 NRC?

22 DR. ZIEGLER: I think certainly before we  
23 go forward, we will present what our proposal is to  
24 the TRB. I know of no formal mechanism, and probably  
25 similar to the mechanism that existed going into SR,

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1 and I would expect the technical review board to make  
2 their opinions known before we submit a license  
3 application.

4 MR. LEE: Right. The reason that I asked  
5 was that I wasn't sure and I didn't see a milestone to  
6 that effect on your backup slides. So I was not sure  
7 if you were going to have that type of activity.

8 DR. ZIEGLER: We have regularly scheduled  
9 meetings with the TRB, and those will continue, and I  
10 am sure that there will be one before we submit our  
11 license application.

12 And I am sure that there will be one  
13 before we submit our license application to lay out  
14 exactly what our plans are.

15 MR. LEE: And I would expect them to  
16 comment. They are not shy.

17 DR. GARRICK: Any other questions for Joe  
18 from the staff? I'm sorry, Mike, but I was just  
19 trying to practice what I preach and manage our  
20 schedule. We are seven minutes behind schedule. But  
21 I am sure that we will get back on. Okay. If the next  
22 speaker will introduce himself.

23 DR. LUNDGAARD: Good morning. My name is  
24 Eric Lundgaard, and I work for the Office of Project  
25 Control, with the Department of Energy. And I wanted

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1 to talk to you a little bit about the baseline design  
2 phase that we are in right now, which is a preliminary  
3 and design phase.

4 And before I get into that, I would also  
5 like to talk a little bit about the budget status and  
6 where we are now, and the budget for 2003, and where  
7 we are at this point in time.

8 And then go on to talk a little bit about  
9 the overview, and I think that most of what has been  
10 said here is included in that overview. And then some  
11 of the newer things that probably have not been  
12 discussed yet that I will be discussing, and I think  
13 Jim Gardiner a little bit later, are the contractor's  
14 proposed approach for emplacement given the schedule  
15 that we have and meeting it by the year 2010.

16 And then also a little bit about the  
17 budgets that are required to do that in the future,  
18 and the budgets that we have available to us to do  
19 that in the future.

20 This year, we had an initial request of  
21 \$527 million, and a supplemental request of \$66  
22 million. Both the House of Representatives and the  
23 Senate have taken action on that, leaving us with \$525  
24 and \$336 million respectively.

25 At this point in time, we are not really

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1 sure exactly what we are going to end up, because the  
2 process has now moved forward to a conference  
3 committee, and certainly of course the President  
4 hasn't signed it.

5 It looks at this point in time that we are  
6 going to be in a continuing resolution, unfortunately,  
7 and perhaps that might last six months. And we don't  
8 know exactly what the funding level would be in a  
9 continuing resolution. It might be \$375 million,  
10 which is where we are at right now in terms of  
11 funding.

12 But it might be above that or lower than  
13 that, depending on what the Chief Financial Officer  
14 decides to do with it, with the continuing resolution.  
15 As I said, some of this has already been discussed.  
16 The baseline change proposal has been received by the  
17 Department of Energy from our contractor on September  
18 3rd, and is currently under review.

19 And within the schedule that is proposed  
20 to us, the license application of course would have to  
21 change from March of this year to December '04, and  
22 waste acceptance would still be occurring in 2010, all  
23 numbers that I think people have discussed before.

24 So I will talk a little bit about the  
25 contractor's proposed approach to emplacement,

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1 requires a phase surface facility or staged surface  
2 facility that would occur over time and in stages.

3 And it also allows us to receive 400  
4 metric tons per year initially, and then of course we  
5 would need to wrap up to the 3,000 metric tons per  
6 year over the 2010 to 2014 period.

7 This process has some beneficial effects.  
8 It allows us to look at and learn from the lessons  
9 that we might have from the first panel and the first  
10 surface facilities to make sure that the next ones are  
11 more appropriate to obtaining the objectives of taking  
12 waste and storing it under ground.

13 And we assume also in this, or the  
14 contractors assumed also that no waste receipt  
15 characterization provisions are in those facilities.  
16 So the waste would have to be characterized ahead of  
17 time before it is shipped to Yucca Mountain.

18 The initial operations then would exist to  
19 a panel one, and I will show you a diagram of panel  
20 one and the other panels, and the balance of the plant  
21 for panel one would be completed to support the  
22 initial operations.

23 And then we go on to panel two according  
24 to this proposal by the contractor, and the  
25 construction would continue beyond the initial

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1 operation. As far as the underground facilities, the  
2 underground facilities would look something like this.

3 Prior to this, we had proposed to have a  
4 perimeter drift around the entire facility. With this  
5 phased approach, we wouldn't require that perimeter  
6 drift, but it would require another underground access  
7 as you see on the top of that diagram.

8 There is another tunnel boring machine  
9 that would be required in another hole in the  
10 mountain, or another north portal would basically be  
11 required for panel two. The second north portal.

12 And you see that we have five panels  
13 there, which allows us the flexibility of having a hot  
14 or cold storage within this, and depending upon how  
15 far we have to space those.

16 So there are things that Joe talked about  
17 that we have not necessarily precluded in this option  
18 the ability to go with a colder design. And it  
19 utilizes the exploratory studies facilities that  
20 exists today, to begin with emplacement by the year  
21 2010.

22 And a construction schedule that is  
23 required for that first emplacement is in around a  
24 little over two years, 2 years and 4 months. It  
25 eliminates as I said the need for that perimeter

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1 drift, which will save us some time, and again that  
2 third access is required.

3 Going on to the next slide, I think it  
4 gives you a little bit of the proposed schedule that  
5 is required by our contractor. The modulation means  
6 phase and the flexibility is that it still could be a  
7 hot or cold design, or a hot or cold facility.

8 And the production waste streams means  
9 that we have an ability to wrap up this facility and  
10 go from the 400 metric tons on to higher levels of  
11 waste received.

12 And I don't think there is any surprises  
13 here in terms of our schedule. We are still asking  
14 for a submittal of the license application in 12/04  
15 with 36 months then required before construction  
16 authorization.

17 Now, that date, a three year link, is  
18 probably 12/07, unless you include three months for  
19 docketing. I think the Department of Energy has  
20 always said it would be 12/07.

21 But this one from our contractor includes  
22 three months for docketing. And then there is a  
23 process then of updating the LA and going head and  
24 asking for a license to receive and possess.

25 And we would expect to get that in time

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1 for the 9/2010 goal of receiving the first waste, and  
2 then some emplacement by December of 2010 goal. If  
3 you look at safety and infrastructure improvements,  
4 you will see probably some new items in there.

5 We are going to be able to go ahead and do  
6 some work on the site prior to construction  
7 authorization, roads and access utilities  
8 infrastructure, and test facility upgrades, and the  
9 underground utilities. The staging issues. however,  
10 would be things like perhaps both purchases, off-site  
11 prototyping, which would be offset modules, and  
12 storage of both materials.

13 And also allowing us to go ahead or  
14 allowing the contractor to go ahead and provide some  
15 engineered equipment, like the welding machine that is  
16 required for the canisters.

17 And then perhaps a training facility, and  
18 normally procurements would be things like the TBM  
19 that is needed for the third access. Let's see. We  
20 then would go on to basically maintain the same  
21 objectives that we already have with the 12/10 goal.  
22 And the license or the facility active at that point  
23 in time.

24 There is some uncertainty in there, in the  
25 process, between where we get the construction

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1 authorization and the actual then request for license  
2 to receive and possess. Those dates aren't really  
3 well known, but we expect that they will occur in time  
4 for us to go ahead and receive the waste by 12/2010.

5 And then as far as the budget goes, as I  
6 said, this year, we have requested \$593 million, and  
7 we are in a state of flux waiting for some direction  
8 from Congress and then the decision of the President  
9 as to what level of funding we will have in 2003.

10 And it is anybody's guess as to what that  
11 might be, but we do expect a continuing resolution,  
12 because Congress has been very busy lately, especially  
13 with the possibility of a war and those kinds of  
14 issues.

15 And you do a wrap-up, and this is from our  
16 chief financial officer, and the rest of the numbers  
17 are 2004 to 2008, and a wrap-up of budget  
18 requirements, on up to billions of dollars,  
19 culminating in the year 2008.

20 And this is a schedule that is provided by  
21 our contractor and provides a schedule until March of  
22 2008. We should know better in terms of what OMB's  
23 position is after Thanksgiving, when they will provide  
24 us a pass back on all of these numbers, 2004 to 2008.

25 Some of the more detailed -- and I know

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1 that some of this will be presented by Jim Gardiner  
2 also, in terms of the more detailed design effort.  
3 But I just wanted to give you an indication as to  
4 where we are with the scope, and where we are with the  
5 review process, and what our expectations are for  
6 funding.

7 So if you have any questions, I would be  
8 glad to entertain those.

9 DR. GARRICK: Ray.

10 VICE CHAIRMAN WYMER: You indicated that  
11 there would be a small initial facility. What is the  
12 size of that facility, and what is the capacity?

13 DR. LUNDGAARD: Initially, it would be  
14 400, would be able to receive 400 metric tons.

15 VICE CHAIRMAN WYMER: I mean, what is the  
16 capacity?

17 DR. LUNDGAARD: I don't know what the  
18 capacity is. I think that Jim will be able to speak  
19 to that in more detail.

20 VICE CHAIRMAN WYMER: And what sort of  
21 schedule do you have for enlarging that?

22 DR. LUNDGAARD: In terms of waste received  
23 Over the 2010 to 2014 period? Are you looking for  
24 capacity?

25 VICE CHAIRMAN WYMER: Yes.

1 DR. LUNDGAARD: Actual capacity at certain  
2 points in time?

3 VICE CHAIRMAN WYMER: Yes.

4 DR. LUNDGAARD: I don't know exactly what  
5 those numbers are.

6 VICE CHAIRMAN WYMER: But that is of  
7 interest to the facilities?

8 DR. LUNDGAARD: Sure. I understand. Joe,  
9 do you have an answer to that?

10 DR. ZIEGLER: Joseph Ziegler. Eric  
11 indicated that in 2004 that we would be up to full  
12 capacity to be able to handle at least 3,000 metric  
13 tons per year, but that is just a wrap up from the  
14 first year to the fourth year to get it up to 3,000  
15 metric tons per year.

16 So it is not being extended indefinitely.  
17 So it is basically just a few years stretched out.

18 CHAIRMAN HORNBERGER: Could I just ask one  
19 question with my taxpayer hat on? Can you tell me why  
20 the tunnel boring machine that has been sitting at the  
21 south portal since daylighting couldn't be used for  
22 the third access, rather than purchasing a new one?

23 DR. LUNDGAARD: That is a very good  
24 question. As far as I know, it can't be. I think  
25 they are required to get another one, but I'm not sure

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1 exactly what the details are for that.

2 DR. GARDINER: Jim Gardiner, DOE. In  
3 using the machine that they had, they found a number  
4 of operational problems with it, although it did work,  
5 and it did do reasonably well for us. If in fact we  
6 are going to get into a higher production mode, we  
7 could use the machine as it is, but there are some  
8 plans underfoot to go back and maybe refurbish, or  
9 change, or alter that machine, which would help us  
10 accommodate the ground conditions that we have been  
11 finding.

12 And we got it stuck a time or two, and it  
13 caused us some problems. So there is definitely some  
14 modifications that would have to be made to that  
15 machine, but that is a possibility to have it reused  
16 after being refurbished.

17 MR. LEVENSON: I guess I have a taxpayer  
18 question, too. We are up to \$1.6 billion at the time  
19 that we start construction. What is the expenditure  
20 rate during construction? I assume it doesn't go  
21 down.

22 DR. LUNDGAARD: You mean the budget  
23 numbers beyond 2008?

24 MR. LEVENSON: Well, 2008 is when you get  
25 construction authorization, and presumably

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1 construction doesn't start before that. So what is  
2 the level of funding during construction, the one  
3 significant figure?

4 DR. LUNDGAARD: It would be at a higher  
5 level actually, but as far as the actual numbers and  
6 what they are, I don't have those with me.

7 DR. GARRICK: Mike, do you have any  
8 questions?

9 DR. LUNDGAARD: No, I am just a little bit  
10 staggered by those numbers.

11 DR. GARRICK: A bit dumbfounded?

12 DR. RYAN: Yes.

13 DR. GARRICK: I don't know if this is a  
14 question to ask now or later, but --

15 DR. LUNDGAARD: I think it is relevant at  
16 this point just to mention also that this is with the  
17 phased approach to building the repository that the  
18 numbers are still this high. There is an intent to  
19 spread the money out, and that's what we end up with  
20 in terms of doing that.

21 DR. GARRICK: One of the peculiarities of  
22 this project is that there is going to be a great deal  
23 of construction going on during the early operating  
24 phases. I am curious if there has been a careful  
25 consideration of that, in terms of, for example, what

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1 the construction operations might be, or how the  
2 construction operations might impact preclosure  
3 safety?

4 Do you know if there has been any detailed  
5 modeling of the combined activities of construction  
6 and operations as a function of time, and has that  
7 information been factored into the preclosure safety  
8 analysis?

9 DR. LUNDGAARD: That is a very good  
10 question and I will defer to Joe on that one. That is  
11 his area of expertise.

12 DR. ZIEGLER: Joseph Ziegler again. I may  
13 not have a satisfactory answer yet either, but the  
14 concept had always been, even back in the SR, or the  
15 pre-SR, or the viability assessment days is that the  
16 underground construction would continue as emplacement  
17 was going on, with a bulkhead in between to make sure  
18 that the air flow -- that there would be negative  
19 pressure, you know, in the construction areas, versus  
20 the positive pressure where the emplacement is going  
21 on, so that you wouldn't get any -- I'm sorry, that's  
22 backwards. Excuse me.

23 That negative pressure where emplacement  
24 is going on to make sure that the air flow wouldn't go  
25 in any direction, just in case some event, even though

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1 unanticipated, and unlikely, might occur.

2 The new layout that we are considering  
3 right now with the modular underground, with the  
4 modules that go in there, the specific analyses, the  
5 specific preclosure safety analysis for those, has not  
6 been completed yet, and until those are defined  
7 better, won't be able to be completed.

8 But it will be a similar concept that will  
9 be bulkheaded, and physically separated, both air flow  
10 and actual geographic separation. So we don't  
11 anticipate it to be a problem.

12 But, no, there has been no detailed  
13 analysis of that at this point in time.

14 DR. GARRICK: Milt, go ahead.

15 MR. LEVENSON: I just wanted to comment on  
16 that. I don't think we want to imply by our questions  
17 on that that it can't be done. If we use as an example  
18 the WHIP facility, which has a fair amount of weight,  
19 there are two things that are underway with WHIP.

