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ACNWT-0080

**OFFICIAL TRANSCRIPT OF PROCEEDINGS**

**Agency:** Nuclear Regulatory Commission  
Advisory Committee on Nuclear Waste

**Title:** 61st ACNW Meeting

**Docket No.**

**LOCATION:** Bethesda, Maryland

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**PAGES:** 278 - 386

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

DATE: February 24, 1994

The contents of this transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Nuclear Waste, (date) February 24, 1994, as Reported herein, are a record of the discussions recorded at the meeting held on the above date.

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1 UNITED STATES OF AMERICA  
2 NUCLEAR REGULATORY COMMISSION

3 - - - - -  
4 ADVISORY COMMITTEE ON NUCLEAR WASTE  
5 - - - - -

6 61st ACNW Meeting  
7 - - - - -

8 Nuclear Regulatory Commission

9 7920 Norfolk Avenue

10 Room P-110

11 Bethesda, Maryland

12 Thursday, February 24, 1994

13 8:30 a.m.

14 ACNW MEMBERS PRESENT:

15 Martin Steindler, Chairman

16 Paul W. Pomeroy, Vice Chairman

17 William J. Hinze

18 B. John Garrick

19 ACNW STAFF PRESENT:

20 Richard Major

21 Howard Larson

22 George Gnugnoli

23 Lynn Deering, Designated Federal Official

24 ACNW CONSULTANT:

25 Ken Foland, ACNW Consultant

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

1  
2 MR. STEINDLER: Good morning. The meeting will  
3 come to order.

4 This is the second day of the 61st meeting of the  
5 Advisory Committee on Nuclear Waste. The same ground rules  
6 we had yesterday will apply today.

7 During today's meeting all of the sessions are  
8 going to be open. The Committee is going to hear reports on  
9 some of the recent field trips and meetings that the members  
10 and the staff took and decide on that basis what kind of  
11 further action we should take.

12 These field trips and reports will include a  
13 discussion of the report on the pneumatic pathway meeting, a  
14 report on issues related to the exploratory studies facility  
15 in Nevada, some highlights of a field trip on erosion, and a  
16 field trip to the newly uncovered, or discovered, or both,  
17 Sun Dance fault.

18 In addition, the Committee will discuss  
19 anticipated and proposed activities for the future meeting  
20 agenda, administrative and organizational matters as they  
21 arise and as they seem appropriate.

22 Ms. Lynn Deering, to my right, three down, is the  
23 Designated Federal Official for the initial session of the  
24 meeting.

25 The meeting is being conducted in accordance with

1 the provisions of the Federal Advisory Committee Act. We  
2 have received no written statements or requests to make oral  
3 statements from members of the public regarding today's  
4 activities. As usual, if someone wishes to address the  
5 Committee for any reason, they should make arrangements to  
6 do so and we will provide some time for that activity.

7 It is requested that all speakers use one of the  
8 microphones, identify himself or herself, and speak with  
9 sufficient clarity and volume to be readily heard by both  
10 the members, the audience, and the reporter.

11 Are there any opening comments that any of the  
12 members or Ken would like to make?

13 [No response.]

14 MR. STEINDLER: Let's move to the agenda. I  
15 believe Bill Hinze is the lead member for the activity on  
16 pneumatic pathways and the subsequent discussions.

17 Bill.

18 MR. HINZE: Mr. Chairman, what I would like to do  
19 is pass this to Lynn Deering of the staff who attended the  
20 Nye County Pneumatic Pathways Workshop. We have a report on  
21 that and some suggestions of follow-up items.

22 Lynn, let's make certain that we are all looking  
23 at the correct documents. We have an additional document.  
24 Is this a replacement?

25 MS. DEERING: What you are holding is a status

1 report on the pneumatic pathways meeting. I handed it out  
2 yesterday.

3 I was the only one to attend this meeting.  
4 Somebody from the NRC staff is supposed to be in the  
5 audience. I may call on him at some point when he shows up.

6 I will try to go through this fairly quickly.  
7 This was January 26 and 27 in Las Vegas. I would like to  
8 give you a brief background on why this meeting came about.

9 MR. HINZE: Lynn, before you go back that far, why  
10 don't you make certain that we are all together in terms of  
11 a what a pneumatic pathway is and why it is important?

12 MS. DEERING: Pneumatic pathways, meaning air,  
13 vapor or gas phase as opposed to liquid. The reason it's  
14 important was really the subject of the workshop and wide  
15 diverging views as to why and whether pneumatic data is  
16 important.

17 I think the most important point is what the state  
18 raised about a year ago. There is quite a lot of momentum  
19 behind getting the underground on this project. This,  
20 unfortunately, competes with a lot of the existing testing  
21 for surface-based testing, boreholes and that sort of thing,  
22 including pneumatic testing that was planned. This is two  
23 competing issues in the program right now. In many ways  
24 this was the central issue to the workshop.

