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**OFFICIAL TRANSCRIPT OF PROCEEDINGS**

**NUCLEAR REGULATORY COMMISSION**

**ADVISORY COMMITTEE ON NUCLEAR WASTE**

**Title: MEETING: 120TH ADVISORY  
COMMITTEE ON NUCLEAR WASTE  
(ACNW)**

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UNITED STATES NUCLEAR REGULATORY COMMISSION'S  
ADVISORY COMMITTEE ON NUCLEAR WASTE

JULY 26, 2000

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Nuclear Waste, taken on July 26, 2000, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

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

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2 UNITED STATES OF AMERICA  
3 NUCLEAR REGULATORY COMMISSION

4 \*\*\*

5 ADVISORY COMMITTEE ON NUCLEAR WASTE  
6 120TH ACNW MEETING

7 \*\*\*

8  
9 Nuclear Regulatory Commission  
10 Room T2B3  
11 Two White Flint North  
12 11545 Rockville Pike  
13 Rockville, Maryland

14  
15 Wednesday, July 26, 2000  
16

17 The Commission met in open session, pursuant to  
18 notice, at 8:30 a.m., THE HONORABLE DR. B. JOHN GARRICK,  
19 Chairman of the Committee, presiding.

20 MEMBERS PRESENT:

21 DR. JOHN B. GARRICK, Chairman  
22 DR. GEORGE W. HORNBERGER, Vice Chairman  
23 DR. RAYMOND G. WYMER  
24 MR. MILTON N. LEVENSON  
25

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1 ALSO PRESENT:

2 DR. JOHN T. LARKINS, Executive Director, ACRS/ACNW

3 MR. HOWARD J. LARSON, Acting Associate Director, ACRS/ACNW

4 MR. RICHARD K. MAJOR, ACNW Staff

5 MS. LYNN DEERING, ACNW Staff

6 MR. AMARJIT SINGH, ACNW Staff

7 DR. ANDREW C. CAMPBELL, ACNW Staff

8 LISA GUE, Public Citizen

9 ERIC SMISTAD, Yucca Mountain Site Characterization Office,  
10 DOE

11 CAROL L. HANLON, Yucca Mt. Site Characterization Ofc., DOE

12 KING STABLEIN, High-Level Waste Branch, NRC

13 DAVID BROOKS, High-Level Waste Branch, NRC

14 JEFFREY POHLE, High-Level Waste Branch, NRC

15 PHILIP JUSTUS, High-Level Waste Branch, NRC

16 JOHN BRADBERRY, High-Level Waste Branch, NRC

17 MERAJ RAHIMI, High-Level Waste Branch, NRC

18 BRET LESLIE, High-Level Waste Branch, NRC

19 MYSORE NATARAJA, High-Level Waste Branch, NRC

20 JAMES FIRTH, High-Level Waste Branch, NRC

21 JOHN TRAPP, High-Level Waste Branch, NRC

22 BILL REAMER, High-Level Waste Branch, NRC

23 MARK SELLARS, U.S. Department of Energy

24 ERNEST LINDNER, U.S. Department of Energy

25 ROBERT ANDREWS, U.S. Department of Energy

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1 ALSO PRESENT:

2 LARRY HAYES, U.S. Department of Energy

3 GUSTAVO CRAGNOLINO, Ctr. for Nuclear Waste Regulatory  
4 Analysis

5 MARTIN VIRGILIO, Ofc. of Nuclear Material Safety &  
6 Safeguards

7 RICHARD TURTIL, Ofc. of Nuclear Material Safety & Safeguards

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

[8:30 a.m.]

1 DR. GARRICK: Good morning.

2 The meeting will come to order.

3 This is the second day of the 120th meeting of the  
4 Advisory Committee on Nuclear Waste.

5 My name is John Garrick, Chairman of the ACNW.

6 Other members of the committee include George  
7 Hornberg, Ray Wymer, and Milton Levenson.

8 The entire meeting will open to the public.

9 Today the committee will hear from the Department  
10 of Energy on the performance confirmation program for the  
11 proposed repository at Yucca Mountain, Nevada, present an  
12 update on Yucca Mountain Key Technical Issues resolutions  
13 strategy, prepare for the next public meeting with the  
14 Commission, currently scheduled for October 17th, and meet  
15 with Martin Virgilio, Deputy to the Director of the Office  
16 of Nuclear Materials and Safeguards to discuss items of  
17 mutual interest.

18 Richard Major is the designated Federal official  
19 for the initial portion of today's meeting.

20 This meeting is being conducted in accordance with  
21 the provisions of the Federal Advisory Committee Act.

22 We have received no written statements from  
23 members of the public regarding today's session.

24  
25  
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1           Should anyone wish to address the committee,  
2 please make your wishes known to one of the committee's  
3 staff.

4           It is requested that each speaker use one of the  
5 microphones, identify himself or herself, and speak with  
6 sufficient clarity and volume so that he or she can be  
7 readily heard.

8           Our first presenter today is going to be Eric  
9 Smistad.

10          The committee member that's going to lead the  
11 discussion on performance confirmation will be Milt  
12 Levenson.

13          Milt, do you have any introductory remarks?

14          MR. LEVENSON: Good morning.

15          Just a couple of comments.

16          It's my understanding that the presentation this  
17 morning is for information only, and it's also my  
18 understanding that the general requirements for the  
19 performance confirmation plan are to measure, wherever  
20 practical, any sub-surface condition and changes in those  
21 conditions during construction and waste placement to assure  
22 they're within limits assumed in the licensing review.

23          Since we don't yet have a licensing application,  
24 we have to make maybe some assumptions as to what DOE will  
25 put in the license application, and also review those things



1 that might be necessary or assumed to function after  
2 closure.

3 This program goes from the time of starting to  
4 build a repository until it's permanently closed.

5 There was also a general requirement that any time  
6 during this period in which changes occurred, the Commission  
7 would be notified as to any changed condition that might  
8 lead to a change in design requirements.

9 I don't know if we're at that stage or not, but  
10 maybe that's another issue to keep in mind as we go through  
11 this proceeding.

12 And with that, Eric, if you're ready.

13 MR. SMISTAD: Good morning.

14 My name is Eric Smistad. I am the DOE functional  
15 manager for the performance confirmation plan and program.

16 Just a couple of words of introduction here.

17 We have a performance confirmation plan that's on  
18 the street now. It's Rev. 1. It was approved in May, and I  
19 think maybe the committee has copies of that already.

20 Since this is a Rev. 1, we are early on in the  
21 development of the plan and, indeed, the program. So, a lot  
22 of the details that will eventually be in this plan are not  
23 there yet.

24 We anticipate incorporating -- and I'll talk about  
25 this in the pitch here in a minute -- incorporating a lot

1 more detail next year and in subsequent revisions of the  
2 plan.

3 We also have some folks out west, in Vegas there.

4 You guys awake?

5 A couple of the authors of the plan and some other  
6 folks, in case we get into some real detailed questions on  
7 the plan and the input to the plan.

8 What I want to do today is to walk through a  
9 definition of the performance confirmation as we understand  
10 it, describe the process that we went through in developing  
11 the plan and its relationship to the overall testing program  
12 that we have and will have in the future, describe elements  
13 of the program, and then give a status and path forward.

14 The definition we're working with, straight out of  
15 Draft 63.

16 There's a lot in this definition. I'll just go  
17 ahead and read it.

18 Performance confirmation means the program test,  
19 experiments, and analyses as conducted to evaluate the  
20 accuracy and adequacy of the information used to determine  
21 with reasonable assurance that the performance objective  
22 will be met.

23 Like I say, it is a broad definition, but that is  
24 the definition we're working with.

25 Further in 63, at section 131, there is some

1 fleshing out of requirements for the definition itself.

2 It must focus on items that are important to  
3 post-closure safety, and it must indicate where the  
4 sub-surface conditions and changes during construction and  
5 waste emplacement may affect what has been established in  
6 the license application and whether the natural engineered  
7 barriers are functioning as we anticipate or had predicted,  
8 and as Milt mentioned earlier, it starts during site  
9 characterization and ends at closure.

10 DR. HORNBERGER: Eric, if I can interrupt just a  
11 second, is there any provision in Draft 63 anywhere for  
12 long-term monitoring following closure? Do you know?

13 MR. SMISTAD: I believe those words are in there,  
14 so there is a requirement, and we, in fact, intend to do  
15 that.

16 Aspects of the program here -- don't pay too much  
17 attention to the pie here. It's not a comparison thing,  
18 it's just an illustration.

19 This is intended to illustrate the entire test and  
20 evaluation program. There is obviously a lot more to it  
21 than I have got on this slide, but the point here is that  
22 the performance confirmation program which is outlined here  
23 in this black outline is part of an overall test and  
24 evaluation program.

25 There are essentially two components to the

1 performance confirmation program -- inputs, if you will --  
2 the testing of factors important to performance through our  
3 TSPA, one major component, and the other is the regulatory  
4 piece, inputs from the regulatory -- the regulation.

5 This piece of the pie here represents the  
6 remainder of the test and evaluation program.

7 I won't go into detail on that program, but it  
8 really involves engineering, design, prototype testing,  
9 start-up testing, that sort of thing.

10 Some additional aspects of our program:

11 We will, indeed, comply with the requirements in  
12 Draft 63 or 63, and we will focus on the areas that are  
13 important to post-closure performance, and this is done  
14 through the TSPA, as communicated in the RSS, and I think  
15 you had a presentation on the RSS earlier.

16 These are factors, principle factors from RSS 3.  
17 There is an RSS 4 coming up. That's going to be published  
18 at the end of August.

19 And as I said, the basis for these principle  
20 factors are firmly established in the -- from TSPA and  
21 communicated in the RSS.

22 So, we are focusing on post-closure performance to  
23 set this program up.

24 A little more on inputs here -- I have a flow  
25 diagram.

1           Essentially, two or three classes of inputs here  
2 -- 63, obviously, and regulatory commitments here, as they  
3 are communicated in the KTIs.

4           Our of 63 comes the regulatory requirements, and  
5 those can feed directly into the performance confirmation  
6 plan, and I have the RSS here.

7           The strategy or the intent behind the RSS is to  
8 satisfy the regulation, to communicate those areas that are  
9 important to post-closure performance.

10           TSPA feeds the strategy, and out of this comes the  
11 plan itself.

12           I've got a box here at the end, detailed test  
13 plans and packages.

14           We're not there yet. That will be a separate --  
15 separate publications, if you will, of the details of the  
16 tests themselves.

17           Process -- this slide is a little involved, and I  
18 hope I don't myself wrapped around the axle here.

19           Starting with the repository safety strategy, we  
20 identify the processes that are important to performance,  
21 and again, this is driven by TSPA.

22           Out of that, we identify the parameters that we  
23 want to measure related to the processes.

24           If you follow the two arrows shooting diagonally  
25 across the page, we would establish bounds on any given

1 parameter as part of the process.

2 Also at this juncture, if we can go ahead and  
3 anticipate maybe unexpected outcome and start outlining  
4 steps we would take early on if we did have something that  
5 was out of bounds, at least, on an example like this.

6 Following down the page, out of the parameter box,  
7 you would conduct a test, acquire the data, process the  
8 data, and compare that against what you have established as  
9 your predictions, and there are two -- basically two  
10 outcomes from this process.

11 You have an expected outcome and then you're  
12 finished. You can fold that into a compliance argument. Or  
13 you have a unexpected outcome. In the next slide, I'll talk  
14 about outcomes.

15 The first bullet there is if you do confirm your  
16 predictions, you're complete, and you can move, at least  
17 with that process, that parameter related to the process,  
18 towards the closure evaluation on that.

19 The measurement is out of bounds, and it is  
20 significant. It's very important. We've got to determine  
21 through the TSPA if falling out of bounds is, indeed,  
22 significant to the dose.

23 Then there's the four major categories of  
24 corrective actions you could take.

25 You can go ahead and look at your technical basis,

1 your models and your codes themselves, look at the tests  
2 themselves, see if they were conducted properly or executed  
3 properly.

4 You can look at the changes to design or  
5 construction or the effect of that on, perhaps, the test, or  
6 finally, you could get to removal of waste, either in a  
7 limited sense or a full-scale sense.

8 I think I would be remiss if I didn't show  
9 something out of the plan. So, I've got a table of contents  
10 and appendices here.

11 What I really wanted to -- I won't walk through  
12 each one of these chapters or appendices, but I did want to  
13 point out that, in Appendices G, that is where we -- where  
14 the rubber kind of hits the road in this plan.

15 There are test descriptions there. They're more  
16 of a -- they're more along the line of scoping descriptions.  
17 They're not, like I mentioned, the detailed test plans as of  
18 yet. That's in the future.

19 On the next slide, I'll talk about some of the  
20 categories of tests in that appendix.

21 You might recognize the test types here from the  
22 document, if you've seen it, and what I've done is I tried  
23 to bucket these test types in terms of what they're  
24 complying with or driven by.

25 The first box here is the RSS or the TSPA, and

1 these are essentially the principle factors out of RSS 3  
2 rolled into what we're calling testing or monitoring, and  
3 then there's the other main driver, which is regulatory  
4 requirements. You'll recognize some of these out of  
5 sub-part F in 63.

6 There is some overlap. Some of the regulatory  
7 requirements do drive some of these tests here. So, there  
8 is some overlap, but I wanted to give you an idea of the  
9 drivers that we were working with to come up with some of  
10 these scoping tests or test descriptions.

11 A little bit on methodology or locale, essentially  
12 three areas we would be testing in. There would be in situ  
13 monitoring within the repository itself, lab testing, and  
14 field testing, and in fact, we are using these methodologies  
15 today in site characterization.

16 The next few slides I'm going to walk through  
17 examples of each one of those methodologies.

18 I've listed -- for instance, on this in situ  
19 slide, I've gone ahead and listed tests that you saw on one  
20 of the previous slides on test types. I've just gone ahead  
21 and bucketed these in terms of methodology.

22 Just as an example, this diagram here, a cartoon,  
23 is depicting the post-closure simulation, and we talk about  
24 that in a little bit of detail in the plan.

25 This is for the grand-daddy of all tests. It's



1 going to be getting a couple of processes and looking at  
2 that in an environment as close as we can get to the actual  
3 repository.

4 The idea is to emplace real waste or heaters -- we  
5 haven't gotten to that stage yet -- in one of the first two  
6 drifts to give us the longest time possible to look at these  
7 couple of processes, and the drifts will be instrumented,  
8 and there will also be bore-holes, instrumentation similar  
9 to what we have in the heater tests we've got in the  
10 repository now, or in the ESF.

11 Field testing -- we've done quite a little bit of  
12 this in the past. We've done a lot of drilling out at the  
13 site.

14 A couple of examples from the previous slide here  
15 is ground water quality and ground level monitoring and  
16 temperature monitoring of the ground water.

17 You'll see seals testing here, for instance,  
18 driven by sub-part F in this category, as well.

19 I won't go through each test unless you have  
20 specific questions on the tests.

21 MR. LEVENSON: One question.

22 How are you doing the surface uplift monitoring?  
23 Is that being done by satellite?

24 MR. SMISTAD: I think it's being done by remote --  
25 Mark Sellars, are you out there?

1 MR. SELLARS: Yeah, we're here.

2 MR. SMISTAD: Did you hear the question?

3 MR. SELLARS: Yeah, we heard the question, and the  
4 concept for that is GPS-driven.

5 MR. LINDNER: We've been using an extrapolation of  
6 the existing precision level, and it's done across the  
7 country, and we'd hopefully use GPS in the future if it's  
8 accurate enough.

9 MR. SMISTAD: Okay.

10 The idea at this point, in terms of monitoring and  
11 technology, we are anticipating not going into and  
12 developing new technology or doing R&D based on the  
13 performance confirmation program.

14 For instance, the post-closure simulation test I  
15 mentioned before will use -- we're anticipating using  
16 similar instrumentation that we're using in the ESF now for  
17 the heater tests.

18 Laboratory testing:

19 This would involve long-term materials testing,  
20 waste package and drip shield, waste form included, as well,  
21 in long-term testing.

22 Currently, we are testing -- you see materials  
23 sample rack here out at Livermore. Currently, we have -- we  
24 are two years into an alloy C-22 testing program out at  
25 Livermore.

1           Status and path forward:

2           The PC plan and program will evolve for the  
3 license application.

4           I think I mentioned that earlier.

5           We have determined the test types that are in the  
6 plan now and I showed on an earlier viewgraph.

7           Some of the PC testing has occurred during site  
8 characterization. We do have baseline data that we have  
9 gathered and that we will use.

10           The PC testing will be performed concurrent with  
11 construction.

12           We have -- we're doing this now with our testing  
13 program, and we have a process and a program in place to  
14 look at the effects of construction on testing and vice  
15 versa, and it's a program we've had in place for several  
16 years, and it works fairly well.

17           The specific tests will be determined prior to  
18 license application, with the details -- will be developed,  
19 obviously, before the testing begins.

20           We plan to rev the PC plan in August of 2001.

21           We would like to get some of the bounds and  
22 predictions that I talked about earlier on the process slide  
23 into the document for this iteration, and it may be modified  
24 based on new principle factors emanating from TSPA, and we  
25 will incorporate any updated test defined parameters, as I

1 mentioned.

2 We anticipate continuing to rev the plan through  
3 construction and operation.

4 In other words, we'll have our e on it, because we  
5 think it's obviously a very important thing to do, and we  
6 want to keep it up to date.

7 Just a short summary:

8 The PC program will comply with the requirements  
9 in 63.

10 The program will focus on factors important to  
11 post-closure performance, as performed in the TSPA, and the  
12 PC program is part of an overall integrated test evaluation  
13 program, as I discussed earlier.

14 That's all I have.

15 MR. LEVENSON: John, did you have any questions?

16 DR. GARRICK: Just a couple.

17 I'm really curious about what you really are going  
18 to end up testing and how it relates to the regulatory  
19 requirements and the performance assessment results.

20 Now, you have already indicated that your  
21 over-arching driver will be, of course, Part 63, and then  
22 you identify what the TSPA and the repository safety  
23 strategy have indicate as important things to measure.

24 One of the things I'm a little curious about -- it  
25 looks like all you've done is take the principle factors,

1 essentially, and add all of those kinds of tests to the  
2 regulatory requirements.

3 There has not been -- at least on the surface,  
4 there does not appear to be any merging or analysis that  
5 would indicate that one is a subset of the other or  
6 importance ranking or what have you.

7 I guess I would like you to comment on that, and  
8 what I'd really like to know is, if you were going to design  
9 a performance confirmation testing program strictly on the  
10 basis of performance, how would you importance-rank the  
11 specific things that you're going to measure, and is there a  
12 chance here that you could end up with a confirmation  
13 testing program ever so much simpler than what this is  
14 beginning to look like?

15 MR. SMISTAD: Let me put that slide up, and then  
16 I'll try to get to your questions, John.

17 DR. GARRICK: I'm looking at slide 11.

18 MR. SMISTAD: We haven't -- I'll kind of start at  
19 the end of your questions here.

20 We haven't prioritized from the PC program  
21 standpoint these test descriptions here. We haven't gotten  
22 to that stage yet.

23 I think we have the information to do that from  
24 the TSPAs.

25 It would require a little more analysis from the

1 TSPA group to do that.

2 Certainly, that's one of the next steps that we  
3 need to get, is to prioritize, because it may be, when the  
4 time comes, we don't -- we just don't have the resources to  
5 do all that, and clearly, we have to prioritize -- even if  
6 we think we're going to get to it all, we have to prioritize  
7 these tests.

8 As I mentioned, I think you asked, there are some  
9 of these things here, tests here that are driven by  
10 regulatory requirements, and I didn't choose to rack that  
11 slide up.

12 I think any long-term materials testing -- I don't  
13 know if they specifically call for a post-closure  
14 simulation, near-field environment testing from a couple of  
15 standpoints is definitely called for in the regulation  
16 itself, and by the same token, some of these tests, test  
17 types I'll say, driven by regulatory requirements, are not  
18 generated -- would not be generated by our post-closure  
19 analysis themselves, itself.

20 There's, you know, some of the seal testing and  
21 whatnot is not something that we're producing as a  
22 sensitivity out of our TSPAs.

23 DR. GARRICK: Now, if the TSPA were the sole  
24 basis, then, of course, all the measurements would be  
25 directed towards improving the long-term performance or at

1 least verifying, if you wish, the long-term performance of  
2 the repository.

3 One of the strategies that this committee tries to  
4 take is to understand what the real requirements are of  
5 things and the real needs are before we start tacking on  
6 conservatisms and safety margins and what have you, and so,  
7 what's behind my question is really, from a purely technical  
8 and purely long-term performance standpoint, what makes  
9 sense to -- where do you get the biggest bang for your buck?

10 I suspect some of these tests, you're probably not  
11 going to get much out of them, and they may be the most  
12 expensive ones, and so, I'm kind of looking for how are we  
13 going to optimize this, or is there going to be any attempt  
14 to do that?

15 MR. SMISTAD: There definitely will be an attempt,  
16 and we will optimize this in the future.

17 We're not there yet. As I said, this is kind of  
18 our first or second put to this plan.

19 DR. GARRICK: Right.

20 MR. SMISTAD: The challenge ahead of us is to look  
21 at the type of tests that we are coming up with, the  
22 categories of tests we're coming up with out of the RSS and  
23 the TSPA, and determine, number one, are these testable  
24 areas, can we field a test, and coupled with how much do we  
25 think we'll get out of this test from learning about

1 post-closure performance, is there a real sensitivity that  
2 we can get at with these tests?

3 So, that's definitely a challenge we have ahead of  
4 us.

5 DR. GARRICK: Is there any research going on to --  
6 that would contribute to this optimization process,  
7 particularly in the monitoring area?

8 The monitoring is a big question-mark in deep  
9 geologic repositories.

10 WIPP is having the same problem.

11 They have a requirement for long-term monitoring,  
12 and -- but nobody quite knows how to do it and what to  
13 monitor and what have you, and I sense there's some of the  
14 same kind of problem here, and so, I think this is a major  
15 issue, and it has a lot to do with building public  
16 confidence, and yet, there is an opportunity, because of the  
17 long operating period, to do some in-repository  
18 measurements, in-facility measurements, an opportunity that  
19 usually doesn't exist on facilities.

20 So, I think this is one of the reasons why this is  
21 of considerable importance to us all.

22 One other thing I wanted to just pick up on what  
23 George Hornberger said a little while ago, in the Part 63  
24 there's a section called "Permanent Closure," and the  
25 submission of the application to amend the license before



1 permanent closure includes a requirement for a description  
2 of the program for post-permanent closure monitoring of the  
3 geologic repository.

4 That's another program? Is that somebody else?

5 MR. SMISTAD: I think that would be a different  
6 program.

7 Mark Sellars, did you hear John's question?

8 MR. SELLARS: Yeah. That's actually defined  
9 outside of the performance confirmation program, and that  
10 would have to be a program that's established prior to  
11 closure.

12 This is Mark Sellars.

13 Let me go back and just comment a little bit on  
14 the prior discussion.

15 The items that are identified in the repository  
16 safety strategy are one means by which we attempt to comply  
17 with the regulation by identifying those things that are  
18 most important to post-closure safety, which is required by  
19 the regulation.

20 Just to give you a sense of the focus that we have  
21 established here, we have been looking at the life-cycle  
22 cost of these types of tests, and I can say that the lion's  
23 share of the emphasis is on the items that we've identified  
24 ourselves through the TSPA as being important to  
25 post-closure performance, but in addition to that, we do

1 meet the specific items called out by the regulation, as  
2 well.

3 So, that's just a small clarification there.

4 DR. GARRICK: Yes.

5 Well, I think that the intent of the regulatory  
6 process, of course, as you know, is to move towards a  
7 risk-informed approach, and so, I would think that there  
8 would be some flexibility, if, in fact, the license was able  
9 to demonstrate in a rather convincing manner on the basis of  
10 risk arguments that a particular confirmation program  
11 embodies or covers the important things and puts you -- and  
12 you could be in a pretty strong position to negotiate, if  
13 you wish, a program that really gives you the best bang for  
14 your buck.

15 MR. SMISTAD: We fully anticipate doing that with  
16 these test types or whatever the future listed test types  
17 are going to be, including the regulatory sides, as well.  
18 We'll look at how those really do play into post-closure  
19 performance from the prioritization standpoint.

20 DR. GARRICK: Okay.

21 MR. LEVENSON: I have just one short followup on  
22 John's question.

23 You mentioned that you are going to be  
24 prioritizing these sometime in the future.

25 Do you have established the criteria you're going

1 to use in prioritizing, or is that yet to be developed?

2 MR. SMISTAD: That's yet to be developed. Just  
3 from a broad sense, you know, what's the biggest bang for  
4 the buck? I mean what really does move the needle on a dose  
5 curve, is what we're after.

6 I guess I can throw that out west.

7 Mark, you guys have thought about this a lot more  
8 than I have.

9 MR. HAYES: This is Larry Hayes. Let me comment  
10 on that.

11 Through our TSPA, of course, we identify those  
12 things that are most important to performance.

13 One of them is keeping water off the waste,  
14 seepage monitoring.

15 We have put a lot of effort into seepage  
16 monitoring to try to understand whether or not there is a  
17 seepage threshold and how much water we might expect to  
18 contact the waste.

19 The other aspect is our waste packages. Right now  
20 our plan is long-lived waste packages.

21 So, performance of those packages are very  
22 important, and we're putting a lot of effort into the waste  
23 package performance corrosion work, testing to demonstrate  
24 that these waste packages, indeed, will last a very long  
25 time in the environment they're expected to perform in.

1           So, those are two very important priorities,  
2 frankly, of our program, the amount of water that may  
3 contact the waste packages and then waste package  
4 performance.

5           MR. SELLARS: But the priorities are driven by  
6 TSPA, and we use the RSS as our vehicle to, you know, help  
7 us decide -- make those type of decisions.

8           MR. LEVENSON: I understand that, but how you use  
9 the TSPA is of some interest in that just because from some  
10 particular run, some parameter gives you bad results, but on  
11 the other hand, the distribution of that particular  
12 parameter over all of the cases might be quite different.

13           So, will you be taking -- in other words, not just  
14 use the results, but will you be using a weighting process  
15 in setting your priorities?

16           MR. ANDREWS: This is Bob Andrews out here in Las  
17 Vegas.

18           Let me try to help elucidate a little bit what  
19 we're doing.

20           You know, the TSPA -- there are many facets in the  
21 TSPA, including the uncertainty and variability of the  
22 various component piece-parts that go into the total system  
23 and, in fact, the uncertainty of their conceptualizations  
24 and models that are used as the bases for the uncertainty  
25 included in the TSPA, and we're doing, you know, several

1 different things with these.

2 We're doing a lot of different regression-type  
3 analyses to understand what drove the total variance or  
4 spread of the outcomes.

5 The outcome of the TSPA is not simply the expected  
6 or mean dose response as required in Part 63, but it's the  
7 entire spectrum of potential responses for alternative  
8 models and the uncertainties that are incorporated in it.

9 So, one aspect is simply doing regression to try  
10 to understand the spread of the results and what is driving  
11 the spread of the results.

12 Another aspect is looking at -- given that the  
13 spread of the results is quite a broad spread over many  
14 orders of magnitude of potential dose response, the other  
15 aspect is trying to understand what drove the extremes of  
16 the dose response, what drove the top 10 percentile, what  
17 drove the top 5 percentile of the dose responses to be the  
18 way they were, and in terms of supporting the performance  
19 confirmation, are there additional tests or monitoring or  
20 evaluations that can be done to confirm that the range of  
21 uncertainty that's presently incorporated in the TSPA, or I  
22 should say will be incorporated in additional TSPAs as we  
23 move closer to licensing, if the site is found suitable,  
24 that those are adequately accounting for the natural  
25 variability and uncertainty in those piece-parts.

1           In addition to those, we are doing a wide range of  
2 what-if kind of analyses, what-if kinds of analysis with  
3 respect to alternative scenarios, what-if kind of analysis  
4 with respect to different ranges of parameters for the  
5 different component parts of the system, in order to gain  
6 understanding and to elucidate what is driving system  
7 performance, in order so we can do some of the  
8 prioritization, you know, that I think you guys are talking  
9 about back there.

10           Right now I think it's true to say we don't have a  
11 quantitative basis for prioritizing.

12           I think what we have is we look at the whole  
13 spectrum of results, including the uncertainty analyses, the  
14 regression analyses, the importance analyses, the barrier  
15 analyses, and in fact, the neutralization analyses to gain  
16 insights into the overall system performance and what is  
17 significant rather than pick any one of those and make a  
18 quantitative basis for prioritizing significance, and I  
19 think the final prioritization, of course, is somewhat  
20 negotiated. It's negotiated based on the cost of doing the  
21 performance confirmation, negotiated with respect to the  
22 significance and the degree of uncertainty of each of those  
23 piece-parts as they affect the total system performance.

24           MR. LEVENSON: Thank you.

25           George?

1 DR. HORNBERGER: Eric, I have a question related  
2 to your mother of all tests, your post-closure --

3 MR. SMISTAD: Grand-daddy, yeah.

4 DR. HORNBERGER: You indicated that this is going  
5 to be the first -- in one of the first drifts, I guess.

6 MR. SMISTAD: Yeah, first couple of drifts, is the  
7 idea, right.

8 DR. HORNBERGER: Now, to do this, I presume you're  
9 going to seal those off.

10 MR. SMISTAD: Yes.

11 DR. HORNBERGER: Okay. And I'm curious, because  
12 of course, you have the experience with your heater tests  
13 and the pluses and minuses with your heater tests, and  
14 assuming a 40-or-50-year operational period, is that the  
15 right time scale to get the performance confirmation on,  
16 let's say, water contacting the waste packages, for example,  
17 which is really what you're after?