20 One is the storage of waste, and the  
21 other, which is an interesting one, is in an adjacent  
22 tunnel, the high energy physicists of the world have  
23 installed equipment because they find it is the lowest  
24 background of anywhere in the world for neutrino  
25 experiments.

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1           So certainly these things can be  
2 separated, but they have got to be planned for and  
3 designed for, and thought out.

4           DR. GARRICK: Any questions from the  
5 staff? Mike.

6           MR. LEE: Mike Lee, ACNW staff. Just  
7 going back to slide five, you said that there is no  
8 provision for site waste characterization at the site?

9           DR. LUNDGAARD: That's right.

10          MR. LEE: Could you explain that?

11          DR. LUNDGAARD: It is expected that the  
12 waste would have to be characterized before it is  
13 shipped, and it is a way I think of speeding up the  
14 process, in terms of receipt, and having to review it.  
15 There is an inspection process, and rather than  
16 answering that question, I think I would rather defer  
17 that.

18          MR. LEE: My point is that I think you  
19 have to have materials control on accounting at some  
20 point, and so where does that begin? I know that the  
21 Navy fuel, for example, will come as is, and it will  
22 be presealed and it will be good to go for  
23 emplacement. But I think the other --

24          DR. LUNDGAARD: Well, it will come in the  
25 estimate.

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1 DR. RYAN: Well, I understand the reason  
2 for not doing it at a receipt location, but there has  
3 got to be some front end process that qualifies the  
4 material, and that is a good point.

5 DR. LUNDGAARD: Perhaps Jim will touch on  
6 that point.

7 DR. RYAN: That's my point. That's what  
8 I said. That's what I said, that it is at the point  
9 of generation, and not at the point of receipt.

10 DR. LUNDGAARD: Yes, that is what this  
11 implies.

12 DR. RYAN: Right.

13 DR. GARRICK: Any other questions from the  
14 staff? This might be a good time to see if any of the  
15 public wants to make a comment in response to these  
16 two presentations, or if they have any questions?  
17 Yes.

18 MR. PARROTT: Jack Parrott, NRC staff on-  
19 site rep. On your milestone chart, you have got  
20 construction authorization in what looks like FY 2008,  
21 but on the next page, on page 9, you have a big wrap  
22 up in funding in FY 2005, '06, and '07. What is that  
23 wrap-up in funding for?

24 DR. LUNDGAARD: I think largely what that  
25 is, is trying to spread out the costs so we can go

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1 ahead and move ahead with the phases that are outlined  
2 here in the receipt and emplacement diagram that I  
3 have got.

4 MR. PARROTT: So would it be like physical  
5 site activities or point of --

6 DR. LUNDGAARD: There are some physical  
7 site activities. That is what is indicated, and they  
8 are not actually site activities, not before  
9 construction authorization, but perhaps in some off-  
10 site work that would have to be done. Perhaps Joe  
11 could expound on that.

12 DR. ZIEGLER: Joe Ziegler, DOE, and I  
13 don't have the specifics. We would have to look at  
14 the cost estimates, and we can make those available,  
15 but there is all kinds of materials and equipment  
16 procurement activities that are going to have to go  
17 on, and some of this stuff is pretty dog gone  
18 expensive.

19 And a dish on Nevada Rail is very  
20 expensive, and we would like to get the rail on in as  
21 soon as possible, and so some of those activities are  
22 probably showing up, certainly earlier than 2010. And  
23 it is anywhere from between a hundred and 300 miles of  
24 rail line that would have to go in before 2010, and  
25 that's going to show up in the schedule as well.

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1           So I don't know the specifics, but we  
2 recognize that there is certain on-site activities  
3 that can't happen until we get an NRC construction  
4 authorization, and there is certain other activities,  
5 particularly off-site activities, that can go on.

6           DR. GARRICK: Any other questions? Steve.

7           MR. FRISCHMAN: Yes, Steve Frischman,  
8 State of Nevada. You know, you raised a question  
9 about page 5 on Joe's presentation about his design  
10 and level of design.

11           Now, you will see in the comments that I  
12 referred to yesterday were that we had sent to the  
13 Chairman a review of the department's comments on the  
14 Yucca Mountain Review Plan.

15           You will see in there that we raised this  
16 same issue about level of design, and it is because  
17 the department raised it in their comments, and on  
18 looking at it, and what Joe said was that at license  
19 application the design level of detail will be similar  
20 to what is typically seen with a design for a  
21 commercial power plant at license application.

22           Well, in looking at the process of Part  
23 50, it is different from what appears to be envisioned  
24 in Part 63. In part 50, there is the very clear  
25 distinction, or as the Department used the word,

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1 differentiation, between a preliminary safety analysis  
2 report, and a final safety analysis report.

3 And the requirements for each one of those  
4 is laid out in Part 50. In Part 63, the requirement  
5 is for a safety analysis report at the time, or to  
6 accompany the license application.

7 So there is a distinction here. The  
8 Department is apparently very intent on applying the  
9 requirements of Part 50 instead of the requirements of  
10 Part 63, and i think when you brought this up, this is  
11 an illustration of what they are trying to do.

12 And part of the reason that we sent our  
13 comments on to the Chairman of the Commission, and we  
14 have also spoken with the staff and management about  
15 this, is because this is going to need to be resolved.

16 And I bring it up here just in case you  
17 are not aware of the level that it is going to. And  
18 Janet tells me that it is possible that there is a  
19 meeting coming up fairly soon where this will at least  
20 be mentioned.

21 This has been going on for a number of  
22 years actually, and we have raised the issue to the  
23 Commission in the past. We have raised it with the  
24 staff, and so far there has been silence.

25 And what we take the result of that to be

1 is that the Department continues on trying to have  
2 their desire to use Part 50 procedure, and their  
3 desire to have that self-fulfilling, and we see that  
4 that is essentially happening at this point because of  
5 silence from the Commission.

6 So our intent in-part in sending our  
7 comments to the Chairman was to get this on the table  
8 before the silence actually does become self-  
9 fulfilling, rather than the Commission actually  
10 looking at how it wants to operate and implement its  
11 own rule, rather than the Department telling them that  
12 Part 63 is really going to be operating like Part 50.

13 DR. GARRICK: Any comments or response to  
14 what Steve just said? And I guess that was more of a  
15 comment than a question. Any other comments?

16 (No response.)

17 DR. GARRICK: Okay. Thank you very much.  
18 Our next presentation will be on the final  
19 environmental impact statement for Yucca Mountain.  
20 This is simply a report, I understand, as to what has  
21 been taking place since the final environmental impact  
22 statement that was published in February of this year.

23 As we all know the draft environmental  
24 impact statement received literally thousands of  
25 comments, and there were many changes in the draft as

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1 a result of those comments.

2 For example, more information regarding  
3 potential impacts, and particularly impacts associated  
4 with transportation, and use of a representative fuel  
5 element in the accident analysis, and use of updated  
6 data, particularly population data in the impact  
7 analysis.

8 A more detailed discussion of the issue of  
9 potential impacts associated with the negative  
10 perceptions about the repository project, and use of  
11 updated computer models for assessing human health and  
12 transportation; the usual types of corrections; an  
13 addition to the U.S. Fish and Wildlife Service  
14 biological opinion as an appendix to the final EIS; an  
15 addition of a reader's guide to help the document be  
16 a little more reader friendly.

17 And all of that was a part of what went  
18 between the draft and the final, and I understand that  
19 Robin Sweeney now is going to indicate to us and give  
20 us a rundown of what happened since the final  
21 publication.

22 DR. SWEENEY: I have to admit, Dr.  
23 Garrick, that you did a great job. I am not sure that  
24 there is a whole lot I can add to that. I did want to  
25 let folks know that Jane Somersome was unable to make

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1 it today, but does send her regards to the Committee.

2 Next slide. Part of this Dr. Garrick went  
3 over, and we went back and looked, and discovered that  
4 it was in May of 2001 was the last time that we  
5 briefed this committee, and so we wanted an  
6 opportunity to update folks and let them know what has  
7 happened since then, and just give it a little bit of  
8 additional information on the final environmental  
9 impact statement.

10 Next slide, please. Since the draft  
11 environmental impact statement, and most of this  
12 initial information is what we shared with you last  
13 time, I think the supplement had just come out when we  
14 briefed you before, and since then we have had a 45  
15 day public comment period, with three public hearings  
16 in the State of Nevada on the supplement.

17 We received an additional 1,100 comments.  
18 So altogether we have received almost 13,000 comments  
19 on the environmental impact statement, which certainly  
20 helped us make a much better final environmental  
21 impact statement.

22 We really appreciate the effort that the  
23 public went through to provide us some really careful  
24 thought out comments. Next slide.

25 As you are aware, on February 14th, the

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1 Secretary of Energy recommended the site as  
2 scientifically and technically suitable, and as part  
3 of the basis of recommendation package, was the final  
4 environmental impact statement as required by the  
5 Nuclear Waste Policy Act. This document is  
6 approximately 5,100 pages long. Next slide.

7 We made the final environmental impact  
8 statement available to the public on the internet,  
9 embracing the Secretary of Energy's warm endorsement  
10 of a paperless government, and since then we have just  
11 recently delivered to the General Printing Office the  
12 document, and it is in the midst of being printed now.

13 Next slide, please. The major conclusions  
14 that we reached in the final environmental impact  
15 statement is that the proposed action would call  
16 small, short term public health impacts, primarily due  
17 to transportation, and that the impacts of the site  
18 would be very small.

19 And that primarily the transportation  
20 impacts are traffic fatalities, and long term  
21 performance of the repository would result in a very  
22 low mean peak annual dose and that we cannot expect  
23 the repository to result in impacts to public health  
24 beyond prescribed standards.

25 The primary areas of change from the draft

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1 environmental impact statement, and Dr. Garrick  
2 touched on some of these, is that we provided more  
3 information regarding potential impacts, particularly  
4 transportation impacts, within the State of Nevada.

5 We received a large number of comments  
6 from the public that asked for this additional  
7 information, and this included things like additional  
8 descriptions of the rail corridors, looking at some of  
9 the Clean Air Act non-attainment area, and information  
10 on the Las Vegas valley, looking a little bit more at  
11 biological resources, and things like noise and ground  
12 vibration.

13 We also came up with the concept of a  
14 representative fuel assembly and accident analyses.  
15 I think that this was primarily a comment that we  
16 received from the State that said that you, DOE, have  
17 underestimated the potential impacts here.

18 We have used an average age fuel in the  
19 draft, and we decided to go back and use a  
20 representative fuel, which is average risk or hazard.  
21 And what this meant was that it was approximately 25  
22 percent higher burn up fuel. It is 15 year old fuel,  
23 versus 26 year old fuel.

24 And it increased the source term by a  
25 factor of two. We also provided updated data along

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1 the lines of population data. It was a little touch  
2 and go there for a while, but some of the census data  
3 was out in time for us to incorporate it into the  
4 final environmental impact statement.

5 And we also used County-provided  
6 population data and projected it out to 2035. We  
7 provided a more detailed discussion on perception-  
8 based impacts, and we received numerous comments on  
9 that, and we looked at whether the state of the  
10 science in predicting future behavior had progressed  
11 to the point that it would allow DOE to quantify this,  
12 and quantify the impacts from it.

13 We hired an independent expert to come in  
14 and look at the literature and review all the comments  
15 that we had received, and the results of his analysis  
16 are in Section 2.5.4., and we also included his entire  
17 report as Appendix N in the document.

18 We used updated computer models, and we  
19 went from RAD Tran 4 to RAD Tran 5. Obviously, we  
20 added editorial changes and corrections, and we also  
21 added an additional appendix on transportation,  
22 Appendix M, and there were a lot of questions that we  
23 received that were on transportation, but were not  
24 necessarily DOE's purview.

25 Questions about the Nuclear Regulatory

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1 Commission regulations, and Department of  
2 Transportation regulations, and that sort of thing.  
3 And we felt that it would be helpful to the reader if  
4 we provided essentially a primer of information on  
5 transportation in the EIS to help them understand the  
6 basis for some of the analysis that we did in Chapter  
7 6 and Appendix J.

8 So all of that is in Appendix M. The Fish  
9 and Wildlife Service provided us a biological opinion,  
10 and we included that as Appendix O, and as Dr. Garrick  
11 said, we also provided a reader's guide.

12 We had received comments saying reciprocal  
13 -- you know, trying to know where to go in this  
14 environmental impact statement, and since the document  
15 increased so much in size, we felt that for the final  
16 one that it was really important to provide that  
17 information up front to help people know where to go  
18 in the document to find certain information.

19 As I said before, a large part of the  
20 changes in the environmental impact statement were due  
21 to public comments. Volume 3, which is the comment  
22 response document, is almost 3,000 pages long, and  
23 contained the public comments that we received and  
24 DOE's response to those comments.

25 And approximately 25 percent of the

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1 comments we received caused a change in the documents,  
2 and so we really do feel that the public helped us  
3 improve the document immensely for the final.

4 We also thought that we had to correct  
5 errors. You know, typographical and editorial errors,  
6 and in places where we thought we were absolutely as  
7 clear as we could be, that based on input that we  
8 received either internally or externally, we found  
9 that maybe we had not done as good a job explaining  
10 things as we thought we did.

11 And then again if there was new  
12 information on improved analysis, that was put in the  
13 document as well. Now, the comment response document,  
14 as I said, we received over 12,000 comments --  
15 letters, e-mails, transcripts from the public hearings  
16 -- and we counted any comment that we received through  
17 August 31st, 2001, and we were able to get that in the  
18 document.

19 Any comments that we received after that,  
20 we looked at and evaluated to try to determine if it  
21 raised new issues, and we felt that none did.

22 Similar comments were summarized, and what  
23 I mean by that is that we received numerous comments  
24 that said the same thing, and we combined them all  
25 into one which we called the summary comment, and then

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1 provided a summary response after that.

2 It was a trade-off, because we really  
3 carefully scrubbed those to make sure that any nuance  
4 in an individual's comment wasn't lost when it got  
5 grouped together.

6 And if at the same time this document is  
7 already 3,000 pages long, and if we hadn't done that,  
8 I can't even imagine how long the comment response  
9 document would have been. And I am essentially  
10 repeating a lot of the same answers over and over  
11 again if we had decided to do it by individual  
12 comment.

13 And as we said before, approximately 25  
14 percent of the comments caused this change or update  
15 in the environmental impact statement. The preferred  
16 alternative in the final environmental impact  
17 statement is to do the proposed action, which is to  
18 construct, operate, and monitor, and eventually close  
19 the geologic repository at Yucca Mountain.