25 About a year ago, the state wrote a letter to the

1 NRC and indicated that they felt if pneumatic data could not  
2 be collected prior to the ESF being constructed that there  
3 could be serious consequences such that NRC couldn't make  
4 regulatory findings with respect to performance objectives,  
5 radionuclide release via gaseous pathways, as well as  
6 groundwater travel time. The the state was interpreting  
7 groundwater in the NRC's regulation to include the vapor  
8 phase. If this were true, then NRC in its groundwater  
9 travel time requirement needs to look at the fastest path,  
10 which could be the vapor phase, and this had potential  
11 serious consequences.

12 Since that time, I think NRC has openly stated  
13 that groundwater does not in fact include vapor; that was  
14 not the intent in the regulation. I think therefore that  
15 concern of the states, I would assume, is going to go away  
16 if NRC makes that position clear.

17 Basically, these were the origins a year ago.

18 The NRC also had concerns about the need to  
19 collect baseline pneumatic data before the ESF was  
20 constructed, and they had a number of comments on the  
21 record, one of which related to the need to collect isotope  
22 geochemical data prior to the effects of the ventilation  
23 from the tunnel, because they felt that the tunnel  
24 ventilation could seriously affect this kind of data.

25 The USGS also got involved. They were asked their

1 opinion. We have a couple USGS folks in the audience. They  
2 might want to chime in at any time.

3 The USGS wrote letters, which we have in our file,  
4 that suggest, yes, this could be very serious, and they  
5 proposed some possible accelerated testing, most of which  
6 was actually already planned. They felt, let's accelerate  
7 it and make sure it gets done and we have adequate time to  
8 monitor at least one year before the ESF comes in.

9 Nye County felt, for various reasons, that they  
10 wanted to pull all of the interested parties together in one  
11 room to sort of hash this out. That is what happened at  
12 this meeting. I'll just go over some highlights of that  
13 meeting.

14 Please interrupt me at any time if you have a  
15 question. That's fine.

16 The current conceptual model is a thin-bedded unit  
17 which lies between the upper Tiva Canyon and the lower  
18 Topapaw Springs repository unit. There was a lot of  
19 emphasis during this meeting on whether or not that is in  
20 fact a barrier. This was a theme throughout the meeting and  
21 the data that one would need to collect to determine whether  
22 or not in fact you had gas flow between Tiva and Topapaw  
23 Springs or whether or not this bedded unit was serving as a  
24 barrier. I think the modelers felt that this was really  
25 important in order to understand gas flow, whether the

1 system was dynamic or static.

2 I think testing will be done. The USGS proposed  
3 air permeability testing and pressure transducers in the  
4 upper and lower unit. It sounds like there is information  
5 and plans to collect the data they need to test whether or  
6 not this in fact a barrier.

7 What is not clear, at least to me, was the  
8 significance of this unit as a barrier. A DOE management  
9 person said, "In all likelihood, we're not planning on  
10 relying on this as a barrier to limit gaseous radionuclide  
11 releases." On the other hand, there was concern expressed  
12 that if this was in fact a laterally continuous barrier, it  
13 could create problems of its own; rather than serve as a  
14 positive influence, it could be negative in that it could  
15 trap vapors and not allow the mountain to dry out as some of  
16 these thermal loading scenarios are planning on.

17 I would also say that there was a lot of emphasis  
18 on thermal loading: once the effect of heat comes into play,  
19 how will that affect vapor redistribution? A lot of  
20 discussion was devoted towards thermal loading and the  
21 relationship of pneumatic pathways to thermal loading.

22 It was pretty unanimous that this data was  
23 important for all kinds of different reasons, but for the  
24 most part for modeling. The modelers felt they needed to at  
25 least understand existing conditions -- pressure,

1 temperature, saturation, and so forth -- before they could  
2 go on to predict the effects of heat. And boundary  
3 conditions for modeling. So there was a lot of emphasis on  
4 the need for this data for modeling.

5 Just a few more observations. I think it was  
6 important what the NRC said about groundwater and the  
7 definition of groundwater.

8 MR. HINZE: That has only been stated. There is  
9 no written communication on that?

10 MS. DEERING: Not that I'm aware of.

11 MR. HINZE: Is there any indication planned on  
12 that?

13 MS. DEERING: Nye County encouraged the NRC to  
14 clarify that position, and they were suggesting with  
15 guidance. I don't know what NRC's plans are. That is why I  
16 am hoping that Bill Ford can comment on this. We asked the  
17 NRC to come and talk to the ACNW on their position on the  
18 importance of pneumatic pathways: does groundwater travel  
19 time include vapor phase?