18 MR. SMISTAD: Right. That's why I alluded to  
19 heaters, as well, because with a heater you can speed the  
20 process up and, you know, watch for the re-wetting and the  
21 seepage, if it occurs.

22 You won't have that -- that part of the cycle --  
23 with real waste. We don't anticipate having that part of  
24 the cycle with real waste.

25 It may be in the end that we do both. We're not

1 there yet.

2 But certainly, with real waste and real packages,  
3 you're limited from a time scale as to what you're going to  
4 see, but that's part of our considerations in trying to plan  
5 this test out and what we're after in the end.

6 DR. HORNBERGER: The other half of that, then, is  
7 -- again, as John found the statement in Part 63 that we  
8 hadn't found when I asked you the question -- the  
9 requirement for some kind of post-closure monitoring, and  
10 one of our -- the reason we're curious about this is,  
11 basically, as you answered, it's a separate program, yet to  
12 be determined who's going to do it, and yet it's pretty  
13 clear to us, anyway, that there probably should be some kind  
14 of coordination, and I know the answer would be, well,  
15 that's 50 years from now and we'll know a lot more then, but  
16 just in terms of this mother of all tests, it would strike  
17 me that, even now, it might be wise to do a little planning.

18 You might, in fact, want to somehow continue  
19 monitoring post-closure those first drifts. If you're going  
20 to instrument the heck out of them, there's no reason that I  
21 can see that you couldn't remotely do that, run some wires  
22 up the shaft.

23 MR. SMISTAD: I anticipate that we will do that  
24 when that time comes. I cannot imagine the Department not  
25 doing that when the time comes.



1 MR. LEVENSON: One follow-on question.

2 If you proceed fairly soon to seal the first drift  
3 or two, the difference between that test and reality of the  
4 rest of the repository is that that drift hasn't dried out  
5 for 30 or 40 years before you seal it, anticipate that  
6 introducing major perturbations into the value of the test?

7 MR. SMISTAD: The planning on this test, in a  
8 rough sense, is we would ventilate those drifts for a period  
9 of 10 years, is the current thinking, so we're trying to get  
10 at the most realistic situation we can, even though the time  
11 is limited.

12 MR. LEVENSON: Okay. So, the sealing is down the  
13 road a ways.

14 MR. SMISTAD: Yes.

15 MR. LEVENSON: Ray?

16 DR. WYMER: I have, I guess, an observation and  
17 then a question that relates to view-graphs number 8 and  
18 number 10.

19 On number 8, you point out that there will be  
20 expected and unexpected outcomes.

21 MR. SMISTAD: Those are two possible --

22 DR. WYMER: Yeah, sure, those obviously are the  
23 two ways it can go.

24 And in viewgraph number 10, you have nine chapters  
25 indicated there.

1           Number four is processes and predictions. Then  
2 you have six, which is daily evaluations. But you don't  
3 have a chapter which I would consider to be the most  
4 important, namely comparing the process predictions with the  
5 outcomes. It seems to me that's worthy of the total chapter  
6 since that's the whole ball game.

7           MR. SMISTAD: Yeah, I think that's buried, and  
8 Mark, I'm digging for the slide now.

9           The chapter that we would have talking about the  
10 strategy and the steps for unexpected outcomes --

11           Mark Sellars, are you --

12           MR. SELLARS: Yeah, I'm going to have Earnest  
13 answer that.

14           MR. SMISTAD: Okay.

15           Ernie?

16           MR. LINDNER: This is Earnest Lindner.

17           When we talk about data evaluation, the process  
18 for performance confirmation goes up to the -- identifying  
19 that something is occurring that we don't expect, whether  
20 it's a trend or the data itself is outside the bounds. At  
21 that point, we identify a process of going back to the NRC  
22 and to the public and recommending action.

23           At that point, it ceases to be a performance  
24 confirmation activity but it becomes a remedial activity  
25 that the repository has to deal with, and we might have to

1 re-do the TSPA, we might have to re-building some process  
2 models, or it may be something very significant, and in that  
3 case, we'd have to take the least favored option of  
4 retrieving the waste, but that's to be done outside the  
5 performance confirmation process, where performance  
6 confirmation is limited to gathering of test data and making  
7 recommendations and evaluations on it.

8 MR. SELLARS: Doing the comparisons.

9 This is in chapter six, though, right?

10 MR. LINDNER: It's in chapter six.

11 MR. SMISTAD: It's buried in six, yeah.

12 MR. LINDNER: When we talk about data evaluation,  
13 we're talking about reporting requirements and the what-if's  
14 if something doesn't occur the way we expect it, what do we  
15 do then?

16 DR. WYMER: Okay. I guess I didn't read data  
17 evaluation in that sense. I probably would have had a  
18 different title for the chapter.

19 MR. SMISTAD: It's buried.

20 DR. WYMER: Thanks.

21 MR. LINDNER: I have to apologize -- this is  
22 Ernest Lindner again.

23 The titles here are very abstracted from the  
24 actual report.

25 If you had the full title, you would say that, as

1 well.

2 So, these are abstractions of the title for  
3 brevity on the slide.

4 MR. SMISTAD: This is slide dynamics here.

5 DR. WYMER: Thank you.

6 DR. HORNBERGER: There seems to be a presumption  
7 here in some of these answers that, if you measure  
8 something, that it's going to be worse than you had  
9 indicated, when in fact what you might find, for example, is  
10 that TSPA has water raining into the drifts, and you go in  
11 there and you make some measurements and find out that the  
12 parameter isn't what you assumed but maybe inverted comma is  
13 better. Do you still go through and have to re-do the TSPA?

14 MR. SMISTAD: Yes.

15 We would first determine if that out-of-bounds, so  
16 to speak, in a better sense or in a good direction, does  
17 impact the TSPA or the dose curve if it swings it  
18 appreciably enough, but you have to do the sensitivity  
19 analysis to do that, and at the end of all that, if we  
20 determine that we need to shift our baseline data set based  
21 on that or subsequent values of that same parameter that  
22 more or less confirm that we were off, I fully anticipate  
23 that would be incorporated back into the TSPA as a baseline  
24 parameter or number.

25 We certainly want to go forward with the best data

1 we have or the most -- the data that we have the most faith  
2 in or confidence in, and if that's in a better direction, we  
3 certainly would go there.

4           Somebody out west have a comment on that?

5           MR. ANDREWS: Eric, this is Bob Andrews.

6           MR. SMISTAD: Yeah, Bob.

7           MR. ANDREWS: What I was going to say was, you  
8 know, in areas of significant -- of course, one of the  
9 reasons we're doing the tests is to confirm that we're  
10 within the bounds of the performance assessment to begin  
11 with.

12           The performance assessment that's done in the year  
13 2000 or the year 2001 or the year 2002 has some uncertainty,  
14 residual uncertainties associated with it, just because we  
15 have not, you know, directly observed some aspects of the  
16 repository or repository block or timeframes of the response  
17 of the system that will be observed over these longer-term  
18 performance confirmation-type tests.

19           If, in those TSPAs done in 2000 and 2001, in order  
20 to address that complexity and that large uncertainty, if  
21 there were conservative, you know, assumptions made to  
22 minimize, you know, the regulatory -- how should I say? --  
23 exposure, I guess, of that uncertainty, that would be okay,  
24 and we would probably do that in a number of areas, and if  
25 the test confirms that the conservatisms used were adequate

1 and were appropriate, that would be, I think, a very useful  
2 and sound confirmation.

3 It may be that, as Eric says, you want to re-do  
4 that aspect of the TSPA to see how much did it move the  
5 needle in the better direction, but you may not re-do the  
6 TSPA.

7 The one that you used as your basis for the  
8 license application if the site is found suitable would  
9 still be an adequate basis for the decision-makers to make.

10 MR. LEVENSON: I have sort of a followup to  
11 George's question.

12 You're going to have some limits which include  
13 uncertainty, and if the confirmation indicates you're on the  
14 negative side of that, you will make some changes to bring  
15 you back in range.

16 If I understood what you just said, if, in fact,  
17 you identify that you're way out of range on the  
18 ultra-conservative side, would you undertake to do anything  
19 to reduce the cost and exposure to workers to bring you back  
20 into range, and if not, why not?

21 MR. SMISTAD: Anybody in the west want to take  
22 that one on?

23 MR. LINDNER: This is Ernest Lindner.

24 MR. SMISTAD: Yeah, Ernie.

25 MR. LINDNER: The last phrase you were referencing

1 is pre-closure safety.

2 The safety of the workers in the work-place is a  
3 high priority that is not addressed by the post-closure  
4 plan, concerns of the performance confirmation plan, rather,  
5 so that we would not do anything that would compromise  
6 safety with the performance confirmation program.

7 We would evaluate if there is a trend or data  
8 variance from the bounds, the bounds being set so that we  
9 have exceeded our abstractions in the TSPA, then we would  
10 have to evaluate what's wrong, take a look.

11 I mean is the data reliable? Is that data coming  
12 in as it should?

13 Is there some -- perhaps we should put some  
14 different instrumentation in that area to validate that we  
15 might have a wrong transducer, or there may be something  
16 that wasn't considered in the process models, the models  
17 that model the overall geologic and mechanical processes, or  
18 there may be something a little bit further.

19 So, your response has to be evaluated at that time  
20 of what's gone wrong or what is wrong, but I mean in no  
21 sense would we compromise the safety of the facility for  
22 performance confirmation.

23 MR. LEVENSON: The question I'm asking is really  
24 the reverse of that.

25 Nothing will come out of the performance

1 confirmation to increase risk of the staff above ground, but  
2 will you utilize anything that comes out of performance  
3 confirmation that indicates you could reduce the exposure of  
4 the people that are working on the facility, or are these  
5 two completely different things in your mind?

6 MR. LINDNER: This is Ernest Lindner.

7 I would see them as two different aspects of the  
8 repository.

9 I mean, obviously, you'd like to see something in  
10 testing that would reduce the exposure to personnel. I  
11 would indicate that's so. But I don't anticipate anything  
12 from the test that would suggest that.

13 MR. SELLARS: We would get the information from  
14 the performance confirmation program.

15 This is Mark Sellars.

16 What you're getting at basically are like  
17 enhancements to the safety case, enhancements to the design  
18 to do even better than what you have in your licensing  
19 basis, and that's not one of the fundamental objectives of  
20 the program. The program is to confirm the basis that you  
21 have when you go up front.

22 But certainly, the information that you gather  
23 from the program could be used to do that.

24 But that's not one of the fundamental tenets or  
25 objectives of the program.



1 MR. SMISTAD: I certainly think that could be an  
2 outcome.

3 I mean, you know, that's a possibility, and I  
4 would be remiss by not saying that we would consider safety  
5 first in all the testing that we do.

6 MR. LEVENSON: If we look at history, which -- not  
7 necessarily what happened, it's what historians say  
8 happened, but nevertheless, we look at it, we see that WIPP,  
9 which is a little farther down the road than you are, is now  
10 recognizing that a major fraction of the exposure to the  
11 people in the program is coming from requirements that, in  
12 fact, have apparently no basis in either safety or legal  
13 reasons, and they have a major program to try to back out.

14 It's not easy to do, but if the objective is  
15 overall safety, then one has to recognize that you have an  
16 envelope, if you go out either side of it I think it  
17 requires serious assessment as to what it means, because any  
18 action you take has some consequence.

19 MR. LEVENSON: Ray, more comments?

20 DR. WYMER: No, nothing more.

21 MR. LEVENSON: I just have one more question. I  
22 don't really want to hang you on any of your own words, but  
23 you did say it.

24 You said that the schedule for the plan in detail  
25 would be available prior to license application. Would you

1 care to estimate the decade or year in which the plan will  
2 be ready for us to look at?

3 MR. SMISTAD: Let's see. What did I say?

4 I guess that was a statement that I put into the  
5 presentation to communicate that this plan is evolving; the  
6 details aren't on the table yet for the particular tests.

7 Those will be detailed at the time of the license  
8 application, obviously, and obviously prior to the time of  
9 the testing.

10 So, that was kind of a bullet I threw in to give a  
11 sense that we're not at that stage right now.

12 MR. LEVENSON: But you say it needs to be done  
13 before license application.

14 Do you have a target date for completion of the  
15 plan?

16 MR. SMISTAD: We have not established a target  
17 date bond the August date of next year for an iteration, but  
18 we certainly think there will be one. We just haven't  
19 established the date yet.

20 DR. GARRICK: I want to press my earlier question  
21 just a little bit.

22 We know that things get done on the basis of  
23 budgets, and then it becomes a problem of allocation from  
24 that budget to certain activities, and in a situation here  
25 where you have some 23 tests or measurements that you're

1 trying to make -- and we all know that probably three or  
2 four of these are 10 times more important than the other 20,  
3 and in fact, if I were to pick one -- and Bob Andrews may  
4 either verify this or dispute it -- if I had excellent  
5 information on seepage monitoring, I would be very satisfied  
6 with respect to a lot of the driver of performance on the  
7 basis that, if there is an 800-pound gorilla in the  
8 repository design, it's water access to the waste package.

9 So, what I'm really saying is are you going to  
10 have the kind of flexibility where, when the analysts or the  
11 scientists put forth what they consider to be the truly  
12 important things to know about in terms of monitoring, to  
13 allocate budgets accordingly?

14 MR. SMISTAD: I'll take it first, and then if Bob  
15 wants to go, he can go.

16 Yes, there's no question about it, that the  
17 process will work in that way, and in fact, this is not a  
18 foreign process to us.

19 We've enumerated many tests through the years and  
20 through all the budget cycles, and we have managed to  
21 prioritize those.

22 Especially in recent years, I think we've done a  
23 real good job of that, probably over the last five years, of  
24 using the results from the TSPA, and with input from the  
25 PI's, as well, to determine what tests are really important,

1 and you've mentioned the seepage test.

2 In fact, we have fielded seepage tests, and we are  
3 currently fielding seepage tests, and we will continue to  
4 field seepage tests in the repository.

5 So, the point is this is not a foreign process to  
6 us, prioritizing testing based on importance, and it will be  
7 --

8 MR. HAYES: This is Larry Hayes from back west.

9 Obviously, an indication of how important one  
10 thinks something is how much mon they put into it.

11 Let me talk about what we perhaps think are two of  
12 our most important tests.

13 Seepage, absolutely right, how much water may  
14 contact the waste.

15 I believe, from what I see in the budget process,  
16 seepage is very well-funded, perhaps more so than most other  
17 natural science testing. Seepage is our priority.

18 Over on the engineering side, waste package  
19 performance is very highly funded, because that's perhaps  
20 equal to seepage in importance.

21 So, indeed, if you look at where we're putting  
22 some of our mon in testing, those two areas, relatively  
23 speaking, are fairly well funded.

24 MR. LINDNER: This is Ernest Lindner.

25 I'd also like to clarify that, even though

1 something may be very important to performance, in the PC  
2 plan, performance confirmation plan, we evaluate if we can  
3 measure something that's significant to reduce the  
4 uncertainty of that item.

5 In other words, we don't do a measurement of  
6 something just because it's there.

7 We do the measurements because we will, indeed, if  
8 we do measure it, have some effect or can have some effect  
9 on the modeling of that process or the evaluation of that  
10 process.

11 So, just to gather data is not the intent of the  
12 performance confirmation plan.

13 DR. GARRICK: Thank you.

14 MR. LEVENSON: Tim?

15 MR. McCARTIN: Tim McCartin, NRC staff.

16 Just one quick comment that the amendment for  
17 closure does require DOE to update the TSPA based on the  
18 performance confirmation program.

19 So, all the -- both plus and negative things that  
20 they find along the way, when you get to closure, they do  
21 have to update the TSPA.

22 So, it is wrapped all together at the end there.

23 MR. LEVENSON: Any comments from ACNW staff?

24 [No response.]

25 DR. GARRICK: Okay.

1           We've received a request from a member of the  
2 public citizen group to make a comment, and I think now is  
3 the time to do that.

4           I think it's Lisa Gue.

5           MS. GUE: Thank you very much.

6           Lisa Gue from Public Citizen.

7           In response to one of the questions that was asked  
8 earlier, I think it was said that, in the event of an  
9 unexpected outcome, a process would have to be identified  
10 for informing the public and the NRC, and I'd just like to  
11 know -- and certainly, I'd advocate for a process to be  
12 built into the plan for regular and complete reporting  
13 available to the public on the results of the performance  
14 confirmation tests and what actions were being recommended.

15           Thank you.

16           DR. GARRICK: Thank you.

17           MR. SMISTAD: If I could just comment on that --

18           DR. GARRICK: Yes, go ahead.

19           MR. SMISTAD: That's certainly something that we  
20 have in mind.

21           In fact, we discuss it a little bit in the PC  
22 plan. We haven't got the details of exactly how we're going  
23 to do that yet, but it's certainly something the Department  
24 has in mind to do.

25           DR. GARRICK: Okay.

1 MR. LINDNER: This is Ernest Lindner, out west.  
2 I'd like to add to what Eric said.

3 In the PC plan, we have identified the process of  
4 getting the data from down-under, so to speak, and from  
5 sub-surface to the public, so that eventually we hope to  
6 have the data in a real mode, a real-time format, rather,  
7 available perhaps in reports or on the web, if possible.

8 We would like to get to that point, so that the  
9 data can be viewed by the public, so they can actually see  
10 the data as it comes out from the sub-surface and get  
11 assurance that, indeed, things are behaving as expected in a  
12 real-time fashion.

13 In other words, within a week or so, we would have  
14 the data posted or available to the public, so that you can  
15 compare it against the published bounds.

16 To add to the -- what Eric said about the test  
17 descriptions for the LA, as required by the license, we will  
18 have to describe the tests in some detail, but the detailed  
19 test plan will follow separate plans, which will specify the  
20 actual measurement frequencies, the instrument types, their  
21 accuracy and reliability, etcetera, but the LA will contain  
22 a description of the tests that we consider necessary and  
23 adequate for the license.

24 MR. McCARTIN: Tim McCartin, NRC staff.

25 NRC licensees are held to a very strict

1 requirement of notification, if they learn something that's  
2 going to change anything that we made our decision on, and I  
3 don't have the -- off the top of my head, I can't recite the  
4 requirement, but I'll be happy to find it and get that  
5 information, but there's very strict requirements on  
6 notification, if you learn something that was different than  
7 what you told us.

8 MR. LEVENSON: But that does not apply prior to  
9 license application.

10 MR. McCARTIN: No, once they're a licensee.

11 DR. GARRICK: All right.

12 Any other comments or questions from anybody on  
13 this topic?

14 Eric, we want to thank you for honoring the  
15 requirement to allow us plenty of time to have an exchange  
16 and ask questions.

17 Are there any final comments from the people out  
18 west on this topic?

19 [No response.]

20 DR. GARRICK: All right.

21 MR. SMISTAD: I want to thank you for giving us  
22 the opportunity to come talk about the plan, and I wanted to  
23 thank the guys out west for getting up at the crack of dawn  
24 to participate.

25 MR. LEVENSON: Some of us are on the same time



1 schedule they are.

2 DR. GARRICK: All right.

3 Then I think what we'll do is move directly into  
4 our next topic, which is a summary of Key Technical Issues,  
5 strategy, etcetera, and the committee member that has the  
6 lead on this topic is George Hornberger.

7 DR. HORNBERGER: Thanks, John.

8 We're going to have a discussion on Key Technical  
9 Issues and their resolution and how this process is going.

10 Some of the interest has been stimulated by how  
11 the NRC and DOE put their different lists into conjunction,  
12 so that the NRC has Key Technical Issues and the DOE has k  
13 program principle factors -- well, at any rate, something  
14 else, and furthermore, the DOE has issued process model  
15 reports, and the NRC staff and DOE are interacting on these,  
16 and we heard just a little bit yesterday that the NRC and  
17 DOE have revised their strategy for how they're going to  
18 treat these PMRs and the analysis.

19 So, before break -- we'll come back after break  
20 and have the NRC staff in this discussion, but before break,  
21 I'm going to ask Carol Hanlon if she would do her  
22 presentation on the revised approach that DOE and NRC are  
23 taking.

24 MS. HANLON: Thanks for the opportunity to talk to  
25 you about our evolving and revised approach to presenting

1 information that's going to assist, hopefully, the Nuclear  
2 Regulatory Commission staff in doing their considerations of  
3 sufficiency, and perhaps I could shed just a little bit of  
4 clarifying light on the three things that Dr. Hornberger  
5 mentioned, especially the principle factors in the process  
6 model reports, as compared with the Key Technical Issues.

7           You will recall that, in earlier repository safety  
8 strategies and, indeed, in the viability assessment, we  
9 identified items that we believe to be important --  
10 principle factors that were important to post-closure  
11 performance and, therefore, were used to prioritize the work  
12 that we were planning to take from the phase on into license  
13 application.

14           So, we have used iterations of those principle  
15 factors.

16           I think you remember that there were 19 in the  
17 viability assessment.

18           As we've gone through the evolution of the  
19 performance assessments and we've looked through the  
20 principle -- or excuse me -- the repository safety strategy  
21 again, we've winnowed that down to, I believe, seven or  
22 eight, and we're evaluating those to see where the real  
23 principle factors are and if there are other issues that are  
24 important to performance.

25           So, we've done a little bit of modifying there,

1 but it's, I think, essentially the same set, with the same  
2 emphases that you're familiar with, and that process has led  
3 us to look at process models, which feed into the Total  
4 System Performance Assessment and helps us evaluate our  
5 total system, repository system, the natural and engineered  
6 barriers, to again see how that system is functioning and  
7 consider that we still do have the same principle factors,  
8 and that is in comparison with the Key Technical Issues.

9 I'm a little bit out of bounds here. Probably it  
10 would be better for the NRC staff to explain this, but I'm  
11 sure they won't be shy about correcting me.

12 The Key Technical Issues are those nine or 10  
13 areas which they feel are very important areas to overall  
14 repository performance and areas that they have concerns on,  
15 they want to share their concerns, they want us to be aware  
16 of those concerns, and they want us to take those into  
17 account as we're moving forward to resolve open items.

18 So, hopefully that helps a little.

19 I was going to say that, due to the excellent  
20 presentation that the NRC staff has made on their  
21 sufficiency process, I will use that as a basis to  
22 discussing with you some updated input on how we are hoping  
23 to conduct meetings that support that process of doing  
24 sufficiency considerations and giving us their comment and a  
25 little bit of history that probably by now you all could

1 recite better than many of us.

2 As a component of any site recommendation that's  
3 given, the Nuclear Waste Policy Act requires the NRC to  
4 provide comments on certain aspects of our repository  
5 information leading to license of that repository.

6 So, that's a requirement out of section 114. I'll  
7 let you read it; I won't.

8 Last year, we developed and put forward an initial  
9 -- we proposed an initial approach to the Commission to  
10 assist them in preparing for their comments.

11 That was in Dr. Brocoum's November 24th letter to  
12 John Greeves where he proposed this approach. Parts of that  
13 approach were we proposed to conduct meetings on various  
14 aspects, including the process model reports and the Total  
15 System Performance Assessment, to provide information to the  
16 staff.

17 We also identified types of information and  
18 documents which we intended to provide to assist the staff  
19 in their evaluation, so that they would fully understand the  
20 technical basis leading to any site recommendation, and we  
21 wanted to include an evaluation of the Key Technical Issue,  
22 the status as we saw it in our own self-assessment of where  
23 our status might be against those.

24 Recently, April 25th and 26th, in Las Vegas, we  
25 had a technical exchange.

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1           This meeting focused on two aspects.

2           It focused on the staff's discussion of their  
3 sufficiency strategy, and additionally, it focused on a  
4 discussion of the status of the key technical item open  
5 issues.

6           NRC's management made it very, very clear that  
7 their intent was to evaluate the status of closing KTI open  
8 items as an important part of the sufficiency  
9 considerations, and in the two days of meetings that  
10 followed, NRC and DOE staffs presented their respective  
11 assessment of where we with regard to those Key Technical  
12 Issues.

13           The NRC staff perspective, I believe, was  
14 basically from their development of the issue resolution  
15 status report, their revisions of those, and where they  
16 found the status to be, as well as their progress in moving  
17 toward -- forward for developing the Yucca Mountain review  
18 plan, and DOE status was based on not only an evaluation of  
19 the issue resolution status reports and what we saw in there  
20 but also the information that we were getting then from the  
21 process model reports and the analysis and modeling reports  
22 which were well underway by April, and many were  
23 substantially completed.

24           So, with this technical exchange in April as a  
25 foundation and a departure point, we developed a set of

1 planned interactions on process model reports.

2 We originally developed a set of nine process  
3 model reports, and again, those were basically model --  
4 excuse me -- process model report meetings.

5 They were basically those which we had promised in  
6 our November 24th letter, and we wanted to allow the  
7 opportunity to go through those.

8 The meetings would have, as envisioned, had two  
9 main purposes, both to discuss the process model report  
10 itself and to evaluate progress against the KTIs.

11 In discussing the process model report, we wanted  
12 to present the purpose of that particular report and  
13 conclusions that it might have reached and the basis from  
14 Analysis and Modeling Reports that substantiated those  
15 conclusions, so walk through the process model reports and  
16 see why we were reaching the conclusions we were reaching,  
17 in addition take the next step into taking that forward into  
18 Total System Performance Assessment implications, what it  
19 meant for the performance assessment and a correlation with  
20 the repository safety strategy principle factors where they  
21 were relevant.

22 A second very important part of that meeting and  
23 really the heart of the meeting was to discuss again those  
24 conclusions and that information and the evolving  
25 information from the Analysis and Modeling Reports against

1 the KTI status and how that moved the ball forward on the  
2 open issues, and one of the tools we used and we began to  
3 develop we're now referring to as our delta analysis.

4 We had called it a gap analysis, and the purpose  
5 of that was to evaluate the -- to compare the process that  
6 the Commission staff was beginning to develop against these  
7 KTI open issues with our own self-assessment of where the  
8 status was and how we could show the basis for it.

9 So, with that in mind, we moved forward to the  
10 first technical exchange on Total System Performance  
11 Assessment, June 6th and 7th in San Antonio.

12 That focused on the status of the TSPA, SR, and  
13 assumptions that had gone into it, the various components,  
14 and it also focused on related issues from the Key Technical  
15 Issue on Total System Performance Assessment and  
16 integration.

17 It was an ambitious agenda, and it was an agenda  
18 that was developed through extensive interactions between  
19 DOE and NRC.

20 Much work was done and much planning was done on  
21 that agenda, and I think both sides did a lot of effort, and  
22 from that meeting, I think we had a number of positive  
23 results.

24 We exchanged a lot of new and important  
25 information, understood opinions.

1           We laid the ground work for future meetings which  
2 would address specific areas of the Key Technical Issues and  
3 the particular concerns of performance modeling reports,  
4 process model reports, and throughout the meeting, we  
5 identified -- at the end of the meeting, we identified ways  
6 that we could improve the effectiveness of these future  
7 interactions that we had laid out.

8           However, we didn't -- we were not able to close  
9 any additional items, and there remained no status really --  
10 no change in the issue status, and therefore, NRC and DOE  
11 management sought ways to improve our ability to reach  
12 resolution on these issues.

13           So, based on that, we re-focused our interaction  
14 approach.

15           DOE and NRC management agreed to focus on those  
16 subset of interactions which were believed to have the most  
17 potential for resolving KTI open items and fully resolving,  
18 closing.

19           So, we came up with a set of five meetings that  
20 we'll have in the next four months.

21           Unsaturated zone flow and saturated zone flow are  
22 really a pair that address one KTI, unsaturated zone and the  
23 saturated zone, and I can never get the acronym for USFICI.  
24 I just don't do acronyms.

25           USFIC, igneous activity and structural



1 deformation, again are a pair which address the KTI and  
2 structural deformation and seismicity.

3 Container life and source term stands on its own.

4 And the dates for those are August 16th and 17th  
5 in Berkeley for the unsaturated zone flow meeting; August  
6 29th, 30th, and 31st for the igneous activity meeting --  
7 that's a change; September 12th and 13th, container life and  
8 source term -- again, both that and igneous activity are in  
9 Las Vegas, as well as structural deformation and seismicity,  
10 which will be October 3rd through 5th, and they include a  
11 field trip.

12 November 1st and 2nd, we'll have saturated zone  
13 flow. That will be held in Albuquerque.

14 So, one of the considerations we've used in these  
15 meetings is carefully considering and developing the agenda  
16 and making sure that we have adequate time for sufficient  
17 discussions, and I think that's shown right here where we've  
18 extended that for an additional day to make sure that we  
19 have the time.

20 We would invite you to participate or attend these  
21 meetings. You or your staff representatives would be most  
22 welcome.

23 The one in Berkeley -- we'll have to travel to  
24 Berkeley to participate in that meeting. We've decided not  
25 to have details, telecons for these meetings. We believe

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1 it's much more effective to have the participants working  
2 face to face in the same room. We think that promotes  
3 dialogue, promotes discussion, and may help us to expedite  
4 and facilitate closure of issues.

5 So, we're not going to V-tel these. We hope that  
6 works out.

7 So, please join us.

8 Just for your information, the ones that remain to  
9 be scheduled, thermal effects, repository design, thermal  
10 mechanical effects, radio-nuclide transport, evolution of  
11 the near-field environment, and total system performance  
12 assessment integration -- so, we have not forgotten those.