20 And in the transportation section, we  
21 identified mostly rail, which is our preferred mode of  
22 transportation, nationally and in the State of Nevada,  
23 acknowledging that there may be some sites, some  
24 commercial sites, that do not have rail capability,  
25 and would have to ship by legal weight truck. So

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1 that's why the mostly is in front of rail.

2 At some point in the future, a DOE record  
3 of decision will come out on the transportation load,  
4 showing what DOE has selected as its mode. This can  
5 come out no sooner than 30 days following the EPA  
6 notice of availability, and obviously if we receive  
7 any comments before then, we will have to address them  
8 in the record decision.

9 If mostly rail is selected, then the next  
10 step would be that the DOE would identify a preference  
11 for one of the rail corridors in Nevada, in  
12 consultation with affected stakeholders, including the  
13 State of Nevada.

14 And then DOE would then issue a record of  
15 decision on a rail corridor in Nevada, and we would  
16 issue that record of decision no sooner than 30 days  
17 after the announcement of the preference. And a  
18 similar process would occur if the DOE decided to  
19 select heavy haul truck as the mode in Nevada.

20 We would go through the same identifying  
21 preference for one of the routes, putting in a Federal  
22 Register notice, et cetera. And other transportation  
23 decisions, such as selection of a rail alignment,  
24 should we choose to go with mostly rail, would require  
25 additional NEPA analysis.

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1           We are also currently reviewing ongoing  
2 project activities and potential design changes to  
3 ensure that we are still in compliance with NEPA, and  
4 at this point we are closely looking at the Nuclear  
5 Regulatory Commission to understand what is going to  
6 be required as far as adoption of the EIS by them.  
7 That concludes my talk.

8           DR. GARRICK: Thank you. Ray, do you have  
9 any questions?

10           VICE CHAIRMAN WYMER: No.

11           DR. GARRICK: George.

12           CHAIRMAN HORNBERGER: I'm just curious,  
13 but I think you called it perception impacts or  
14 something. Is this mainly the perceived economic  
15 impacts, which can be real, as well as perceived?

16           DR. SWEENEY: Right. It was economic, but  
17 it was also things like -- gosh, what was the term  
18 that was used. It was standard of life or whatever,  
19 and that it would have an impact on them.

20           And it may not be a direct economic  
21 impact, but it would still affect them personally.  
22 The stigmas, as Joe said, is another term that folks  
23 use for it as well, and that sort of thing.

24           DR. GARRICK: Milt.

25           MR. LEVENSON: I understand changing the

1 representative fuel assembly to a higher burn up  
2 because that is what is in fact happening, but I don't  
3 understand shortening the time with cooling, and I  
4 think it is going to be 60 or 70 years before you can  
5 possibly reach a fuel element cooled only 15 years.

6 And if it were used as a limiting case, it  
7 might be, but to use it as a representative number  
8 seems strange.

9 DR. SWEENEY: Sure, go ahead, Joe. You  
10 are my boss. I will let you answer.

11 DR. ZIEGLER: Joseph Ziegler, DOE. For  
12 the representative fuel, we used a median hazard on  
13 the fuel for the transportation accident analysis, and  
14 that is the transportation analysis.

15 The accident analysis for the fuel at the  
16 repository, we basically used five year old fuel burn-  
17 up fuel there, because that was the worst case, and we  
18 analyzed the case that we would have to design the  
19 repository and the handling facilities for it.

20 So the representative fuel was used in the  
21 transportation analysis, and that was as a direct  
22 result of comments that we got from the State of  
23 Nevada.

24 The average age didn't give you average  
25 hazard, and so we went back and did a hazard index to

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1 do the median hazard that would be more representative  
2 of what the potential accidents during the  
3 transportation accident could be. Does that answer  
4 your question? No? I ask that because you still have  
5 a puzzled look on your face.

6 MR. LEVENSON: When are you going to be  
7 shipping -- how soon can you possibly be shipping 15  
8 fuel-cooled only 15 years with the long delay in the  
9 repository schedule for shipment?

10 DR. ZIEGLER: How soon could we ship? As  
11 far as I know, there is nothing that would prevent us  
12 from shipping five year old fuel in the year 2010. So  
13 the only limitations on shipping is if we got some  
14 temperature limits and we have got some radiation  
15 limits, and how much fuel you put in any particular  
16 shipping container.

17 But we could legally ship five year old  
18 fuel as soon as we start receiving fuel.

19 MR. LEVENSON: Well, I know you can  
20 legally, but in the real world, it is going to be more  
21 like 30 years isn't it?

22 DR. ZIEGLER: That may be true, but we  
23 were trying to make sure that we bounded the potential  
24 environment impacts associated with it.

25 MR. LEVENSON: If you use it as a bounding

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1 analysis, I have no problems at all. It's when you  
2 define it as representative.

3 DR. ZIEGLER: Well, I will tell you that  
4 the way that the assumptions went on the fuel  
5 shipments that we used, is that we assumed that 10  
6 year old fuel would be shipped out of the pools first,  
7 and then we would ship progressively younger fuel per  
8 the standard contracts that we have with the  
9 utilities.

10 And then we would start picking up the  
11 older than 10 year old fuel, and the last things that  
12 would be shipped would be the fuel that was already in  
13 dry storage containers at the utilities.

14 That was the basis for analysis to make  
15 sure that we covered the potential impacts. I can  
16 tell that you don't -- if you want to talk more about  
17 it, we will come back to it.

18 DR. GARRICK: Mike, do you have any  
19 questions?

20 DR. RYAN: I guess as a follow-up. The  
21 utilities are scheduling to ship 10 year old fuel  
22 before older fuel? I mean, I don't mean to press on  
23 it, but it just sounds like they would ship the oldest  
24 fuel first.

25 DR. ZIEGLER: Joe Ziegler, DOE. The

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1 utilities get to choose which fuel they ship first,  
2 okay? So if you are a utility, and you have got fuel  
3 in your fuel pool, then it may not make a lot of  
4 difference which fuel you ship first.

5 But then again you may want to ship your  
6 youngest fuel first if you are a utility, because that  
7 is the hottest and highest burn up stuff. And if you  
8 can load a full container with it, you might want to  
9 ship it first.

10 But instead of speculating too much, we  
11 had to make a set of assumptions to do the analysis  
12 on. So knowing that we weren't in full control over  
13 what got shipped with the utilities, we tried to make  
14 a set of reasonable assumptions, and we tried to be a  
15 little bit conservative in those assumptions.

16 We got comments from the State of Nevada  
17 that maybe we weren't conservative enough, and so we  
18 did a reanalysis on the accident.

19 It didn't make a whole lot of difference  
20 as far as just normal radiation level impacts from an  
21 environmental impact standpoint, because we assumed  
22 that the normal radiation dose limits were at the  
23 regulatory limits on the shipping containers and  
24 vehicles.

25 So I'm sure that we overestimated there,

1 because we will never get up to the absolute limit.  
2 But for accident analysis, again we used average aged  
3 fuel of everything that would be shipped in the first  
4 70,000 metric tons, or 63,000 metric tons of  
5 commercial fuel.

6 And because we got the comment from the  
7 State, and because if utilities chose to ship younger  
8 fuel first, we are not in complete control of that,  
9 then it could be a younger average age.

10 So we were trying to be conservative and  
11 make sure that we bounded the impacts.

12 DR. GARRICK: Joe, while you are up there,  
13 if it turns out that thermal blending becomes a big  
14 practice, would that not impact the shipping schedule?

15 DR. ZIEGLER: It could if we could somehow  
16 work out arrangements with the utilities to optimize  
17 so that we would have to do less handling at the  
18 repository for thermal blending.

19 What we assumed for the impact analysis in  
20 the environment impact statement was that we would  
21 have 5,000 metric tons of lag storage, or capability,  
22 at the repository such that we could accommodate  
23 whatever we received, and be able to do the thermal  
24 blending as necessary to levelize the heat load in the  
25 repository once it's closed.

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1 But I agree with you that what would make  
2 more sense would be to work out an arrangement with  
3 the utilities so that we could get some older fuel and  
4 some younger fuel, and get that so that we would not  
5 have to do so much fuel handling or storage at the  
6 repository.

7 So that is what makes sense, but again we  
8 wanted to make sure that we bounded the impacts and so  
9 we made some assumptions that would allow us to do  
10 that. When we get into the actual operations, you  
11 know, life may actually be simpler.

12 VICE CHAIRMAN WYMER: Is that your design  
13 basis, 5,000 metric tons at lag storage?

14 DR. ZIEGLER: The design basis as it  
15 existed going into the site recommendation was 5,000  
16 metric tons. Now, there has been some relooks at  
17 that, and Jim may be able to address that later, is  
18 that we may not need that much.

19 We may have overestimated the needs there,  
20 and so I think that number has been going down based  
21 on some relooking at the conditions that exist.

22 DR. GARRICK: Okay. Thank you. I wanted  
23 to ask a question about transportation. If it turns  
24 out, and especially by the State of Nevada, that rail  
25 transportation is much preferred over truck

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1 transportation, is consideration being given to some  
2 sort of interim shipment process that will accommodate  
3 the plants that don't have rail facilities?

4 In other words, that is one option, and  
5 even though it increases the handling, et cetera, it  
6 may better distribute the risks if you wish if it  
7 turns out that the analyses and the conclusions are  
8 for a strong preference for rail shipments in the  
9 State?

10 DR. SWEENEY: Let me see if I can -- let  
11 me attempt to answer and make sure that I have  
12 captured all your points here. We have estimated that  
13 there would be about a thousand truck shipments over  
14 the 24 year shipping campaign if we go mostly by rail  
15 just to accommodate the six sites.

16 I can't tell if what you are asking is  
17 would we take their fuel and move it to someplace else  
18 and blend it, and I doubt that we have analyzed that.  
19 But another option would be to take a legal weight  
20 truck cast from these sites and put it on a rail car  
21 and do it that way.

22 DR. GARRICK: That's right, and I am just  
23 asking if that is being considered.

24 DR. SWEENEY: We analyzed that as part of  
25 the sensitivity analysis in the EIS, trying to put all

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1 the legal weight trucks cast if we went mostly truck  
2 on rail to at least get it closer here by rail.

3 As far as the record of decision, we are  
4 just now starting to put that together and looking at  
5 the comments that we are receiving on that, and that  
6 sort of thing.

7 DR. GARRICK: Okay. Are there any  
8 questions from the staff on the environmental impact  
9 statement presentation? I would also offer this as an  
10 opportunity for anybody else to ask questions about  
11 the final environmental impact statement? Yes. Okay.  
12 John.

13 DR. LARKINS: I have just an information  
14 question. What burn-ups did you consider? You said  
15 that you went back and looked at high burn-up fuel.  
16 What average?

17 DR. SWEENEY: As part of the  
18 representative fuel? Let's see. It is approximately  
19 25 percent higher burn-up.

20 DR. ZIEGLER: Joe Ziegler, DOE. I don't  
21 know the answer right off the top of my head. It is  
22 in the EIS back in -- what is the appendix for -- have  
23 you got a copy of the EIS there?

24 DR. SWEENEY: No.

25 DR. ZIEGLER: All right. It is in

1 Appendix -- is it J?

2 DR. SWEENEY: Yes.

3 DR. ZIEGLER: Appendix J is the  
4 transportation analysis appendix, and look at the  
5 accident analysis part of that, and you will find the  
6 burn-ups that were assumed. But I can't tell you off  
7 the top of my head.

8 DR. GARRICK: Any other questions?  
9 Contrary to what is on the program, I think we are  
10 going to declare a break before our next presentation.  
11 So let's take a 15 minute break.

12 DR. SWEENEY: Thank you.

13 (Whereupon, at 9:57 a.m., the meeting was  
14 recessed, and resumed at 10:19 a.m.)

15 DR. GARRICK: I am going to turn the  
16 cognizant member responsibility over to Milt Levenson,  
17 but before I do that, I have been asked to remind us  
18 all that for those of you who have not signed in,  
19 please do so.

20 It is very important for us to have an  
21 accurate record of who is in attendance. So with  
22 that, and given that we are now moving into the  
23 repository design issue, the member of the committee  
24 that is cognizant and responsible for overseeing that  
25 activity is Milt Levenson, and I yield to Milt.

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1 MR. LEVENSON: Okay. Thank you, John. I  
2 guess our next presentation is the repository design  
3 update, and is going Jim Gardiner going to do that?

4 DR. GARDINER: Again, my name is Jim  
5 Gardiner, for the Department of Energy, and I work in  
6 the Office of Project Execution, and that is managed  
7 by Suzy Millington, and my area of work is the design  
8 of the repository surface facilities.

9 As far as a little personal background, I  
10 have worked at seven nuclear power plants around the  
11 United States, and I am proud to say that six of them  
12 are now operating, and have a good operating record.  
13 The one plant that is not operating happened to get  
14 mothballed when it was about 60 percent complete.

15 And I guess that Washington Public Power  
16 found out that Building 50 was kind of stretching  
17 their finances a little bit. For the overview, we  
18 want to provide you folks with a basis that we have  
19 for proceeding with a license application design, and  
20 we wanted to describe the design evolution which is in  
21 progress.

22 And which takes us from the site  
23 recommendation design to the license application  
24 design now under way. Our specific reasons for moving  
25 towards the design concept that supports a phased

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1 implementation approach are as follows.

2 They are consistent with the findings of  
3 the National Academy Panel on stage repository  
4 development, and let me for clarify here say that our  
5 word phase that we are using is consistent with and  
6 synonymous with the word stage.

7 So you will hear those used maybe  
8 interchangeably throughout. Our phased implementation  
9 is primarily focused on the surface and subsurface  
10 areas of the design. One of our main objectives is to  
11 allow for implementation of a smaller initial disposal  
12 capability and facilities.

13 Some of the benefits of these are that it  
14 adopts a lessons learned approach consistent with the  
15 National Academy's panel. It increases our confidence  
16 in meeting the schedule for 2010 initial construction.  
17 I mean, operation.

18 And it is also consistent with the NRC  
19 regulatory requirements for in situ testing. And in  
20 situ testing or performance confirmation testing is  
21 something that is certainly going to be a large part  
22 of all of our continued work.

23 We get some other benefits. We gain also  
24 in that it provides flexibility to adjust for future  
25 changes, and I am sure that you all know that when

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1 funding comes around that that is always going to be  
2 a problem.

3 We also have had some schedule adjustments  
4 lately because of the funding, and we are also dealing  
5 with an incoming waste steam which is something that  
6 we cannot control at the moment.