20 We have asked them to come down. They felt that  
21 they had a lot of pre-decisional information and they didn't  
22 want to do it at this time. They are planning some  
23 activities related to this issue.

24 When Bill Ford comes here, we would like to ask  
25 him what NRC staff is planning and whether or not we would

1 like to still invite them down, if they would share with us  
2 what they are doing on this issue. Because it really wasn't  
3 clear when we left this meeting what the follow-up action  
4 was or what the results of this meeting would be, if any.

5           It seemed that the USGS for the most part were  
6 satisfied. They had a plan on the table; DOE seemed to be  
7 interested in adopting most of it; but overriding everything  
8 was this schedule, the ESF. I think at the end there were  
9 concerns expressed by lots of people: How realistic is this?  
10 How serious is DOE taking this? Is it really a priority?  
11 Will this plan actually be implemented? We know the TBM is  
12 coming in in August.

13           There was a lot of sort of snickering. People  
14 laughed that the TBM would actually begin operating in  
15 August. I've not heard an official slip on that, but it  
16 seemed that people thought it was kind of humorous, that  
17 that really wasn't going to happen and that we had more time  
18 than we thought to get this baseline pneumatic information.  
19 But I felt uneasy about that, because I felt they should be  
20 officially slipped and built into the schedule so that we  
21 all have assurance that this information that seems to be  
22 important will in fact be collected.

23           I would also add that there was no discussion that  
24 I heard of the analysis of this information. It was not  
25 clear how they would make a decision whether or not they

1 would actually define pneumatic baseline conditions adequate  
2 for their purposes, what their decision criteria would be,  
3 and what kind of analysis and interpretation they would do.

4 MR. HINZE: Back in the Paleolithic we used to  
5 have something called study plans that covered these topics.  
6 Did anyone at this meeting ever refer to a study plan?

7 MS. DEERING: Yes. I heard more than once what is  
8 being proposed here in terms of accelerated testing, gas  
9 chemistry, pneumatic, air permeability testing of faults, et  
10 cetera, is in there; it's all in the study plans; it's  
11 covered over the nine unsaturated zone study plans; you just  
12 have to sort of pluck it out.

13 I'm not sure if there is a single comprehensive  
14 plan that you can throw on the table and say it's here and  
15 it shows the different study plans that it is drawing from.  
16 I have never seen anything like that.

17 MR. HINZE: Is there a pneumatic pathways SAR in  
18 DOE that is looking at this in its totality or someone that  
19 has the responsibility for this?

20 MS DEERING: It wasn't obvious, if it's true. It  
21 seemed that it might have been shared responsibility. Gene  
22 Yonker was present and representing DOE management. Joe  
23 D'Lugosz, who is the DOE manager of unsaturated zone  
24 studies, was there and representing the data that they were  
25 planning on collecting. I can look into that and find out.

1 But the NRC staff plans to take some action to find out.  
2 They have a lot of questions based on that meeting.

3 MR. HINZE: The reason I asked that is because of  
4 our discussion yesterday about integration and the SEA's  
5 numerous comments and questions regarding the whole problem  
6 of integration. When you see a topic being investigated in  
7 a number of study plans, you wonder where the integration is  
8 going to take place.

9 MS. DEERING: That's a very good question. It  
10 wasn't obvious.

11 MR. STEINDLER: Can I go back a few feet?

12 MS. DEERING: Yes.

13 MR. STEINDLER: What is it that they are looking  
14 for by way of data? Is it really true that the gas  
15 permeability of the various beds adjacent to the repository  
16 horizon is unknown? Does that make sense?

17 MS. DEERING: Matrix, fractures and faults: these  
18 are difficult things to measure and on a repository-wide  
19 scale in particular it is difficult to get the spatial  
20 variability of this kind of information. Apparently this is  
21 highly significant to have for your modeling to understand  
22 gas flow. You need to know the permeabilities, be it bulk  
23 permeability or permeabilities of the faults. I get the  
24 impression they want to do this and there are plans to do  
25 it. There are only so many boreholes that they have.

1 I get the feeling it's a very difficult thing  
2 technically, methodology-wise, just to get these  
3 permeabilities. But no, they don't have the kind of  
4 information that they need at this point, particularly on  
5 faults.

6 MR. STEINDLER: Is it reasonable to suppose that  
7 gas permeability done on cored samples that you pull up out  
8 of the various boreholes is going to be significantly  
9 different than the gross permeability of the entire layer?  
10 One assumes that that is a reasonable assumption.

11 In order to get the latter data, are they planning  
12 to drill additional boreholes and do a whole formation study  
13 in some fashion or another?

14 It doesn't sound like they are going to have all  
15 that much time unless they put a two-year hold on the  
16 exploratory studies facility.