13 In preparing for these meetings, we've kept a  
14 number of things in mind, and we're going to continue the  
15 technique that we used in San Antonio of having an  
16 issue-oriented agenda that's organized by sub-issues, so  
17 that we can have categories to close out the issue and the  
18 criteria and the open items issue by issue or sub-issue by  
19 issue.

20 We're going to continue developing our delta  
21 analysis so that we can use that as a tool to facilitate  
22 these meetings, and what we're doing with that delta  
23 analysis is, for the various criteria, acceptance criteria,  
24 we're attempting to identify where in AMRs we have  
25 information that addresses that, we are identifying where

1 there are differences, and we're attempting to focus on a  
2 path forward to resolution.

3 So, we hope that that delta analysis will prove to  
4 be a very useful tool for both parties, and it has certainly  
5 been effective for us, and we're working on the one for UZ  
6 right now and hope to have it to NRC very soon.

7 The staff, in its turn, has agreed to review the  
8 AMRs carefully and to identify questions that they may have  
9 for discussion in technical exchange, in those areas where  
10 they'd like additional information or they'd like  
11 clarification, how we might facilitate that, and at this  
12 point, I think they may have more than they wished. I think  
13 they have 115 or so AMRs, Analysis and Modeling Reports, to  
14 review.

15 So, hopefully you're enjoying those.

16 In addition, at all these meetings, we've agreed  
17 that we're going to -- and we would have anyway -- discuss  
18 the performance assessment implications, make sure that  
19 there are people there that are prepared to discuss  
20 performance assessment, and also features, events, and  
21 processes will be addressed.

22 I think that you have perhaps seen this analysis.  
23 We changed the name to delta analysis. We change names  
24 every week or so.

25 But the main components that it will have is the

1 acceptance criteria, what the NRC staff analysis is, and as  
2 you see, it's sub-issue by sub-issue, what DOE's view of the  
3 status is based on what we believe is in the AMRs or in  
4 other documents, so our view, and a proposed path forward,  
5 and we are also going to add columns that we can fill out,  
6 hopefully as we go through the meeting, that will indicate  
7 at least a preview of what agreements we've reached in terms  
8 of the status as we evolve.

9 You had seen the sample from the June TSP meeting.

10 Do you all have copies of that?

11 So, just see how it's evolving just a little bit.  
12 It's basically not much different.

13 And where it is for the unsaturated zone flow  
14 meeting.

15 We have a copy of this draft delta analysis. If  
16 you would be interest in having copies, just let us know and  
17 we can get it to you. We have them here today.

18 So, just to summarize, DOE and NRC management have  
19 established an approach which we hope will facilitate issue  
20 resolution, fully close open items, as focused on the Key  
21 Technical Issues more specifically. Five interactions are  
22 scheduled over the next four months for those Key Technical  
23 Issues which are believed to have the most potential for  
24 complete issue resolution.

25 The objective is to support NRC's preparation of

1 their sufficient comments by closing as many open items as  
2 possible and, where they're not fully closed, by agreeing on  
3 the path forward to resolution of the open items for the  
4 license application.

5 So, that's basically where we are.

6 May I answer any questions for you?

7 DR. HORNBERGER: Thanks very much, Carol.

8 Questions for Carol?

9 [No response.]

10 DR. HORNBERGER: Carol, as you know, I teleconned  
11 to San Antonio.

12 MS. HANLON: A remarkable experience.

13 [Laughter.]

14 DR. HORNBERGER: I think both Lynn and I approve  
15 of your not teleconning anymore.

16 No, actually, it was still worthwhile. I was glad  
17 to have an opportunity to sit in.

18 Clearly, you say you did learn from that. You  
19 have a better sense of how to move forward efficiently.

20 It did strike me that a lot of the issues that  
21 were raised at the TSPA meeting really got down into the  
22 details that would be contained in the PMR, the PMRs  
23 themselves, and I guess the question that I have is, is  
24 there any plan farther in the future to come back and  
25 revisit the TSPA itself after these other issues are -- that

1 kept coming up at the TSPA are resolved?

2 MS. HANLON: Well, yeah, I'm sure -- yeah, and I  
3 don't know if Bob is still there. He could probably say  
4 more if he is.

5 But one of the things about this meeting was it  
6 was a bit early in the process, not really all that early in  
7 the process, but the results were not in yet.

8 So, we were talking about some things where the  
9 TSPA was not completely finished, the results were not in,  
10 and the package hadn't been wrapped up.

11 So, we realize, you know, that it was in some ways  
12 early and in some ways late. That's why I mentioned the  
13 fact that it set the tone for future meetings where we would  
14 go into the specific process model as we'd previously  
15 envisioned and go into the Analysis and Modeling Reports  
16 that provided the specific data that fed the process model,  
17 again that fed the TSPA.

18 So, that was the plan we envisioned.

19 Now we're focusing on the Key Technical Issues.  
20 We'll do somewhat the same, but with the assistance of the  
21 staff, who are reading the AMRs and identifying questions,  
22 then we will interact to define the agendas and again find  
23 those spots where we may want to look at the TSPA, we might  
24 want to look at the results, what the results are telling  
25 us, and understand those or identify sensitivities or feed

1       them back into the meeting.

2               I think that we were both thinking about it  
3       anyway. I'm sure that NRC was intending to have a  
4       performance assessment component. I know DOE was. At that  
5       meeting, we both assured each other that there would be that  
6       TSPA component in all the future meetings.

7               DR. HORNBERGER: Okay. Thanks.

8               Questions or comments from the staff?

9               MR. FIRTH: James Firth, NRC.

10              In the letter from Steve Brocoum that initially  
11       proposed the interactions, there were TSPA interactions  
12       scheduled for basically the spring/summer, before DOE had  
13       completed their TSPA, then one in November, and then there  
14       was one in April of 2001.

15              So, there are opportunities, depending on how  
16       things shake out, for doing the AMRs and PMRs and the  
17       changes to those, what comes out of the results of DOE's  
18       TSPA, that there are opportunities through the process to  
19       continue to revisit and to continue to make progress on  
20       resolving the issues, and I would reiterate what Carol had  
21       said in terms of -- that given that the DOE documents,  
22       either the TSPA/SR model report or the technical document,  
23       neither one of those were available to the NRC staff in  
24       advance of the meeting.

25              So, for us to be able to really make progress on

1 moving issues from open to closed or closed pending, we need  
2 a little bit more in terms of detail that's in-hand, as well  
3 as more detailed commitments.

4 So, it was a little bit premature in June, given  
5 the status of DOE's TSPA, the documentation, and the  
6 information that was available to the NRC staff to move  
7 things from the open status at this point.

8 DR. HORNBERGER: Thanks, James.

9 Don't take my comment as a criticism of the June  
10 meeting. I think it was, as you say, very valuable.  
11 "Premature" is perhaps too strong a word.

12 MS. HANLON: We just noticed those things, and  
13 that's why we've taken some actions, in fact, getting the  
14 delta analysis to the staff early so that they can see where  
15 we think the things are.

16 I think they have almost all of the AMRs now.  
17 There are just four remaining that are probably coming very  
18 soon. In draft, I think they have almost all of the PMRs,  
19 if not all, and they have formal copies of two, and  
20 hopefully, the relevant AMRs and PMR will be available.  
21 They're available now and will be to them for the meeting in  
22 August. So, hopefully we're moving forward on those.

23 DR. HORNBERGER: Good.

24 Thanks again, Carol.

25 MS. HANLON: You're welcome.



1 DR. GARRICK: I think what we'll do is take a  
2 15-minute break and then continue with our next item on our  
3 agenda.

4 As I understand it, the people that are going to  
5 make the presentations are here. So, rather than 10:30 or  
6 whatever it was, we will have that presentation in 15  
7 minutes.

8 Okay.

9 We'll break for now.

10 [Recess.]

11 DR. GARRICK: George, do you want to carry on?

12 DR. HORNBERGER: Okay.

13 We're reconvening on our discussion of Key  
14 Technical Issues, and King Stablein said that Carol Hanlon  
15 stole everything that he was going to say and so his  
16 presentation was going to be short.

17 And I don't say that to have you make it even  
18 shorter, King, but go ahead.

19 MR. STABLEIN: Thank you very much, Dr.  
20 Hornberger.

21 I had intended this to be short and informal and  
22 kind of a concise status report on issue resolution anyway,  
23 and Carol did touch on a lot of the things that I was going  
24 to say.

25 It gives you a chance to kind of contrast and

1 compare and make sure that we're being consistent in what we  
2 put out before you, and although my own presentation will be  
3 relatively short, I have with me representatives of all of  
4 the key technical issues, all nine of them, in the audience  
5 and near microphones, so that if any of the members is  
6 interested in a particular Key Technical Issue or sub-issue  
7 and its status or how we view it in terms of issue  
8 resolution, I would encourage you to ask these staff  
9 members, because they're the experts in those individual  
10 areas, and I wanted to have them all available.

11 They were all at the issue closure meeting on  
12 April 25th and 26th, so they are well up to date on what  
13 transpired there, and they're all actively involved in this  
14 issue resolution process.

15 So, to indicate to you the importance that the NRC  
16 is putting on this area of issue resolution, we have, in  
17 fact, installed a new senior project manager who is in  
18 charge of issue closure, Jim Anderson.

19 He can't be with us today, but in the future, you  
20 will be hearing from Jim as to how we will proceed to work  
21 on the issue closure meetings that Carol talked about.

22 So, let's turn to the first slide, background for  
23 Key Technical Issue resolution.

24 This is material that you're familiar with, but  
25 just quickly to remind us that we refocused the high-level

1 waste program in FY '96 to pay attention to those issues  
2 that we viewed in the post-closure as most important to  
3 performance, and we have nine of those issues.

4 They are listed there for you. We don't have to  
5 read them off.

6 You have performance assessment, you have the site  
7 issues, and you have the design issues.

8 On the next slide, we have the objective of Key  
9 Technical Issue resolution, and the goal for the NRC is to  
10 complete resolution of all of the Key Technical Issues and  
11 the 38 associated sub-issues before DOE submits the license  
12 application.

13 And the rationale for this is that Congress has  
14 given us a mandate to review DOE's license application  
15 within three years, and for us to be able to do that, DOE  
16 needs to prepare a license application that's sufficiently  
17 complete and high-quality such that we can accomplish our  
18 goal of docketing the application, reviewing it, and writing  
19 the SER in that three-year period.

20 So, this issue resolution process is very  
21 important to us to meet that mandate.

22 We have established a basis for issue resolution.  
23 We had an agreed-upon definition in the regulations on the  
24 pre-licensing process and our 1992 agreement with DOE. It  
25 involves staff-level resolution being able to be achieved

1 during the pre-licensing process.

2           These issues can be reopened as new information  
3 becomes available, and very important for all parties to  
4 understand is that these are non-binding resolutions and  
5 they're non-binding on any party to the licensing process.  
6 These issues can be raised and discussed in licensing. They  
7 are not closed by virtue of what happens in the  
8 pre-licensing consultation phase.

9           Now, the April 25th and 26th meeting was, in my  
10 thinking, a real watershed.

11           We've been working on issue resolution in this  
12 program, actually, for more than 10 years, but we had never  
13 come together with as much focus as we did at this meeting  
14 with a real intensity in terms of finding the paths to issue  
15 resolution, and there was just a changed attitude and focus  
16 on the parties involved in this meeting.

17           We've been looking at the technical information  
18 over the more than 10 years.

19           We have been documenting the status of issue  
20 resolution in our issue resolution status reports for the  
21 last three or four years, and in those reports, we've been  
22 indicating the status of the sub-issues and what is needed  
23 to close those issues.

24           So, the information has been there. DOE has read  
25 those, and they've provided us, in fact, with feedback on

1 some of those issue resolution status reports.

2 Now, the April 25th and 26th meeting represented  
3 this attempt to take a quantum leap forward in the  
4 resolution process, and what we promised to do and we think  
5 we did was to summarize the current resolution status of the  
6 Key Technical Issues, the associated sub-issues, and most  
7 importantly to state specifically what is needed from DOE to  
8 close these issues and sub-issues, and for its part, as  
9 Carol told you in greater detail, DOE staff would discuss  
10 its plans and schedule for providing the needed information  
11 and also would give their views on how close they were to  
12 actually having some issues resolved or providing the  
13 information that we were asking for, and I might say that  
14 the format that DOE provided that information in we found  
15 very useful and are still working with.

16 It's important to understand what we mean by our  
17 various categories of issue resolution.

18 We now have three categories open.

19 DOE has not yet acceptably addressed staff  
20 questions regarding the model, data, or other information  
21 pertaining to an issue or its subordinate sub-issues, and  
22 what this means is that, in the staff's view, additional  
23 information is required to provide an adequate basis for  
24 regulatory decision-making at the time that we're reviewing  
25 the license application, and in fact, the failure to provide

1 the needed information could even result in the LA not  
2 managing to be docketed.

3 Closed is when the staff has no further questions  
4 regarding the model data or other information.

5 The DOE approach and the supporting information  
6 acceptably addresses our questions and our comments, and no  
7 information beyond what is currently available will likely  
8 be required for staff regulatory decision-making when we are  
9 writing that SER and when we are reviewing the license  
10 application.

11 The third category is one that we more recently  
12 added, and it's closed pending the license application or  
13 construction authorization review, and this closed pending  
14 means that, right now, the staff has no further questions  
15 regarding the model data or other supporting information  
16 pertaining to an issue or the subordinate sub-issue, but the  
17 staff is awaiting additional information from DOE.

18 The staff feels that it needs more information to  
19 gain confidence that that information, combined with what is  
20 already available, if provided by the time we're doing our  
21 licensing review, will be enough to enable us to proceed  
22 with regulatory decision-making.

23 And the last point is very important. If the  
24 additional information has not been provided before the  
25 license application, the LA itself will include the

1 remaining required information sufficient for staff to make  
2 its determinations.

3 Now, the commitments we're looking for, where DOE  
4 has not yet done the data gathering or the analyses that  
5 we're looking for, these commitments need to be documented,  
6 they need to be specific in terms of what will be done and  
7 when it will be done.

8 At the KTI resolution meeting, the staff presented  
9 the current status of each sub-issue and the overall Key  
10 Technical Issue and specifically what DOE needs to provide  
11 or consider to close the sub-issue.

12 There were three categories of information. The  
13 DOE needed to provide additional analyses or initial data  
14 and analyses or, in rare instances, one or more additional  
15 aspects of the sub-issue need to be addressed, something  
16 that DOE simply had not yet even looked at.

17 At this stage in the program, there weren't too  
18 many of those situations.

19 The outcomes of the April meeting -- in  
20 preparation for that meeting and/or at that meeting, seven  
21 sub-issues were able to be called closed or closed pending,  
22 four in the container life and source term Key Technical  
23 Issue and three under repository design and thermal  
24 mechanical effects, and those are listed there for you, and  
25 you see my note indicating that, on the next page, it gives

1 you a summary status for all of the nine KTIs and the 38  
2 sub-issues. Right now, 14 sub-issues are considered closed  
3 or closed pending and 24 are considered open.

4 Two other outcomes of the April meeting -- there  
5 was a much better understanding of DOE plans and schedules  
6 for providing the information to close issues, and the bases  
7 were established for NRC staff to develop more detailed  
8 schedules by the end of September for implementation of the  
9 paths toward resolution, and in fact, all nine Key Technical  
10 Issue teams are currently engaged in working out detailed  
11 schedules and plans that can lead to resolution of their Key  
12 Technical Issue and the associated sub-issues.

13 This is the chart showing the underlying  
14 sub-issues are the ones that are open and the others are  
15 closed or closed pending.

16 If you have questions about any of the individual  
17 KTIs, as I mentioned, the staff members are here who can  
18 discuss those for you.

19 You can see that, in most of the -- well, I don't  
20 want to exaggerate, but in many of the Key Technical Issues,  
21 there is at least one sub-issue which is closed or closed  
22 pending.

23 There are a couple of Key Technical Issues where  
24 everything is open at the present time.

25 And finally, the path forward, the next steps --



1 NRC staff will continue development of the plans that I just  
2 discussed to reach closure of the sub-issues and the issues,  
3 especially incorporating review of the transmittals that  
4 Carol mentioned, the AMRs, the PMRs, and the proposed  
5 near-term meetings to attempt to achieve closure of the  
6 first four KTIs that DOE identified.

7 I want to point out in my chart that I didn't mean  
8 to unilaterally move the saturated zone meeting from -- to  
9 Berkeley from Albuquerque.

10 That's a little flaw in my slide for the November  
11 1st-2nd meeting.

12 That should be Albuquerque.

13 And for the SDS meeting, I've got a TBD, where  
14 Carol had October 3 through 5, because it appears that,  
15 right now, ongoing discussions may cause a slight change in  
16 those dates, and of course, you all will be informed as soon  
17 as those dates get re-established.

18 The dates being considered are a week or two from  
19 the October 3rd through 5th date.

20 The issue resolution status reports for the for  
21 KTIs involved in these meetings will be deferred until after  
22 the meetings take place so that the staff has an opportunity  
23 to include the results of the meeting in those issue  
24 resolution status reports, document any further closures or  
25 at least the path toward closure, and as Carol mentioned,

1 meetings on the other five Key Technical Issues have not yet  
2 been scheduled, and the staff will go forward and issue  
3 those issue resolution status reports by the end of October  
4 of this year, and then we will proceed to schedule those  
5 meetings as soon as possible based on both parties'  
6 availability.

7 So, that's pretty much the status of issue  
8 resolution from the NRC point of view, and certainly, what  
9 Carol talked about in terms of sufficiency is important. We  
10 are looking at the available information in terms of what we  
11 would write about the sufficiency of the data available for  
12 DOE to prepare a license application.

13 NRC, in issue resolution, has the long-term view  
14 of the license application and whether the information that  
15 will be provided will be enough for a complete high-quality  
16 application.

17 At this point, I will stop and let you ask  
18 questions of me or the leads for the Key Technical Issues.

19 Dr. Hornberger?

20 DR. HORNBERGER: Thanks, King.

21 Let me ask a first quick question.

22 On your last slide and what Carol showed us, it  
23 does look -- or it's obvious that these meetings are focused  
24 on KTIs, and the question I have -- do you have any  
25 gut-level feeling as to how many PMRs and AMRs feed into

1 each one of these KTIs?

2 That is, they're no longer strictly PMR meetings.

3 MR. STABLEIN: That's correct.

4 DR. HORNBERGER: Could you give me some feel for  
5 how many?

6 MR. STABLEIN: I know that there are a lot of AMRs  
7 that feed into the PMRs for these, but why don't we pick  
8 one, because the KTI leads are --

9 DR. HORNBERGER: -- are here.

10 MR. STABLEIN: -- on top of this.

11 How about, for example, the USFIC?

12 Latif, would you like to address that?

13 Introduce yourself first.

14 MR. HAMDAN: Yeah. I'm Latif Hamdan.

15 I can deal with the saturated zone exactly. We  
16 have one saturated zone flow and transport PMR, and it is  
17 supported by 13 AMRs.

18 DR. HORNBERGER: So, it clearly, then, is either  
19 one PMR associated with each of these meetings or no more  
20 than two?

21 MR. STABLEIN: Gustavo?

22 MR. CRAGNOLINO: Gustavo Cragnolino, Center for  
23 Nuclear Waste Regulatory Analysis.

24 In the case of the CLST KTI, there are two PMR,  
25 one for waste form and another one for waste package.

1 MR. STABLEIN: James?

2 MR. FIRTH: James Firth, NRC.

3 In the case of Total System Performance Assessment  
4 and Integration we sort of capture elements of all of the  
5 PMRs, like primarily the abstraction AMRs and the FEP AMRs.  
6 We also have some documents that are not in the set of PMRs.  
7 We have the TSPA SR documents, which is the model document  
8 in the technical report.

9 So, we have some things beyond just the PMRs that  
10 we have to look at, as well.

11 DR. HORNBERGER: Thanks.

12 Milt, do you have questions?

13 MR. LEVENSON: I have one sort of general question  
14 that I suppose I should ask you and Carol independently, but  
15 do you feel there is general agreement on these open issues  
16 where more information is needed? Do you think the two  
17 sides are pretty much talking about the same thing as to  
18 what's needed, etcetera?

19 MR. STABLEIN: I think that the April meeting  
20 brought us a lot closer in assuring that we are focused on  
21 the same needs for data and analyses.

22 I wasn't at the meeting.

23 David, would you want to comment on that from your  
24 experience at the meeting?

25 MR. BROOKS: Yeah. Dave Brooks.

1 I would agree with King. I think the meeting  
2 indicated that the DOE and the NRC are focusing on the same  
3 kinds of information needs.

4 An example would be, for example, in the  
5 unsaturated/saturated flow, it would be the flow paths and  
6 the data needed to define flow paths in the saturated zone.

7 You know, I don't think there's any disagreement  
8 with -- among the staff on the need for that information,  
9 for doing the total systems performance, and I think you  
10 could probably come up with examples for all of the KTIs.

11 MR. LEVENSON: I was really thinking more about  
12 detailed information at the meeting where there are very  
13 many or any responses where when you said, well, we need  
14 more on this, were the responses, well, we thought we gave  
15 you what was wanted.

16 That's a fairly normal problem in this kind of  
17 communication.

18 Do you feel there is a good understanding?

19 MR. BROOKS: Yes, I do.

20 I can't remember any areas where there was extreme  
21 disagreement.

22 We always have discussions about igneous activity.  
23 I think we've come very close together on that one. That  
24 one's a priority issue to meet with DOE on, and we'll be  
25 doing that in August.

1 Carol?

2 MS. HANLON: Yeah, I just want to note that we  
3 worked very carefully together to make sure that we minimize  
4 areas of discrepancy such as that.

5 It was very helpful to have the April meeting and  
6 to clearly identify where NRC thought we were with regard to  
7 the status and where we thought we were.

8 In addition, we've provided -- at NRC's request,  
9 we've provided copies of all the analysis in modeling  
10 reports in draft phases, and they will get them in final  
11 phases. So, they have the actual documents to look at the  
12 information and see if, in fact, the information that we  
13 think makes a point does make that point, or if they have  
14 any additional questions on that, and one thing we did in  
15 San Antonio was to agree that, as we prepare for these  
16 meetings, it's very important that we've digested the  
17 Analysis and Modeling Report, we've gone through the gap  
18 analysis, and we've looked where we are and tried to define  
19 points where we need to further clarify in order to have  
20 meaningful understanding and to reach resolution.

21 So, we may not be perfectly there yet, but we  
22 certainly are focusing on getting there.

23 DR. HORNBERGER: Ray?

24 DR. WYMER: I have a question that's probably a  
25 little more specific than is appropriate for this meeting,

1 but I want to ask it anyway.

2 I noticed under your Key Technical Issues and  
3 sub-issues on viewgraph number nine, the evolution of the  
4 near-field environment has a lot of underlining.

5 [Laughter.]

6 DR. WYMER: And it's basically chemistry.

7 And I wondered if -- two things: one, if there's  
8 any feeling for whether or not DOE is really addressing  
9 these things at the level of effort that will get to the  
10 answers in a timely way and, secondly, whether or not there  
11 is adequate support at the center and elsewhere in NRC to  
12 evaluate what DOE turns in.

13 MR. STABLEIN: Well, Bret Leslie is the lead on  
14 that, and I think he can respond.

15 MR. LESLIE: Bret Leslie, NRC staff.

16 Ray, I think one reason why you see those things  
17 underlined is that, in terms of bringing in geo-chemistry  
18 into performance assessment, it's been rather a late-comer.

19 DR. WYMER: Yeah.

20 MR. LESLIE: I think the TSPA VA was the first  
21 real attempt by DOE to really try to bring in the  
22 complexity, and they made very good progress.

23 We feel that, after our review of the AMRs, that  
24 -- I wouldn't say that everything's open. We're definitely  
25 focusing on major -- on the things that are most important

1 to risk, and I think they understand that, that, for  
2 instance, you don't need to know everything about the  
3 geo-chemistry, but you need to know certain particular  
4 things, and I think we've focused at that April meeting what  
5 it is that we're looking for.

6 So, I don't -- I think we have the resources  
7 necessary to do it, and I think DOE -- you know, we're in  
8 the process of reviewing the AMRs.

9 We still see that there are some things that  
10 aren't being focused on by DOE and the AMRs in terms of the  
11 near-field.

12 DR. WYMER: But you do think you have the  
13 resources necessary to evaluate what you see?

14 MR. LESLIE: If not, we'll make noise.

15 DR. WYMER: Okay. Thanks.

16 DR. HORNBERGER: Bret, could you perhaps give us a  
17 specific example of something that you want to focus on and  
18 perhaps you're not quite sure that -- how DOE is going to  
19 get there?

20 MR. LESLIE: We'll give you the example.

21 Primarily, as you well know, the near-field is  
22 really looking at how it impacts performance, and so, we  
23 rely on the container life and source term folks to tell us,  
24 okay, well, for the drip shield, we need to know what the  
25 fluoride chemistry is.



1 Well, if you look at the AMRs on evaporates and  
2 salt analysis, they don't evaluate fluoride, yet we know  
3 that fluoride concentration could be critical to one type of  
4 corrosion mechanism in the drip shield, and so, that's one  
5 of them where it would be fairly easy to do, but they  
6 haven't addressed it to date, and so, this is likely to be  
7 something that we'll be bringing up in our interactions with  
8 DOE sooner rather than later.

9 DR. HORNBERGER: Okay.

10 So, you don't have like major issues in inadequacy  
11 of the thermo-dynamic database or something really  
12 fundamental.

13 DR. WYMER: I wouldn't say that.

14 [Laughter.]

15 MR. LESLIE: In some ways we're a little fortunate  
16 that the geo-chemical parameters for both the waste package  
17 and drip shield are things that tend to behave  
18 conservatively, like chloride and fluoride.

19 So, we're not really relying on exotic things, and  
20 it just happens that the engineered barriers are not  
21 necessarily reliant on things that don't -- there isn't a  
22 good thermo-dynamic database.

23 Sure, if you wanted to model the mountain in a  
24 scientific sense, that's -- you know, there are some gaps,  
25 but when you focus on what things are important to risk, the

1 chemistry is rather simple or the breadth that you need is  
2 narrowed.

3 DR. HORNBERGER: Ray?

4 DR. WYMER: I'm done.

5 MR. McCARTIN: John?

6 DR. GARRICK: Sort of continuing a discussion of  
7 viewgraph number nine, I was struck at first -- and as the  
8 discussion proceeded, I was less -- it was less of a  
9 mystery, but at first I look at number three, which is  
10 container life and source term, for which there has been  
11 considerable progress in resolution of sub-issues for a part  
12 of the repository that the design is still reasonably  
13 dynamic, and then I look at -- and yet, there's closure on a  
14 lot of the sub-issues, and then I look at KTI 4, which for  
15 the -- on first look, is basically the mountain, which is  
16 pretty well-designed, and there is nothing resolved, and it  
17 was kind of a curious thing to me that we had made so much  
18 progress on a part of the repository where the design is in  
19 a high state of dynamics and very little progress on a part  
20 of a design where things are reasonably stable, but part of  
21 the problem is the coupled process issue.

22 I was just wondering if anybody wanted to comment  
23 on that.

24 And the other thing, I would like to have somebody  
25 just spend a few minutes taking us through one of these

1 issues to get a little better feel for, at the technical  
2 level, what constitutes closure, and I don't care which one  
3 we take, although maybe, because there's been so much  
4 discussion of it, we could use as our example igneous  
5 activity.

6 So, there's two kinds of things. One is how come  
7 we've made so much progress on the container life and source  
8 term KTI and so little progress on the natural setting,  
9 given that we've been dealing with the natural setting for  
10 many, many, many years?

11 Is this an artifact of scheduling? Is it because  
12 of the complexity of the issue? What are some of the  
13 contributing factors?

14 MR. LESLIE: Dr. Garrick, this is Bret Leslie, NRC  
15 staff. I'll answer that.

16 I think I touched a little bit about it, but  
17 basically it's been a lack of an analysis. While they may  
18 have collected a lot of data, the drip shield heater test is  
19 a relatively new program. The EBS testing at DOE is  
20 relatively new.

21 The state of knowledge in terms of applying it to  
22 risk is new, and so, when we're focusing on closure, we're  
23 focusing on those things that aren't necessarily just the  
24 description but how that information is applied in a  
25 performance assessment to evaluate the risk.

1           And the other thing is that the issue resolution  
2 is, really, when we write these things, it's a snapshot. If  
3 the design were to change, container life and source term,  
4 if they introduced a new exotic thing, one of the sub-issues  
5 would open up again.

6           I think I'll let CLST explain why they can close  
7 and we're not.

8           MR. CRAGNOLINO: I will take a different example  
9 that is in some ways related. This is what we consider  
10 sub-issue number three, the rate at which radio-nuclides are  
11 released.

12           For us, this issue is closed but pending  
13 additional information, and I think that the way that it has  
14 been underlined, this is a little different and it's very  
15 important.

16           Closed pending additional information doesn't mean  
17 that it's closed.

18           Maybe there's critical information there that is  
19 not essentially relevant to the nature of the problem but  
20 will impact in the uncertainties, and let me make example.

21           I don't know if I have enough time, but DOE is  
22 dealing very well with the rate of dissolution of the spent  
23 fuel. They use a good model and database. There are some  
24 minor problems, but we agree, essentially. There are some  
25 problems later on regarding the solubility of neptunium, but

1 I will leave this aside.

2 Now, if the cladding is very important in their  
3 performance demonstration, we have a problem, and this is  
4 related in some way with some aspect of the impact of  
5 chemistry.