7 For the design evolution, the preliminary  
8 design that we have or that we are now about to begin,  
9 will support a license application, and will consist  
10 of additional details and refinements to the design  
11 concept for that which was established for site  
12 recommendation.

13 The final decisions and approvals that we  
14 have for license application design have not been  
15 made, but they are in progress and we are progressing  
16 considerably from the site recommendation concept.

17 The license application design is expected  
18 to fall within the bounds that we have already  
19 established in the site recommendation, and also in  
20 our environmental impact statement.

21 Our LA design will continue to be capable  
22 of a range of thermal operating conditions, and that  
23 is being the high end of the range. Naturally,  
24 environment impacts analysis are part of the  
25 evaluation, and reflects the process of potential

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1 repository refinements certainly take into account  
2 those decision making processes.

3 This is the design evolution process that  
4 we have been performing this year, and if you will  
5 take note of some of the studies that we list. These  
6 cover a pretty broad range of the spectrum of the  
7 repository work elements.

8 Notice that they involve the underground  
9 waste package, and also the waste handling surface  
10 facility, and from the conclusion of these studies,  
11 these conclusions flow down into an overall set of  
12 design concept recommendations.

13 And as we have worked with these  
14 recommendations, we want to fully document them and  
15 review them, and make sure that they are consistent  
16 and integrated. From that point, they flow into a  
17 preliminary change package, and we are now in the  
18 process of reviewing a baseline change proposal which  
19 will affect the change of going from a site  
20 recommendation to these new alternatives.

21 And the date that you see up there in the  
22 upper right-hand corner, going out from 8 to 10 of '02  
23 (sic), that is the time frame that we are hoping to  
24 get this baseline change proposal through again. Next  
25 slide.

1           The potential changes that are now being  
2 considered as design solutions for the license  
3 application are as follows. In regards to surface  
4 facilities, the major change is changing from one  
5 large full capacity waste handling building to  
6 multiple smaller capacity buildings.

7           We have also changed our primary, or  
8 predominant waste handling environment from that of a  
9 wet commercial spent fuel handling cool, to a dry hot  
10 cell environment.

11           We have also made some gains in reducing  
12 the number of crane lifts and crane handling, and we  
13 are doing that by the use of a wheel transporter, and  
14 that operates both inside and between the new  
15 buildings of our proposed options for alternatives.

16           For the surface, we have changed from one  
17 large panel to five smaller emplacement panels. We  
18 have also changed our mode of getting the waste  
19 packages from the surface to the underground from the  
20 rail system, to a wheel transporter system. Next  
21 slide.

22           Continuing on in the waste package arena,  
23 we are replacing the large full penetration weld on  
24 the stainless steel closure list, with a sheer ring  
25 and smaller seal welds.

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1 We have also undergone evaluating the  
2 engineer study. It says that it is under way, but we  
3 are very near completion on that, to identify some  
4 potential improvements in design and fabrication.

5 And I have learned that there are some  
6 very good conclusions coming from that, and it looks  
7 like we are going to be able to save some substantial  
8 money due to the results of this valuable engineering  
9 study.

10 In order to enhance our capabilities and  
11 our timing on the project, we have decided to go with  
12 an off-site training facility, and this is going to be  
13 a non-nuclear or a cold facility.

14 It is going to be constructed off-site,  
15 and the location of that is not necessarily  
16 determined, but we are working on what aspects would  
17 go into that off-site facility, and we plan to use it  
18 for prototyping, testing, and operator training.

19 And we can get quite a jump on being able  
20 to put our facility in operation. Next slide. This  
21 is the site recommendation, sub-surface layout, and on  
22 the left, which is here, is what we call our upper  
23 block.

24 And in this upper block, we were able to  
25 replace the 70,000 mandated metric tons, and the lower

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1 box, which is on the right, was proposed for expansion  
2 as needed.

3 And I will also say that on Slide 17, we  
4 have a blow up of this so that you can get some  
5 greater detail, but we will get to that in a moment.  
6 Well, go back to Slide 17. I don't know if anyone had  
7 any questions on this one or not. If there aren't, on  
8 to Slide 9.

9 Our present concept with the potential  
10 underground layout is now in smaller panels, and I  
11 realize that this might be a little hard to see  
12 because of the color scheme, but we also have a blow-  
13 up of it.

14 But I will go through this slide  
15 initially, and panels 1 through 4 that you see here I  
16 can point out. Panel 1 is a smaller panel, which is  
17 right here, with a small initial panel, and it is the  
18 only one that is really hard to see.

19 And then panels 2, 3, and 4, and those  
20 areas we are able to place the again mandated 70,000  
21 metric tons. If we go on and use panel 5, we have a  
22 contingency of approximately 25 percent to use.

23 In this new layout, we also have an  
24 improved ventilation scheme, and that helps us with  
25 efficiency, and it also helps us with future heat

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1 removal through ventilation.

2 Our modular développement allows for  
3 adaptive staging, and so that we can apply lessons  
4 learned in one panel into the next panel. So we see  
5 that as a great benefit.

6 And as with the tunnel boring machine that  
7 we have already used, there have been lots of lessons  
8 learned. We also utilize the existing exploratory  
9 studies facility for construction of a small initial  
10 emplacement panel by 2010, and this happens to be  
11 panel one that I pointed out before.

12 And we have blow-ups of that which I will  
13 give get to shortly. A portion of panel one is  
14 planned for use for additional scientific and  
15 engineering testing and also for performance  
16 confirmation. Performance confirmation is something  
17 that is going to continue for many years.

18 Our construction schedule. For the first  
19 emplacement in panel one, we are estimating at about  
20 27 months. Now, an astute observer may remember that  
21 in Eric Lundgaard's presentation, he listed that as 28  
22 months. But I think I can explain that.

23 His department is just much slower in  
24 processing paperwork than my department. Next slide.  
25 This slide is just a comparison of the site

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1 recommendation design and its overlay with our new  
2 proposed layout for the panels.

3 You will see that it was essentially very  
4 close with what the other was, and in the upper end up  
5 in here, we are able to eliminate some concerns that  
6 we had about the water table in the north end.

7 And at the southern end, down in here,  
8 there was some rock fracture areas that gave us an  
9 area for concern, and it looked like we can maybe  
10 avoid those, although those areas are still available  
11 for future expansion as necessary.

12 This proposed layout is essentially within  
13 the SR primary upper and lower blocks, and the  
14 potential layout that we have here had approximately  
15 69 miles of replacement drift in all five panels, but  
16 we also had the benefit here that we save  
17 approximately 5.5 miles of excavation over what the SR  
18 design did. Next panel.

19 This is a blow-up of panel one that we  
20 mentioned earlier, which shows our potential test  
21 facility. In doing so, this utilizes a portion of  
22 panel one to acquire engineering and scientific data  
23 to support our cost performance confirmation  
24 activities.

25 It provides us flexibility for defining

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1 performance confirmation testing in the future. This  
2 is something that is really a kind of a great benefit  
3 for us, and so you can plan tests, but if you don't  
4 know exactly where you are going to put them, it can  
5 cause lots of delays in getting them active.

6 So if we have a site already selected, it  
7 helps our planning, and it helps our funding profiles  
8 for that element to work. It also allows us to start  
9 our performance confirmation during the testing  
10 program in the early stages of the emplacement  
11 operation.

12 And this location happens to be a good  
13 representative location to evaluate the overall  
14 repository performance, and this location is good  
15 because it is in the overall block within the rest of  
16 the panels.

17 And it also has minimal impact on our  
18 underground development schedule. To help you get  
19 oriented, this is the ramp that comes down from our  
20 north portal, and comes in through here.

21 The ECRB is already existing and that  
22 comes down through here. The green lines that you see  
23 going across here, those would be the emplacement  
24 panels, and the pink that you see in this area, that  
25 is the test facility.

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1                   One other item on here so that it is  
2 clear, you see this ventilation shaft from ECRB, that  
3 does not exist now. That is for future construction,  
4 to go along with the emplacement panel in the testing.

5                   CHAIRMAN HORNBERGER: Is this panel one in  
6 the same area as Alco-5, the heater tank?

7                   DR. GARDINER: I am not that familiar with  
8 the underground layout. By the way, let me indicate  
9 that I have Gene Rowe here who works in surface and  
10 overall layout.

11                   I have Al Linden here from subsurface for  
12 questions, and I have Mike Andersen also, who deals  
13 with the waste package. So these people are here for  
14 those questions, and I may defer.

15                   MR. LINDEN: My name is Al Linden and I am  
16 with BSC. Yes, the heater test, and if you will look  
17 at that little drift that is sticking off there below  
18 the pink, we are actually utilizing the heater drift  
19 area right there to access the performance  
20 confirmation area.

21                   DR. GARDINER: Thank you. We also have a  
22 back-up slide on this and that is Slide 20, which we  
23 will get to before long. Next slide. This is our  
24 obligatory overly-inclusive and unreadable slide.

25                   It is a site recommendation design for a

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1 waste handling facility, and this is at the north  
2 portal. It is the primary element that you want to be  
3 looking at here, is this building right here. This is  
4 the waste handling building.

5 All of the areas that you see that are in  
6 the orange coloration, that is within the  
7 radiologically controlled area. The area that you see  
8 down here, which is in the yellow, that is the balance  
9 of the plant.

10 That original site recommendation, single  
11 waste handling building, it includes all of the waste  
12 handling building functions that we need. And if it  
13 were our desire, this is what we would be looking for  
14 if we had adequate funding and if we have adequate  
15 time to build a facility.

16 This is a very large facility, and at one  
17 time the estimate for this building was about \$900  
18 million. But it has full capabilities, and from the  
19 beginning, and as soon as it started up, we could  
20 produce the 3,000 metric tons, I believe, of  
21 processing a year.

22 To go over some of the elements, it has  
23 cath receipt. and it has waste transfer, and it had a  
24 wet system for the commercial spent nuclear fuel, and  
25 it had a dry system for the high level waste and DOE

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1 spent nuclear fuels.

2 It also had a waste package prep, and a  
3 welding area, and significantly it had four commercial  
4 spent nuclear fuel blending pools, and the capacity of  
5 those was about 5,000 metric tons.

6 Here again there is a blow-up of this on  
7 Slide 22 that we be getting to. Let me go on to the  
8 next slide. Now we have the phased surface facilities  
9 approach, and we will start off with our first phase,  
10 where we would have dry facility number one.

11 This is located right here, and dry  
12 facility number one is the finishing building, and it  
13 has waste receipt and dry transfer capability. And it  
14 is a smaller facility, but we would still have the  
15 capability to process between 500 and a thousand MTU  
16 per year.

17 So they have the full capability to  
18 process what is mandated, which is the 400 metric tons  
19 for the first year. We would also be building the  
20 cast carrier preparation building, which is here, and  
21 this is where the casts come in and are received.

22 And we also would build a disposal  
23 container building, which is this location. So that  
24 the slide is not confusing, it is not the disposal  
25 container pre-building that shortens the construction

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1 schedule, and if you go over to the next bullet, which  
2 can emplace waste for emplacement of storage, and  
3 those are just some of the general aspects that we  
4 gain from the smaller and unlimited capability  
5 building.

6 So by introducing the size of that  
7 facility, we hope to shorten the construction schedule  
8 so that we are on-line by December 2010. In the phase  
9 two facility, we are going to build a waste  
10 remediation building. one of these, and we are going  
11 to also build a waste treatment building.

12 And the waste treatment building, again we  
13 will go back to having some wet pool capabilities for  
14 handling off-normal pool fuel, and damaged fuel, et  
15 cetera.

16 In Phase III, we would go back and we  
17 would build this facility, and this is another partial  
18 finishing building, plus a dry waste transfer line,  
19 and again this would up our overall processing  
20 capability to 2,000 to 3,000 metric tons per year.

21 Of interest, this all fits within our site  
22 recommendation footprint, and when all of these  
23 facilities are built, we have the same capabilities as  
24 the site recommendation design.

25 The next slide. These are some layouts of

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1 the dry facility number one, which is here, and then  
2 phrase three, you would come on-line with this larger  
3 building, which is dry facility number two.

4 I don't know what you may want to know  
5 about these other than we do have the capability of  
6 receiving and processing, and getting finished waste  
7 packages out of the dry facility number one, and also  
8 dry facility number two.

9 Specific questions on the -- on how the  
10 flow goes through here, I would defer to Gene Rowe,  
11 and if you have some questions, please bring them up.

12 (No audible response.)

13 DR. GARDINER: Next slide. It says pre-  
14 emplacement aging option. The modular dry surface  
15 pre-emplacement aging was identified as an option, and  
16 this was to make sure that all of the potential  
17 scenarios were bounded by the EIS.

18 I realize that this is a little small, and  
19 we do have a blow-up of it also. The path sites may  
20 be needed for some aging, because we are maybe under  
21 restraints as far as total waste package output. We  
22 are kind of limited now to a range of about 11.8  
23 kilowatts per package.

24 So in order to get that, we may have to  
25 blend some hot fuel with some cooler fuel. And if we

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1 got in some five year fuel that is very hot, again it  
2 may not be capable of immediately placing all of it  
3 underground in packages that would exceed our waste  
4 package limits.

5 Places for pads have also been considered,  
6 because at some point in time we have to consider or  
7 accommodate retrieval, if that ever happens to be a  
8 reality. And that is near the end of the  
9 presentation. If you want to go on, we have some  
10 backup slides, to 17.

11 This is just another view of the  
12 repository block, and the main emplacement area, we  
13 are doing the shaded area right here.

14 MR. LEVENSON: Okay. Thank you. Ray.

15 VICE CHAIRMAN WYMER: First, I guess the  
16 upper and lower block means upper and lower?

17 DR. GARDINER: There is a difference in  
18 elevation there, but it is not significant, and it is  
19 primarily the difference in elevation is to get into  
20 more favorable rock.

21 VICE CHAIRMAN WYMER: It looked to me like  
22 the existing tunnel goes right through one of the  
23 blocks, instead of along the edge of it.

24 DR. GARDINER: In actuality, we tried to  
25 get as much information as we could on both of the

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1 blocks, and the north ramp, which comes down through  
2 here, it passes above that lower block, and we have  
3 got some data from that lower block in so doing.

4 And we came down and this direction here  
5 was designed because it followed a particular fault.

6 VICE CHAIRMAN WYMER: My point was though  
7 that the north ramp goes right through the drifts in  
8 the picture.

9 DR. GARDINER: Yes, it probably does, but  
10 I think there is an elevation difference.

11 VICE CHAIRMAN WYMER: That's what I meant  
12 by upper and lower. There is a significant upper and  
13 lower, and not just a little bit.