17 MS. DEERING: I don't want to misspeak. It was  
18 not clear and I don't want to profess to understand exactly  
19 what they are going to do and how it differs from where they  
20 were a year ago. I heard many concerns expressed from the  
21 principal investigators that there are limitations in the  
22 existing plan on what is going to be measured and the scale  
23 and the time frames in which we have to monitor.

24 MR. STEINDLER: Aside from the uncertainty as to  
25 when the boring machine was going to start operating, was

1 there any noise made about delaying the actual start of  
2 tunnel boring for a year or two?

3 MS. DEERING: No. There was absolutely no formal  
4 commitment like that from DOE. I think that is one of the  
5 things that was missing. It seems that they are ready to  
6 prove that we're fine: chances are we are not going to  
7 start on time; there will be plenty of time to collect this.  
8 It just seems like there was no commitment, nor, as I said,  
9 the analysis to model any of this data once it's collected  
10 prior to ESF construction.

11 MR. STEINDLER: That latter point doesn't trouble  
12 me all that much.

13 Was there any way in which the importance of  
14 pneumatic data acquisition to modeling the performance of  
15 the entire repository was evaluated? Does it really make a  
16 difference? How important is it to the performance of the  
17 repository and retention of fission products, or what have  
18 you? In other words, does anybody care?

19 MS. DEERING: A lot of people care, or they feel  
20 that it's significant.

21 MR. GARRICK: Have there been calculations made of  
22 different levels of permeability due to the pneumatic  
23 pathway?

24 MS. DEERING: They have looked at different  
25 options for thermal loading. There have been calculations

1 made without the data to support them.

2 MR. GARRICK: Are these calculations that carry  
3 forward to consequences?

4 MS. DEERING: I'm not sure. I think it's just  
5 flow.

6 MR. GARRICK: How can they bound the problem if  
7 they don't do some of that?

8 MS. DEERING: I didn't see any kind of  
9 presentation on here's what we've done to attempt to bound  
10 the problem now; once we get the data, we can look at which  
11 of these possibilities we can throw out.

12 MR. GARRICK: I don't understand that. I don't  
13 understand why we are always looking at the data and not  
14 doing calculations to tell us what data we should be looking  
15 for.

16 MS. DEERING: I understand.

17 Bill, as far as you know, have calculations been  
18 done to bound the problem, whether or not this pneumatic is  
19 even important?

20 MR. FORD: My name is Bill Ford. I'm a  
21 geohydrologist with NMSS.

22 Did Lynn explain why the state feels the data is  
23 important to site performance?

24 MR. HINZE: She mentioned something about that. I  
25 really think that we might even defer the answer to this

1 question and if you have a presentation let you put that  
2 together and put it in order.

3 MR. FORD: I didn't come to make a presentation.  
4 I was told to answer questions.

5 MR. HINZE: I saw the overheads.

6 MR. FORD: I have a few.

7 MR. HINZE: That's a bad or a good sign.

8 [Laughter.]

9 MR. STEINDLER: It's a good sign.

10 MR. FORD: Those are just a mixed bag in case a  
11 question comes up. It's not a presentation for this  
12 meeting.

13 MR. HINZE: If you can, why don't you help us out  
14 with this question of have bounding calculations of the  
15 pneumatic pathways been done to indicate the significance of  
16 this data acquisition and its interpretations.

17 MR. FORD: First of all, let me define what I  
18 think the issue is, what I think I heard at the meeting. I  
19 think the state's pneumatic concern incorporates some of the  
20 NRC open items which had to do with ESF interference. We  
21 have an open item that has to do with dewatering effects on  
22 the ESF. That's a very old comment which has been on the  
23 books a long time. Then we have one that has to do with  
24 effects on the ESF on isotope sampling, gas and water in the  
25 rock.

1 I think the additional concept that the state has  
2 added, which you have hit on, is ESF effects on the  
3 collection of ambient air pressure and airflow data.

4 When we first started looking at the state's  
5 concern we thought that the main reason they would be  
6 concerned about the collection of this data was to  
7 characterize the site from the standpoint of radionuclide  
8 release.

9 When I got to the meeting, over the days it's my  
10 impression listening to the state and the county's  
11 consultant that the concern is that they are worried about  
12 the characterization of flow barriers. Not just the  
13 collection of, let's say, data to calibrate a code that you  
14 could then model the radionuclide release or gas flow at  
15 some future date.

16 What they are concerned about is if there are gas  
17 flow barriers. In particular, they are worried about the  
18 bedded unit on top of the Topapaw Springs.

19 They are also worried about where the Topapaw  
20 Springs unit outcrops in Solitario Canyon on the west side  
21 of the site, that if these boundaries are barriers to  
22 airflow, that in a hot repository situation they could be  
23 important in modeling how the water moves in the site. They  
24 are particularly worried that if the water can't get out of  
25 the mountain and a hot repository it might not be able to

1 dry out. I believe they are also worried that it might  
2 cause more complexities in modeling a hot repository as far  
3 as where the water moves.