6 If fluoride, coming back to the example, is not  
7 tied up, fluoride can impact the zircalloy cladding, and the  
8 zircalloy cladding will corrode right away. On the other  
9 side, if fluoride is tied up with silicone or something else  
10 from the fuel or from the environment inside, you don't have  
11 the same problem.

12 I mean the problem is well-defined, but DOE needs  
13 to provide additional information, and here is a problem  
14 that is not thermal-dynamic in nature, but it has to do with  
15 the problem of concentrated solution.

16 There is no good way with EQ326 to deal with  
17 concentrated solution.

18 Well, they have to conclude the solution are  
19 diluted or are concentrated.

20 This is the root of the problem.

21 However, the approach is sound, they have good  
22 models, enough databases, but they need additional  
23 information before we can close the issue.

24 We consider the issue is closed pending this  
25 additional information, but it's not closed. It all depends

1 upon how the impact of the failure of the cladding will  
2 further release.

3 I think that this clarifies the issue for us.

4 DR. GARRICK: So, a lot of these closures are  
5 conditional?

6 MR. CRAGNOLINO: Conditional. And if you want, I  
7 can amplify on the others.

8 To take another simple example, second one,  
9 sub-issue related to mechanical failure, with the change in  
10 design, thermal embrittlement of carbon steel is moot, and  
11 for the temperatures we are talking about, we don't  
12 anticipate problems with embrittlement or the regulation of  
13 mechanical failure for alloy-22.

14 Therefore, it's very much information that we need  
15 there, and mostly, it is related with initial failures, how  
16 they handle initial failure, with a lack of information in  
17 the fabrication of component of alloy-22.

18 For stainless steel, they have a lot of components  
19 over there, but it's different to weld, stainless steel to  
20 alloy-22.

21 It's closed pending additional information, but we  
22 can capture this information very soon, we believe.

23 DR. GARRICK: Is this kind of strategy,  
24 conditional closure, consistently applied, reasonably  
25 consistently applied throughout all the sub-issues?

1 MR. STABLEIN: I can tell you that, in preparation  
2 for the meeting, we worked very hard, staff and management,  
3 on each sub-issue, looking at the information, looking at  
4 how the criteria were applied, and it is my belief that it  
5 is reasonably consistently applied.

6 DR. GARRICK: Now, is there close interaction or  
7 strong interaction in the effort to develop the technical  
8 case for closure, the preparation of the issue status  
9 resolution reports or issue resolution status reports?

10 Is there close tie between that activity and the  
11 NRC experts on the TPA such that there is that element of  
12 consistency, namely the attempt to bring the risk-informed  
13 aspect to the resolution process?

14 MR. STABLEIN: Very much so, and if Gordon or  
15 James want to give us a little --

16 DR. GARRICK: I was kind of looking for that  
17 connection as we cite an example of just walking us through  
18 how a sub-issue is actually resolved.

19 We are reading the IRSRs, and we do see that kind  
20 of information, but again, at a time when the agency is  
21 preaching the gospel of risk-informed, are they, indeed,  
22 practicing it? Here is an opportunity to turn up the  
23 microscope on an activity and see if, in fact, that's taking  
24 place, and we're kind of interested in doing that.

25 MR. FIRTH: James Firth, NRC staff.

1           To get to the point about the external review that  
2 we had of the TPA code, that activity has been done. We are  
3 still in the process of trying to pull in the comments of  
4 the experts into our TPA code, which will then filter  
5 through the entire process.

6           We have not been able to complete all of their  
7 recommendations or to evaluate them all in terms of pulling  
8 them into the TPA code and then informing what's going on in  
9 the issue resolution process.

10          All of the KTI leads do have a copy of the report  
11 and the recommendations. We have pulled them out into an  
12 action plan that we're working on developing exactly where  
13 and how we are going to be addressing that.

14          That process is still underway.

15          We are going to be doing a lot more as we work on  
16 updating the TPA code for version 5.0, and we are also  
17 looking at pulling that into all of our activities beyond  
18 the TPA code, because some of the comments that they're  
19 making do apply to the other areas.

20          So, we are looking at in a comprehensive way. We  
21 have not completed that effort, however.

22          DR. GARRICK: One of the things I was half  
23 expecting to hear was we know from the TPA presentations  
24 that there has been quite a bit of effort in modeling the  
25 waste package and what might happen over long periods of



1 time, and I was very curious to see if that would manifest  
2 itself as one of the contributing factors to closure of  
3 those items, because you were more advanced in your TPA  
4 modeling with respect to the waste package than you, say,  
5 might be with respect to some of the other things, but I  
6 didn't quite hear that.

7 MR. FIRTH: In terms of the comments on our waste  
8 package modeling, I mean just to take -- we had some very  
9 positive comments in terms of the approach that was buried  
10 into our EBSPAC model and incorporated into our TPA model in  
11 terms of the chemistry and the degradation of the waste  
12 packages.

13 So, that was seen as very positive, as a  
14 significant advance in terms of how you would look at the  
15 long-term performance of metals.

16 We also are in the situation for the TPA code of  
17 trying to keep up with DOE's design, which includes adding  
18 the drip shield, changing the dimensions and the structure  
19 of the waste package over time.

20 So, we're still end up having to try and play  
21 catch-up.

22 So, while we're relatively current, there are some  
23 degradation modes that we are still looking at trying to  
24 pull into the TPA code and making sure that we do have the  
25 full coverage, because the waste package is very significant

1 when it has a very long life that cascades through the  
2 entire process of what's important and how you would  
3 evaluate the repository system and DOE's safety case.

4 DR. GARRICK: Thank you.

5 MR. STABLEIN: Dr. Garrick?

6 DR. GARRICK: Yes.

7 MR. STABLEIN: I think John Trapp is willing to  
8 address your igneous activity question, if you'd like.

9 DR. GARRICK: Yes.

10 MR. TRAPP: If you take a look at where we're  
11 sitting in igneous activity and if I go under the  
12 consequence sub-issue, there's a whole series of things that  
13 we can talk about, and I can go into as much detail as you  
14 really want.

15 For instance, one of the things that we have got  
16 under the igneous consequence sub-issue is the need to put  
17 together models which accurately transport ash through the  
18 area.

19 Now, there have been a series of questions with  
20 DOE as to which models they were using and this type of  
21 thing, and they are presently using the ash plume model  
22 which was developed on the center.

23 We've had that looked by experts on our side, and  
24 everybody agrees that the model itself, while it's got a few  
25 warts and this type of thing, is probably about the best

1 that we've presently got in the field of volcanology.

2 The question that still remains on this right now  
3 is that, now that DOE has got the model, they are going to  
4 have to actually go through the validation and verification.

5 We have seen a little bit of stuff, but there is  
6 nothing formal, and we understand that what they've done --  
7 well, we've seen what they've done, which is compare it to  
8 the 1995 Cierra Negro eruption and show that they're getting  
9 a good match, but this has not been run through the QA  
10 process, etcetera, this kind of thing, and documented.

11 So, one of the things to be done there is really  
12 go through this documentation, get it QA'd, and then there's  
13 one point that's taken care of.

14 As mentioned in some of the other discussions that  
15 we've had, one of the big things we've got to worry about is  
16 magma/repository interaction.

17 We've done quite a bit of modeling on it in both  
18 mathematical and analog, and the DOE now is doing a series  
19 of modeling where they are also going through this.

20 The problem that we've got with the DOE modeling  
21 so far -- and they recognize it -- is they were using the  
22 assumption of a backfilled repository.

23 They are presently doing some work on this, and  
24 actually, the person that could tell you more about it is  
25 sitting right here, is Eric Smistad. He could tell you

1 exactly what the status is of the modification there, but we  
2 know that it's being done, and hopefully, this is something  
3 during the August technical exchange that we can come much  
4 closer to.

5 Dropping back to the previous one, in addition to  
6 the technical exchange, the week prior to that, there is a  
7 week-long QA audit on the disruptive processes, and this,  
8 hopefully, will get, also, some of these models and QA  
9 questions and documentation taken care of.

10 MR. SMISTAD: Eric Smistad, DOE.

11 The ICNs or the analysis for the no-backfill case  
12 has been completed, and those -- that analysis has been  
13 incorporated into our TSBA runs.

14 The documentation for that should be out within a  
15 week or so, so we should have that prior to the technical  
16 exchange that we've been talking about today for igneous  
17 activity.

18 DR. GARRICK: Good.

19 MR. TRAPP: So, anyway, in that area, the question  
20 of closure is going to require us to, you know, take a look  
21 at it, see where we're sitting, and based on what we saw on  
22 the non-backfilled case, it's probable that this one can --  
23 this specific issue, once we have time to review it, can be  
24 taken care of.

25 If you go through some of the other concerns --

1 for instance, interaction of the waste package and all these  
2 other kind of things -- we had a lot of problems back in the  
3 VA stage because of the assumption that was gone through on  
4 survivability of the waste package.

5 We did not believe it and we did not believe that  
6 the data was there to support it.

7 In simplest form, DOE, at present, has decided not  
8 to take credit for the waste package during a volcanic  
9 eruption, therefore we don't have to worry about the data  
10 case, all we need is just one piece of paper or a formal  
11 commitment that says they're not -- we got this informally.  
12 If they'd just say it formally, then that part of the issue  
13 is closed.

14 We break off into stuff dealing with the  
15 biosphere, and this is a case where we're going to have to  
16 deal slightly with two of the different PMRs, and I am not  
17 sure how many AMRs are dealing with biosphere, but a big  
18 question deals with re-distribution.

19 This is something that we -- well, previously,  
20 when we were looking at standard or not, it was really  
21 looking at peak dose.

22 We looked at expected dose, then we had to start  
23 evaluating a few other things, and through time, the  
24 redistribution factor really started becoming important or  
25 appears important, because no matter where the stuff is

1 going to be deposited from a volcanic eruption, 40-mile wash  
2 is going to basically be taking it up, picking it up,  
3 rolling it, and transporting it down to the area of the  
4 critical group.

5 The effect of this is something we recognize can  
6 be important, but very honestly, at the NRC, we are only in  
7 the very juvenile stages of evaluating it.

8 Now, we've talked to DOE. They recognize the  
9 importance, and in the meeting coming up in August, they are  
10 going to present, if I understand it correctly, a scheme or  
11 a methodology by which this can be probably bounded.

12 I'm not sure if we can get very much closer  
13 without a tremendous amount of expenditure of money, which  
14 I'm not sure is necessary.

15 We haven't heard exactly how they are going to do  
16 it.

17 So, once we get the presentation, take a look at  
18 it, etcetera, then hopefully this can be closed.

19 I can go into a whole bunch of other examples, but  
20 this is basically where we're sitting.

21 DR. HORNBERGER: Can I just ask about one example,  
22 John?

23 The probability of igneous activity -- it seems  
24 the NRC has been standing very firm on 10 to the minus 7th  
25 and DOE has been standing firm on their expert elicitation

1 that they say includes 10 to the minus 7th.

2 Can you tell us a little bit about how you're  
3 going to take that underline away?

4 MR. TRAPP: Yes.

5 In simplest form, we realize that we've still got  
6 some very, very deep differences.

7 During the meeting in August, we are planning on  
8 covering all these different points to find out if we still  
9 have the same amount of difference or not. If we do, then I  
10 guess the best way to say it is we're going to try to  
11 finesse it.

12 DOE -- and this has been discussed at the NRC/DOE  
13 management level -- would be coming in with something like a  
14 licensing case using exactly the numbers that they want to  
15 use, with no variant as to 10 to the minus 7th or anything  
16 like this, and this would be presented as the licensing  
17 case.

18 However, there would be a reference case someplace  
19 else, and not necessarily in the licensing document, but it  
20 would be in a document that is readily referenced and  
21 available, which would do an analysis at 10 to the minus  
22 7th.

23 We may have the technical differences, but if they  
24 can show under both those cases that the site's safe, who  
25 cares what the probability is? And that's really the way

1 that we're trying to get around it.

2 DR. WYMER: I had sort of a general question with  
3 respect to the design of the facility and how it affects the  
4 resolution of the KTIs.

5 We've seen a lot of flip-flopping by DOE, and they  
6 steadfastly maintain they have not frozen a design, although  
7 they have a design, at the moment, but we've seen C-22  
8 inside the waste package, we've seen C-22 outside the waste  
9 package, we've seen backfill and we've seen no backfill, and  
10 we've seen drip shields and no drip shields and drip shields  
11 again, and we've seen above boiling and below boiling  
12 repositories, and the question I had is, are the technical  
13 inputs into the KTIs flexible enough and broad enough that,  
14 if we have another flip-flop or something -- dramatic change  
15 in design -- they can be encompassed in what has already  
16 been agreed upon, or will this throw a bunch of the KTIs  
17 back onto the drawing board for re-resolution?

18 MR. STABLEIN: Well, let me start the discussion  
19 and then bring up the experts to comment on either the  
20 repository design or the container design.

21 In general, we mentioned that these sub-issues can  
22 be closed on the basis of current information but can be  
23 re-opened, and I would say, for design issues, this is one  
24 of the weaknesses, if you will, with the closure process, is  
25 if the design changes, we have to revisit.



1 MR. TRAPP: Could I give a couple of examples just  
2 to kind of fill in there? Because one of the things in  
3 igneous activity that has made an effect -- well, two things  
4 -- are the presence or absence of backfill and the actual  
5 orientation of the drifts.

6 We have -- well, basically, like I stated, DOE has  
7 done the analysis under the backfilled case, and what  
8 happens there is, because of the backfill, the possibility  
9 of magma getting into the drifts and migrating far down the  
10 drifts is quite limited.

11 Therefore, the effects are much less, especially  
12 from an intrusive standpoint, than they would be from an  
13 extrusive.

14 In a no-backfill case, there's an awful lot more  
15 canisters from an intrusive case which would be affected.

16 Our code basically goes through and allows us to  
17 vary the number of canisters, etcetera, put this in, do  
18 these things, and find out the effects, and from what I've  
19 seen, DOE's code also does.

20 In addition, there has been some talk lately about  
21 the change in design where they change the actual angle of  
22 the repository.

23 While it does an awful lot of good for rock fall  
24 and all this other kind of thing, one of the things it does  
25 is, if you start talking about bringing an igneous intrusion

1 through there and bringing the cone to the surface, the  
2 actual layout of the repository now would end up with an  
3 elongated cone, therefore increasing the number of waste  
4 packages that could actually be in the eruption and brought  
5 to the surface.

6 Again, we've taken a look at the mathematics,  
7 changed it in the code, found out the differences, and yes,  
8 we are able to factor them in.

9 DR. GARRICK: Being a bit of an opportunist and  
10 recalling, King, that you said that all your experts were  
11 here representing each of the nine Key Technical Issues and  
12 having heard something from experts on at least three of  
13 them, namely the container life and the near-field  
14 environment and igneous activity, I think the committee  
15 would appreciate a five-minute summary from the expert of  
16 each of the remaining technical issues on the status of the  
17 KTI from their perspective. Is that a reasonable request?

18 MR. STABLEIN: That's reasonable, and we've come  
19 prepared for that kind of discussion. So, we can take them  
20 in whatever order you'd like and provide you with kind of a  
21 quick status, sure.

22 DR. GARRICK: Sure. I think that would be very  
23 helpful.

24 So, you can take whatever order you wish. I'll  
25 let you make that decision.

1 MR. STABLEIN: Okay.

2 Raj is standing up.

3 Go ahead, Raj.

4 MR. NATARAJA: This is Nataraja from the staff.

5 We have four sub-issues. As you can see, there's  
6 only one underlined.

7 This is repository design and thermal-mechanical  
8 effects.

9 The design control process issue is something that  
10 has been monitored for quite some time.

11 We had a number of problems with the design of the  
12 exploratory storage facility for quite some time, and if you  
13 remember, we had an objection based on that particular issue  
14 that was raised during the site characterization plan, and  
15 we have been monitoring that for quite some time, and we had  
16 a number of issues related to their document hierarchy and  
17 documentation of design changes and so forth, and based on  
18 the number of audits and surveillances and observation of  
19 design reviews, we concluded that they had made significant  
20 progress in the area of design control process, and although  
21 we continue to monitor that for the global design, based on  
22 our work so far, we have concluded that most of the serious  
23 issues that we have raised have been addressed adequately by  
24 the Department of Energy, and that's the first one, design  
25 control process.

1           And the second issue is related to the design of  
2 the repository with respect to seismic vibratory motion and  
3 fault displacement, and this was handled by the NRC staff  
4 when DOE agreed for a topical report process.

5           DOE agreed to write three topical reports -- TR1,  
6 TR2, and TR3.

7           TR1 comes under SDS. Perhaps Phil might talk  
8 about it later.

9           That's the one that deals with the probabilistic  
10 hazard assessment methodology, and that has been reviewed  
11 and accepted by the staff.

12           The second one is the design methodology itself  
13 for the -- both surface and underground facilities --  
14 seismic design methodology, that is -- and we have reviewed  
15 that and we have accepted that, and that's all documented.

16           There is one final, TR3, that is supposed to come  
17 in.

18           It has been postponed a number of times. We  
19 understand that it's now slated for 2001.

20           We have encouraged DOE to complete that as quickly  
21 as possible, and that's the one which talks about the design  
22 inputs that will be used for the surface and sub-surface  
23 facilities, and that's the reason why we have closed it  
24 pending.

25           Once the information from TR3 is submitted, we

1 understand the information is already available, it's only a  
2 question of putting it in the format of a topical report,  
3 and we have a procedure to review the topical report, and we  
4 expect that should be a reasonably straightforward exercise,  
5 and that's the reason that's also closed, but that's closed  
6 pending submission of TR3.

7           And I'll take the fourth one first, the repository  
8 seals.

9           The reason why that was closed was because of a  
10 change in the rule.

11           Part 60 had a specific requirement for the design  
12 of the seals.

13           Now that it's handled slightly differently, it's  
14 not directly connected to -- you know, they don't have to  
15 show that the design of the seal is done in such a way that  
16 a failed seal will not become a preferential pathway.

17           Right now, we are going to look at it as any other  
18 part of the design of the repository. We'll look at the  
19 tests and the specifications, but we are not going to insist  
20 on linking the Total System Performance Assessment as was  
21 done in Part 60.

22           So, because of the change requirement in the rule,  
23 that has been closed.

24           The one that's still open is the design of the  
25 repository to withstand the thermal-mechanical effects, and

1 that's the one which deals with issues like change of the  
2 rock properties as a function of temperature and time and  
3 the change of material properties as well as change of  
4 permeability which might have an impact on the amount of  
5 water that seeps into the repository as a function of time.

6 We have some differences.

7 We have reviewed a number of AMRs that the  
8 Department has given us, and they have concluded that the  
9 thermal effects on the permeability changes are quite  
10 negligible, but we think that there are some significant  
11 changes that might happen. But what is not clear at this  
12 stage is whether that change has a significant impact on the  
13 overall performance.

14 We are looking at that, and that's a matter for  
15 discussion that's going on between NRC and DOE, continuing.  
16 Perhaps in the next revision of the IRSR, we might be able  
17 to close that aspect of it.

18 And the other thing that comes under this  
19 particular sub-issue is the rock-fall.

20 Here is an example where the change of design  
21 might have an impact.

22 If they have, for instance, backfill, the  
23 rock-fall issue will not become a significant issue, whereas  
24 if they do not have the backfill, then we have to look at the  
25 impact of rock-fall and the performance of the drip shield

1 as well as the waste package.

2 We have some modeling being done at the center to  
3 analyze the impacts of falling rocks both on the drip shield  
4 as well as the waste package, and that's an activity that we  
5 will be spending a lot of time on during the upcoming months  
6 and perhaps a couple of years.

7 DR. GARRICK: Thank you.

8 MR. STABLEIN: Phil, do you want to talk about  
9 SDS?

10 Phil Justus is our KTI lead for the structural  
11 deformation and seismicity.

12 MR. JUSTUS: I am Phil Justus. Raj always  
13 provides a nice segue for our structural deformation and  
14 seismicity because the facts of the matter are that it is  
15 recognized that there will be earthquakes during the  
16 lifetime of the repository. There's likely to be false  
17 slippage occurring. When these things happen, fractures  
18 will also open or close.

19 The structural deformation and seismicity KTI  
20 deals with the natural system as it works to change  
21 discontinuities, in particular, is our interest. This is a  
22 matter for preclosure analysis where the waste handling  
23 building facility and pad and other surface facilities  
24 during operations require appropriate seismic design and  
25 similarly, of course, for postclosure seismic hazard and

1 fault displacement hazard analysis. We interact with DOE to  
2 try to resolve what those hazards are.

3 The fault displacement and seismicity subissues  
4 are both the subject of a probabilistic seismic hazard  
5 analysis that DOE performed. We have no major issues with  
6 that PSHA. The result of our interacting with DOE over the  
7 years to see that faulting and seismic characterization of a  
8 site has proceeded to an adequate level has essentially been  
9 moving along lines that have led to the current state of  
10 closed pending for these two subissues.

11 In the area of fault displacement, we do believe  
12 that faults, active faults in particular, which we call Type  
13 1 faults, have been adequately characterized. What we are  
14 waiting for to close the issue is to see how DOE has taken  
15 the characteristics of the faults and actually utilized them  
16 in their consideration of that hazard of fault slippage for  
17 design.

18 DOE has indicated it will do this. At our meeting  
19 to be scheduled some time in October we expect to see the  
20 benefits of DOE's activities in that area and presumably  
21 close or keep the issue closed in the sense or tighter  
22 closed than it is now.

23 In the area of seismicity DOE is doing more work  
24 to characterize the effects of the seismic hazard that its  
25 experts have developed. They are taking the hazard



1 translated to accelerations under a certain probability of  
2 occurrence or exceedence of occurrence into actual designs.  
3 To do that they need to know the way in which the seismic  
4 waves will be attenuated or interact with the soils and the  
5 other foundation and so forth, and they are proceeding to do  
6 work to get that information for finalizing their seismic  
7 design.

8 We can't close the issue until we see DOE's final  
9 seismic designs and the basis for it, but we expect that we  
10 will be able to close that issue when we do get the  
11 information.

12 CHAIRMAN GARRICK: You are talking about  
13 translation of this what I will call a seismic risk curve  
14 into the actual design of the facility and hardware and what  
15 have you. How about the seismic hazard curve itself? Is  
16 there reasonable agreement between the NRC and DOE on what  
17 that is for the site?

18 MR. JUSTUS: Yes, there is.

19 CHAIRMAN GARRICK: Including the uncertainty?

20 MR. JUSTUS: Yes. We are in general agreement  
21 with the range that the experts considered relevant models  
22 for input, that the uncertainty was generally appropriately  
23 defined and propagated through the final hazard curves.

24 With regard to fractures, that is an open matter  
25 right now. While we in general don't take issue with the

1 characterization of fractures that has occurred, and in the  
2 last several years underground, much fracture mapping and  
3 analysis has been done. We found though that we are not  
4 clear on whether the fracture information that has been  
5 developed or derived by the fracture mappers have been  
6 utilized consistently or within the range of uncertainties  
7 of the data.

8           This is coming to light as we see and look and  
9 review, for example, rock fall and flow models where  
10 fractures are involved. At different scales the fracture  
11 modelers make different assumptions and generalizations  
12 about the very detailed database. We are now engaging DOE  
13 in interdisciplinary meetings where we follow through, seek  
14 to follow through the use of the actual data and how they  
15 have been abstracted into the models.

16           What is pending is our review of the PMRs that  
17 utilize fracture information.

18           To go on to tectonic framework, the major portion  
19 of tectonic framework is the array of tectonic models that  
20 exist to describe the tectonism in Southern Nevada including  
21 Yucca Mountain, of course. There is no unique model. This  
22 is because of the state of the art of geological  
23 understanding of that part of the world.

24           However, tectonic models have been included in  
25 PSHA. In a generally satisfactory way, prior to PSHA in

1 fact we had reached some agreement with DOE on what the  
2 viable models are. There were some dozen of them some years  
3 ago. We agreed that five actually described the  
4 uncertainties involved and DOE agreed to utilize those in  
5 their calculations or as background for hazard analysis.

6 The experts brought in their own tectonic models  
7 or variations on them. That was perfectly acceptable.

8 What concern remains is not so much what models  
9 are there -- we agree what they are -- it is that, for  
10 example, the igneous activity group utilized some aspect of  
11 tectonic models that we felt was incompatible or at least  
12 inconsistent I should say with the aspect of hazard analysis  
13 that the seismic -- seismotectonic experts used, and we are  
14 looking to resolve this apparent inconsistency.

15 Our aim really is to ensure that one group or the  
16 other, although we think we are focusing on the use for  
17 igneous activity source term development, it hasn't picked  
18 the model or emphasized tectonic models that might  
19 underestimate their use for determining the igneous source  
20 terms. We have no indication that this will not be resolved  
21 at the igneous activity technical exchange coming up in  
22 August.

23 That is the detailed analysis -- we can go into  
24 more detail if you would like.

25 MR. STABLEIN: Thanks, Phil. That's very good.

1 Dr. Garrick, should we continue on?

2 CHAIRMAN GARRICK: Yes.

3 MR. STABLEIN: Okay. Is Jeff Pohle out there? I  
4 would like him to talk about thermal effects on flow.

5 DR. HORNBERGER: Jeff, if I could make a  
6 suggestion, rather than go through each individual subissue,  
7 perhaps if you could just give us the flavor. We can't  
8 digest everything in detail -- if you could give us a flavor  
9 of the issue and perhaps highlighting where you see  
10 potential difficulties in reaching resolution and why.

11 MR. POHLE: Okay. Jeff Pohle, NRC Staff.

12 Let me compose my thoughts to that question. I  
13 was ready to go item by item. I had a little table all  
14 ready.

15 DR. HORNBERGER: I knew you were quick on your  
16 feet and so I could do that to you.

17 [Laughter.]

18 MR. POHLE: Well, actually I am in the process of  
19 working on the next provision of the IRSR, trying to forget  
20 about Part 63 and the review plan for a minute.

21 As I recall, what we are interested in in this KTI  
22 is it relates to one of DOE's safety strategy factors,  
23 basically seepage into the drift -- that is one aspect and  
24 the other aspects will be temperature, humidity -- those  
25 aspects of the waste package environment given the

1 importance of the waste package.

2           So we kind of look at DOE's program from that  
3 perspective and we have to interact closely with USFIC, so  
4 these topics are covered in a number of PMRs. There is not  
5 necessarily a thermal effects on flow PMR so we are spread  
6 across a lot of documents.

7           One thing we have been following over the years is  
8 their thermal testing program and as you know our IRSRs will  
9 be structured such that the acceptance criteria in the  
10 review plan will be laid out there and we will evaluate  
11 those subissues in that context without going through this  
12 long list of criteria. Based on our last Rev., we really  
13 only have one open regarding the thermal testing program,  
14 and that was the amount of heat and mass lost through the  
15 bulkhead, how that affects the modeling you do and your  
16 interpretation of the results of that test.

17           Certainly the status at this point is I don't  
18 think there's been any change in our view or DOE's view,  
19 that I don't think they intend actually to do a physical  
20 measurement.

21           Some DOE technical support people think it can be  
22 handling through modeling and some do not think so, think it  
23 is circular logic when you are trying to attack the problem  
24 that way.

25           My perspective is that I am trying to look at it

1 from the point of view does it make any difference,  
2 understanding that there is another test plan for the  
3 crossdrift where they are trying to evaluate this concept of  
4 draining through the pillars directly, and that wasn't  
5 necessarily in the draft objective of the driftscale thermal  
6 tests, so it may be that while we disagree on that aspect of  
7 the driftscale test it may not matter. We may be actually  
8 monitoring our attention to this other test and seeing how  
9 relevant that is to supporting this design concept of DOE's  
10 on trying to enhance any drainage through the pillars to  
11 reduce seepage into the drift.

12 Then we take it from there and try and look how  
13 that is propagated through the various levels of modeling,  
14 and, one, what are the estimates they are going to use in  
15 the performance assessment for how much water seeps in the  
16 drift? Are those estimates or the approach used in the PA  
17 consistent with detailed, multidimensional process level  
18 models? Is it capturing and consistent with what is in the  
19 results of those analyses, and further is that consistent  
20 with what is observed in the field, whether it is previous  
21 or current experiments being done?

22 In terms of the modeling, I think in the RSR we  
23 have laid out some typical questions on how they are dealing  
24 with heterogeneity perhaps and looking more closely at the  
25 estimates of seepage into the drift.

1           Now we are kind of in time box here where we are  
2 getting in the preliminary and the drafts of the AMRs and  
3 PMRs but we can't use -- unless the document is final and  
4 approved by DOE we can't close an issue.

5           We have started to read them but they came in in a  
6 timeframe when we developed the next draft of the IRSR --  
7 those reviews were not complete and aren't necessarily all  
8 laid out in there, so we are kind of in an in-between  
9 situation here.

10           We did do some level of review of the preliminary  
11 drafts and may have made some comments on here, but that  
12 can't be the basis for saying "closed" or like that.

13           In fact, my support at the Center is also working  
14 closely with the USFIC KTI. There is a lot of overlap here,  
15 dealing with the seepage issue, but within the context of  
16 thermal effects we are just trying to deal with what the  
17 super position of the effects of the heat from the emplaced  
18 waste would have on those estimates and how they are going  
19 to accounted for or if they are accounted for in DOE's PA.