14 DR. GARDINER: Al, can you elaborate on  
15 the elevation of those things?

16 MR. LINDEN: Right where the north ramp  
17 crosses over the lower block on this edge, there is  
18 approximately a 2 to 300 foot elevation difference.

19 VICE CHAIRMAN WYMER: That is pretty  
20 significant, yes. Okay. That takes care of that  
21 question. I have a couple of more. What is meant by  
22 an aging option study?

23 DR. GARDINER: Again, if we get in real  
24 hot fuel, it may have to sit a while before we can  
25 adequately work it into a waste package to keep the

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1 overall waste package heat output to a certain level.

2 VICE CHAIRMAN WYMER: Okay. And is there  
3 a written performance confirmation test facility  
4 study? That is on one of your earlier viewgraphs.  
5 You refer to a performance confirmation and test  
6 facility study, and I wondered if that is written.

7 DR. GARDINER: What slide is that? Do you  
8 recall?

9 VICE CHAIRMAN WYMER: Oh, it is an early  
10 one. Let's see. It is five. It is called, "Design  
11 Evolution Study Process." And down in there, there is  
12 a performance confirmation and test facility study  
13 under design studies. Yes, she has it up there.

14 DR. GARDINER: Oh, yes, all of these  
15 studies have been completed.

16 VICE CHAIRMAN WYMER: I don't think we  
17 have ever seen a copy of that. Are those available?

18 DR. GARDINER: I would say go through our  
19 -- well, okay, we have an answer back there it looks  
20 like.

21 MS. HANLON: Thanks, Mike. Carol Hanlon,  
22 Yucca Mountain. We do have performance confirmation  
23 plans, and we have two iterations. I thought that I  
24 had provided them to the board, but I had spoken with  
25 Mike earlier that I will go back and see what the

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1 status is, and get you the latest versions. I can get  
2 you both versions if you would like.

3 VICE CHAIRMAN WYMER: Okay. Thanks,  
4 Carol.

5 MS. HANLON: I will take care of it.

6 VICE CHAIRMAN WYMER: Okay. I have a  
7 couple of more. Why is a commercial field transfer  
8 wet and the DOE spent nuclear fuel is dry?

9 DR. GARDINER: What is it?

10 VICE CHAIRMAN WYMER: The commercial spent  
11 nuclear fuel transfer is done wet.

12 DR. GARDINER: Yes.

13 VICE CHAIRMAN WYMER: And the DOE spent  
14 nuclear fuel transfer is done dry. Why the  
15 difference?

16 DR. GARDINER: I believe the DOE spent  
17 nuclear fuel is probably already canistered.

18 VICE CHAIRMAN WYMER: Is probably already  
19 what? I'm sorry.

20 DR. GARDINER: Canistered. And put  
21 directly into a waste package.

22 VICE CHAIRMAN WYMER: And in another one  
23 of your slides, you talk about waste remediation and  
24 waste treatment are planned -- that facilities are  
25 planned for that in phase two.

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1 DR. GARDINER: Correct.

2 VICE CHAIRMAN WYMER: What are those?

3 DR. GARDINER: If we get some spent  
4 nuclear fuel that comes in, and maybe it is damaged  
5 fuel, or it has got some off-normal fuel, and  
6 something that we didn't expect and don't know exactly  
7 how to handle it, that is one of the reasons for  
8 coming up a wet facility. It gives us more capability  
9 to deal with this type of fuel that we are not  
10 expecting to see.

11 VICE CHAIRMAN WYMER: Okay.

12 DR. GARDINER: We also have to have a  
13 remediation facility, meaning that if we have a waste  
14 package that has a bad weld, and we have some waste  
15 package that has some defect in it, you can take it  
16 over there and maybe correct that situation.

17 VICE CHAIRMAN WYMER: Okay. And finally  
18 what is a finishing building?

19 DR. GARDINER: Well, I will give it a try  
20 here. A finishing building, I believe, just meant  
21 that we can finish out a waste package. We can  
22 prepare it so that it is able to ship it under mount.

23 VICE CHAIRMAN WYMER: Okay. That's all I  
24 have for right now.

25 DR. GARRICK: I would like to look at

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1 Slide 6. I guess it is Slides 6 and 7. Can you give  
2 us a little bit of insight as to what was the driver  
3 for some of these changes?

4 DR. GARDINER: I believe on a waste  
5 package that it is a new area that we have been  
6 dealing with materials, and we have been dealing with  
7 corrosion testing, and lots of things.

8 And as we get the results back, we have to  
9 continue to keep reevaluating. And at one time we had  
10 like I said this full penetration weld on the same  
11 steel closure lid, but on that full penetration weld,  
12 we would have to do heat treating and that type of  
13 thing.

14 And that got to be a very costly and  
15 difficult aspect to provide, and so we are always  
16 looking for ways to where maybe we can improve that.  
17 And we also got input from the Navy on how they do  
18 some of their canister closures, and we are adopting,  
19 I believe, some of their inputs, which seems to be a  
20 better system.

21 DR. GARRICK: On the heat treating issue,  
22 given that you have made this change on the basis that  
23 it first gives you better control of the heat  
24 treatment process, and second, there is less involved,  
25 is that

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1 -- and this was an issue in the performance assessment  
2 as far as penetrating the waste package.

3 Is that design being incorporated into the  
4 performance assessment, that change?

5 DR. GARDINER: Mike, do you have any input  
6 on that?

7 MR. ANDERSON: Yes. Michael Anderson,  
8 from BSC. The particular change here is on the inner  
9 stainless steel shell, and not the outer shell, which  
10 is the corrosion resistant area.

11 And so what we have here is the inner  
12 shell is primarily the structural shell, which helps  
13 the waste package sustain pre-closure events, and  
14 let's say a drop took over some kind of vent occurring  
15 in the surface facility, or on its way underground and  
16 foreclosure.

17 So we are not talking any performance  
18 assessment credit for that. That's why we were able  
19 to move away from welding and go to mechanical  
20 closure.

21 DR. GARRICK: You are not doing anything  
22 with the outer lid?

23 MR. ANDERSON: Our engineering study is  
24 advocating some changes, but that is not quite final.  
25 So we won't know anything about that for now.

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1 DR. GARDINER: (Off microphone) Just to  
2 let you know that the value engineering studies are  
3 underway and it looks like there are some good  
4 conclusions coming out of them, but I would say that  
5 it is premature.

6 It has not been through our internal BSC  
7 review process fully yet, and so it is probably  
8 premature to discuss that with Mike.

9 DR. GARRICK: Well, this is about the only  
10 mechanism that you show for access to the waste  
11 package for stress corrosion cracks, and I was curious  
12 as to whether or not this was going to materially  
13 impact those analyses

14 MR. ANDERSON: You are referring to the  
15 particular change on here?

16 DR. GARRICK: Yes.

17 MR. ANDERSON: Well, that has no effect.

18 DR. GARRICK: Well, yes, I know that has  
19 no effect, but I am thinking of the study where you  
20 say it is ongoing.

21 MR. ANDERSON: Yes. Certainly the issue  
22 of stress corrosion cracking and transport of water  
23 in, and waste form now is a focus of that study.

24 DR. GARRICK: Okay. On the subsurface  
25 facility, is the change from one large emplacement

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1 panel to five smaller ones, and the change from rail  
2 to wheel transport, what is some of the reasoning  
3 behind those?

4 DR. GARDINER: By building this initial  
5 facility, like I said, it has sort given us a lot of  
6 lessons learned, but it also helps to assure us that  
7 we can meet this 2010 emplacement time. We can build  
8 a small facility which is -- well, we can come  
9 directly off the ESF which is existing, and we can  
10 have the room for emplacement and meet the  
11 requirements that were put on us.

12 And it just helps us construction-wise and  
13 I think there is also some phasing and other aspects  
14 that are of benefit.

15 DR. GARRICK: And one of the things that  
16 I was trying to get at here is how much safety had to  
17 do with these changes,<sup>1</sup> and whether they were to  
18 enhance the schedule, through put, or costs, or other  
19 factors.

20 Because the other thing that is important  
21 here is that it may turn out that the greatest risk of  
22 operating this repository is such that we might have  
23 some insight as to safety and in particular the on-  
24 site handling, or better insight as to possible  
25 delays.

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1 MR. LINDEN: Well, actually the biggest  
2 change that we have from a construction facilities  
3 standpoint is that we have done a lot of reduction on  
4 things like dust control, and we improved ventilation,  
5 and one of the changes was that we removed some of the  
6 ventilation controls from our subsurface design, which  
7 were hard to access from the SR design, and keeping  
8 our ventilation controls on our intake side allowed us  
9 to have full access.

10 One of the biggest changes that was  
11 facilitated for the sub-surface design would be to  
12 reduce uncertainties from (inaudible) and basically  
13 once we pulled in to smaller equipment, it kind of let  
14 us go to smaller panels, which just kind of flowed  
15 through and gave us better options.

16 Just a couple of more questions. Would  
17 one of you care to comment on what you see in the  
18 short term as the most critical path design issue?  
19 What is driving the design activity? And we might  
20 have better insight into possible delays. You must  
21 have a very clear cut critical path schedule  
22 somewhere?

23 DR. GARDINER: Lucky for me, the critical  
24 path issues have not gone through the design element  
25 as much as you would think. There is some licensing

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1 issues, and Gene may have some other input here, too.

2 But we are close to it, and I say one  
3 thing that may be lagging now or is of concern is  
4 seismic issues.

5 We have some seismic analysis going on now, and we  
6 need to get to a final conclusion on what acceleration  
7 factors and that type of thing are.

8 I wouldn't say it is exactly on the  
9 critical path right now, but primarily we do have a  
10 very short design schedule. I will certainly admit  
11 that. We have a lot to do in a fairly short amount of  
12 time.

13 But we have resource loaded our schedules  
14 and we do feel that it is doable within the time  
15 frames that we are looking at. Gene, do you want to  
16 add anything as far as critical path? I think that is  
17 a very good question, and so I hope we can give you  
18 some information.

19 MR. ROWE: My name is Gene Rowe, of the  
20 Repository Design. From the design point of view, I  
21 think that the driving thing is to finalize the design  
22 to such a point that we can go through our event  
23 sequence evaluation, and do the PSA evaluation of  
24 those event sequences.

25 And I think that from a strictly design

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1 point of view, I think that is what is really driving  
2 us.

3 DR. GARRICK: Thank you. Early in the  
4 project, we heard a lot about engineered barriers, and  
5 we also heard a lot about engineering in the natural  
6 setting. We have not heard very much about  
7 engineering in the natural setting of late.

8 And by that I mean the consideration of  
9 such things as ridges barriers and other means of  
10 altering the geology and the hydrology. Is there  
11 anything going on in that arena at the present time?

12 DR. GARDINER: I believe that is for  
13 underground, but I will say that some of those are  
14 pretty expensive items, and where possible, we have  
15 been trying to remove them if we can show performance  
16 elsewhere.

17 So the ridges barriers are essentially  
18 gone, and the backfill is essentially gone. We still  
19 have the drip shield over the waste package. So, yes,  
20 the expensive items, those are also costly as far as  
21 schedule goes, the construction schedule.

22 And so I think we have been successful,  
23 and there is adequate backup for the removal of some  
24 of those items.

25 DR. GARRICK: My final comment is maybe

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1 more of a comment than a question, and that is you  
2 make reference to the recommendation of the National  
3 Academies to adopt a phrased design approach, and I  
4 guess the concern there is to not confuse a phase  
5 design approach with the failure to ever give a  
6 design.

7 It seems like there has to be some real  
8 strategic planning to avoid that being somewhat of an  
9 excuse to drag this thing out more than it needs to  
10 with respect to moving on with fixing at least that  
11 part of the design that will allow you to stay on  
12 schedule.

13 DR. GARDINER: Right.

14 DR. GARRICK: Do you have any comment on  
15 that?

16 DR. GARDINER: Well, a good point. We do  
17 know that some questions came up earlier about budget  
18 and what the funding was going to be and so forth.  
19 And we have some charts that show that, although I'm  
20 afraid that we don't have them with us now.

21 But there is some very steep increases and  
22 wrap-ups that we have to have in order to be able to  
23 start replacing in 2010. And I would say that some of  
24 those, the budget scenarios that we would like to have  
25 I would say are probably not likely.

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1           You can already see in the recent budget  
2 phase where we are now designated as a site, but still  
3 coming back through Senator Reid. We got a \$336  
4 million case. So that is always going to play against  
5 us, and I think that what we have gone through now is  
6 giving ourselves flexibility to adapt to those  
7 situations.

8           We can demonstrate that we still have the  
9 capability that we need, and we feel it is a workable  
10 situation now. And, yes, we have got enough  
11 background now, and have worked enough of the elements  
12 to where our course for design, railway design, is  
13 pretty clear.

14           DR. GARRICK: All right. Thank you.

15           MR. LEVENSON: George.

16           CHAIRMAN HORNBERGER: You mentioned that  
17 in terms of the subsurface, one of the critical things  
18 that you are looking at are seismic. I am just  
19 curious. How confident are you in the details of your  
20 subsurface design, in terms of such things as support,  
21 rock bolting, and how confident you are about the  
22 invert design and those kinds of details. Are they  
23 pretty well set?

24           DR. GARDINER: My comment was primarily  
25 related to our seismic issues related to surface

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1 facilities, and I will let Alan comment on the  
2 subsurface types.

3 MR. LINDEN: I can't really give you an  
4 answer. I know that the seismic stuff is being worked  
5 on, and we can probably get you some information later  
6 on it.

7 CHAIRMAN HORNBERGER: I just have one  
8 other question that is also subsurface. I am curious.  
9 Since you have gone through this and done these  
10 changes, or the potential changes to your design and  
11 your staging of different areas.

12 And even though right now you have said  
13 that there is not going to be any backfill. When you  
14 look at Joe's slide that suggests that this design  
15 might evolve, and if in fact you find out that for the  
16 ingenious activity scenario, for example, that you do  
17 need to backfill, and you make that decision somewhere  
18 in 2030, can you tell me if your design planning  
19 taking that into account? Can you go back and  
20 backfill after the fact?

21 MR. LINDEN: Yeah, we have not changed  
22 anything that would preclude us from backfill or  
23 anything like that. Essentially the mechanism for  
24 closing is the same as what it would be for the SR.  
25 Again, it would be a phased approach fill.

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1 CHAIRMAN HORNBERGER: I take it then that  
2 no further work has been done, even in terms of --  
3 well, even pre-preliminary designs for how one might  
4 accomplish backfill in these drifts after the waste  
5 has been in place?