4 They are particularly concerned with the  
5 collection of air pressure data. They are concerned with  
6 gas chemistry. They would like approximately a year's worth  
7 of data collection prior to any potential disturbance from  
8 the ESF.

9 What they are looking for is the change of large  
10 pressure fronts, like weather fronts that might move over  
11 the site so you would see changes in barometric pressure,  
12 and that if they see changes in barometric pressure above  
13 these presumed barriers and none below, then they would feel  
14 confident that there is a gas flow barrier at that location.  
15 If they see changes above and below, then they would say  
16 that they do not have a barrier there. They are worried  
17 that when they go below the bedded unit, or the ESF, that  
18 when they see changes in the air pressure below the bedded  
19 unit they wouldn't know whether it was from the atmosphere  
20 above the mountain or from the ESF.

21 So in answer to your questions on calculations,  
22 nobody at the meeting presented calculations on the extent  
23 of the effect, the USGS, the DOE, the state, or the NRC.

24 What they have presented is an accelerated  
25 surface-based testing program, which I think might be

1 different from what we have seen before. I have overheads  
2 on that.

3 Does that answer that?

4 MR. HINZE: That's fine, Bill, if you would like  
5 to show us those overheads.

6 John, did you get the answer?

7 MR. GARRICK: Yes, a frustrating answer. I  
8 continue to see that there is so much preoccupation with the  
9 process and the procedures that there is nobody looking at  
10 the technical issues from a fundamental standpoint and using  
11 that information to scope the activities that are related to  
12 the regulatory findings. I'm sure that has been done, but I  
13 sure haven't seen it.

14 MS. DEERING: I would just comment that at  
15 Lawrence Livermore Tom Buscheck in particular has done a lot  
16 of modeling on thermal loading. He does not have the data  
17 to support it, like I mentioned. He needs information on  
18 bulk permeabilities. He needs information from heater block  
19 tests that are just being set up now. He's looked at, "if I  
20 get this data, I can tell you how significant redistribution  
21 of water can be given various thermal loading options."  
22 Heat pipe effects is one concern.

23 In other words, I would say he's moving towards  
24 what you are talking about but the data isn't there to  
25 support it, so that is why they are going out there to

1           The data doesn't have to be there to  
2           support the analysis. The data doesn't have to be there to  
3           support the analysis.

4           MR. GARDNER: Right. What he has done has helped  
5           them focus on the data they need. This data just doesn't  
6           exist right now.

7           MR. GARDNER: I think that's a fallacy in  
8           philosophy of how you do analysis. It seems to me that what  
9           you are not getting, and I hope I am proven wrong as I learn  
10          more about this, is the kind of fundamental physics guidance  
11          of the processes that are going on and what kind of bounds  
12          that those processes result in with respect to the ultimate  
13          thing you are concerned about, namely, consequences.

14          It would be very nice to see somebody back  
15          calculate from consequences that you are concerned about to  
16          these pathways in order to begin to develop some physics  
17          sense of their relative importance. I know from some other  
18          projects that some gas generation calculations that were  
19          done in fact a very simple first approximation, first  
20          principles fashion put a great many issues in clear  
21          perspective as to their importance. I think that sort of  
22          thing would be extremely beneficial here. Maybe it has been  
23          done.

24          MR. HINZE: Bill.

25          MR. FORD: We are still thinking about this issue.

1 So what I am going to tell you is not final. We have done  
2 gas flow modeling for the iterative performance assessment  
3 phase 2, several of our fellows. The people that have been  
4 doing modeling to date have felt the gas pathway would be so  
5 fast that it wasn't that much of a significant barrier. So  
6 that might give you some feel for how fast they are thinking  
7 gas might move in the mountain, but I don't believe they are  
8 modeling this type of proposed barrier that the state has  
9 proposed.

10 Some of the thoughts we had in terms of if you  
11 needed this information to model gaseous radionuclide  
12 release, we were thinking that perhaps you could collect the  
13 data. At some later date, when the ESF was under ground, at  
14 some time go around and collect your air pressures and use  
15 that data to calibrate your codes.

16 I'm not saying this is our final decision. We are  
17 still exploring it. I'm just giving you some of the thought  
18 process which has gone into the pneumatic airflow issue.

19 The other thought we have had is that it might be  
20 possible that it's not do or die with the air data. If  
21 someday it decides that this is an important piece of data  
22 to have, if you need this to really characterize the site,  
23 that it might be possible to collect this data by either  
24 shutting off parts of the ESF to the atmosphere, closing  
25 doors to the thing or just shutting it down for a while,

1 with the idea that air pressure should equilibrate rapidly  
2 as opposed to dewatering the rock, and that at that time you  
3 could collect your air pressure measurements.