20           I think in terms of the subissues that we are  
21 dealing with in modeling that I just can't see anything  
22 there that should not be readily resolvable, because they  
23 are just modeling questions or they are questions related to  
24 you estimate this amount of seepage in your model; is it  
25 consistent with this; is it consistent with your

1 observations or is it just a guess? That would be the type  
2 of issues we would be dealing with.

3 One thing, as new documents come in from DOE they  
4 may well address some of the older questions we had with,  
5 such as a lot of the models fundamentally didn't deal with  
6 the ventilation during this time period. There's a lot of  
7 heat and mass can be moved through that system and your  
8 results certainly in temperature and humidity and estimates  
9 of seepage, it would be radically affected by ventilation,  
10 so we haven't reviewed in detail models that would include  
11 ventilation, so that is something that needs to be done that  
12 could be a source of comment beyond the comment we are  
13 already making that ventilation needs to be dealt with in  
14 these analyses.

15 That is kind of in a nutshell where we are. If  
16 you have anything more specific --

17 CHAIRMAN GARRICK: Have the opinions of the NRC  
18 reviewers and Staff changed at all in the last few months,  
19 years regarding the impact of thermal effects on flow, given  
20 all of the debate and discussion of the cold versus hot  
21 repository?

22 MR. POHLE: Conceptually -- from our point of view  
23 we didn't enter into the debate whether it should be hot or  
24 cold.

25 CHAIRMAN GARRICK: Yes.



1 MR. POHLE: But to some extent I would think a  
2 cooler repository simplifies the problem. We always had  
3 probably -- perhaps we had a differing view that it was our  
4 perspective that there was always potential for a large  
5 amount of water influx in a very hot repository, that this  
6 assumption that it was just going to dry out and this water  
7 was going to go somewhere, we didn't necessarily buy it.

8 That is probably less of a concern with the lower  
9 temperatures, although there could be some increased amount  
10 of seepage, whether that would pass through any threshold  
11 that would matter to performance or not is primarily a waste  
12 package and corrosion issue.

13 We are trying to feed into that issue in terms of  
14 are the temperatures and humidities predicted within this  
15 range they assume in the corrosion models, and is that  
16 technically supported and defensible.

17 MR. STABLEIN: Thanks, Jeff. Latif Hamdan,  
18 representing the USFIC KTI.

19 MR. HAMDAN: Latif Hamdan, NRC staff. Speaking of  
20 flavor, I would like to offer two very transparent examples  
21 in answer to Ray's earlier questions as to how things change  
22 that may result in reopening otherwise closed issues.

23 In our KTI, we include the issue of shallow  
24 infiltration based on an infiltration rate of 7.7  
25 millimeters per year in the VA, and after the VA, and my

1 understanding that in the UZ unsaturated zone PMR, that we  
2 received recently this infiltration rate was changed to 4.7  
3 millimeters per year.

4 So when something like this has come, we need to  
5 follow up with DOE and see if we have to reopen otherwise  
6 closed issues.

7 Another example, very transparent and direct, is  
8 in the VA, DOE took the position that they are not going to  
9 take credit for dilution due to -- so we closed that item.

10 Now, in the saturated zone BMR and the other BMRs,  
11 DOE decided to take credit for dilution due to -- which is  
12 fine, except that we need to review what they did and make  
13 sure that it's okay, and so this issue may have to be  
14 reopened.

15 So this is the kind of examples, Ray, that go  
16 directly to your question. It's not like design. It's very  
17 direct and very transparent.

18 Now, in the USFIC, we have, as -- handout shows,  
19 we have open items in deep percolation, in the saturated  
20 zone flow, and in methods diffusion.

21 Let me just go in the same order that -- put them.  
22 In deep percolation, and after the technical exchange with  
23 the Center in April, the issues that are -- we are concerned  
24 about in deep percolation go to the percolation above -- how  
25 much seepage goes into drift, and how much -- what goes into

1 drift, and also --

2 So, how much water seeps into drift and how much  
3 of that water actually contacts the waste packages, and also  
4 there are issues, and we have on that, some questions about  
5 some of the -- but more importantly about the model that DOE  
6 is using.

7 And on that regard, it seems that there is  
8 basically -- we are very close to closure on the high range  
9 of the -- how much of infiltration is in contact with waste  
10 packages, something like 50 or 60 percent.

11 But on the lower values, it seems DOE has a  
12 threshold where below which there is no seepage would occur  
13 and no water, and it seems that -- technical staff and our  
14 staff are -- had agreement with DOE in that.

15 Below the repository, we have questions about  
16 basically two issues, the zeolitic and vitric distribution  
17 to the extent that affix the attenuation of contaminants in  
18 the unsaturated zone.

19 And there's also another issue that keeps coming  
20 back, and that's the pairs water zone and how it will impact  
21 flow from the repository from the drift to the water table.

22 So, these issues are on the table, and these are  
23 items that are to be closed.

24 On the saturated zone flow, really this is a  
25 fairly -- we feel there are many weaknesses of the nine

1 items in the saturated zone in the IRSR. We have seven or  
2 now eight because of dilution due to -- that are still open.

3 So this -- most of the items or the majority of  
4 the items in the -- are still open, and the reason for that  
5 -- I mean, to give you a flavor of that, we have concerns  
6 about the alternative conceptual models for the saturated  
7 zone flow.

8 And it's not that only NRC is concerned about  
9 that. I was in an audit in June of the saturated zone PMR,  
10 and even the contractor staff for DOE are recognizing that  
11 there are alternative conceptual models for saturated zone  
12 flow, and alternative conceptual models for delineating the  
13 potential -- heads in the saturated zone, but they stop  
14 short of identifying any alternative models, and, of course,  
15 if you don't find any, you don't analyze any.

16 Just on the positive side, in the TSPA, they do  
17 look at alternatives that go and touch upon some of the  
18 concerns that we have in the USFIC KTI. But at the KTI  
19 level, at the saturated zone level, there seems to be no  
20 identification or any alternative conceptual models, and, of  
21 course, therefore, there is no analysis.

22 On the actual modeling of the saturated zone, we  
23 have a concern that they have a site scale model and a  
24 regional scale model, and the calibration of the site scale  
25 model is dependent, in part, on the regional model.

1           Now, the regional model has -- is virtually  
2       obsolete, because they -- illustration in '97, '98, where  
3       basically indicated that the regional model is not  
4       acceptable, so much so that DOE contracted with the USGS to  
5       redo the regional model.

6           And now the saturated zone model has been updated  
7       or advanced some, but still using the old regional model for  
8       calibration, among other things. So we are concerned about  
9       that, that the site scale model should either not use the  
10      old regional model at all to the calibration, or wait until  
11      the new model comes in May of next year, and then calibrate  
12      the site model according to that.

13           Another weakness in the saturated zone that we see  
14      is that these models, the site scale model and the regional  
15      model, have been reviewed by outside reviewers, including  
16      the technical peer review that DOE asked to review. And  
17      they reviewed every word, and they gave comments on these  
18      models, and many of them are -- comments.

19           You have the comments by the Nuclear Waste  
20      Technical Review Board, and there are comments also by NRC,  
21      ACNW.

22           And when you look at the saturated zone BMR that  
23      came out just last month, this aspect of the models are not  
24      handled very well because essentially either in the PRM they  
25      have this appendix that addresses all these comments by

1 outside reviewers.

2 The problem is that if you go to the appendix and  
3 look at them, either the comments they made there are  
4 non-responsive at all to these comments by the outside  
5 reviewers, or in our discussions with the contractors, they  
6 said their budget and instructions from DOE that we are not  
7 going to address many of these concerns that were raised in  
8 these comments.

9 Then one perhaps last item on the unsaturated zone  
10 that keeps coming up, it's more of a concept, and that's the  
11 geothermal intrusion, you know, in the repository, and this  
12 is an issue that I'm not going to dwell on because you know  
13 about it from Mr. Szmanski and what have you. It keeps  
14 coming back.

15 The failed -- diffusion issue, basically, it  
16 addresses more the -- diffusion, the diffusion of -- but it  
17 is also, of course, the alluvium because now the alluvium is  
18 a major involvement for attenuating radionuclides, and  
19 there, basically at least for the alluvium, we need the  
20 data, and DOE is going to get the data from proposed -- and  
21 -- as for the -- , the basic question, as far as I can tell  
22 from our reading on our side is that basically the  
23 assumption that diffusion goes from the fractures to the  
24 metrics and not the other way around, is something that we  
25 need to follow up with DOE.

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1 So, basically, this is the flavor.

2 MR. STABLEIN: Thank you, Latif. John Bradberry,  
3 do you want to bring us up on radionuclide transport?  
4 John's the KTI lead for this one.

5 MR. BRADBERRY: I am John Bradberry. For  
6 radionuclide transport, we're divided into four subissues.

7 With regard to porous rock the thought was in  
8 terms of developing acceptance criteria the Staff had to  
9 come up with a best guess as to what types of conceptual  
10 models would be used by DOE and it was concluded that we  
11 guess that the constant KD approach would be used.  
12 Consequently, the parameters needed for that would be KDs,  
13 porosities and bulk densities.

14 We were prescriptive in saying that we thought  
15 batch sorption experiments along with flow through column  
16 tests would be adequate, and also along these lines,  
17 however, we identified the assumptions that are required for  
18 appropriate application of this conceptual model including  
19 linear sorption, isotherm, fast sorption reactions and  
20 constant bulk chemistry of the groundwater.

21 Furthermore, the parts of the flow path that are  
22 considered to be applicable would have to be homogeneous.  
23 These models have been developed by chemical engineers using  
24 modeling flow through porous media, and so this would be the  
25 situation that would be appropriate when these models, when

1 this model is applied.

2           However, if material is fractured, fractures  
3 actually can act as features that bypass the sorptive  
4 capabilities and isolation capabilities of the solid, so  
5 with regard to fractured rock our main acceptance criteria  
6 had to do with DOE's capability to demonstrate its -- let me  
7 say this again -- capability to predict a breakthrough of  
8 both nonreactive and reactive transfers.

9           The seawell complex is the only transport  
10 experiment done in the saturated zone presently, so we  
11 consider it is a very important set of experiments, the  
12 experiments in the Prow Pass, in the Bullfrog.

13           These experiments are done on the scale of 30  
14 meters, however the size of the blocks used in the modeling,  
15 the TPA modeling, are 500 meters on a side. It is unclear  
16 to us how one gets from one scale -- from the smallscale to  
17 the largescale, and this is definitely open, an open issue.  
18 We are trying to figure this one out.

19           With regard to the alluvium, the model, the TPA  
20 code assumes a sandbox type situation and tests in the  
21 alluvium are currently going on and it remains to be seen  
22 whether that is an appropriate simplification of the  
23 alluvium.

24           With regard to criticality, that is closed  
25 pending, and the acceptance criteria that were dealing with



1 that had to do with the probability -- were divided into the  
2 probability and the consequences. The thought was  
3 criticalities near the repository were more probable that  
4 they most likely have lower consequences and the reverse  
5 might be the case farther out, closer to the biosphere,  
6 where probabilities drop off, but the consequences would  
7 increase if such an occurrence happened. That's it.

8 MR. STABLEIN: Thank you, John. Go ahead.

9 MR. LEVENSON: One quick question. On the issue  
10 of criticality, what is the -- in your current thinking the  
11 relative probability of the criticality being a plutonium  
12 concern as opposed to an enriched uranium concern?

13 MR. BRADBERRY: I don't think I can go into detail  
14 on that right now.

15 MR. STABLEIN: We have Meraj here --

16 MR. BRADBERRY: Because I am the transport guy.

17 MR. RAHIMI: Meraj Rahim, NRC Staff. I have the  
18 lead on criticality.

19 Right now, actually we just finished putting out  
20 the safety evaluation report on a topical report that the  
21 DOE had submitted on the postclosure criticality on what  
22 they had proposed, an approach, a methodology how to analyze  
23 the in-package near-field and far-field criticality.

24 Among other things they are going to look at the  
25 concept of Bowman-Veneri, what they propose in the far-field

1 criticality or ex-package criticality, and right now the  
2 status of it is that DOE has developed an approach to  
3 identify the scenarios and configuration, what possible  
4 scenarios and configuration you could have that you could  
5 have critical conditions.

6 With regard to external criticality they are going  
7 to look at their radionuclide transport and the possible  
8 reconcentration of fissile isotopes and they are going to  
9 look at the dissolution rate of plutonium and uranium  
10 exiting the waste package and the different mechanisms of  
11 reconcentration in the drift and further out in the  
12 unsaturated zone.

13 DR. HORNBERGER: Is it more likely to be plutonium  
14 or enriched uranium though?

15 MR. RAHIMI: Well, for the uranium, you know,  
16 dissolution rate is higher. It is probably going to be  
17 uranium. The plutonium is going to be -- it has a lower  
18 dissolution rate and again the concept or theory that the  
19 Bowman-Veneri had presented, that concentration of the  
20 plutonium, what they were talking about, more of the weapons  
21 grade plutonium which are going to be disposed of in the  
22 high level waste glass logs migrating outside of the waste  
23 package and being reconcentrated and being reflected by 100  
24 percent silicon dioxide in the tuff, so that theory has been  
25 rejected due to various reasons, but DOE has as part of

1 their approach to analyze criticality they are going to look  
2 at all the possible mechanisms of the fissile isotope  
3 reconcentration.

4 MR. BRADBERRY: I have a pet scenario that I like.  
5 It has to do with, probably has to do with plutonium, has to  
6 do with the generation of colloids, colloids transported  
7 through the Topopah Spring, the fractures at Topopah Spring,  
8 down to the porous media, the Calico Hills, at which point  
9 they stop and they are filtered out and the process  
10 continues until a critical mass is accumulated and the  
11 question is could that happen, but it is one scenario that I  
12 like to keep on thinking about

13 MR. LESLIE: Just to complete the criticality,  
14 Meraj was talking about -- this is Bret Leslie of the NRC  
15 Staff -- he leads the effort in the CLS team. He was really  
16 looking at in-package, but I lead, I have a subissue on  
17 criticality as well, and to put it in risk perspective the  
18 DOE has indicated that criticality in postclosure would be  
19 screened out, so less than 10 to the minus 8th probability,  
20 so that is the bottom line, I think.

21 MR. STABLEIN: Thank you, John. We could finish  
22 up with a brief statement on the performance assessment.

23 CHAIRMAN GARRICK: That would be great.

24 MR. STABLEIN: Okay. Would you like to hear more  
25 on CLST as well?

1 Jim, go ahead and talk about performance  
2 assessment. We will get to Gustavo right after that.

3 MR. FIRTH: Okay. James Firth, NRC Staff.

4 I want to give you the highlights in terms of  
5 generally where we are for performance assessment subissues  
6 and here there's a couple things that get wrapped up into  
7 that in terms of that we will rely on a lot of what is going  
8 on in the specific process KTIs so as the information is  
9 available in the models that are being developed.

10 That feeds into our model abstraction subissue.  
11 So various things remain open in areas such as container  
12 life and source term, the near field, igneous activity and  
13 so forth. We still will have model abstractions still open  
14 and there is also the integration component and some of the  
15 things that are more specific to how DOE does the TSPA  
16 modeling.

17 Currently we do not have a performance assessment  
18 that reflects the current design that we have seen the  
19 results and have had a chance to analyze. We are evaluating  
20 the abstraction model reports that talk about the model  
21 abstractions, so we are continuing our review for the  
22 current design, but we are awaiting the TSPA model document  
23 and technical document. With those, we will have more  
24 information for evaluating how DOE is doing multiple  
25 barriers.

1           On the overall performance objective for multiple  
2 barriers we did have some questions relating to what we saw  
3 on how DOE is deciding to degrade their barriers in terms of  
4 using 5th and 95th percentiles for parameter values or sets  
5 of parameter values to reflect the degraded performance of a  
6 barrier. We may be hoping to see some additional  
7 documentation in terms of DOE's basis for that, but this is  
8 DOE's first opportunity in the TSPA SR to show us some of  
9 these analyses and we will be using those to continue to  
10 move forward on resolving the issue, but the things we are  
11 seeing in multiple barriers are generally very favorable so  
12 we are hoping that things will be continuing to move  
13 forward.

14           For scenario analysis as all of the process KTIs  
15 are evaluating their subissues they are identifying whether  
16 there are concerns or not with how DOE has evaluated the  
17 features, events and processes, and the screening of those  
18 features, events and processes in their area.

19           In general, we have identified that there are some  
20 features, events and processes that have not been included  
21 in the initial round of AMRs and PMRs. There are some  
22 issues related to the basis that DOE is using to screen out  
23 particular features, events and processes and I think that  
24 is a natural evolution. It is iterative in terms of whether  
25 initial try is going to be enough for establishing the

1 technical basis for probability or consequences for  
2 screening something out.

3 We are looking for additional information from DOE  
4 on why they believe their initial list of features, events  
5 and processes is comprehensive. This is something we are  
6 expecting to see in the TSPA model report when that comes  
7 in.

8 The overall performance objective, again this is  
9 something that is a methodology issue along with multiple  
10 barriers to a large extent and there we are hoping to see  
11 things on how DOE is addressing it in their TSPA reports,  
12 and they are coming in later this year.

13 One aspect of multiple barriers that I did not  
14 touch on earlier is the subset, which is transparency and  
15 traceability. What we have been seeing in terms of DOE's  
16 model that has been developed using the GOLDSIM code is that  
17 there is some positive attributes for that code for showing  
18 how the data gets carried forward through the analysis, so  
19 we are interested in looking at that further to see how that  
20 would change what we might want to see in other documents  
21 that would reflect transparency and traceability, so the  
22 initial indications are that that is going to go a good way  
23 for improving the transparency and traceability of DOE's  
24 documentation of their TSPA.

25 We are excited about seeing how well that is

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1 working and to take a look at it in a little bit more  
2 detail.

3 If you have any further questions on TSPA, I can  
4 answer them or David Esh, who has been pulling together the  
5 current version of the issue resolution status report may be  
6 able to answer them.

7 DR. WYMER: I have a comment or question. I am  
8 not sure which it is. It has to do with model abstraction.  
9 The committee has always expressed considerable interest in  
10 the model abstraction process and in particular how well it  
11 carries over to the coupled processes which are sometimes  
12 extremely complex.

13 Can you comment a little bit on that?

14 MR. FIRTH: One of the areas that we are looking  
15 at is the -- in terms of the way we are evaluating the model  
16 abstraction is integrated subissues, and those are designed  
17 to capture the coupling and allow us to focus on the issues  
18 that are most important within the coupling, so it is  
19 embedded with how we are evaluating model abstraction, that  
20 there is the part within the specific process KTIs but we  
21 also do a look, which is the integration piece, where we do  
22 look outside of just the KTI to is there integration within  
23 the integrated subissue and then from the integrated  
24 subissues to the other parts of the model, so it is  
25 something we are looking at.

1 DR. WYMER: That's beyond the KTIs. It's  
2 something --

3 MR. FIRTH: Yes, it's something that falls under  
4 the umbrella of model abstraction and total system  
5 performance assessment.

6 DR. WYMER: Thanks.

7 MR. FIRTH: And it is also within some of the KTIs  
8 as well.

9 I don't want to give the impression that the KTIs  
10 are not looking at coupled processes.

11 DR. WYMER: But it is not constantly recognized in  
12 the KTIs?

13 MR. FIRTH: Some of the coupled processes cross  
14 KTIs, so the TSPA role is to help facilitate how the KTIs  
15 look at those and in terms of answering the question for the  
16 integrated pieces of the model that we want to come to some  
17 decision on that, and that will rely on what is coming out  
18 of the KTIs as well.

19 DR. WYMER: Thanks.

20 MR. FIRTH: And I also want to take this  
21 opportunity to add onto my answer to the question Dr.  
22 Garrick asked earlier regarding the external reviewer  
23 comments and how that is being reflected in resolving the  
24 issues.

25 I wanted to make sure the committee was aware that



1 when we resolve the issues we are primarily looking at what  
2 DOE's models, data and total performance assessment are  
3 doing so we can reflect the external reviewer comments in  
4 our TSPA, which will give us risk insights, but we will also  
5 gain risk insights from evaluating DOE's TSPA and all of  
6 their other analyses, so the emphasis in terms of resolving  
7 issues is on what DOE is providing.

8 We can use what the external reviewers give us to  
9 inform our own decisions, but it is still up to DOE and our  
10 analysis of DOE's to close issues.

11 CHAIRMAN GARRICK: Isn't it almost by definition  
12 that the performance assessment KTI will be the last one  
13 resolved?

14 MR. FIRTH: For model abstraction it will be.

15 CHAIRMAN GARRICK: Yes.

16 MR. FIRTH: The overall performance objective and  
17 multiple barriers are a lot more in terms of methodology so  
18 the methodology issues can be closed before we get to  
19 reviewing the license application.

20 CHAIRMAN GARRICK: Right.

21 MR. STABLEIN: Thank you, Jim. Gustavo, do you  
22 want to finish up on CLST?

23 I will try to summarize for you and give you a  
24 flavor of Issue 1 in CLST KTI, because it's one of the ones  
25 that remains open, and I will try to in some way summarize

1 what we provide as an input for the IRSR Issue 3 that we  
2 gave it to the NRC about a month ago.

3 For us, this issue is still open because there are  
4 models, data, and analysis provided by the DOE that we  
5 consider not acceptable for several reasons:

6 For instance, we think that the -- data -- for the  
7 case of evaluating the susceptibility of Alloy 22 to  
8 localized corrosion and to microbial corrosion, that this  
9 really form of localized corrosion -- mediated by the  
10 metabolic activity of bacteria.

11 I mean that we, in our work, called -- with this  
12 problem in a common basis with - -- but we need additional  
13 data an quantification from the DOE, from the work at  
14 Lawrence Livermore.

15 Another important issue is the additional data and  
16 analysis in this case required for the long-term corrosion  
17 rates of Alloy 22 regarding the range of values and  
18 distribution.

19 Here we have a very important point -- the  
20 methodologies that they are using for evaluating corrosion  
21 rate, and we believe that they have what you can call a  
22 systematic error in the measurements, that they are not able  
23 to handle pretty well.

24 This is an issue, but separate from this issue is  
25 the very long-term prediction of corrosion rate. That is an

1 important -- in corrosion -- .

2 And nobody has deal with that at the time we are  
3 dealing now. We are trying to make it separate for doing  
4 some fundamental work in this area, but in order to resolve  
5 the issue, DOE has to come with a clear response, trying to  
6 bound the type of value that they get in these short-term  
7 measurements, because we have to recognize that in the last  
8 five years, they have had a significant effort in terms of  
9 increasing the modeling capability for waste package  
10 degradation and increasing the capability to obtain data in  
11 the laboratory. There are many questions that are open.

12 CHAIRMAN GARRICK: Do you have any sense of what  
13 kind of short-term experiments or analysis would be  
14 convincing for long-term performance?

15 MR. CRAGNOLINO: Well, you know, this is the issue  
16 of performance confirmation into the picture. That is an  
17 issue that has been brewing in some way and the discussion  
18 was partially this morning. I think that we have to make a  
19 very close connection in between the result of ongoing test,  
20 what is going to be the performance confirmation.

21 And I -- but my concern when I talking about  
22 performance confirmation is somebody has to start thinking  
23 about -- or monitor the -- for times that are far more  
24 longer than the ones that are used in the chemical  
25 industrial and many other applications, and this takes time.

1           But I leave this aside. Susceptibility to stress  
2 corrosion from cracking, this has been an issue that was  
3 brought by the DOE for -- Lawrence Livermore National  
4 Laboratory, and has not been clarified.

5           We found that the -- they were using for these  
6 tests was not acceptable, and they have to improve the  
7 technique, and they have to get very sensitive methods to  
8 measure slow crack growth rate.

9           And they are moving in the right direction. They  
10 secured other laboratories to do additional testing. But  
11 stress corrosion cracking is probably one of the most  
12 difficult problems to tackle in corrosion from the  
13 experimental point of view and from the mechanistic point of  
14 view.

15           There are models, mechanistic models that have  
16 been in the literature for many years, but there is not  
17 clear consensus. What is different for localized corrosion  
18 or -- corrosion that are clear, well defined models, just a  
19 matter of using the right value in your experimental  
20 measurement, and you can input in this type of model.

21           But it's not the case for a stress corrosion  
22 crack.

23           The DOE has covered -- has done a significant  
24 effort for the first time because they -- from their own  
25 experimental work, to include in their -- in the waste

1 package degradation code, a stress corrosion cracking as a  
2 phenomenon.

3           What they used is two approaches: One, empirical,  
4 that we proposed several years ago as a way to get rid with  
5 this problem with indetermination in the mechanistic model.

6           And the other one, there is basically a model that  
7 was done by General Electric or by people at General  
8 Electric, not by General Electric, was developed in order to  
9 -- of cracking in boiling water reactors.

10           The model is very successful, but there is no data  
11 equivalent to the data that was acquired through many  
12 failures involving reactors for the present application.  
13 Now, this is a problem.

14           It's a model that even though it appeared to be  
15 mechanistic in nature, is essentially based in an important  
16 database to -- the data and therefore -- data. But we don't  
17 have a repository yet.

18           We are trying to deal with this issue of modeling,  
19 but, again, this is an important thing, and I think that  
20 this is an important contribution that we can do in order to  
21 improve the -- TPA code.

22           Finally, one issue that has been floating around  
23 and we'd like to see more action from the part of the DOE is  
24 in terms of the issue of welding and fabrication of  
25 containers.

1 I think that they should move ahead in terms of  
2 the -- and doing specific testing, because the fabrication  
3 of these large containers is not easy, especially for the  
4 final closure well. And this can have a significant impact,  
5 not only localized corrosion but in the stress corrosion  
6 cracking.

7 They have an approach. We have reviewed their PMR  
8 and approximately -- AMR plus -- information in order to  
9 produce the information that I summarized for you, but I  
10 think there is a long way to go, and I think that this is  
11 something that has importance in terms of the uncertainty  
12 regarding initial failures.

13 Issue 2 is the reason that that -- is not  
14 completely closed. It's closed, pending issuing  
15 information.

16 This is a -- that gives you a flavor of the  
17 current status, and if you have any additional questions,  
18 you can ask them.

19 DR. WYMER: Is DOE doing, in your judgment, enough  
20 fundamental to enable you to have -- in the results that  
21 they're going to present you in a little while?

22 MR. CRAGNOLINO: You know, the problem is really  
23 the uncertainty, in particular. I have to make a very clear  
24 point here:

25 Alloy 22 is probably one of the best choices in

1 terms of alloy for container material in this application  
2 due to the uncertainty of the repository and the unsaturated  
3 -- this put all this together.

4 Now, if -- to localized corrosion could be  
5 extremely resistant to microbial corrosion, even though  
6 there are sensitivity data at Lawrence Livermore that we  
7 don't have yet, a complete conclusion.

8 But if it is resistant to this mode of failure,  
9 and you can -- stress corrosion cracking by reducing --  
10 stress, is -- we are dealing now with calculation of --  
11 beyond the performance periods.

12 It goes beyond the 10,000 years. These are  
13 calculations on the basis of relatively short-term results.  
14 Could we predict if corrosion -- or, by the way, in any  
15 other discipline, there are not the geoscientists -- time  
16 beyond 100 years or less than that? No.

17 Total -- have been said now. We have good reason  
18 to believe, by -- analysis, by comparing for other material  
19 that we have analogs, that these are valid conceptions, the  
20 material metal can resist many thousands of years.

21 But this particular alloys that are complex  
22 alloys, could have a problem of what is called selective  
23 dissolution or preferential dissolution of one alloy and  
24 element in respect to the other in a very slow pace, but  
25 change the internal composition of the alloy in localized

1 areas or in the interfaces and so on.

2 And this is a subject of interest in corrosion  
3 science, but it's not in a complete secure answer at the  
4 present time, and we are trying to model this, as many other  
5 people are.

6 In particular -- this has nothing to do with this  
7 meeting, but my manager is attending the Gordon's  
8 Conference, and really chairing a panel discussing precisely  
9 this issue, long-term prediction of corrosion rate for  
10 materials of this nature and in repository applications, in  
11 which people from the Nuclear Waste Technical Review Board  
12 like -- are involved.

13 It's a tough issue. Nobody has a complete answer,  
14 but we look forward to provide information.

15 DR. WYMER: Thank you.

16 DR. HORNBERGER: Okay, we have once again  
17 confirmed Parkinson's law, King, and had the discussion  
18 expand to fill the available time.

19 [Laughter.]

20 MR. REAMER: Bill Reamer from the NRC Staff. If I  
21 could just say one final thing: We're in the closing  
22 stretch, and I understand that, but this has given the  
23 Committee to get a glimpse of the KTIs, particularly at the  
24 technical level to see where the Staff and the DOE have  
25 technical issues.



1           And I want to take the opportunity to reiterate  
2 the point that King made. KTI closure, issue resolution, is  
3 an expectation or a goal that the Staff has for the license  
4 application, for license application which is in what we've  
5 heard that is in the 2002 context.

6           The focus of the Department of Energy right now,  
7 and certainly a focus of our efforts as well is site  
8 recommendation, a nearer-term milestone, a 2001 milestone.  
9 The Staff's role with respect to site recommendation is  
10 narrower, more limited than it is in a license application  
11 context.

12           It is to, as the law says, to provide preliminary  
13 comments with respect to a subset of what we've talked about  
14 today, at-depth characterization and waste form proposal.