6 MR. LINDEN: We have for prior studies  
7 that were done back 4 or 5 years ago have handled  
8 backfill, and essentially the method we have always  
9 used is still applicable.

10 CHAIRMAN HORNBERGER: Thank you.

11 DR. RYAN: I am asking this question as  
12 the new person on the ACNW, and so it may be something  
13 that is well known, but I don't know it. In these  
14 above ground facilities where the fuel handling is  
15 going to occur, that is the place where there is the  
16 highest opportunity, at least under abnormal  
17 circumstances, for occupational radiation exposure.

18 I think there was a comment earlier that  
19 you are looking to get the design to a point where you  
20 are going to begin or continue the process of that  
21 kind of safety analysis, and can you comment on how  
22 that is going, or how those kind of occupational  
23 radiation exposure assessments are proceeding, and  
24 that kind of thing?

25 DR. GARDINER: With some of the new

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1 layouts, we have been able to have some of the areas  
2 to where there is very little radiation exposure. And  
3 to go into the hot cell approach also limits exposure,  
4 and also our ability to confine things in case there  
5 is some kind of an accident is pretty good in those  
6 environments in a hot cell.

7 Those studies are certainly going to be  
8 flushed out more as we are allowed to get into detail  
9 design, but I think all in all that our facility is  
10 such that we plan on having a fairly low exposure  
11 anyway.

12 And something that we will discuss here in  
13 a second is this wheel lift transporter that we have,  
14 and we can shield our packages when they are moved  
15 from one area to another, which provides a lot of  
16 protection. Gene, did you want to add anything?

17 MR. ROWE: Yes. A lot of our  
18 considerations are a foundation of the design. That's  
19 one of the main reasons or one of the driving reasons  
20 from going from a wet environment to a dry  
21 environment.

22 One of the basic philosophies that we have  
23 is that we want to be able to have access to any of  
24 the areas should off-normal events occur, and so that  
25 is why we are going with a shielded waste package when

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1 it is moving on the surface.

2 So, yes, it is the foundation of where we  
3 are at, or a foundation of the design, and we are  
4 going to start doing some real detail to allow our  
5 evaluations probably at the beginning of the year.

6 DR. RYAN: Okay. And that is really the  
7 answer to my question, is that you have done some good  
8 conceptual thinking and applied good principles, and  
9 fundamentals, but you are really in need of -- and all  
10 these details have come up.

11 MR. ROWE: We are in the process of --  
12 well, again, probably at the beginning of next year,  
13 we will be able to actually start doing some modeling  
14 of the lab test systems that allow you to evaluate not  
15 only just the ergonomics of the work environment, but  
16 also exposure, and we are planning to adopt some of  
17 those tools to do it.

18 DR. RYAN: Okay. Thank you.

19 MR. LEVENSON: First, I have got a couple  
20 of questions for orientation. These two pretty  
21 pictures showed up on the table. Can somebody tell us  
22 what they are?

23 DR. GARDINER: Yes. Those might be the  
24 only interesting slides of the whole presentation.  
25 They were not in your presentation, and we weren't

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1 able to get them on an electronic file so that we  
2 could show them up there.

3 This little option, that is what they call  
4 an omni-directional wheel lift transporter. This is  
5 something that we have been evaluating recently, and  
6 one of the main benefits of this is that it can pivot  
7 on its own access.

8 Each one of those wheels that you see is  
9 hydraulically driven, and those are hydraulic units,  
10 where it can be lifted, and you can lift tremendous  
11 weights with that.

12 By the use of this little device, we have  
13 been able to reduce the number of crane lifts in the  
14 building, which has always been problematic. Any time  
15 that you lift a package, you have the drop scenario  
16 that you have to deal with.

17 Now, in using these things, we have been  
18 able to save a number of steps, and as far as total  
19 processing time and going through the building, it has  
20 helped us to dramatically there also.

21 So if in fact we can qualify this type of  
22 a unit for application in the nuclear arena, why we  
23 will have gained quite a bit we feel.

24 MR. LEVENSON: So this is for use inside  
25 the above-ground building?

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1 DR. GARDINER: Well, it has more than  
2 that. We use it inside the buildings themselves for  
3 moving the waste packages around, and waste packages,  
4 and shipping casts, et cetera.

5 We also, if we have to -- well, because of  
6 the phased approach, where we have separate buildings,  
7 we may need to be able to move a cast from one  
8 building to another.

9 So we can also use these to do that, and  
10 it is shielded, and so the transport from one building  
11 to another is actually very safe. They are also  
12 considering using this instead of rail to go  
13 underground, and if we can develop it as such, we  
14 would use this to transport the waste package  
15 underground also. So that stays at another transfer  
16 point.

17 MR. LEVENSON: If you take this  
18 underground that means that you need a paved tunnel  
19 about four times as wide as what you have now?

20 DR. GARDINER: We would need a smooth  
21 inverse, but the width is not four times as wide. It  
22 is really pretty amenable to what the rail system  
23 would be; is that correct?

24 MR. ROWE: Actually, those particular  
25 pictures don't represent the configuration for moving

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1 it into the underground. The underground system has  
2 the waste package horizontally, and not vertically,  
3 and one of the benefits as Jim had mentioned is that  
4 this has a very good turning radius.

5 One of the lessons learned that we picked  
6 up from the Germans when they were over here a couple  
7 of months ago is that they were having difficulty with  
8 their emplacement system because of the sharp turning  
9 radius, and derailing of the prime mover.

10 That is one of the reasons that we looked  
11 at this system, and that problem goes away. This  
12 system has some unique properties to it. The wheels  
13 are linked together to maintain the bed of the  
14 equipment horizontally, and so if you go over non-  
15 uniform surfaces, the bed plate itself will maintain  
16 horizontally. And as Jim said, it will actually spin  
17 on a dime.

18 MR. LEVENSON: Does it have hydraulic  
19 power?

20 MR. ROWE: It is a hydraulic motor, and  
21 you can power that motor any way you want.

22 DR. RYAN: Is it a self-contained motor?

23 MR. ROWE: Yes, it will be a self-  
24 contained unit. We are evaluating now what the fuel  
25 will be.

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1 DR. RYAN: Are they all wheels?

2 MR. ROWE: Yes, they are all wheels. Not  
3 all of them are powered, and I don't think we are far  
4 enough to know exactly how many would actually be  
5 powered, but they are powered, and there is redundant  
6 power for the wheels, et cetera, et cetera.

7 MR. LEVENSON: Does this require paving  
8 the tunnels?

9 MR. ROWE: The present plan was to have  
10 concrete access down, and so it is no different than  
11 what we had originally planned. We eliminate the rail  
12 line.

13 MR. LEVENSON: This is entirely remotely  
14 operated from outside somewhere?

15 MR. ROWE: We are not that far yet as to  
16 exactly how we are going to operate it. It is going  
17 to definitely be -- there is not going to be an  
18 operator on this equipment.

19 We would like to try to make it as  
20 automated as possible. I think the technology exists  
21 now to allow it to be pretty independent.

22 MR. LEVENSON: Does it have a diesel  
23 engine or something for power?

24 MR. ROWE: Again, we haven't made that  
25 decision yet.

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1 MR. LEVENSON: Let me ask a different  
2 question for orientation. This is a design update.  
3 Does that mean that we can assume that anything --  
4 well, I guess the answer is no, as I have answered it  
5 myself by what you just said.

6 I was going to ask does that mean that the  
7 temperature of the drip shield, the backfill, the  
8 inverts, anything not discussed here, remains the  
9 same? And I guess the answer is no, because what you  
10 just said is that you are going to have to change  
11 this.

12 So there are additional changes that you  
13 are seriously considering that are not in this update;  
14 is that right?

15 MR. ROWE: Well, I think the detailed  
16 design, when it comes around, is going to certainly  
17 finalize some of these things, and yet there could be  
18 some change from what we are seeing now. I think the  
19 presentation that you have got there was primarily the  
20 major items, the major items of concern.

21 We wanted to show you that we are not  
22 going outside of the SR bounding conditions or  
23 necessarily violating the EIS situations.

24 MR. LEVENSON: I was not very concerned  
25 about you going outside the bounds of anything,

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1 because if you do, you don't get a license. So that  
2 is not really a concern. The concern is more of how  
3 it is being done.

4 I was interested in one flat statement  
5 that was made that I personally happen to not agree  
6 with, that for your waste handling building that going  
7 wet is simpler for unusual situations.

8 And you make the argument that the main  
9 reason that you are going dry with the main building  
10 is that potentially it is simpler, easier, and  
11 cheaper. If you are going to go wet, you have got all  
12 of the problems of pools and contamination.

13 And if I were handling defected fuel, the  
14 last thing I would want to do with it is stick it in  
15 a wet pool if I have a dry hot cell available. So I  
16 don't understand the answer that you gave before.

17 MR. ROWE: Well, it was probably my  
18 comments, and I had better defend myself a little bit.  
19 Yes, the construction of the pools themselves, and the  
20 building, and the supporting equipment that you have  
21 to have for a wet system is more complicated.

22 And so that is not the simpler part. We  
23 were trying to indicate that if there is an off-normal  
24 situation, if you can get in there and see it, and if  
25 you have better access to it, possibly in a pool, that

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1 that may be the simplification. The system itself is  
2 more difficult.

3 MR. LEVENSON: I don't think it is  
4 simplification. I think viewing hot cells and  
5 flexibility has been demonstrated for many years, and  
6 people have been doing welding in hot cells for 50  
7 years, and there is a lot of background and  
8 experience.

9 MR. ROWE: Well, yes, what you bring up is  
10 certainly something that has been debated over and  
11 over again, and there is some schools that say go wet,  
12 and they don't want to budge on that. And others say  
13 go dry. But it looks like the place where we are at  
14 that the dry method is probably more beneficial to us.

15 MR. LEVENSON: Has this design group or  
16 team accessed all of the -- well, not all, but a  
17 significant part of the hot cell experience that  
18 exists, because there is a lot of it around?

19 DR. GARDINER: Yes, we are trying to tap  
20 into as much as we can that experience at Lahague  
21 (phonetic) obviously, and we are planning a trip over  
22 to France to look at the lahague facility.

23 I just had two of my staff return from  
24 Hanford to look at the facility up there, and we are  
25 also planning trips to INELE to look at the plant

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1 facility up there.

2 We are looking at bringing in some  
3 consultants, Foster Wheeler, or a couple of others  
4 that we are looking at to bring that expertise in. So  
5 our objective is not to reinvent the wheel, but to get  
6 that experience that is already out there.

7 MR. LEVENSON: On the design evolution,  
8 you make the statement that you are going to do the  
9 analysis at the high end of the range, with an  
10 implication that that is the safest end.

11 And therefore if you go colder, you don't  
12 have to do additional analysis. Well, I think that is  
13 a very controversial position to take. There are a  
14 lot of people that wouldn't agree with that, and that  
15 the colder repository may be easier to analyze, but it  
16 not be safer.

17 And I wondered why or what your feeling  
18 was about tying your design to the high end of the  
19 range.

20 DR. GARDINER: It seems to me that has  
21 been controversial for a number of years, and it may  
22 never go away. I guess that the high end is -- well,  
23 it is a case that we have analyzed, and it is a case  
24 where we are able to present a performance assessment  
25 on.

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1 MR. LEVENSON: Let me just say that in  
2 other issues you have said that the design is  
3 flexible, and I wondered why you aren't saying the  
4 same thing here?

5 DR. GARDINER: We have a volunteer here.  
6 Go ahead.

7 DR. ZIEGLER: Joe Ziegler, DOE. We feel  
8 that we need to go in the license application with an  
9 approach, a design, and a method of operation that  
10 gets us from the beginning to the end, and by saying,  
11 oh, we are going to make everything flexible forever  
12 doesn't mean that we can't change.

13 So we are going to build in the ability to  
14 accommodate going hot or cold, but we are going into  
15 our license application, we believe -- and they are  
16 supposed to be recommended right now is about 10  
17 centimeters to the middle waste package spacing, and  
18 a configuration that will turn out to be above the  
19 boiling point of water for some period of time.

20 So we are doing that because we believe  
21 that for us and for the NRC to analyze a certain  
22 circumstance, that it needs to be a circumstance that  
23 we are taking to the license.

24 So in order to get a license, we think  
25 that is necessary. That doesn't mean that if some

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1 information comes along in the future that says that  
2 not going above the boiling point of water is the  
3 better way to go, that we can't go in that direction.

4 But there are some issues associated with  
5 that, and the ease of analysis for colder which I  
6 think you mentioned may not be the case, because once  
7 you decide to go cold, then cold becomes an operating  
8 condition. In other words, 85 degrees, 96 degrees,  
9 you pick the number.

10 Well, then the degree of precision and the  
11 ability to analyze becomes more important. So cold  
12 may not be easier to analyze, and in fact it's  
13 probably not if that becomes the condition of a  
14 license.

15 So that is kind of misleading. We are  
16 trying to go with a solution that is a complete  
17 workable solution. We have to pick something right  
18 now that is to allow the temperature to go above the  
19 point of boiling water.

20 DR. GARDINER: I would add also that you  
21 start talking about a couple of degrees in  
22 temperature, which doesn't sound like much from a  
23 degree standpoint. But all of those conditions  
24 translate back into some bigger problems in other  
25 aspects of the project.

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1           If we start going colder, that means that  
2 we have to have waste packages with less heat output,  
3 which means that we have to blend more fuel, which  
4 means that we have to take far more processing time  
5 internally to get the waste packages together.

6           We have to maybe receive more fuel so that  
7 we have the right inventory to draw from, and it gives  
8 us a lot more steps in surface facilities. So that  
9 hampers our through put capability. I mean, we could  
10 have built it and had the original 3,000 mtu capacity  
11 that was required.

12           But if those changes come back in, then  
13 our facility is no longer adequate again. So there is  
14 certainly a trail of effects that happen under  
15 circumstances where it may just appear to somebody to  
16 being a few degrees one way or another.

17           MR. LEVENSON:     Sometimes the English  
18 language isn't very good for communication, but it is  
19 the only one we have got. And on one of your bullets,  
20 it states that the license application design is  
21 expected to fall within the bounds described in the  
22 site recommendation.

23           And I don't know about the NRC staff, and  
24 I don't speak for them, and I don't even speak for  
25 this Committee. But I can say that at least one

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1 member of this Committee expects to see a lot more  
2 detail in your license application than anything in  
3 either site recommendation or environmental.

4 DR. GARDINER: Well, that is most  
5 definitely true, yes. We are looking to the point now  
6 where we can get preliminary design up, and it will be  
7 compatible with the Yucca Mountain Review Plan so that  
8 we know what we are providing is of the detail  
9 required for the NRC.