4 That was kicked around at the meeting. People  
5 expressed that idea. I don't know if that would be  
6 practical in the future, but it is not do or die. There may  
7 be some ways to get some of this data.

8 With respect to isotope data, we are talking not  
9 about pneumatic, but when we ask people how if you had  
10 changes in the isotopes in the rock -- we sampled experts  
11 outside the agency and inside, and we were getting people  
12 saying, oh, they won't move hardly at all; you'll see hardly  
13 any effect, to people who said, Oh my God! It might move  
14 over the whole mountain.

15 We were wondering what the value of modeling that  
16 would be. So we have been primarily suggesting that if that  
17 data is very important that they should go out and collect  
18 some of it now. That will give you some insight into some  
19 of the thinking. I should have brought some of that  
20 background data, but I didn't know we would get into that.

21 If you would like, I will give you some of my  
22 impressions on the accelerated drilling program.

23 MR. STEINDLER: Could you expand a little more on  
24 that isotope data? What is it we are looking for and why,  
25 and which kind of isotopes?

1 MR. FORD: I have some overheads on that one.

2 MR. HINZE: While Bill is getting his  
3 transparencies together, Lynn, does DOE have an accelerated  
4 program in place to obtain as much information as possible  
5 before the ESF is cut and to conduct these tests as part of  
6 the ESF studies? Is there an accelerated program here?

7 MS. DEERING: It was certainly alluded to but it  
8 was questioned: Does DOE really place this as a high  
9 priority, and, as all their accelerated programs, does it  
10 mean anything?

11 MR. HINZE: That's true enough, but you and I  
12 attended the ESF design and construction meeting and DOE did  
13 talk, not at length or in detail, but they did state that  
14 this was part of the above procedures and that the  
15 pneumatic pathways were going to be a very important factor  
16 and they focused on the winter section of it.

17 MS. DEERING: I guess I would add that I heard  
18 them describe testing that would be conducted before, during  
19 and after ESF construction so that they could look at the  
20 effects of ESF construction through their surface-based  
21 testing. I don't know beyond that. I really can't answer  
22 your question.

23 MR. HINZE: Doesn't the DOE letter in response to  
24 the state make it clear that they are going to have an  
25 extensive program in this area and as rapidly as possible?

1 MS. DEERING: That's a hard question to answer. I  
2 think the intent is there, but nobody is standing up, saying  
3 --

4 MR. HINZE: I have the responsibility; I'm going  
5 to follow through.

6 MS. DEERING: Exactly.

7 MR. FORD: I would like to answer the question on  
8 isotopes and I think I will go into some of the accelerated  
9 drilling program.

10 This is the open item on progress report 6 and 7,  
11 which asks what evaluation has DOE made of the potential for  
12 air movement from the ESF to adversely impact the collection  
13 of geochemical data necessary for site characterization? It  
14 was made with respect to progress report 6 and 7.

15 Here is the basis of it. This contains the  
16 species that you asked for. Basically, we are concerned  
17 that chemical species such a deuterium, tritium, freon-11  
18 and freon-12, argon 39, carbon 14, and oxygen 18 could move  
19 through the unsaturated zone in both liquid and gas phases.  
20 If the air from the ESF moves significant distances along  
21 paths of high air permeability, such as open fractures,  
22 gases from drifts, and could mix with liquids and gases and  
23 gases in the rock, at locations where this occurs future  
24 geochemical sampling of pre-disturbance baseline conditions  
25 could be compromised.

1           A lot of these are used to try and get a handle on  
2 the rate of groundwater flow in the unsaturated zone as well  
3 as the rate of gas movement from a geochemical standpoint.  
4 The concern pictorially was that we weren't concerned with  
5 air pressures or drying; we were concerned with gas  
6 circulation, that this phenomena could occur even with no  
7 changes in humidity. In other words, no drying.

8           The idea was that if you have air circulating  
9 through the ESF, and Topopaw Springs is considered to be  
10 highly fractured, that you would have through the fractures have  
11 gas circulation move out some distance, and then at some  
12 future date when you drill a hole in that location that  
13 the isotopic signatures would have changed because isotopes  
14 that are found in the atmosphere, such as tritium, might  
15 move as a gas through the rock and then exchange with a  
16 liquid form, or you might gas sample at that location and  
17 get recent tritium that might not have been there, for  
18 example, or collect water samples at that location that  
19 would record recent tritium that had moved there as gas from  
20 the ESF and then moved into the liquid phase.

21           We had gotten quite a range of opinions on whether  
22 or not this effect would be large or small. We had talked  
23 with a lot of USGS people. We knew that there was a range  
24 of opinion internally with the USGS as to whether the effect  
25 would be large or small.