15           And so our expectations, I think we should be  
16 clear on that -- are not to state them in the negative.  
17 We're not saying that key technical issues need to be closed  
18 or need to be resolved before site recommendation, rather,  
19 in a positive sense, our focus, our first priority for site  
20 recommendation is that subset that's identified in the law  
21 that we should focus on, and specifically the DOE progress  
22 in that area, at-depth site characterization and analysis,  
23 waste form proposal, preliminary comments with respect to  
24 DOE progress in that area.

25           DR. HORNBERGER: Thanks for that clarification,

1 Bill. I think we have a lunchtime special meeting, so I  
2 think we should move on.

3 CHAIRMAN GARRICK: Yes, I think so. And we want  
4 to thank you for having an excellent support staff here.  
5 This is something that I think the Committee is very  
6 appreciative of getting this update, and we look forward to  
7 progress reports down the road.

8 And I think at least for now, we'll adjourn this  
9 meeting and move into our other meeting.

10 [Whereupon, at 12:23 p.m., the meeting was  
11 recessed for luncheon, to be reconvened this same day at  
12 2:30 p.m.]

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## AFTERNOON SESSION

[2:30 p.m.]

CHAIRMAN GARRICK: Come to order. We are pleased to have Marty Virgilio here to give us an update on the activities of the Division of Waste Management and the Office of Nuclear Materials Safety and Safeguards.

A lot of things are happening, I understand, so we would like to hear about them.

MR. VIRGILIO: Good. Let me just go ahead and start right into the presentation then, John. It is a pleasure to be here with you all today.

What I want to do is structure my remarks today around your ACNW action plan and priority list. We agree with the areas you have identified and we believe they are important and timely and we believe that your planned activities in conjunction with ours will contribute significantly to the overall agency efforts and our goals in the waste and materials area.

Basically you know what your priorities are, but for those members of the audience that might not have had the benefit of reviewing that this slide here lays out what you have identified as your priorities in both the first tier and the second tier.

What I want to do in this presentation is not repeat to you what your priorities are, because clearly you

1 know what they are, but help you understand from our  
2 perspective where we see your interactions being most  
3 beneficial to us -- where do we think we can engage in a way  
4 that would be most helpful to us and support us in our  
5 activities.

6 The first tier priority was site suitability and  
7 license application associated with the repository for Yucca  
8 Mountain, and I have listed there bullets on the slide of  
9 some areas where I think that we can have productive  
10 interactions that would contribute to our success.

11 On the sufficiency comments on the DOE site  
12 recommendation, we have completed development of a strategy  
13 that we are going to use to do the site suitability review  
14 and we are developing guidance to implement that strategy.  
15 We have given that strategy to the Commission and we are  
16 awaiting some feedback now on how best to proceed.

17 Our milestone is to complete the guidance for  
18 implementing that strategy in the September timeframe.

19 DOE's current schedule appears to be to issue the  
20 site recommendation consideration report for our review and  
21 comment in the December timeframe. We are thinking that  
22 about six months would be the time period it would take us  
23 to complete our comments on that and we would therefore  
24 submit our comments sometime in the June timeframe, and I  
25 will speak more specifically in each of these areas to where

1 and how I think we could interact the best through that  
2 six-month time period.

3 On preclosure, we have met with DOE. We are  
4 continuing to meet with DOE on design process issues and  
5 continuing to work aggressively on completing the preclosure  
6 portions of the Yucca Mountain Review Plan.

7 On DOE's siting guidance, Part 963, we prepared an  
8 analysis of the proposed final draft in June and provided  
9 that to the Commission. The Commission has that under  
10 review today and the KTIs, you've been meeting with our  
11 Staff throughout this week discussing the KTIs and we will  
12 have a series of meetings between now and November. We  
13 intend to achieve closure for KTIs during that time period.

14 Container life and source term, unsaturated and  
15 saturated flow, igneous activity, and seismic and structural  
16 deformation are the four that we will be focusing on.

17 As far as how we propose to interact with you, and  
18 where we think this would be most effective, we are looking  
19 at the wintertime. I think I said earlier that DOE's  
20 proposal now is to submit their site suitability report in  
21 the December timeframe, so we see in the late winter, mostly  
22 in the early spring, opportunities for us to interact and to  
23 have meetings on sufficiency comments. We would look  
24 forward to your review and comments in that area.

25 In addition, and maybe even going back further a

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1 step, looking at having the Yucca Mountain Review Plan and  
2 our proposal, our strategy for conducting the review of the  
3 site suitability completed sometime in the September-October  
4 timeframe, what we would like to do is interact with you on  
5 that strategy to make sure that we are all in agreement that  
6 that is the right approach for site sufficiency, which is  
7 different than what we are going to have to do in terms of  
8 our review of the license application.

9 There has been a lot of concern from the  
10 stakeholders that we are not acknowledging that difference,  
11 so I think it is important to make sure that we agree on the  
12 strategy and the approach before we start into do the site  
13 sufficiency review and so I see that coming sometime in the  
14 October or November timeframe, getting an agreement with you  
15 all on that approach, and then actually conducting our  
16 review starting in December when we get the site sufficiency  
17 report and continuing through the spring, so that's our  
18 plans there.

19 As far as the Part 63, it will require or does  
20 require DOE to perform a risk assessment for preclosure. We  
21 would be interacting with you particularly on that in the  
22 preclosure area, and of course we will continue to interact  
23 with you on the resolution and closure of the KTIs.

24 Our goal, what we would like to have, is as many  
25 resolved as we can as early as we can. Bill Kane has set --

1 put the gauntlet down before the Staff to say I would like  
2 these closed before the license application is submitted.

3 I think Bill would like to see them closed before  
4 we got to site sufficiency review. We see a tremendous  
5 advantage in having the KTIs closed early. We are putting a  
6 lot more management attention and focus on KTI closure, and  
7 that is where we are headed in the near term, but Bill's  
8 direction to the Staff is before the application is  
9 submitted we want all the KTIs resolved, so that is just to  
10 kind of give you some insight there.

11 On risk informing and our regulatory framework, we  
12 have had a number of interactions with the stakeholders.  
13 Right now our focus is to finalize screening criteria that  
14 we developed and presented to you back in May and develop an  
15 approach for safety goals for the NMSS scope activities.

16 We had a stakeholder meeting back in the April  
17 timeframe. From that stakeholder meeting I think we got  
18 good feedback on how to approach safety goal development.  
19 Stakeholders suggested and we adopted an approach where we  
20 are going to do some case studies. The case studies will do  
21 a number of things for us. They will help us inform the  
22 criteria we developed for what is it you want to risk  
23 inform, and I think that will give us some insights as to  
24 how to go about developing safety goals in the materials  
25 world.

1           If we can through these case studies, I think we  
2 will have draft safety goals in a number of areas.

3           We will have a meeting in September. We are  
4 trying to set that up for the second or third week in  
5 September to roll out the approach that we are going to use,  
6 to roll out these case studies, to give you a sense of what  
7 areas that we are going to be focusing on for conducting the  
8 case studies and to give you a sense of how we would go  
9 about doing the case studies.

10           We would invite you to participate in that  
11 meeting. That will be not only your only opportunity to  
12 help share where we are going in terms of safety goals. I  
13 suspect over the next several years as we proceed to safety  
14 goal development in this area we will have many interactions  
15 with you on this topic.

16           Again the plan will be published and the meeting  
17 will be held in September and I think we will have lots of  
18 opportunity for interaction.

19           On the ongoing activities we briefed you on a  
20 couple of these back in May, particularly on the dry cask  
21 PRA. You have had briefings from Research staff on that.  
22 They are going to be doing the PRA of the Holtec  
23 International High Storm 100 System. We believe that the  
24 draft project scope and schedules have been established at  
25 this point in time, and screening and preliminary



1 consequence analysis should be completed in about a year,  
2 maybe 18 months from now, so we are working through that  
3 process, but I do believe in the stakeholders' belief at  
4 this point in time that there is a lot of advantage into  
5 doing this PRA. They see it to help shaping our guidance  
6 documents, to help shaping our reviews, to identify areas  
7 where we may have large uncertainties, identify areas where  
8 we have large conservatisms to help us focus down and focus  
9 our review efforts.

10 On the byproduct risk review study, right now --  
11 and the Commission paper that provided that study to the  
12 Commission recognized that we didn't do a very good job on  
13 uncertainty analysis, and that is an area where we are  
14 focusing on today to help upgrade the quality of that study  
15 by looking at the uncertainty analysis and the quality of  
16 the data that was used in that study.

17 What we want to do is utilize that study today in  
18 going back and looking at some of our materials licensees.  
19 As you know, we have various categories and classes of  
20 materials licensees. Some are general licensees. Some are  
21 specific licensees. That drives a lot of what we do in  
22 terms of license renewals, frequencies of reviews,  
23 frequencies of inspection activities, and we want to try to  
24 use that study, actually focus on how to improve that study  
25 and then use that study to shape our licensing and

1 inspection program in the materials world to make it more  
2 risk-informed.

3 The other issue I would mention is the ISAs for  
4 Part 70. The Commission affirmed Part 70, the rule, on  
5 Tuesday, and gave us an SRM directing us to move forward. I  
6 would like to continue to have dialogues with you on that  
7 area.

8 Backing up to continue interaction, we are going  
9 to have public meetings the week of September 18th that we  
10 would like you to participate in on finalizing the screening  
11 criteria and the safety goal development. We will also be  
12 developing a training program. We will have the first of  
13 our pilot training program for the NMSS and Region staff  
14 starting the week of September 11th.

15 We have developed, as I told you back in May, we  
16 developed a three-tier approach to training. The first tier  
17 is the management level, second tier being the general Staff  
18 here in Headquarters and Regional staff, and then the third  
19 tier being our specialized experts that are using risk  
20 assessment and risk management techniques in the materials  
21 and waste arena, so that is the week of September 11th. It  
22 will be a four-day pilot and we invite either you or the  
23 Staff to participate in those participate in those pilots on  
24 training to give us some critical feedback as to whether we  
25 are hitting the right topics.

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1 I know when we met with you back in the May  
2 timeframe -- actually it wasn't you all, it was the  
3 subcommittee -- you gave us some very good feedback on what  
4 we ought to have included in that training program,  
5 specifically with regard to the framework and some of the  
6 issues that why are we trying to risk inform our activities,  
7 sort of the "why" as well as the "how" -- and I believe we  
8 have incorporated some of these ideas and thoughts into the  
9 program activity and I hope that you can participate or that  
10 the Staff can participate and give us some feedback in that  
11 area.

12 DR. LARKINS: Marty, a quick question. The  
13 specialist -- is this sort of going to be like the RAs in  
14 the reactor side?

15 MR. VIRGILIO: Yes.

16 DR. LARKINS: Risk Analysts?

17 MR. VIRGILIO: Yes, that is sort of what we are  
18 thinking about, and not necessarily consolidate it in  
19 Headquarters.

20 That is one level of specialists, but I also see  
21 that there is problem more specialized training for people  
22 that will be using the risk assessment and risk management  
23 techniques in a very focused area, for example in Part 70  
24 for the ISAs. I imagine we would want to have somebody  
25 there that really has the capability to do and to analyze an

1 ISA properly, which is a lot more than I see as the base  
2 training that we would give to all the Staff in NMSS and the  
3 Regions.

4 Let's see if I have covered everything on that  
5 slide. I think that's pretty much it.

6 On the next area, on decommissioning issues, we  
7 have got decommissioning guidance. We have had feedback on  
8 the License Termination Plan, and decommissioning plan  
9 reviews.

10 We have developed an SRP for License Termination  
11 Plan reviews, and we issued that back in May. We have an  
12 SRP for decommissioning plan reviews, and we expect to issue  
13 that document later this summer.

14 The Staff is currently getting feedback from use  
15 of the LTP reviews, the License Termination Reviews, and  
16 assessing whether we have got it right, assessing the  
17 effectiveness of that document, and we will be soliciting  
18 feedback from licensees and stakeholders on the  
19 decommissioning process in a workshop that we are planning  
20 to have in the November timeframe.

21 In terms of future actions, we will be evaluating  
22 guidance, decommissioning guidance as part of what we are  
23 going to be doing in 2001 and 2002.

24 We are going to look at how we can risk-inform in  
25 performance and make those guidance documents more

1 performance-based. So it's sort of a two-pronged approach  
2 in 01 and 02 time periods.

3 And with respect to institutional controls and  
4 long-term stewardship, we realize that there are a number of  
5 sites that we have today that may require long-term  
6 stewardship, including institutional controls, once we  
7 terminate the license.

8 We've started some dialogue with DOE over this,  
9 and we may wind up going back and utilizing provisions of  
10 the Nuclear Waste Policy Act, specifically Section 151(b)  
11 that would provide for DOE oversight and long-term  
12 stewardship of these sites, if DOE agrees.

13 So we've started some dialogue with DOE, we're  
14 looking to possibly re-institute some work we had started in  
15 the 1997-1998 timeframe to have an MOU established with DOE  
16 in this area.

17 And in West Valley decommissioning criteria, we're  
18 evaluating public comments that we received on the  
19 decommissioning criteria. We'll be providing a paper to the  
20 Commission on this, and interacting with the Commission on  
21 closure of this issue.

22 Back to where and how we believe that we can  
23 interact most effectively on the decommissioning SRP, we'll  
24 be involving and interacting with you to do updates and  
25 revisions to make it more risk-informed and

1 performance-based.

2 I understand that tomorrow the staff is actually  
3 going to be presenting to you, and overview of the  
4 decommissioning program, so here's an opportunity for us to  
5 start interacting now.

6 And we really do welcome your input. On West  
7 Valley, the staff is still awaiting some Commission guidance  
8 on how to sequence our review, and completion of that  
9 effort. In that guidance, we would hope that we get some  
10 further instruction of how best to interact with you over  
11 those issues.

12 DR. LARKINS: That's a question that I think the  
13 Committee is deliberating on, as to how they could provide  
14 some value in the area of the West Valley. Hopefully there  
15 will be some specificity in terms of particulars that the  
16 ACNW would look at.

17 I know there are some discussions going on right  
18 now.

19 MR. VIRGILIO: There are some ongoing discussions.  
20 You know, there are issues like incidental waste that I  
21 think are going to be significant issues that we're going to  
22 have to deal with, and I think that's going to be an area  
23 where we could use some interaction.

24 DR. LARKINS: It would be good if there were some  
25 specifics, because, you know, it's a rather large program,

1 and I don't think we want to try to bite off more than we  
2 can chew.

3 MR. VIRGILIO: Okay.

4 MR. LARSON: Both of the last two on that  
5 viewgraph are tentatively now on the October schedule.

6 MR. VIRGILIO: Good.

7 MR. LARSON: There is some question as to the  
8 breadth of the institutional control, and as John says, what  
9 Committee should really look at West Valley, because they  
10 have only heard little bits here and there.

11 MR. VIRGILIO: Okay, we'll try to be as specific  
12 as we can in terms of requesting support.

13 MR. LARSON: It's such a complex issue that it  
14 isn't easy to sort out what is appropriate for us to worry  
15 about and what we shouldn't bother with.

16 MR. VIRGILIO: Maybe there are areas that we can  
17 then focus your attention on, to say we could really use  
18 your insights and assistance in these particular areas, if  
19 the scope is, from your perspective, large, and, I sense, a  
20 little daunting, as it is to us. Okay, good.

21 On Part 71, we've got rulemaking underway to  
22 incorporate international ST-1 guidance, and other issues  
23 directed by the Commission.

24 Did I jump ahead one? Oh, good. Risk-informing,  
25 okay, good, I'm sorry. Risk-informing the economic review

1 plan:

2 Revision 0 went forward to the Commission, and  
3 they asked us to make it more risk-informed and  
4 performance-based. I think they had a lot of concern that  
5 it was not, and we stepped back and looked at it critically  
6 and said, yes, we could do quite a bit more in this area.

7 So we're currently working on Revision 1, based on  
8 the feedback that we received from the Commission. We  
9 intend to transmit a revised version of that Yucca Mountain  
10 Review Plan to the Commission in the early September  
11 timeframe.

12 Consistent with the direction that we got from the  
13 Commission, we have been interacting with you as we have  
14 developed that risk-informed document. We really do  
15 appreciate the comments and feedback we've gotten already  
16 from your staff and individual members.

17 We just continue to foresee additional  
18 interactions as we move forward, but we're on a fairly tight  
19 schedule. We want to get it completed and get it out into  
20 the public domain.

21 I appreciate what you've done so far, and look  
22 forward to continued interaction in this area.

23 DR. LARKINS: Mary, we are going to have a public  
24 workshop on that on September 21st?

25 MR. LARSON: 19th.



1 DR. LARKINS: I assume that we have plenty of  
2 staff to support that. It will be in Las Vegas.

3 DR. HORNBERGER: A public workshop on YMRP?

4 DR. LARKINS: Yes, that's the first one that the  
5 Rev 1 will be publicly available.

6 DR. HORNBERGER: Oh, right.

7 DR. LARKINS: Yes.

8 DR. HORNBERGER: When John says we, I think of the  
9 ACNW.

10 DR. LARKINS: Right, so actually the ACNW will be  
11 the first to provide the forum for the Agency's disclosure  
12 of the Yucca Mountain Review Plan.

13 MR. VIRGILIO: And I know that you have been  
14 interacting with the Staff, but I see this as the Staff  
15 actually taking what we've gotten in terms of insights from  
16 the performance assessment, and bringing it back into the  
17 review plan in a way that will guide a reviewer, focus a  
18 reviewer, not only on what's important, but also to give a  
19 sense of where you want to go in terms of scope and depth of  
20 review. Where do you want to focus your attention?

21 We've only got a certain amount of resources  
22 available to us, and shouldn't we be doing this on a  
23 risk-informed basis? So I'm pleased with the way that has  
24 developed, and look forward to continued improvements in the  
25 plan.

1           Going ahead now to Part 71, we are revising Part  
2 71, consistent with the Commission directions to incorporate  
3 the IAEA ST-1 standard and additional items that the  
4 Commission has asked us to look at. We published an issues  
5 paper on the 17th of July, and plan to hold three public  
6 meetings to solicit comments in August in Rockville, in  
7 September in Atlanta, and September in Oakland, California,  
8 as well.

9           We're on a schedule to get a proposed rule to the  
10 Commission in the March timeframe, March 1 timeframe. We  
11 also have a package performance study that we're working on.

12           The purpose is to investigate the performance of  
13 spent nuclear fuel transportation casks during severe  
14 accident conditions. We've held two public workshops so  
15 far, and two public meetings, and we intend to hold  
16 additional public meetings in the August timeframe, and  
17 workshops in August and September as well.

18           Regarding the package performance study, the ACNW  
19 and Staff members are invited to participate in the public  
20 meetings and workshops that we're going to be having in  
21 August and September.

22           We really do look forward to interactions with you  
23 on how we can improve our risk communications in this area.  
24 You've spoken to us before on this matter, and particularly  
25 on how we best communicate risk in this area. I think we

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1 would like to continue that dialogue and understand from  
2 you, insights and how best to do this. I think it's a  
3 significant issue that you can help us on.

4 Your next item in the priority scheme was on  
5 research, and I really have no comments there. I know  
6 you're interacting with Research.

7 Second-Tier Priority Issue 2 is low-level  
8 radioactive waste in the Agreement State Programs. We're  
9 working on mixed waste in two ways:

10 We've got two separate rulemaking efforts  
11 underway. Rulemaking 1, if you will, is allowing disposal  
12 of low-hazard mixed waste in a Part 61 facility. And on  
13 that, we've got public comment period that ended in February  
14 of this past year, and this is an EPA-led initiative, and  
15 they're currently resolving the public comments that they  
16 have in that area, and they expect to issue a final rule  
17 sometime in the Spring of 01.

18 We've had no major comments on that rulemaking.  
19 On Rulemaking 2, this is the rulemaking that would allow for  
20 disposal of low-level activity mixed waste in Subtitle C  
21 RCRA facilities.

22 It requires that NRC develop a rule to allow for  
23 such a proposal, and we provided comments earlier this year.  
24 The outstanding issue between us and EPA continues to be  
25 dose issues, and, you know, surrounding 15 millirem, 25

1 millirem groundwater issues, some of the same issues that we  
2 deal with with EPA on license termination for reactors, as  
3 well as Yucca Mountain.

4 Another issue that we're working on is with the  
5 National Academy of Sciences. NRC is going to be providing  
6 support to the Academy on a civilian low-level waste  
7 disposal study. I think it's called Challenges and  
8 Opportunities Ahead, and we'll be working with them on that  
9 study.

10 The last item, the NUREG on performance  
11 assessment, we've got a Commission paper under development  
12 that will provide the NUREG, and that's currently under  
13 management review.

14 In terms of opportunities to interact with the  
15 ACNW, we see opportunities on that NUREG on the performance  
16 assessment. We understand that comments are coming, that  
17 you're developing comments based on presentations you've  
18 received, and we would look forward to those comments.

19 On the NAS study, we also see some potential  
20 opportunities for informational briefings and interactions  
21 on that issue as well.

22 On the rulemakings that we're working with EPA on  
23 low-level waste disposal, we also see opportunities for  
24 interaction, if you want to engage on that issue, and we  
25 would be scheduling meetings with you, if you would like to

1 discuss those actions with us.

2 DR. LARKINS: What's the timeframe for that  
3 rulemaking?

4 MR. VIRGILIO: EPA expects to issue the final  
5 first rule in the Spring of 01, and with regard to the  
6 second rulemaking, John, I'd have to get back with you on  
7 that, on the timing for that.

8 On the second-tier Priority Issue 3 on risk  
9 harmonization, I have already spoken on what we're doing in  
10 terms of developing safety goals for the NMSS activities,  
11 and there are lots of opportunities, I think, to interact  
12 with you there.

13 I see this as a significant project, and we're  
14 going to be looking for a lot of your input on this  
15 activity, in particular, so it's a big issue for us in terms  
16 of risk-informing our programs, and I see the Subcommittee  
17 that you've established as a great opportunity, a great  
18 sounding board for us to get some good feedback and  
19 direction on how to proceed in this area.

20 Those are my prepared remarks, and I'm ready to  
21 answer questions that you have on this or other issues that  
22 you've got underway.

23 CHAIRMAN GARRICK: Good. By the way this is very  
24 helpful and very timely. We usually don't get this until  
25 the week before our planning session for establishing

1 priorities, and this gives us an opportunity to really  
2 evaluate what you have identified as ways in which we could  
3 provide useful advice to NMSS. So we appreciate this.

4 Can you elaborate a little bit on what you're  
5 actually doing in the arena of developing safety goals, and,  
6 in particular, as you know, in the Subcommittee meetings  
7 we've had considerable discussion about it's quite possible  
8 that the best strategy for safety goals for nuclear  
9 materials is to do it by category of activity.

10 Is that the direction you see that you're going?

11 MR. VIRGILIO: Yes, and we'll roll this out in the  
12 September meeting, but I can give you a sense of what we  
13 heard from the stakeholders and what we've done in response  
14 to what we heard.

15 They proposed that we look at it in categories as  
16 well. And so what we've done is, we've lined up a half a  
17 dozen or so case studies, looking at decisions that we have  
18 made to try to, from those decisions, particularly where the  
19 rules -- cases where we did not just make a decision based  
20 on the rules say do it this way, therefore, we're going to  
21 do it this way, trying to find decisions that we made as an  
22 agency in an area where the rules weren't quite clear, and  
23 from that, see if we can derive what -- some of the thinking  
24 behind the decisions were and how that might influence us in  
25 terms of safety goals.

1           So we've looked at it by categories. For example,  
2 we're looking at it across the materials arena. If think  
3 we've got -- we've got seven programs that we're dealing  
4 with within NMSS, you know, high-level waste, low-level  
5 waste, decommissioning, our fuel cycle activities, our  
6 materials and waste activities, our transportation  
7 activities.

8           If you look at it from that perspective, we kind  
9 of condense down into a smaller set of areas, looking for  
10 commonalities, but, you know, trying to look at, for  
11 example, our materials area, medical and industrial area as  
12 one area where we made decisions. On what basis did we make  
13 those decisions? We're using those case studies to kind of  
14 pick apart, peel back the decisions and look at what were  
15 some of the considerations? What did we look at in terms of  
16 risk to the public?

17           What did we look at in terms of risk to the  
18 worker? What did we consider acceptable risks in those  
19 regards?

20           How did we come to those conclusions? And we are  
21 using those case studies to hopefully step back and say,  
22 now, based on that, what could be possible safety goals in  
23 these areas? And that's what we want to lay out to you and  
24 to the other stakeholders in the September meeting, as to  
25 how we would propose to approach this.

1 MR. LARSON: Is this is a one or two-day thing?

2 MR. VIRGILIO: Well, we want to do it in basically  
3 a half a day. Basically it's not to do anything other than  
4 to lay out the plans.

5 As we go forward and actually conduct the studies,  
6 we would have individual meetings. My vision would be for  
7 individual meetings in each of the study areas where we  
8 would not only roll out what we've done, but use the  
9 meetings as opportunities to get input from the stakeholders  
10 as well.

11 MR. LARSON: Because that's the week that the  
12 Committee will be out at Yucca Mountain.

13 MR. VIRGILIO: I think you're not going to miss a  
14 lot in terms of the documentation is there. It's basically  
15 what we heard at the stakeholder meeting that we had, this  
16 is what we've done with it, this is how we propose to  
17 proceed.

18 And we're going to have additional meetings as we  
19 move forward in each of the areas where we're going to be  
20 trying to formulate safety goals. From maybe five or six  
21 different goals, if you will, what we'll do is then step  
22 back and say is there some overarching goal that we can  
23 develop for the waste arena?

24 Is there an overarching goal that we can develop  
25 for the materials arena, and how do we harmonize that with



1 what we've already done on the reactor side?

2 I think it's a step-wise process that we'll go  
3 through.

4 CHAIRMAN GARRICK: Yes.

5 MR. VIRGILIO: I see it as challenging.

6 CHAIRMAN GARRICK: I guess one of the avenues of  
7 harmonization could be through the underlying principles  
8 that you adopt.

9 MR. VIRGILIO: Yes, and whether we ever get to  
10 quantitative goals remains to be seen. It may be about  
11 principles in the end.

12 CHAIRMAN GARRICK: Yes, right.

13 DR. LARKINS: As you know, the problem with the  
14 QHOs for the Agency safety goal is that it's set at such a  
15 level that when you try to apply it, it's difficult.

16 MR. VIRGILIO: You're always looking for  
17 surrogates.

18 DR. LARKINS: You're looking for surrogates, yes.

19 MR. VIRGILIO: And what are the right surrogates,  
20 and how do they relate back to those goals? And that's the  
21 challenge.

22 I will also mention now, take an opportunity for a  
23 commercial message here; we're working on the risk-informed  
24 regulation implementation plan. We used to every six  
25 months, brief the Commission, provide the Commission with a

1 paper and a briefing on what we're doing in risk-informed  
2 regulation.

3 It was sort of a compilation of our ongoing  
4 activities. And we got a lot of criticism from our  
5 stakeholders that it was just a listing or a summary of the  
6 activities and there was no relationship established; there  
7 was no overarching strategy to say how do these things fit  
8 together? How do they build back up to some goal or some  
9 overarching strategy for the Agency on how it's going to  
10 risk-inform its programs?

11 And so we've taken that criticism to heart. We're  
12 in the process of revising the risk-informed regulation  
13 implementation plan to include an overarching summary of how  
14 does -- starting from the Agency's mission, looking at the  
15 strategic goals and performance goals, looking at the safety  
16 goals that we already have, establish looking at our  
17 strategies and our strategic plan and these activities, what  
18 are the linkages? What are we trying to do?

19 How are we trying to move the Agency forward in  
20 some controlled manner to become more risk-informed? That's  
21 a challenge that we're going to be working on between now  
22 and the October timeframe. So that I think that at some  
23 point in time, we ought to come back and brief you and the  
24 ACRS on that activity as well.

25 CHAIRMAN GARRICK: Yes. Well, as you know, the

1 Subcommittee was quite pleased to see the work that you're  
2 doing with respect to the dry cask probabilistic risk  
3 assessment, and also the risk assessment that you've already  
4 performed on byproduct material.

5 And I assume from that other categories are also  
6 probably going to be addressed in a similar manner. This  
7 follows quite nicely from questions that we raised earlier  
8 about it would be very important for the inside expertise of  
9 NMSS to draw on their experience and their expertise to  
10 assess the risk of materials and wastes as a kind of a  
11 starting point for getting effective and efficient advice  
12 from us on what you do beyond that.

13 MR. VIRGILIO: Good.

14 CHAIRMAN GARRICK: So I take it that you will do  
15 more of these kinds of analyses?

16 MR. VIRGILIO: Yes. I think, if I look at the  
17 byproduct study that's been done so far, I think there's a  
18 lot more we can do with that.

19 CHAIRMAN GARRICK: Right.

20 MR. VIRGILIO: I think there is a lot of  
21 refinement that we can do, but I want to do it in a  
22 controlled way, decide how we want to do -- what we want to do  
23 first, for example, looking at our materials program and the  
24 frequency at which we conduct inspections.

25 How do we need to, if we need to at all, improve

1 that report in order to inform our decisionmaking in that  
2 area? So, what I don't want to do is create shiny books on  
3 people's shelves, go back and do studies that are not going  
4 to be used.

5 What I want to do is try to decide what is the  
6 decision that we're going to have to make in making our  
7 programs more risk-informed, making them more efficient,  
8 making them more effective, and then look at how we can use  
9 risk insights to inform those decisions, and then initiate  
10 the studies or improve on the studies that we have today in  
11 order to support that decisionmaking.