10 MR. LEVENSON: Let me ask a question which  
11 probably isn't part of what you were intending to  
12 cover, but the question has been raised, and since I  
13 have asked it about 8 or 9 times without being able to  
14 get an answer, I am going to ask you again.

15 And that is why -- well, not ask you  
16 again, but ask it again. Since we have added the  
17 Alloy-22 as the corrosion outside, why is the inner-  
18 containment -- and this is a taxpayer's question.

19 Why is the inner-container stainless  
20 steel, and its only role is to support the Alloy-22?  
21 Why isn't it carbon steel?

22 DR. GARDINER: I will gladly defer.

23 MR. ANDERSON: Back in VA, we had carbon  
24 steel on the outside, and Alloy-22 on the inside.  
25 When we went through a license application we had nine

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1 selections, and a number of different options were  
2 looked at.

3 And one of them was the Alloy-22 on the  
4 outside and the carbon steel on the inside. And, you  
5 know, I just can't remember exactly what the  
6 motivation for that was.

7 It certainly is described in the license  
8 application and design selection reports. It was an  
9 issue I think of material compatibility, and oh, we  
10 have another volunteer.

11 MR. TURNER: My name is Joe Farmer from  
12 Livermore. I remember some of those discussions, and  
13 I think that we had received quite a lot of criticism  
14 for putting in a carbon steel possible generation of  
15 ferric ions and the like, and there was also concern  
16 as I recall about what was referred to as inside-out  
17 corrosion, and the possibility of wetness.

18 And I think that there was a feeling at  
19 the time that if they picked the more corrosion  
20 resistant material for the inner-barrier -- and you  
21 are right. It was picked as a structural support, and  
22 not as a corrosion resistant material, and they are  
23 not claiming any credit, per se, but they thought it  
24 might be a better material for trying to construct  
25 this inner-container that actually holds the fuel.

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1 MR. ANDERSON: I think another thing is  
2 that at that time there was some hope that there could  
3 be some credit taken for the stainless steel inner-  
4 shell as another frozen barrier. Since that time,  
5 that has gone by the wayside.

6 MR. LEVENSON: When you move from a wet to  
7 a dry handling system, you reduce the probability of  
8 inside corrosion, too.

9 MR. ANDERSON: Yes.

10 MR. LEVENSON: Another question that I  
11 have is

12 -- and this is just for information. But I am not  
13 sure how you define site, and what I mean by that is  
14 could your off-site training facility be on the MTS?

15 DR. GARDINER: Yes, it could.

16 MR. LEVENSON: I am trying to find out  
17 what you are defining as site here.

18 DR. GARDINER: I think there is certainly  
19 going to be a lot of factors involved in that. One is  
20 accessibility to the people that we want to train, and  
21 access to utilities and other things that are needed  
22 to support that facility.

23 It may depend somewhat on the surrounding  
24 community, and what their facilities and their  
25 approach to things are. So there is lots of options,

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1 and there is lots of areas where maybe we can gain  
2 benefits, not only to us, but maybe to others  
3 associated. And there is a regulatory aspect.

4 DR. ZIEGLER: Joe Ziegler, DOE, again.  
5 The site in 10 CFR 63 is the place where the  
6 preclosure dose limits were measured at the site  
7 boundary, and so I think what we are talking about is  
8 somewhere outside of that boundary, where you measure  
9 your preclosure does limit requirements, and it could  
10 be on property only controlled by the Yucca Mountain  
11 project.

12 It could be on test sites, and it could be  
13 on private property, and I think there is various  
14 opportunities to work within the community for each of  
15 those to be a viable option.

16 DR. GARDINER: I think another added  
17 comment to that is that due to regulations we are  
18 limited on what work we can or cannot do on the site  
19 as it relates to the repository.

20 So if we can somehow hasten develop of  
21 some facilities that are beneficial, and if we can go  
22 elsewhere to build those so that we are not under the  
23 set of regulations, why that is a benefit also.

24 MR. LEVENSON: I am a little curious. I  
25 understand needing to store some fuel to give you

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1 flexibility for the aging option. But 40,000 metric  
2 tons is more than half the total that you are going to  
3 place in there over a hundred years or so. Is that a  
4 rational number to use for design basis?

5 DR. GARDINER: It is a rational number  
6 when you start getting out to the retrieval stage and  
7 so this is a long term look at things. It is not  
8 necessarily saying that we were expecting, or needing,  
9 or even planning to use that much. But we looked at  
10 our site, and said, hey, what are our capabilities and  
11 capacities overall.

12 MR. LEVENSON: If you find it for  
13 retrieval, it is a whole separate thing. On the  
14 slide, it is under aging option.

15 DR. GARDINER: We have gone through some  
16 changes on what the heat output of a waste package can  
17 be, and we also have to look at the bounding scenario,  
18 and since we cannot control what the utilities will  
19 send us, we could get a whole lot of very hot fuel  
20 coming initially. And that would give us some real  
21 problems on processing.

22 MR. LEVENSON: There is no way you can get  
23 40,000 metric tons in the near term. There just isn't  
24 that much.

25 DR. GARDINER: No, I agree.

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1 MR. LEVENSON: It can't be produced.

2 DR. GARDINER: I agree.

3 MR. LEVENSON: I mean, when we do  
4 performance assessments, it is okay to double or  
5 triple something because for conservatism it is just  
6 paper. You start engineering and building stuff, and  
7 you use unrealistic numbers, and you are wasting  
8 taxpayers' money in a big way.

9 The surface facilities, what we are  
10 looking at here is not even at the stage of being a  
11 cartoon, and it is just some boxes or squares. What  
12 will be the stage of the design for the above-ground  
13 facilities by the time of the license application?

14 Will the concepts of things like material  
15 handling and viewing, and ventilation control, and all  
16 those sort of things, will they have all been  
17 developed by then?

18 DR. GARDINER: Most definitely. We are  
19 primarily concentrating on the things that are safety  
20 related, and the detail design on those will be very  
21 extensive.

22 Items that are not safety related will  
23 have a lesser degree of completion, but still will be  
24 adequate to demonstrate to the NRC how the system will  
25 operate.

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1                   We will have mechanical flow diagrams and  
2 we will have PNIDs, and we will have substantial  
3 supporting documentation for that.

4                   MR. LEVENSON:    You are acting as my  
5 straight man.  What is your definition of safety in  
6 this concept?

7                   DR. GARDINER:  The quality classifications  
8 that we have proceduralized.

9                   MR. LEVENSON:  I'm sorry, but I am not  
10 understanding your answer.  Is it related to public  
11 safety or is it occupational safety of the single  
12 worker, et cetera.

13                   DR. GARDINER:  We have classifications  
14 that handle and deal with both of those situations  
15 that you mentioned, and so we have quality  
16 classifications, like one, two, and three, which deal  
17 with dose to the public, worker dose, and other  
18 things.

19                   It is pretty well laid out in our  
20 procedures, and if someone needs to make a venture on  
21 explaining the whole thing, then I think --

22                   MR. LEVENSON:  Well, I mean, I understand  
23 that.  My question really is which or how much of that  
24 will you have done by license application?

25                   DR. GARDINER:    Okay.    We will be

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1 consistent with the Yucca Mountain Review Plan, where  
2 the NRC is expecting a certain level of detail, and we  
3 will provide that at that point in time.

4 In some cases, it may be almost a complete  
5 or final design, and in other cases we may be at the  
6 30, 40, or 50 percent level as far as what we feel is  
7 adequate to describe the system.

8 But let me have Gene Rowe a little bit.

9 MR. ROWE: As I indicated before, someone  
10 asked a question about critical path, and I indicated  
11 that the critical path was developing the design  
12 sufficient that we could do our event sequence  
13 evaluation.

14 Those event sequences are sequences that,  
15 one, lead to an off-site dose, and, two, lead to a  
16 worker dose. That will be very mature, and I don't  
17 want to say anything more than that.

18 But we will have identified dose systems  
19 that are critical to safety for both the worker and  
20 the off-site dose point of view.

21 MR. LEVENSON: Well, do the credible  
22 accident scenarios come in at that some point, too?

23 MR. ROWE: Yes.

24 MR. LEVENSON: I mean, in much more  
25 detail?

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1 MR. ROWE: Yes. That is the process, and  
2 that is what will define what items are critical to  
3 safety, and that will define the level of detail that  
4 we will provide in the license application.

5 MR. LEVENSON: This is a first of a kind,  
6 and while there have been a lot of hot cell operations  
7 say for a lot of years, the weight and size of what  
8 you are going to be handling here is something  
9 significantly different.

10 That means that there is certainly no off  
11 the shelf equipment that you can buy. Is there an  
12 equipment development program in back of this that  
13 supports this activity, or is it going to be first  
14 generation equipment that goes into this facility

15 DR. GARDINER: That's one reason why we  
16 wanted to develop an off-site facility, so we can  
17 start doing prototyping and test this type of  
18 equipment. Yes, we feel that it is very essential.

19 We have it in our budget for proposed high  
20 heat waste package elements for items like you have  
21 seen here. And, yes, it is very critical to us. It  
22 would be I think very wrong to proceed much further  
23 down the road until we have that type of prototype  
24 information.

25 MR. LEVENSON: Well, I guess as far as

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1 update goes, there is more to come than we have seen  
2 to date.

3 DR. GARDINER: Yes.

4 MR. LEVENSON: Staff.

5 MR. LEE: Mike Lee, ACNW staff. For drift  
6 excavation, are you going to use the tunnel boring  
7 machine that you currently have that you use for  
8 cross-drift? That is like the 18 foot diameter?  
9 Well, I guess I have kind of a two-part question. Are  
10 you going to use that one, and then if so, what is the  
11 preferred method for excavation for the cross-drift?

12 Is it going to be TBM or drill and blast?  
13 And if it is TBM, are you going to use the existing  
14 TBM that you have, or do you plan on getting another  
15 one as a back-up, or has that kind of worked into your  
16 decision making?

17 DR. GARDINER: Go ahead, Alan.

18 MR. LINDEN: Basically for the emplacement  
19 drifts, we are planning the TBM. The TBM that we have  
20 right now with the DCRB is slightly smaller than what  
21 the emplacement drifts are scheduled to be. So we  
22 will be getting new TBMs.

23 And basically for the life of the  
24 repository, there will probably be a number of TBMs,  
25 but they will all essentially be the same size.

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1 MR. LEVENSON: Tim.

2 MR. GUNTER: I have a question. When the  
3 utilities would be sending out to you dual-purpose  
4 cases, ones that we they had on their pads, and  
5 loading the metal canister, and that canister was just  
6 transferred to a shipping cast, and then to be shipped  
7 out to your facility.

8 Then you take that and you unload the  
9 canister out of the shipping cast, and you open it up,  
10 and you take the fuel out, and you put that into the  
11 waste package. It is going to go into the mountain.

12 What do you do with the canister then that  
13 came from the utility? The shipping package goes back  
14 somewhere to move fuel from someplace else, but you  
15 are going to have hundreds probably of these other  
16 canisters.

17 DR. GARDINER: Right. That is a  
18 disposable problem that we are dealing with. There is  
19 a couple of low level disposal sites around the  
20 country. Of course, we have one right on NTS that we  
21 are looking at as potential use.

22 We have made a site visit out there and  
23 they certainly have plenty of room. The costs  
24 involved with that are from a national standard are  
25 very reasonable as far as cost per cubic foot and that

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1 type of thing.

2 So hopefully if things work out and  
3 negotiations work, the Nevada Test Site may be a  
4 potential site to dispose of those. We will have to  
5 haul them, yes, from our surface facilities to the  
6 NTS.

7 If not, and if that is not a final  
8 location, they may have to go back east. There is a  
9 location or two back east. I do not know if either of  
10 those are a possibility or not.

11 DR. RYAN: To as a follow-up question.  
12 Where will you process these for disposal?

13 DR. GARDINER: We will process them on-  
14 site. We have a waste treatment building facility  
15 that we plan to build.

16 DR. RYAN: There was a comment this  
17 morning in one of the other presentations that you are  
18 not going to process waste on-site. I mean, I know  
19 that you are not going to deal with incoming fuel in  
20 any way, and so you will have low level waste  
21 processing on-site?

22 DR. GARDINER: That's correct.

23 DR. RYAN: And you are going to  
24 characterize the process.

25 MR. ROWE: What we are looking at is

1 having minimal on-site facilities to process waste,  
2 and we are not going to go with the evaporators for  
3 the liquid RAD waste. We might have some compaction  
4 for some of the solid RAD waste.

5 We are looking at trying to find a vendor,  
6 and as a matter of fact, there is a vendor at NTS that  
7 services NTS that will do the actual processing. We  
8 don't want a large processing facility.

9 DR. RYAN: If he is going to be cutting up  
10 the baskets, that is a little bit more.

11 MR. ROWE: The plan right now is not to  
12 cut up the baskets and dispose of them. Again, it  
13 will probably be a subcontract to a vendor to dispose  
14 of them. We don't want to get into the low level  
15 waste business.

16 MR. LEVENSON: Does the staff have  
17 questions?

18 (No response.)

19 MR. LEVENSON: Does anyone else have  
20 questions or comments? If not, I will turn it back to  
21 our august chairman, or maybe this time it is our  
22 September chairman.

23 CHAIRMAN HORNBERGER: Okay. Thanks very  
24 much. That was a good update presentation, and we  
25 look forward to hearing more as the design phase does

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1 move forward.

2 DR. GARDINER: Well, thanks for going easy  
3 on me.

4 CHAIRMAN HORNBERGER: I did want to ask if  
5 there were any other comments or questions on anything  
6 that we have heard this morning? Judy.

7 MS. TREICHEL: Judy Treichel, Nevada  
8 Nuclear Waste Task Force. I just have to say that an  
9 awful lot of what you have heard is extremely  
10 enthusiastic, and I think you are probably right to  
11 ask money questions, because there is a tremendous  
12 amount of money.

13 And if you look at what is going on right  
14 now, it is just going up really fast within the next  
15 few years, and people are afraid that so much has been  
16 spent on this project that maybe it couldn't stop.

17 But if you look at what is coming up, and  
18 particularly with the new numbers that we have seen in  
19 the press for the military waste, you are looking at  
20 hundreds of billions of dollars now instead of what  
21 has just gone in it.

22 So it is actually pretty small, but we in  
23 Nevada believe of course that the place wasn't even  
24 ready to be recommended, and I think a lot of what you  
25 have seen here is why that is the case.