1           So we put it in a question format to see if we  
2 could encourage the Department of Energy to get together  
3 with their scientists, discuss and see if it was significant  
4 problem, and if it was a significant problem or they  
5 couldn't determine the extent of the effect, that they could  
6 see if they could put together some way to collect this data  
7 or some of this data beforehand if they felt it was  
8 important. There was some debate if it moves as a gas  
9 anyway, if the mountain is breathing that it might not be  
10 that useful.

11           Given that gray area, what we were trying to do is  
12 encourage them to look at the problem and see if it was  
13 important and see if they needed to take some action. That  
14 is the theme in which the recommendation is written:  
15 Consideration should be given to the anticipated effect of  
16 air movement from the ESF on surface-based geochemical  
17 tests. If air movement from the ESF is anticipated to  
18 significantly affect the gathering of geochemical data  
19 necessary for licensing from surface-based tests, then we  
20 recommended that this data be collected before it can be  
21 compromised.

22           They did respond to us. They have recommended an  
23 accelerated surface-based testing program.

24           I think this is the one that you may have seen in  
25 some of your other meetings. It's a markup that I did to

1 show you. I just colored the existing holes versus holes  
2 that are planned to be drilled.

3 This is the ESF through the Topapaw Spring, the  
4 two ramps on either side, the north ramp and the south ramp.  
5 This is the outline of the repository block superimposed on  
6 the site.

7 Here you see some of the faults, the Ghost Dance  
8 fault, the Imbricate fault, Solitario Canyon.

9 These are the holes that they plan to include in  
10 this accelerated surface-based testing program. This  
11 program is geared to answer the two NRC open items and the  
12 additional state concern on pneumatic testing.

13 You have seen some of the overheads in your  
14 previous meetings on what data they plan to collect. They  
15 plan to collect gas samples, gas chemistry; they plan to  
16 collect airflow, and they plan to collect air pressure data,  
17 and in some of the holes they are going to be collecting  
18 water chemistries. I think you can assume from this that  
19 the holes that are not drilled yet are where they will  
20 collect the water chemistries, because that requires core.

21 As you can see from the yellow holes on here,  
22 these are the holes that already exist. They are going to  
23 pump them using packers and collect gas chemistry so they  
24 can get their samples quickly, and they are going to monitor  
25 them, some of them continuously. The holes near the ESF, in

1 the first year's construction, which is about that distance,  
2 they plan to probably monitor quarterly until the ESF gets  
3 close, and they are going to look to see what effects the  
4 ESF could have on their data.

5 MR. STEINDLER: Do all those holes stop at the  
6 repository horizon or are they deeper?

7 MR. FORD: I don't know. We were talking about  
8 this in the staff. We wanted to wait until after the Nye  
9 County meeting to come back and look at these and see if we  
10 wanted to request more information from DOE.

11 MR. STEINDLER: Doesn't the series of holes that  
12 extend into the upper and lower bedded zones basically  
13 represent the same kind of intrusion, with perhaps a slight  
14 difference in size, but the same kind of intrusion as the  
15 exploratory studies facility?

16 MR. FORD: Putting a hole in it?

17 MR. STEINDLER: You've got ten holes already.

18 MR. FORD: This was mentioned at the site. The  
19 concern was that there have already been a lot of holes  
20 drilled over the site. So it may be that there is no  
21 background ambient data, undisturbed data. That was one of  
22 the concerns expressed at the Nye County meeting.

23 In answer to your question about how deep all  
24 these holes go, some of them, I can tell you, go from the  
25 surface. The SD borehole goes from the surface to the water

1 table; UZ-7 does; this one we'll plan to go from the surface  
2 to the water table; this one goes from the surface to the  
3 water table.

4           These holes I'm not sure about. Those are  
5 engineering boreholes. They didn't send me the depths for  
6 these boreholes.

7           The other thing that I think was lacking at the  
8 USGS presentation, the letter that has been sent to us, is  
9 they haven't described yet why they are collecting the data:  
10 We're collecting this geochemistry data to answer this  
11 concern.

12           For example, just for hypothesis, if you wanted to  
13 say, well, we're going out and we are collecting some water  
14 samples from our core so we'll have isotope data from these  
15 holes, and our scientists feel that because these samples  
16 are coming from densely welded matrix where the air can't  
17 move in and exchange rapidly, or we don't expect much rapid  
18 change in isotopes, and by gas sampling these wells would  
19 give us early warning anyway and we can accelerate the  
20 program further.

21           That kind of logic hasn't been presented to the  
22 NRC and I didn't hear it presented at the Nye County  
23 meeting. They presented an accelerated drilling program,  
24 which looks like they have had a lot of discussion and  
25 thought. I heard a lot of experts from the USGS get up and

1 say they thought the program would accomplish their  
2 objectives, but we haven't had an explanation of what the  
3 logic was.