12 So that's the kind of thought process that we're  
13 going through today.

14 CHAIRMAN GARRICK: Right.

15 MR. VIRGILIO: And we would develop more of those  
16 studies in order to do that, or refine the studies we  
17 already have.

18 CHAIRMAN GARRICK: Yes. Comments?

19 DR. HORNBERGER: Marty, we've been -- as John  
20 said, I think this is very helpful. We've been talking,  
21 obviously, about a mix of things, some ACNW, some Joint  
22 Subcommittee. I'm just curious about what kind of process  
23 do you go through as to deciding which issue should go to  
24 the ACNW and which should go to the Joint Subcommittee?

25 MR. VIRGILIO: Dialogue through your staff is the

1 way we have done it so far. If you want to do it in another  
2 way that is okay with me.

3 DR. HORNBERGER: No, it was just a naive question.

4 MR. VIRGILIO: It's a matter of just dialogues  
5 with John and the Staff --

6 DR. LARKINS: George loves the subcommittee.

7 [Laughter.]

8 MR. VIRGILIO: What we have done, I guess, is  
9 looked at -- well, we worked with the Commission on this in  
10 one regard. Think back to SECY 99-100, you know, the  
11 framework paper. What we said was that we were going to  
12 work with the subcommittee on those issues, so that has been  
13 sort of a guiding principle and our interactions with John  
14 and the Staff as to what are the activities we were going to  
15 just really focus on with the subcommittee, so things that  
16 have come out of the SECY 99-100, in particular some of the  
17 things that we are talking about in terms of the safety  
18 goals and the screening criteria, we have been -- I have  
19 been thinking anyway that these are issues for the  
20 subcommittee to focus on, but if you want to do it a  
21 different way, however it works best for you I think.

22 DR. HORNBERGER: The other question I have, I even  
23 hesitate to raise it because you have done such a nice job  
24 here, in mapping between our priorities and how you see us  
25 interfacing, but do you have any issues that aren't on our

1 list that you would like to see on our list?

2 MR. VIRGILIO: We are working on providing  
3 comments on the charter right now and we have got a lot of  
4 internal discussion about those issues.

5 MR. TURTIL: The MOU.

6 MR. VIRGILIO: I'm sorry, the MOU, not the  
7 charter, on the MOU, and there's -- I struggle with a  
8 recognition that you have only got a certain limited,  
9 there's a finite set of resources you have and there are  
10 priorities for us and you here and there's a temptation to  
11 add a number of other things onto that list, but I struggle  
12 with doing that because I don't want to dilute your efforts,  
13 particularly now as the activities with respect to the  
14 repository are increasing dramatically.

15 The amount of time that Bill Kane and I are  
16 engaged is going up. The amount of time that you are  
17 engaged is going up. The Commission's engagement is going  
18 up -- so it is tempting but I am hesitating -- but we will  
19 give you feedback. I will give you an answer to that in the  
20 context of looking at the MOU.

21 DR. LARKINS: This is the draft MOU that we  
22 prepared, I think presented a couple months back, which  
23 talks about how we interface with the NRC Staff. It also  
24 talks a little bit -- well, I don't know if it does or not,  
25 about the separation between ACRS and ACNW but basically it

1 defines the protocol for our interactions between the NRC  
2 Staff and the ACRS, ACNW.

3 MR. VIRGILIO: As part of the -- is it the second  
4 section or third section of it, it provides a summary list  
5 of all the areas where you are engaged and gives you some  
6 sense of priority and -- yes.

7 DR. LARKINS: Now as I recall the response that  
8 came back from the EDO on our tier one and tier two, there  
9 were a few things that were added there that we didn't have  
10 on it initially and we are going to provide some response,  
11 but certainly like you said we are going to be limited in  
12 the number of things that we can undertake this year.

13 CHAIRMAN GARRICK: Ray? Questions?

14 DR. WYMER: No. I thought it was good.

15 MR. VIRGILIO: Thanks.

16 CHAIRMAN GARRICK: It was excellent.

17 MR. VIRGILIO: Thank you.

18 CHAIRMAN GARRICK: And we appreciate it much.

19 MR. VIRGILIO: We appreciate the opportunity.

20 DR. LARKINS: One comment -- the Part 71  
21 rulemaking I guess we need to think about whether we want to  
22 schedule that sometime in the spring or late winter this  
23 year.

24 MR. VIRGILIO: The issues paper is out for public  
25 comment. We have got the meeting scheduled, hopefully, that

1 you or the Staff can participate in a couple of the  
2 meetings.

3 DR. LARKINS: Right, and I guess if we can move  
4 forward in looking at this ISA methodology at some point  
5 that could probably come to the committee, since that is  
6 being used as a method of risk-informing several of the  
7 regulations, so at some point I think all the committee  
8 members should be exposed to that. We are working on it.

9 MR. VIRGILIO: Okay. Thank you very much.

10 CHAIRMAN GARRICK: Thank you.

11 All right, I think this brings the recorded part  
12 of our meeting to a close.

13 [Whereupon, at 3:12 p.m., the hearing was  
14 recessed, to reconvene at 8:30 a.m., Thursday, July 27,  
15 2000.]

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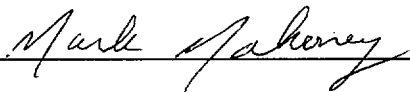
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  ON NUCLEAR WASTE

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U.S. Department of Energy  
Office of Civilian Radioactive Waste Management

# Performance Confirmation

Presented to:  
**Advisory Committee on Nuclear Waste**

Presented by:  
**Eric Smistad**  
**Office of Project Execution**  
**Yucca Mountain Site Characterization Office**

**July 26, 2000**

**YUCCA  
MOUNTAIN  
PROJECT**

# Purpose

- **Define performance confirmation and aspects of the program**
- **Describe the process for developing the performance confirmation program and its relationship to the overall test program**
- **Describe elements of the program**
- **Describe the current status and path forward**

# Definition of Performance Confirmation

- **10 CFR 63.2**

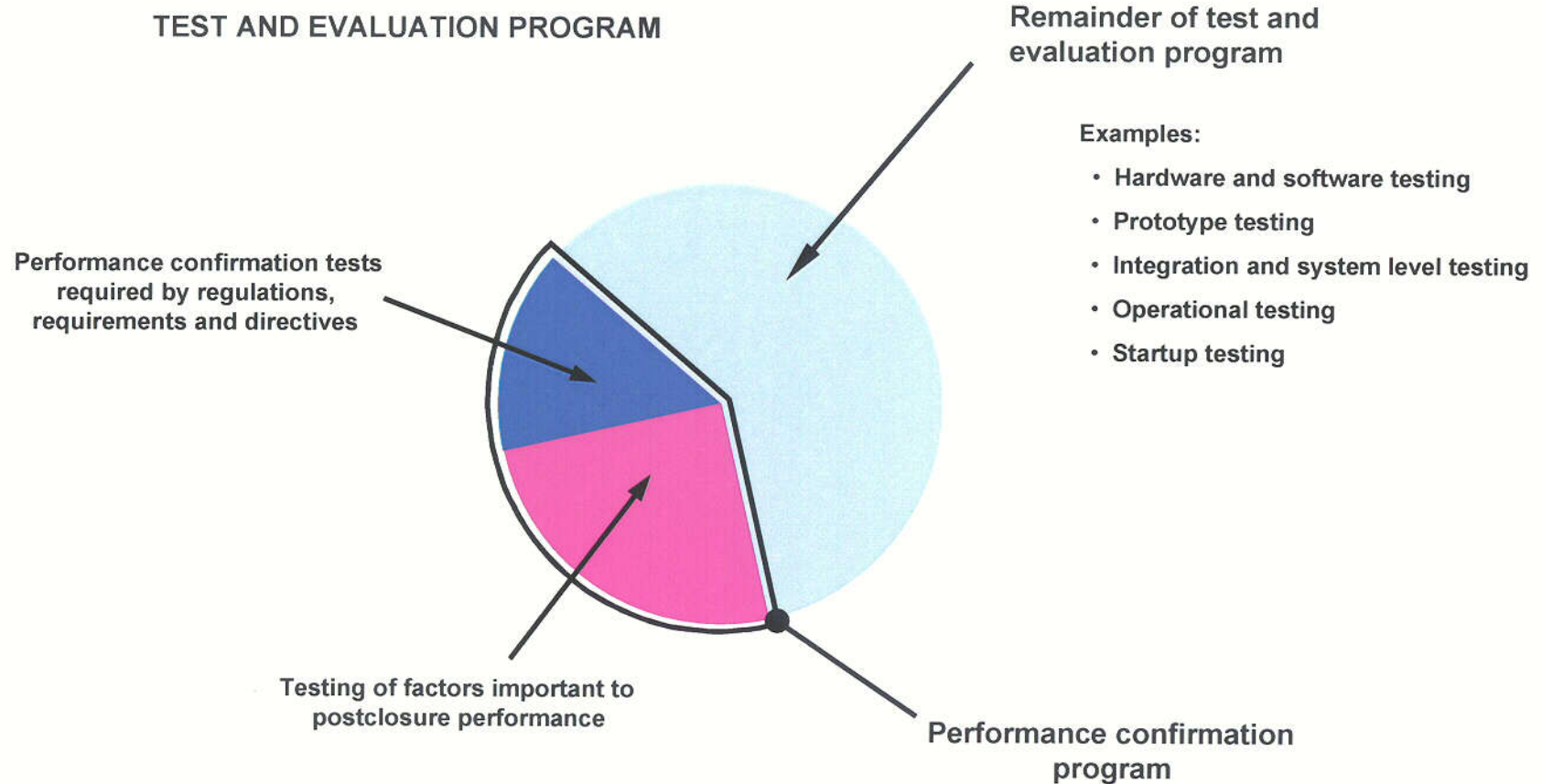
**“Performance confirmation means the program of tests, experiments, and analyses that is conducted to evaluate the accuracy and adequacy of the information used to determine with reasonable assurance that the performance objective at Section 113(b) will be met.”**

# Definition of Performance Confirmation

(Continued)

- **Per 10 CFR 63.131, performance confirmation must:**
  - **Focus on items important to postclosure safety**
  - **Indicate, where practicable, whether subsurface conditions and changes during construction and waste emplacement fall within the limits of the license application**
  - **Indicate, where practicable, whether natural and engineered barriers are functioning as intended**
  - **Start during site characterization and end at closure**

# Aspects of Performance Confirmation

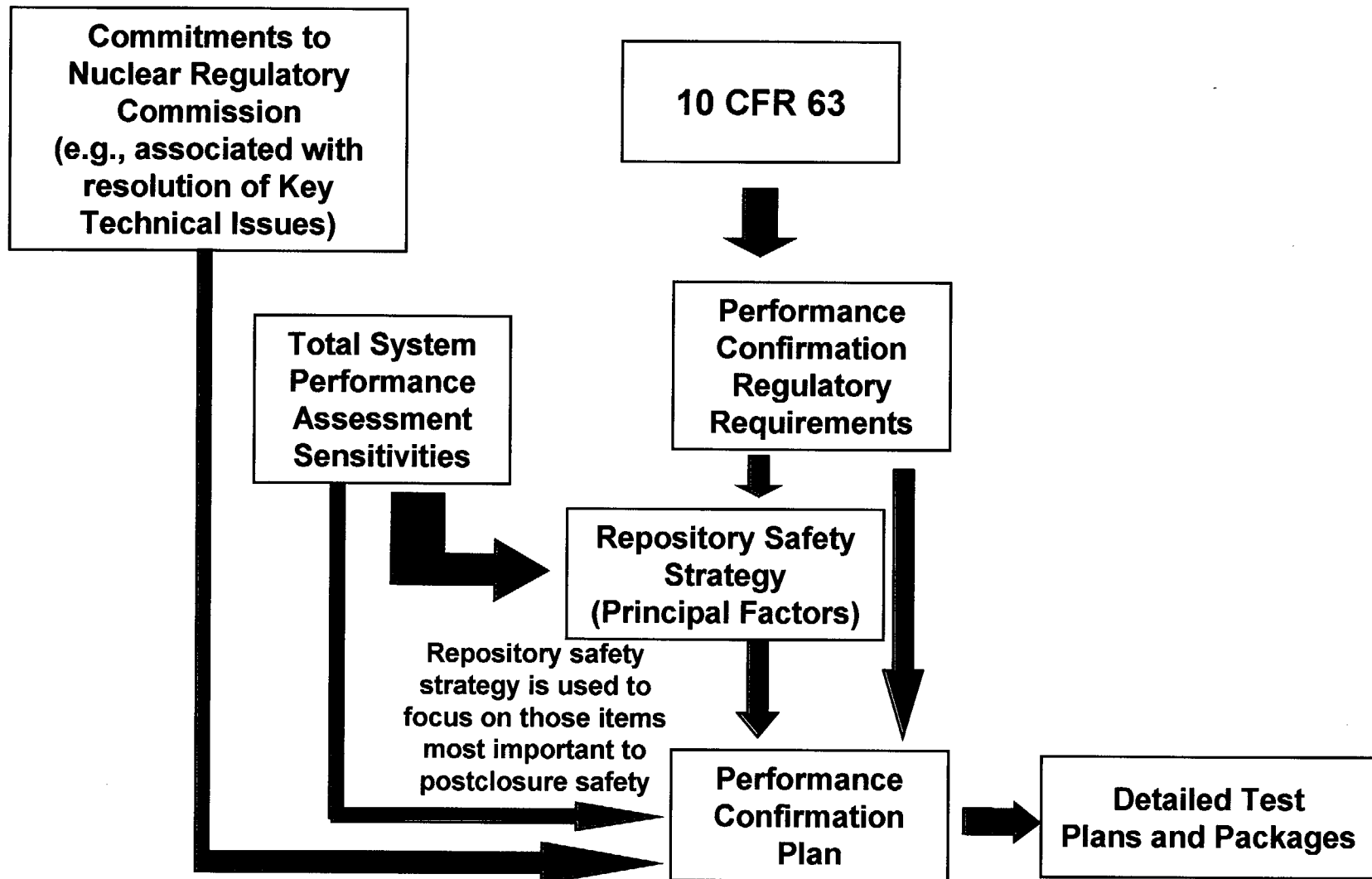


# Aspects of Performance Confirmation

(Continued)

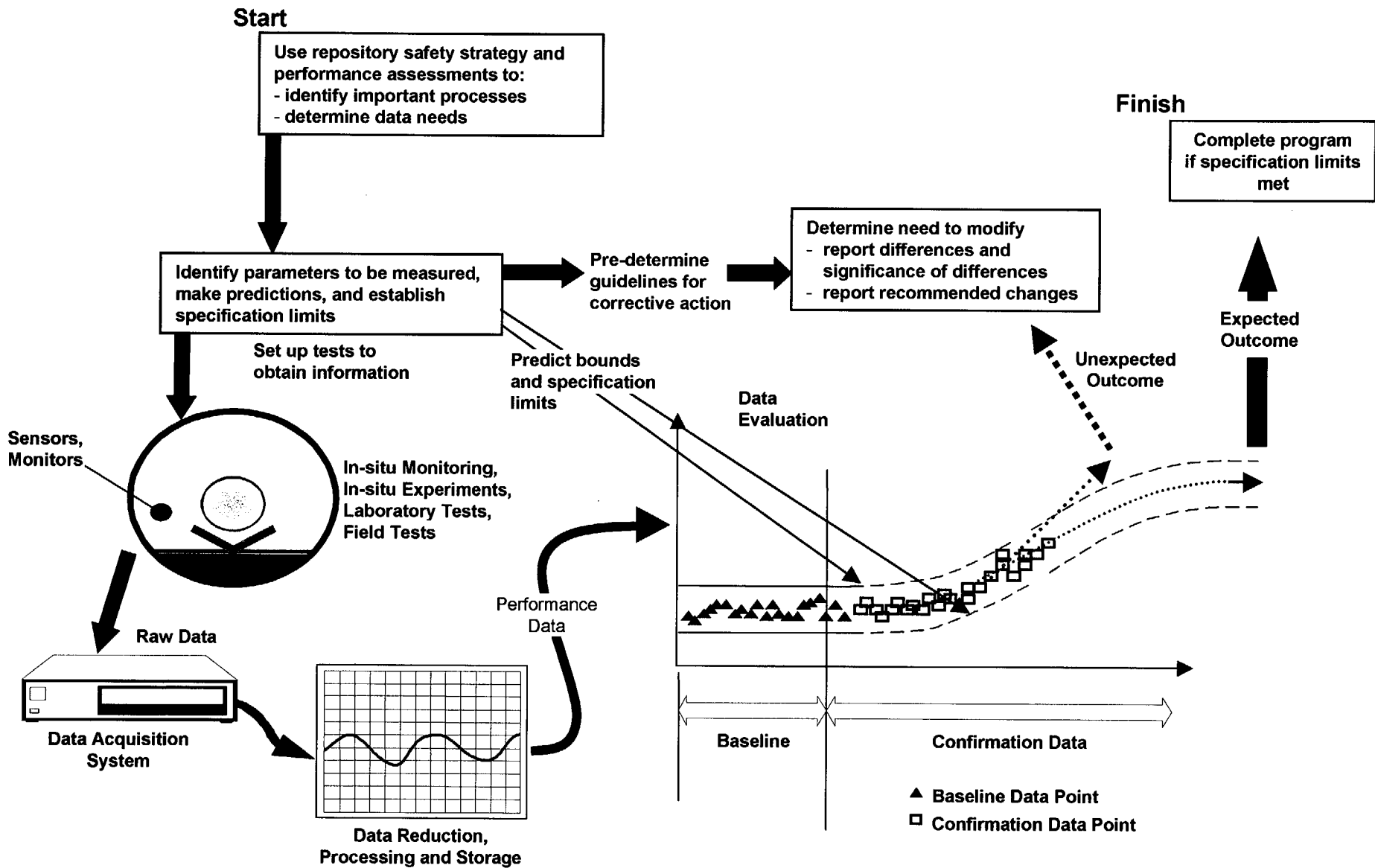
- **Performance confirmation will comply with the requirements of 10 CFR 63**
- **Focus on sensitivities from performance assessments and the repository safety strategy**
  - Seepage into emplacement drifts
  - Performance of the waste package
  - Performance of the drip shield
  - Solubility limits of dissolved radionuclides
  - Retardation of radionuclide migration in the unsaturated zone
  - Retardation of radionuclide migration in the saturated zone
  - Dilution of radionuclide concentrations
- **Basis for principal factors to be firmly established with repository safety strategy revisions**

# Inputs to Performance Confirmation Program





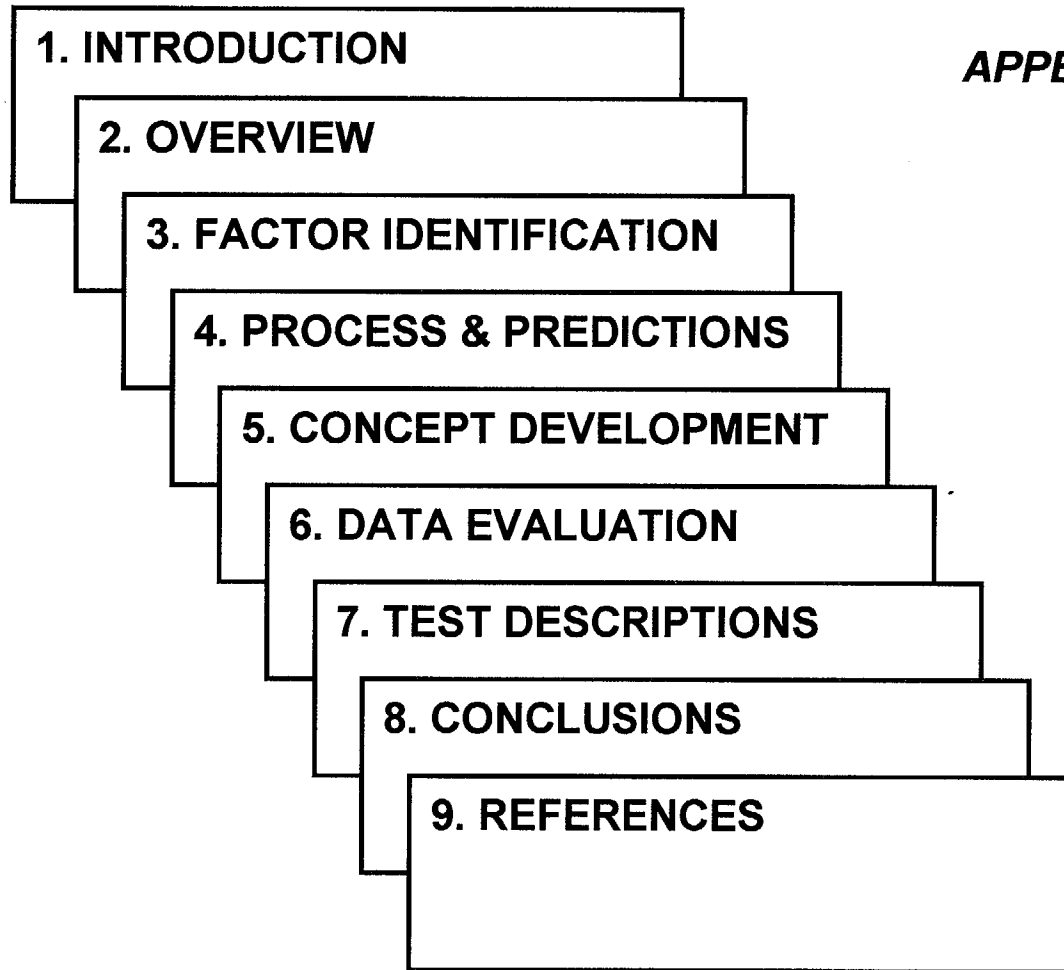
# Performance Confirmation Process



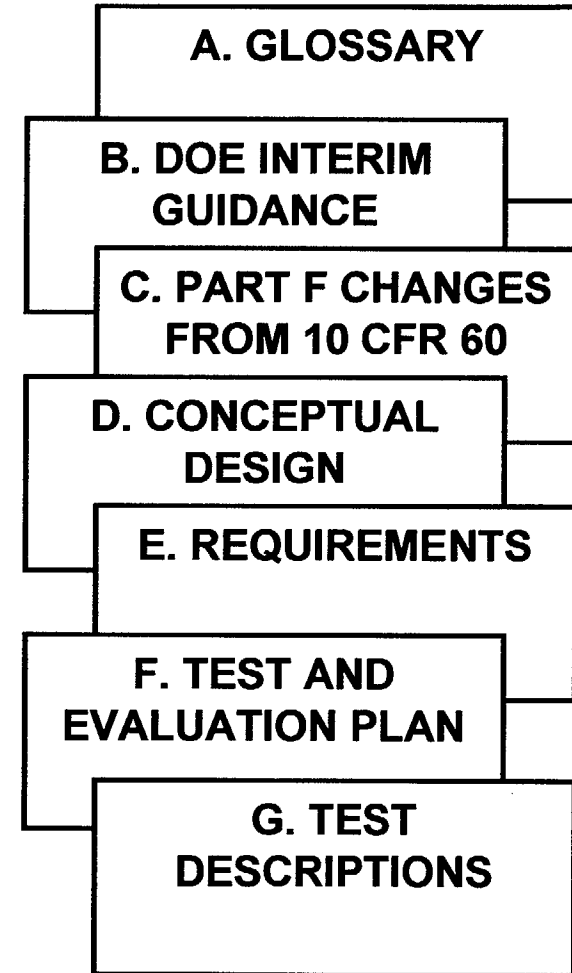
# Potential Outcomes

- **If measurements are as expected – complete program and support closure evaluation**
- **If measurements are unexpected, determine significance and recommend corrective actions**
  - **Minor to significant changes to technical baseline, process models, or mathematical codes**
  - **Changes to the performance confirmation program, test facilities, or test execution**
  - **Changes in the design, construction, or operation of the monitored geologic repository**
  - **Limited or full-scale waste retrieval**

# Performance Confirmation Plan



## *APPENDICES:*



# Performance Confirmation Testing

## Testing resulting from all input factors

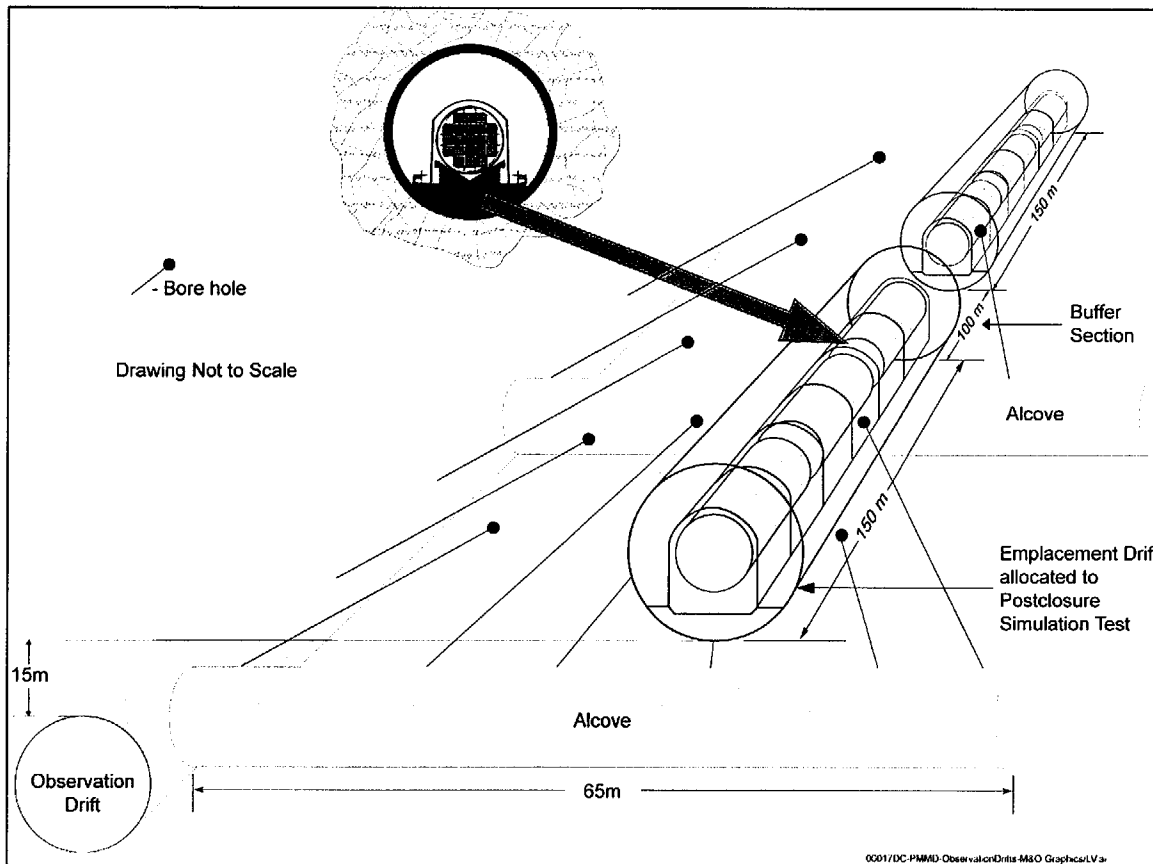
Input Category	Test Type
Repository Safety Strategy and Total System Performance Assessment sensitivity inputs	Seepage monitoring
	Long-term materials monitoring
	In-drift monitoring
	Introduced materials monitoring
	Recovered material coupon testing
	Postclosure simulation testing
	Unsaturated zone testing
	Near-field environment testing
	Waste form testing
	Waste package testing
Regulatory and requirements inputs	In-situ waste package monitoring
	Rock mass monitoring
	Dummy waste package testing
	Geologic observations and mapping
	Subsurface sampling and index testing
	Borehole seal testing
	Ramp and shaft seal testing
	Groundwater level and temperature monitoring
	Surface uplift monitoring
	Subsurface seismic monitoring
	Recovered waste package testing
	Ventilation monitoring
	Groundwater quality monitoring

# Testing Methodologies

- **In-situ monitoring and experiments**
- **Laboratory testing**
- **Field testing**