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1           It certainly to me as far as you being a  
2 regulator, or an organization that would put a license  
3 on this thing, if you are concerned about money, this  
4 is like buying something that -- and the statement was  
5 made that I wouldn't buy a house that wasn't designed  
6 even more than this.

7           This is like buying something way bigger  
8 than a house, and I believe that this project will  
9 probably take as much money as anybody has for as long  
10 as they are willing to throw it at it.

11           So to even consider a license application,  
12 it seems very strange to me at this particular time,  
13 and I think you would have a much more interesting  
14 reading than reading the presentation that was given  
15 on the EIS.

16           If you read the State's lawsuit  
17 challenging the EIS, which it is hard to believe that  
18 it is the same thing that was getting such glowing  
19 reviews. But with the situation that we are in right  
20 now, where things go along and everybody is going to  
21 put a fix in later, the public really never has any  
22 sort of options.

23           And it all just sort of leads to lawsuits,  
24 and we in Nevada have different financial concerns.  
25 We pay Federal taxes, some of which go into the

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1 military waste disposition budget, because that is  
2 Federal taxpayer money.

3 And we also pay from our State taxes for  
4 these lawsuits. So we are sort of paying twice, too,  
5 and we are willing to do that because we think it is  
6 worth doing.

7 And then the only other thing that I  
8 wanted to say was that I not only think that you  
9 should be extremely cautious about proceeding on  
10 towards licensing, and awfully cautious about your  
11 relationship with the Department of Energy, because  
12 the NRC is working very hard.

13 They come out here and they have little  
14 meets and greets, and little cookies and get  
15 together, and so forth to try and show Nevadans who  
16 they are, and how they work.

17 And the message has not gotten through  
18 lately. I got this from one of the t.v. stations  
19 here, and I have had it for about a week because last  
20 week the NRC came out to do an open house for the on-  
21 site reps, and Janet Slater was here, and so forth,  
22 and I was working around the house on Saturday doing  
23 stuff and they were doing the promos for the evening  
24 news.

25 And they kept saying that if you want to

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1 hear what the nuclear industry is going to do to  
2 soothe public fears, tune in at 6:00. And I kept  
3 wondering what in the world, and I thought that the  
4 nuke guys had come up with some wacky benefit deal or  
5 something.

6 And it turned out that the news clip was  
7 while Nevada waits for the Yucca Mountain issue to go  
8 to court, the nuclear industry wants to soothe public  
9 fears over the safety of the proposed radioactive  
10 waste site. Next week they are hosting a public  
11 meeting where you can learn more about Yucca Mountain  
12 and meet with representatives of the Nuclear  
13 Regulatory Commission.

14 So I think you need to be aware, and I  
15 will give you a copy of this thing, and I found out  
16 that the press release wasn't badly written. There is  
17 just an assumption here that DOE, and the nuclear  
18 industry, and the NRC, are all sort of parts of one  
19 thing.

20 And it is hard sometimes not to believe  
21 that. We see in the paper last night where the nuke  
22 industry, NEI, is going to try and help DOE in any way  
23 that it can to get its license application written  
24 because the poor agency ran out of their attorney firm  
25 for big problems that they had.

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1           And you saw John Kessler, who was part of  
2 the NEI's comments on the review plan here yesterday,  
3 sort of trying to work on getting that review plan a  
4 little bit easier as a hurdle to go over.

5           So you have got the industry working on  
6 the NRC to try and soften down, and helping DOE to  
7 sort of wrap up and to beat their time by a year, and  
8 to help them with their license application.

9           And the public sort of falls out in the  
10 center, and they are having a really hard time trying  
11 to figure out who is who, but they realize that the  
12 court is their avenue of first resistance, and I think  
13 you probably all know what the avenue of least or last  
14 resistance is.

15           The final fallback is to just plain fight  
16 any way you can. So, thank you.

17           CHAIRMAN HORNBERGER: Thank you, Judy.  
18 Let's see. We have another commenter.

19           MR. SHETTEL: Don Shettel, for the State  
20 of Nevada. My comment is not as political, but more  
21 scientific, and a follow-up to perhaps some of my  
22 questions on bacteria from yesterday.

23           But it seems from Joanne's talk that they  
24 make the assumption that perhaps there is enough  
25 radiation field from the waste package to sterilize us

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1 forever, and I don't think that is a valid assumption.

2 I think that the radiation field being  
3 emitted from the waste package will vary over time,  
4 and at some point in the life of the repository the  
5 radiation field will not be sufficient to kill most of  
6 the bacteria.

7 And at that point, genetic mutations are  
8 possible, and thus my question is at time does the  
9 radiation field -- when does that become possible, and  
10 what is the time line after closure of the repository  
11 that that will occur?

12 CHAIRMAN HORNBERGER: That is of course a  
13 question that would have to be addressed ot the  
14 Department of Energy people who are doing the studies  
15 on microbial induced corrosion, and the performance  
16 assessment.

17 I don't think that there is anyone here to  
18 answer that question.

19 MR. SHETTEL: I can leave a business card  
20 with somebody if they want to put Joanne or somebody  
21 in contact with me.

22 MS. HANLON: Carol Hanlon, Department of  
23 Energy. You know, we have Joe Farmer here who may  
24 want to add something, but I recall that I took notes  
25 yesterday about one of the things that Joanne said,

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1 which was that initially they expected the radiation  
2 and heat to sterilize the canisters and the  
3 environment.

4 And that subsequently as it cooled, and  
5 there was less radiation, they expected that microbes  
6 would be reintroduced. So I do think if we revisit  
7 the record from yesterday, we will find that Joanne  
8 made those comments. Joe, would you like to answer  
9 that? Joe Farmer.

10 MR. SHETTEL: My question is what is the  
11 radiation level, and what is the time frame into the  
12 10,000 year regulatory period that that would occur?

13 MR. FARMER: Well, let me see. To begin  
14 with, I believe that -- I wasn't here yesterday for  
15 Joanne's talk, but I am familiar with Joanne's work  
16 for some number of years.

17 I don't think that the TSPA assumes that  
18 the waste packages are sterilized. In fact, there is  
19 a corrosion enhancement factor in the TSPA code that  
20 assumes that -- well, it doesn't assume. It is  
21 actually based on some of Joanne's measurements.

22 And that enhancement factor takes for each  
23 wipe deck patch, I think it enhances the corrosion  
24 rate, assuming that you do in fact have the worst-case  
25 scenario for microbial influence corrosion.

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1           So in the current TSPA calculation, I  
2 believe that microbial influenced corrosion is assumed  
3 to occur throughout the entire waste package life,  
4 because for the very reasons that you mentioned, we  
5 realized that we couldn't determine whether or not  
6 these microbes are mutated over thousands of years, or  
7 whether or not they would live or die.

8           So we just took the worse rates, and the  
9 most aggressive rates that Joanne was able to measure,  
10 and we applied those to the waste package.

11           CHAIRMAN HORNBERGER: Okay. Are there any  
12 further questions? If not, thank you all for --

13           MS. HANLON: Just one more point. We had  
14 Jim Houseworth join us, and I think on the tour there  
15 were some questions that came to some of the testing  
16 that was going on in the tunnel, and there were  
17 questions that I think we said we would try and get in  
18 touch with Bo or with Jim.

19           Jim has taken the morning to join us and  
20 so if there are any remaining questions, Jim is here,  
21 and I'm sure that he would be happy to answer them.

22           CHAIRMAN HORNBERGER: Does anyone from the  
23 Committee remember the questions that were unanswered  
24 on the tour? I think that we have probably forgotten  
25 which ones had.

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1 MS. HANLON: As I recall, it would be  
2 related probably to the testing going on in the niches  
3 and the cross-drift.

4 CHAIRMAN HORNBERGER: Okay. Let's see.  
5 In the cross-drift. Well, the only question I can  
6 remember was that I had asked a question on --

7 MS. HANLON: Jim said there was Alco-8 at  
8 niche-3 that Mark Peters thought that we had questions  
9 on.

10 CHAIRMAN HORNBERGER: Right. So the only  
11 ones I can remember were the ones that I asked, and  
12 they related to the testing relative to unsaturated  
13 conditions, rather than ponding conditions.

14 MR. HOUSEWORTH: Jim Houseworth, Lawrence  
15 Berkeley Lab. I believe you are talking about the  
16 Alco-8 niche-3 test where we do have a ponded  
17 infiltration test going on in that large plot.

18 We have a couple of reasons for starting  
19 with that, and that I should point out that the test  
20 plan starts with a ponded infiltration condition, and  
21 after we get some measurements based on that, then we  
22 will step down in rate and we will go to an  
23 unsaturated condition in that test.

24 And so we will ultimately get unsaturated  
25 flow and transport information from the test. The

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1 reason for going first to a ponded condition is that -  
2 - well, there are a few reasons actually. First of  
3 all, it gives the quickest response.

4 And we do want to see before we spend a  
5 lot of time on the test whether you have a connection  
6 between Alco-8 and niche-3, and it is also the case  
7 where you would expect to be able to see whether you  
8 can get dripping or not.

9 And we have shown that that will occur now  
10 with this test. It also gives you the hydraulic  
11 conductivity of the test bed, which is an unknown, and  
12 if you don't know that, you can't do a rate controlled  
13 unsaturated test until you know that information.

14 And then finally if the test is mainly  
15 intended to look at transport, and if you don't let up  
16 the matrix, and you are doing an accelerated test, you  
17 will have a lot of matrix inhibition going on that  
18 would mask any effect of diffusion, which is the  
19 principal mechanism that we wanted to investigate in  
20 the test.

21 So it allows you to look at that mechanism  
22 independent of the matrix in the inhibition process.

23 CHAIRMAN HORNBERGER: So actually that  
24 does help. What I recall when we were on the tour was  
25 that the reason that I asked that question was that

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1 there was some indication that you had attempted an  
2 unsaturated test that was not successful.

3 Now what you are telling me is that you  
4 are doing this in a staged fashion, and that all makes  
5 sense.

6 MR. HOUSEWORTH: Yes. Well, there was a  
7 preliminary test that we ran on the fault. If you  
8 recall in the back of Alco-8 there is a trench with  
9 water on it. And we ran that under saturated  
10 conditions, and then we did go to an unsaturated  
11 condition test.

12 And we didn't see a response to dripping  
13 under the unsaturated condition test, and because the  
14 main focus of the overall test was not the fault, but  
15 it was the fractured rock, we decided that rather than  
16 spending more time on that test at this time, we would  
17 move to the large plot of fractured rock mass.

18 CHAIRMAN HORNBERGER: There was one  
19 related question to this, and that was someone had  
20 raised the question as to what degree of -- well,  
21 actually, the term was used that the saturated tests  
22 were being used to validate the unsaturated model, and  
23 the question that somebody had raised was how can you  
24 use a saturated test to validate an unsaturated model.

25 MR. HOUSEWORTH: Well, ideally you would

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1 be able to run the test at the flow rate and  
2 conditions that we expected in the future under  
3 repository conditions. But in a test that has 20  
4 meters of rock between it and the injection point, and  
5 the collection point, we couldn't possibly hope to run  
6 this at those conditions.

7 Now, we will as I said run some  
8 unsaturated condition tests there. The saturated  
9 condition test is still useful. For example, in the  
10 flow model, although the rates on average are very low  
11 across Yucca Mountain, there is a wide variety of  
12 rates that occur locally in the model and presumably  
13 also in nature.

14 And because of that, you need to be able  
15 to operate over a wide range. Now, probably that is  
16 an extreme case when you get up to saturated  
17 conditions, but there is -- you range from a few  
18 millimeters per year in some locations, to thousands  
19 of millimeters per year in other locations, and this  
20 is in that category of thousands of millimeters per  
21 year. That is about the rate that they are putting  
22 water in now.

23 So it is on that boundary of what we need  
24 to know, but it is probably an area that is important,  
25 and that those higher rate areas are probably what

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1 will control the earliest transport and arrival times  
2 of radio nuclides out of the repository.

3 CHAIRMAN HORNBERGER: Anyone else?

4 MS. HANLON: Carol Hanlon again. I would  
5 just like to call your attention to the USFIC  
6 unsaturated and saturated flow in transport key  
7 technical issue. And one of the agreements that we  
8 had was referring to Alco-8.

9 And Jim is going to correct me whenever I  
10 say something wrong. And the agreement that we put  
11 into that committee report, that report, was the fact  
12 that we would give the test plan for the phase  
13 procedures. So if you wanted to revisit, I think that  
14 you have all of those.

15 And then you can revisit the phasing in  
16 the test plan. Those were reviewed by the NRC staff,  
17 and we took their comments in, and reflected those in  
18 the testing. And I think Neal Coleman is also back  
19 there. Is that correct?

20 CHAIRMAN HORNBERGER: Very well. Staff,  
21 any questions or enlightenment on our tour? Okay. I  
22 think then what we are going to do is break, and we  
23 are actually going to break until 1:30.

24 Furthermore, when we reconvene at 1:30, we  
25 will not need the recorder. We will need the recorder

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1 starting at 3:00. You will recall that I had  
2 suggested that we will move up our stakeholder  
3 interaction time from 3:00 to 4:00.

4 We will need the recorder for that period,  
5 but not for the period between 1:30 and 3:00. Between  
6 1:30 and 3:00, the committee will be considering  
7 reports. We are adjourned until 1:30.

8 (Whereupon, the proceedings went off the  
9 record at 12:02 p.m. and resumed at 3:00 p.m.)

10 CHAIRMAN HORNBERGER: We are now going to  
11 go on the record. We are in session. Again, as I  
12 indicated earlier this is the time when we have opened  
13 the meeting for comments from anyone who wishes to  
14 make a comment.

15 Anyone from the public, from the  
16 Environmental Protection Agency, from Nye County,  
17 anyone at all. Does anyone wish to make a statement,  
18 or raise an issue for the record?

19 (No response.)

20 MR. LEVENSON: We sort of have a loose  
21 end. John had asked about approval to possibly attend  
22 the meeting, and I don't think we responded to the  
23 question. I think we should go on the record saying  
24 that it is okay if he wants to do it.

25 DR. GARRICK: Oh, you mean the SRA

1 meeting?

2 CHAIRMAN HORNBERGER: John Garrick has  
3 suggested that he may want to attend the Society for  
4 Risk Analysis, and I think that would be a good idea.  
5 We can do this off the record. So I am going to  
6 adjourn this meeting. Meeting adjourned.

7 (Whereupon, at 3:03 p.m., the meeting was  
8 concluded.)

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CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on  
Nuclear Waste 137<sup>th</sup> Meeting

Docket Number: N/A

Location: Las Vegas, Nevada

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

  
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