# In-situ Monitoring and Experiments

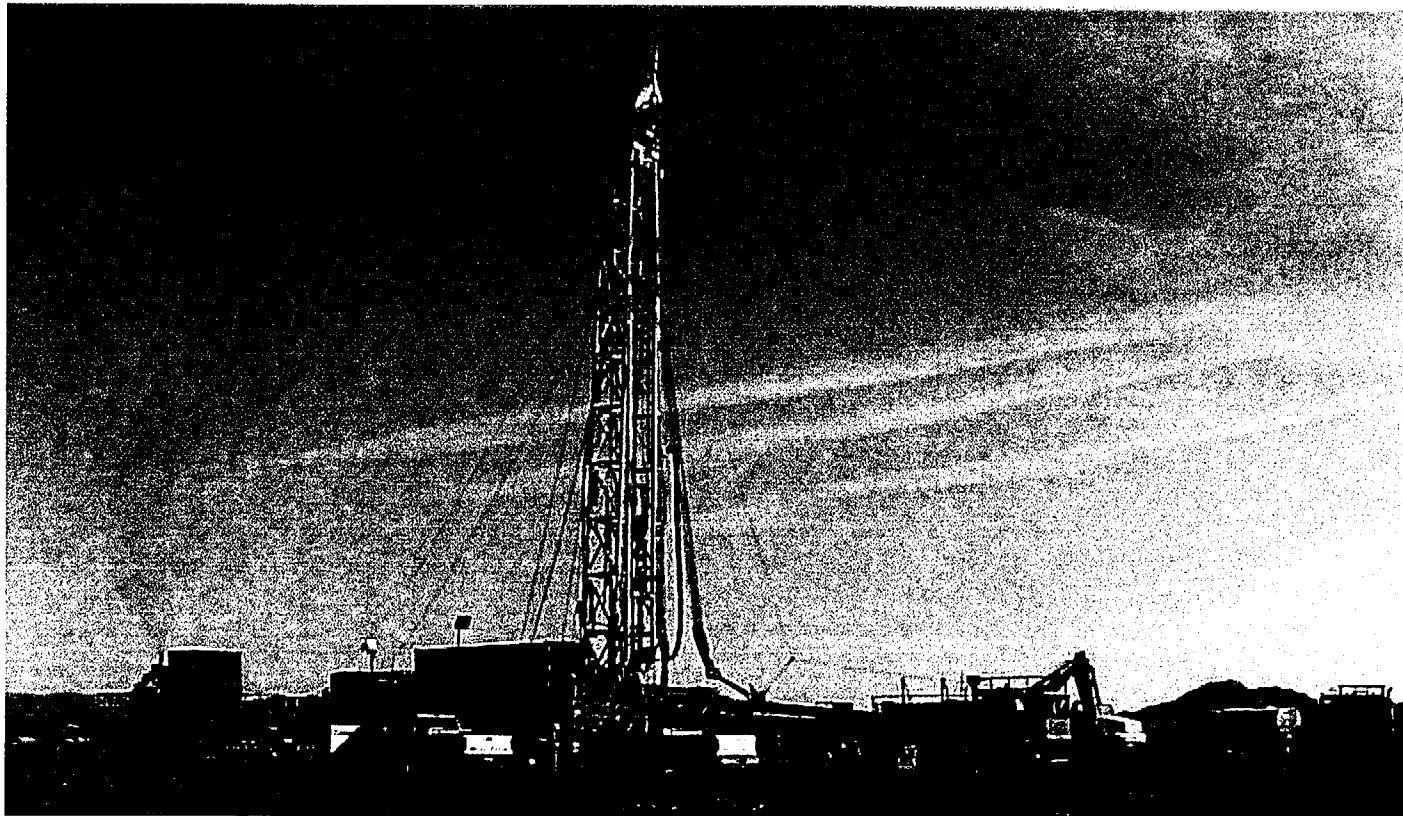
- Seepage monitoring
- In-drift monitoring
- Introduced materials monitoring
- Rock mass monitoring (observation drifts)
- In-situ coupons and dummy packages



- Ventilation monitoring
- Near-field testing
- Unsaturated zone testing
- Mapping and sampling
- Postclosure simulation testing

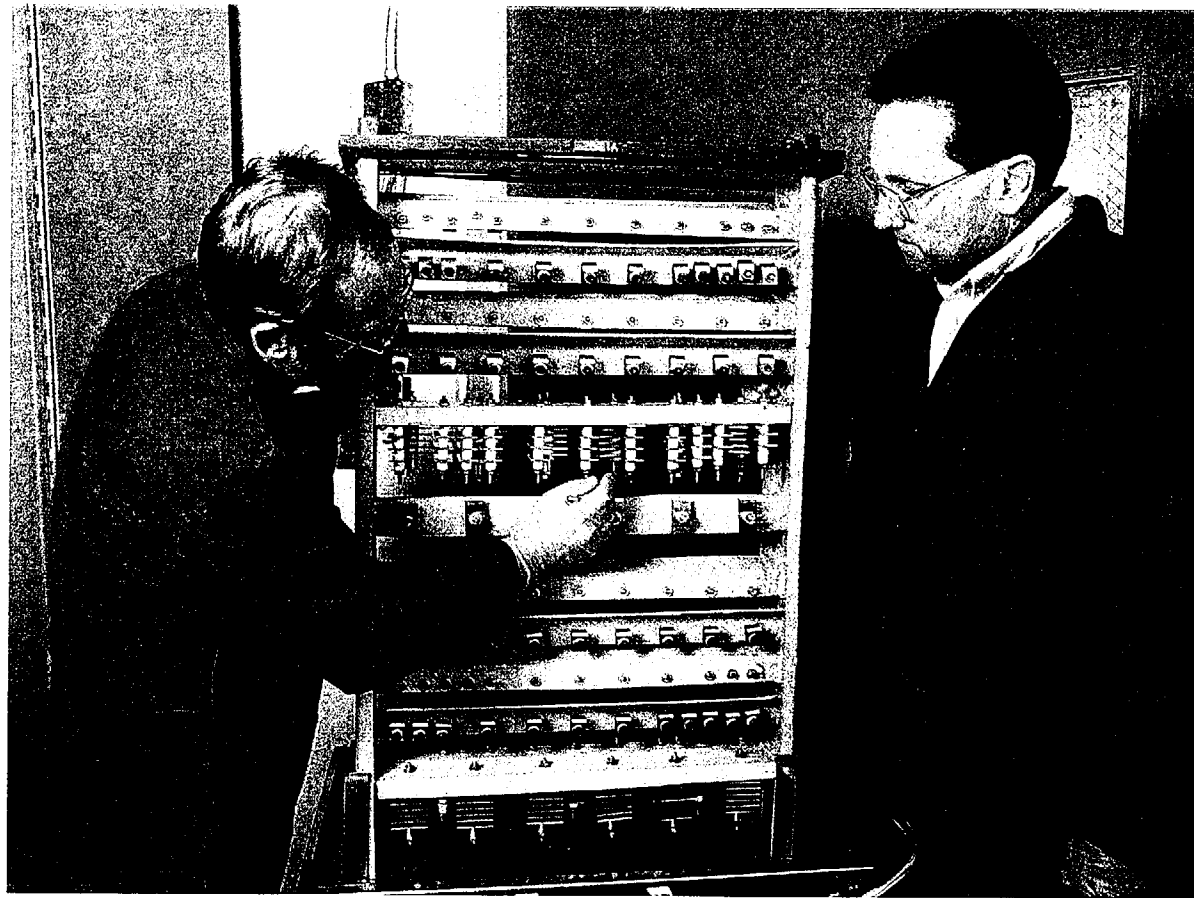
# Field Testing

- Groundwater quality
- Groundwater level and temperature monitoring
- Surface uplift
- Subsurface seismic
- Seals testing



# Laboratory Testing

- Long term materials testing
- Waste package and drip shield testing
- Waste form testing
- Introduced materials
- Sampling and index testing





# Status and Path Forward

- **The performance confirmation program and plan will evolve for the license application**
  - The types of tests have been determined
  - Some testing has occurred during site characterization
  - Data from existing tests will support the program
  - Testing will be performed concurrent with construction
  - Specific tests will be determined prior to License Application with details developed prior to testing
- **Revision of Performance Confirmation Plan is scheduled for August 2001**
  - Modify factors based on updated sensitivities and changes to the repository safety strategy
  - Incorporate updated tests and define test parameters
- **Anticipate continued update of Performance Confirmation Plan through construction and operation**

# Summary

- **The performance confirmation program will comply with regulatory requirements in 10 CFR 63**
- **The program will focus on factors important to postclosure performance based on total system performance assessment sensitivities**
- **Performance confirmation is part of an integrated test program that supports the licensing process**



U.S. Department of Energy  
Office of Civilian Radioactive Waste Management

# Revised Approach to NRC/DOE Meetings on Key Technical Issues in Support of Preliminary NRC Sufficiency Comments

Presented to:  
**Advisory Committee on Nuclear Waste**

Presented by:  
**Carol L. Hanlon**  
**Yucca Mountain Site Characterization Office**

**July 26, 2000**

YUCCA  
MOUNTAIN  
PROJECT

# Nuclear Waste Policy Act Requires:

- **Section 114 (a) (1) (e):**

**“Preliminary comments of the Commission concerning the extent to which the at-depth site characterization analysis and the waste form proposal for such site seem to be sufficient for inclusion in any application to be submitted by the Secretary for licensing of such site as a repository.”**

# Initial Approach

- **November 24, 1999 letter from Brocoum to Greeves proposed approach to provide technical information to the NRC**
- **Proposed conducting meetings on Process Model Reports (PMRs) and Total System Performance Assessment - Site Recommendation (TSPA-SR)**
- **Information intended to assist NRC staff in understanding DOE's technical basis leading to a proposed site recommendation**
- **Included evaluation of Key Technical Issue (KTI) status**

# **NRC/DOE Technical Exchange on Yucca Mountain Pre-licensing Issues, April 25-26, 2000**

- **Meeting focused on KTI status and role in sufficiency process**
- **NRC staff clearly indicated intent to evaluate KTIs as part of sufficiency considerations**
- **NRC and DOE staffs presented their respective assessments of KTI status - DOE status included supporting material from PMRs and Analysis and Model Reports (AMRs)**

# Planned PMR Interactions

- **Nine interactions on PMRs were scheduled for period July through November 2000**
- **Meetings would have two purposes**
  - **Discuss relevant PMRs**
    - ♦ **Purpose**
    - ♦ **Conclusions**
    - ♦ **Bases**
  - **Discuss relation of PMR/AMR conclusions to KTI status (now referred to as “Delta Analysis”)**

# **TSPA Technical Exchange, June 6-7, 2000**

- **Discussion focused on status of TSPA-SR and related issues from Total System Performance Assessment and Integration (TSPAI) KTI**
- **Ambitious agenda**
- **Positive results**
  - **Exchange of much important new information and opinions**
  - **Performance assessment related discussions laid groundwork for future meetings addressing specific KTIs**
  - **Identified ways to improve effectiveness of future interactions**



# **TSPA Technical Exchange, June 6-7, 2000**

(Continued)

- **However, no additional items closed, no change in issue status**
- **NRC/DOE management sought ways to improve ability to reach resolution**

# Refocused Interactions

- **NRC and DOE management agreed to refocus on interactions with most potential for resolving KTI open items**
  - **August 16-17**                      **Unsaturated Zone Flow**
  - **August 30-31**                      **Igneous Activity**
  - **Sept 12-13**                         **Container Life and Source Term**
  - **Oct 3-5**                              **Structural Deformation and Seismicity**
  - **Nov 1-2**                             **Saturated Zone Flow**

# **KTI Interactions Remaining to be Scheduled**

- **Thermal Effects on Flow**
- **Repository Design and Thermal-mechanical Effects**
- **Radionuclide Transport**
- **Evolution of the Near-field Environment**
- **TSPA I**

# Preparation for KTI Interactions

- **Issue-oriented agenda**
- **DOE developing “delta analyses” to identify differing views and focus on path to resolution**
- **NRC staff has agreed to review AMRs and identify questions for discussion in the technical exchanges**
- **Performance assessment implications will be considered**
- **Features, events, and processes (FEPs) will be addressed**

# Template for Delta Analysis

Acceptance Criterion (AC)	NRC Staff Analysis	DOE Status	DOE Proposed Path Forward
Subissue 1: _____			

# Sample Delta Analysis from June TSPA Meeting

TSPA I IRSR REV. 2 ACCEPTANCE CRITERIA	PRESENTATION/ DOCUMENTATION	SELF-ASSESSMENT	PATH FORWARD TO CLOSURE
SUBISSUE 1 - System Description and Demonstration of Multiple Barriers			
Transparency and Traceability of the Analysis			
Abstraction Methodology	Robert Andrews		
T1) The levels and method(s) of abstraction are described starting from assumptions defining the scope of the assessment down to assumptions concerning specific processes and the validity of given data.	All PMRs, TSPA-SR Section 3	Largely Resolved	For this acceptance criteria to be closed, the TSPA-SR Technical Report and supporting PMRs and AMRs will need to be reviewed by the NRC. These documents provide detailed descriptions of the levels and methods of abstraction.
T2) A mapping (e.g., a road map diagram, a traceability matrix, a cross-reference matrix) is provided to show what conceptual features (e.g., patterns of volcanic events) and processes are represented in the abstracted models, and by what algorithms.	TSPA-SR Section 3	Partially Resolved	The TSPA-SR is currently being performed. For this acceptance criteria to be closed, the TSPA-SR Technical Report and supporting PMRs and AMRs will need to be reviewed by the NRC.
T3) An explicit discussion of uncertainty is provided to identify which issues and factors are of most concern or are key sources of disagreement among experts.	All PMRs, TSPA-SR Section 3, TSPA-SR Section 5	Largely Resolved	The TSPA-SR is currently being performed. This document provides descriptions of the treatment of uncertainty for each component model and describes uncertainty importance analysis results. For this acceptance criteria to be closed, the TSPA-SR Technical Report and supporting PMRs and AMRs will need to be reviewed by the NRC.

# Sample Draft Delta Analysis for Unsaturated Zone Flow Meeting

Acceptance Criterion (AC)	NRC Staff Analysis	DOE Status	DOE Proposed Path Forward
<b>Subissue 1: Climate Change</b>			
AC 1. Climate projections used in performance assessments of the YM region are based on paleoclimate data, considering, at a minimum, information contained in Forester, et al. (1996); Winograd, et al. (1992); Szabo, et al. (1994)	NRC status: Closed. The staff found that TSPA-VA provided sufficient detail to meet this criterion (USFIC IRSR Rev 2).	DOE believes this criterion is closed. The Yucca Mountain Site Description, Revision 1 (CRWMS 2000a-TBV) provides a detailed discussion of the paleoclimate data, including references to Forester, et al. (1996) and Szabo, et al. (1994) in Section 6 (Climatology and Meteorology). Winograd et al. (1992) is referenced in Section 9 (Saturated Zone Hydrology).  The Future Climate Analysis (USGS, 2000a, Section 6.3) references Winograd, et al. (1992). This report contains a new analysis of future climate change, also based on the evaluation of paleoclimate data. Section 6.6.2 defines three future climate states: modern climate lasting 600 years, followed by a monsoon climate lasting from 600 to 2,000 years, and a glacial transition for the remainder of the 10,000 year period. This work is also summarized in CRWMS M&O (2000b). This analysis meets the intent of this criterion.	No additional work is needed.
AC 2. DOE has evaluated long-term climate change based on known patterns of climate cycles during the Quaternary, especially the last 500 k.y.	NRC status: Closed. The DOE has estimated future climate states, based on the paleoclimate record (USFIC IRSR Rev 2).	DOE believes this criterion is closed. The AMR for Future Climate Analysis (USGS, 2000a, Section 6.6.2) defines three climate states (see discussion above). This analysis is based on the paleoclimate record and meets the intent of this criterion.	No additional work is needed.
AC 3. If used, numerical climate models are calibrated with paleoclimate data and their use suitably simulates the historical record, before being used for projection of future climate.	NRC status: Closed. The DOE has not used numerical models to estimate future climate change (USFIC IRSR Rev 2).	The DOE continues to use the paleoclimate record to define future climate states rather than numerical models.	No additional work is needed.

# Conclusions

- **NRC and DOE management established an approach to facilitate issue resolution, focused on KTIs**
- **Five interactions scheduled for next four months on KTIs with most potential for complete issue resolution**
- **Objective is to support NRC's preparation of sufficiency comments by agreeing on path forward to resolution of KTI open items for license application**





**STATUS OF ISSUE RESOLUTION PROCESS  
IN THE HIGH-LEVEL WASTE PROGRAM**

**BY  
KING STABLEIN, CHIEF  
PROJECTS AND ENGINEERING SECTION  
HIGH-LEVEL WASTE BRANCH**

**PRESENTED TO  
ADVISORY COMMITTEE ON NUCLEAR WASTE  
JULY 26, 2000**

## **BACKGROUND FOR KEY TECHNICAL ISSUE RESOLUTION**

- **REFOCUSED HIGH-LEVEL WASTE REGULATORY PROGRAM IN FY 1996**
- **ORGANIZED PROGRAM AROUND KTIs MOST IMPORTANT TO POST-CLOSURE PERFORMANCE**
- **THOSE KTIs ARE AS FOLLOWS:**
  - **PERFORMANCE ASSESSMENT (PA)**
  - **UNSATURATED AND SATURATED FLOW UNDER ISOTHERMAL CONDITIONS (USFIC)**
  - **CONTAINER LIFE AND SOURCE TERM (CLST)**
  - **EVOLUTION OF NEAR-FIELD ENVIRONMENT (ENFE)**
  - **REPOSITORY DESIGN AND THERMO-MECHANICAL EFFECTS (RDTME)**
  - **THERMAL EFFECTS ON FLOW (TEF)**
  - **RADIONUCLIDE TRANSPORT (RT)**
  - **IGNEOUS ACTIVITY (IA)**
  - **STRUCTURAL DEFORMATION AND SEISMICITY (SDS)**

## **OBJECTIVE OF KTI RESOLUTION**

**COMPLETE RESOLUTION OF ALL 9 KTIS AND 38 SUBISSUES BEFORE DOE SUBMITS A LICENSE APPLICATION**

## **RATIONALE**

**SUPPORTS THE CONGRESSIONAL MANDATE FOR NRC TO REVIEW ANY DOE LICENSE APPLICATION IN A 3-YEAR PERIOD**

- **DOE NEEDS TO PREPARE A LICENSE APPLICATION THAT IS SUFFICIENTLY COMPLETE FOR NRC TO COMPLETE A REVIEW AND MAKE A DECISION ON CONSTRUCTION AUTHORIZATION (CA) IN 3 YEARS**

## **BASIS OF ISSUE RESOLUTION**

- **DEFINITION ESTABLISHED IN NRC REGULATIONS ON PRE-LICENSING PROCESS AND A 1992 AGREEMENT WITH DOE**
- **STAFF-LEVEL RESOLUTION CAN BE ACHIEVED DURING PRE-LICENSING PROCESS**
- **ISSUES CAN BE REOPENED BASED ON NEW INFORMATION**
- **NON-BINDING ON ANY PARTY TO ANY LICENSING PROCESS**

**ROLE OF THE APRIL 25-26, 2000  
NRC/DOE MEETING ON KTI RESOLUTION**

- **ISSUE RESOLUTION HAS BEEN AN ONGOING FOCUS OF STAFF ACTIVITY FOR OVER TEN YEARS, WITH SPECIFIC ATTENTION TO THE KTIs SINCE 1996**
- **ISSUE RESOLUTION STATUS REPORTS (IRSRs) HAVE BEEN ISSUED FOR THE 9 KTIs CONTAINING INFORMATION ON THE PATHS TO RESOLUTION**
- **THE APRIL 25-26, 2000 MEETING REPRESENTED ATTEMPT TO MOVE FORWARD IN THE RESOLUTION PROCESS**
  - **NRC STAFF WOULD SUMMARIZE THE CURRENT RESOLUTION STATUS OF THE KTIs AND ASSOCIATED SUBISSUES**
  - **NRC STAFF WOULD STATE SPECIFICALLY WHAT IS NEEDED FROM DOE TO CLOSE THE KTIs AND SUBISSUES**
  - **DOE STAFF WOULD DISCUSS ITS PLANS AND SCHEDULE FOR PROVIDING THE NEEDED INFORMATION, AS WELL AS INDICATING WHETHER, IN ITS VIEW, SUFFICIENT INFORMATION IS ALREADY AVAILABLE TO CLOSE PARTICULAR SUBISSUES**

## CATEGORIES OF RESOLUTION

### OPEN

- DOE HAS NOT YET ACCEPTABLY ADDRESSED STAFF QUESTIONS REGARDING THE MODEL, DATA, OR OTHER INFORMATION PERTAINING TO AN ISSUE OR ITS SUBORDINATE SUBISSUES
- ADDITIONAL INFORMATION IS REQUIRED TO PRODUCE AN ADEQUATE BASIS FOR REGULATORY DECISION AT THE TIME OF CA
- FAILURE TO PROVIDE THE REQUIRED INFORMATION COULD RESULT IN THE LA NOT BEING DOCKETED

### CLOSED

- STAFF HAS NO FURTHER QUESTIONS REGARDING THE MODEL, DATA, OR OTHER INFORMATION PERTAINING TO AN ISSUE AND ITS SUBORDINATE SUBISSUES
- - DOE APPROACH AND AVAILABLE SUPPORTING INFORMATION ACCEPTABLY ADDRESS STAFF QUESTIONS
  - NO INFORMATION BEYOND WHAT IS CURRENTLY AVAILABLE WILL LIKELY BE REQUIRED FOR STAFF REGULATORY DECISION MAKING AT THE TIME OF CONSTRUCTION AUTHORIZATION (CA)

## **CATEGORIES OF RESOLUTION**

### **CLOSED PENDING CA REVIEW**

- **STAFF HAS NO FURTHER QUESTIONS REGARDING THE MODEL, EXISTING DATA, OR OTHER INFORMATION PERTAINING TO AN ISSUE AND ITS SUBORDINATE SUBISSUES**
- **STAFF IS AWAITING RECEIPT OF ADDITIONAL INFORMATION FROM DOE**
- **DOE APPROACH AND SUPPORTING INFORMATION, TOGETHER WITH THE DOE SPECIFIC COMMITMENT TO PROVIDE ADDITIONAL INFORMATION, ACCEPTABLY ADDRESS STAFF QUESTIONS**
  - **THE COMMITMENT SHOULD BE DOCUMENTED, AND SHOULD IDENTIFY THE INFORMATION AND DOE PLAN AND SCHEDULE TO PROVIDE THE INFORMATION**
- **NRC HAS IDENTIFIED ADDITIONAL INFORMATION THAT MUST BE PROVIDED FOR STAFF TO HAVE CONFIDENCE THAT DOE HAS ACCEPTABLY ADDRESSED STAFF QUESTIONS**
- **IF THE ADDITIONAL INFORMATION HAS NOT BEEN PROVIDED BEFORE LA, THE LA WILL INCLUDE THE REMAINING REQUIRED INFORMATION, SUFFICIENT FOR STAFF TO MAKE DETERMINATIONS REQUIRED BY THE NRC REGULATIONS AT THE TIME OF CA**

## **NRC STAFF PRESENTATIONS AT THE KTI RESOLUTION MEETING**

**FOR EACH SUB-ISSUE, STAFF PRESENTED:**

- CURRENT STATUS**
- SPECIFICALLY, WHAT DOES ONE NEED TO PROVIDE OR CONSIDER TO CLOSE THE SUBISSUE**
  - a. ADDITIONAL ANALYSES ARE NEEDED TO ANSWER STAFF QUESTIONS**
  - b. ADDITIONAL DATA AND ANALYSES ARE NEEDED TO ANSWER STAFF QUESTIONS**
  - c. ONE OR MORE ADDITIONAL ASPECTS OF THE SUB-ISSUE NEED TO BE ADDRESSED**

## OUTCOMES OF APRIL KTI RESOLUTION MEETING

- 7 ADDITIONAL SUBISSUES CLOSED OR CLOSED PENDING CONSTRUCTION AUTHORIZATION REVIEW, 4 UNDER CLST AND 3 UNDER RDTME

### CLST

- MECHANICAL FAILURE OF CONTAINERS
- RATE OF RADIONUCLIDE RELEASE THROUGH DEGRADATION OF SPENT FUEL
- RATE OF RADIONUCLIDE RELEASE FROM HLW GLASS
- EFFECTS OF ALTERNATE EBS DESIGN FEATURES ON CONTAINER LIFETIME AND RADIONUCLIDE RELEASE

### RDTME

- EFFECTIVE DESIGN CONTROL PROCESS
- DESIGN FOR EFFECTS OF SEISMIC EVENTS AND FAULT DISRUPTION
- DESIGN OF SEALS

(SEE PAGE 9 FOR SUMMARY STATUS OF ALL 38 SUBISSUES)

- BETTER UNDERSTANDING OF DOE PLANS AND SCHEDULES FOR PROVIDING THE INFORMATION TO CLOSE ISSUES
- BASES ESTABLISHED FOR NRC STAFF TO DEVELOP MORE DETAILED SCHEDULE BY 9/00 FOR IMPLEMENTATION OF PATHS TO RESOLUTION



# NRC KEY TECHNICAL ISSUES/SUBISSUES(\*)

## 1. Performance Assessment

1. Multiple Barriers
2. Scenario Analysis
3. Model Abstraction
4. Overall Performance Objective

## 2. Unsaturated and Saturated Flow under Isothermal Conditions

1. Climate
2. Effects of Climate
3. Shallow Infiltration
4. Deep Percolation
5. Saturated Zone Flow
6. Matrix Diffusion

## 3. Container Life and Source Term

1. Corrosion
2. Mechanical Failure
3. Rate of Release/Spend Fuel
4. Rate of Release/Glass
5. Criticality
6. Alternative Designs

## 4. Evolution of Near-field Environment

1. Thermal/Chemical Effects on Seepage
2. Thermal/Chemical Effects on WP Environment
3. Thermal/chemical Effects on Rn Release
4. Thermal/Chemical Effects on Rn Transport
5. Criticality

## 5. Repository Design and Thermo-Mechanical Effects

1. Design Control Process
2. Design for Seismic/Fault disruption
3. Design for Thermal/Mechanical Effects
4. Design of Repository Seals

## 6. Thermal Effects on Flow

1. Thermal Testing for Reflux
2. Thermal Effects of Nearfield Flow
3. Modeling Thermal Effects of Flow in PA

## 7. Radionuclide Transport

1. Transport through Porous Rock
2. Transport through Alluvium
3. Transport through Fractures Rock
4. Criticality

## 8. Igneous Activity

1. Probability of Igneous Activity
2. Consequence of Igneous Activity

## 9. Structural Deformation and Seismicity

1. Fault Displacement
2. Seismicity
3. Fractures
4. Tectonic Framework

\* UNDERLINED SUBISSUES "OPEN"

## PATH FORWARD - NEXT STEPS

- NRC STAFF WILL CONTINUE DEVELOPMENT OF DETAILED SCHEDULE FOR RESOLUTION BASED UPON INFORMATION ACQUIRED AT THE APRIL MEETING, SUBSEQUENT TRANSMITTALS BY DOE, AND PROPOSED NEAR-TERM NRC/DOE MEETINGS TO ATTEMPT TO ACHIEVE CLOSURE OF 4 KTIs - CLST, IA, SDS, AND USFIC
- PROPOSED SCHEDULE AND LOCATION OF MEETINGS ON THESE KTIs:

UZ	8/16-17/00	Berkeley
IA	8/29-31/00	Las Vegas
CLST	9/12-13/00	Las Vegas
SDS	TBD	Las Vegas
SZ	11/1-2/00	Berkeley

- IRSRs FOR THESE FOUR KTIs WILL BE DEFERRED UNTIL AFTER THE MEETINGS TO ALLOW INCLUSION OF THE MEETING RESULTS IN THEM
- MEETINGS ON THE OTHER 5 KTIs HAVE NOT YET BEEN SCHEDULED; IRSRs WILL BE ISSUED BY 9/30/00



**Overview of the Office of Nuclear Material Safety  
and Safeguards' Priorities--A Presentation to the  
Advisory Committee on Nuclear Waste**

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Martin J. Virgilio, Deputy Director  
Office of Nuclear Material Safety and Safeguards

July 26, 2000

# **Presentation of Topics: ACNW's 2000 Action Plan Priority Issues**

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- **5 First Tier Priorities**
- **3 Second Tier Priorities**

# ACNW PRIORITY ISSUES FOR YEAR 2000

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## ■ First Tier Priorities

- ▶ Site Suitability and License Application Associated with the Proposed Yucca Mountain Repository
- ▶ Risk-Informed, Performance-Based (RIPB) Regulatory Framework
- ▶ Decommissioning Issues
- ▶ Yucca Mountain Review Plan
- ▶ Transportation of Radioactive Waste

## ■ Second Tier Priorities

- ▶ Research
- ▶ Low-Level Waste and Agreement States Program
- ▶ Risk Harmonization

# **ACNW Assistance in NMSS Projects:**

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During the Next 12 Months.....

**Which Priorities and NMSS Efforts Will  
Benefit from ACNW Involvement?**

# **First Tier Priority One - Site Suitability and License Application Associated with the Proposed Yucca Mountain Repository**

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- Site Recommendation
- Pre-Closure Issues
- DOE Siting Guidelines
- KTIs

# **First Tier Priority Issue 2 - Risk- Informed, Performance-Based (RIPB) Regulatory Framework**

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- Establishing a Framework
  - ▶ Screening Criteria
  - ▶ Safety Goals
  
- Ongoing Activities
  - ▶ Dry Cask Probabilistic Risk Assessment
  - ▶ Byproduct Risk Study
  
- Training



# **First Tier Priority Issue 3 - Decommissioning Issues**

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- **Decommissioning Guidance - Lessons Learned**
  - ▶ **Feedback on Guidance**
  - ▶ **Feedback on License Termination Plan Reviews**
  - ▶ **Evaluate Guidance - Consider Risk Informed**
- **Institutional Control - Long-term Stewardship**
- **West Valley Decommissioning Criteria**

# **First Tier Priority Issue 4 - Yucca Mountain Review Plan**

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- Risk-Informing the YMRRP
- Revision 1 of the YMRRP

# **First Tier Priority Issue 5 - Transportation of Radioactive Waste**

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- Part 71 Rulemaking
- Package Performance Study

# **Second Tier Priority Issue 2 -Low-Level Radioactive Waste and Agreement States Program**

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- Mixed Waste - Coordinate with EPA on mixed waste rulemakings.
- National Academy of Sciences - NRC Financial Support for Civilian Low-Level Radioactive Waste Disposal Study
- NUREG on Performance Assessment

# **Second Tier Priority Issue 3 -Risk Harmonization**

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- **Development of Safety Goals**
- **Risk Measures and Metrics**