4           The other thing I wanted to get around to is that  
5 I thought I saw some additional holes presented at the Nye  
6 County meeting. This is the map from the Nye County meeting  
7 I'm overlaying. What we have in blue is an additional  
8 circle of boreholes. I'm assuming they are part of the plan  
9 but I'm not sure, so I may have to delve into that. It  
10 looks like additional ones have been added. We may have  
11 lost one, right here, but if this is correct, it looks like  
12 we have picked up perhaps eight boreholes. I may need to go  
13 back and ask some questions about that.

14           Are there any additional questions?

15           MR. HINZE: Bill, before you joined us there was a  
16 discussion of the consideration of the vapor phase as part  
17 of the groundwater travel time. The question arose whether  
18 the NRC was going to make a formal announcement on their  
19 interpretation of whether the vapor phase was included in  
20 the groundwater travel time. Could you brief us on that?

21           MR. FORD: I can tell you what I said at Nye  
22 County, which is still valid. First of all, a little  
23 background.

24           The state in some of its letters has said to us  
25 that they believe the definition of groundwater in our rule

1 applies to both water in its liquid, solid, vapor forms, the  
2 liquid and the vapor, and therefore groundwater travel time  
3 would apply to both gaseous H2O as well as liquid H2O. It's  
4 the opinion of the NRC staff -- this is based on talking  
5 with the people that originally wrote this definition, our  
6 contractors and our own people -- it's always been the  
7 opinion of the staff that groundwater travel time applied to  
8 liquid water, but we haven't issued a formal statement to  
9 that effect.

10 I'm not sure I have the regulation here, but we do  
11 have regulations and the siting criteria that requires us to  
12 look at and characterize the gaseous pathways for  
13 radionuclide release. The concern with radionuclide release  
14 through the gaseous pathways is in our regulations. It's in  
15 122.

16 MR. HINZE: Is there a plan to make a statement on  
17 this?

18 MR. FORD: Now you are going beyond my knowledge.

19 MR. HINZE: You said you would tell us what you  
20 did out in Nye County.

21 MR. FORD: That was it.

22 MR. HINZE: To both you and Lynn, was there a  
23 discussion of any studies within the alcoves as part of the  
24 ESF study program for the pneumatic pathways?

25 MR. FORD: No. I did not get the impression in

1 terms of the concern of collecting data before it could be  
2 disturbed by the ESF. We didn't have discussions of ESF  
3 tests that I can remember.

4 MS. DEERING: The only thing that I thought was  
5 kind of a circular discussion was Tom Buscheck kept making  
6 it known that he absolutely had to have data from heater  
7 tests being conducted in the ESF in order to validate or  
8 support or differentiate conceptual models that he is  
9 working with. That is basically saying I need this date  
10 before I can tell you whether or not you need to go in here  
11 and collect this data before the ESF comes through. He just  
12 needed the data from the ESF testing. That's really what he  
13 was saying.

14 MR. FORD: I didn't think I heard him talking to  
15 the issue. In his session he was explaining why pneumatic  
16 data might be needed, because he was involved with gas and  
17 vapor flow movement in a hot repository. His tests may take  
18 four or five years in the ESF.

19 MR. STEINDLER: Was there any comment by the  
20 Department as to whether or not they have selected a similar  
21 regime for the repository for their design purposes?

22 MR. FORD: No. I didn't get that impression. Tom  
23 Buscheck talked about -- they don't have anything that is  
24 actually cold. Everything has some heat. So a low heat  
25 repository to a high heat repository.

1           What I do remember is that in a high heat  
2 repository that the water gets driven off to such an extent  
3 that he, Tom Buscheck, felt you don't even need to  
4 characterize the hydrologic properties and maybe even the  
5 geochemical, that you can just do it on thermal properties  
6 because there is no water basically in the zone, and it's  
7 easier to collect data on thermal properties and you have  
8 more confidence in that, he felt.

9           In some of the modeling studies I remember he has  
10 something like 10,000 years for rewetting in some of his hot  
11 repository model scenarios that he has modeling. Whereas in  
12 a cooler repository, he says that's when his modeling gets  
13 affected by hydrologic features dealing with air  
14 permeability and water permeability. That would imply, in  
15 my mind, that he doesn't need this ambient data that much if  
16 it's a real hot repository.

17           MR. HINZE: Do I understand correctly that all of  
18 the questions and concerns that have been raised by NRC and  
19 the SEA and regarding the subsequent progress reports that  
20 deal with pneumatic pathways have been closed out?

21           MR. FORD: No. Comment 123, which deals with  
22 dewatering, is still open, and question 1, which I just  
23 mentioned at this meeting, is also still open. So the staff  
24 is considering these at this time.

25           MR. HINZE: The response of DOE?

1 MR. FORD: Yes.

2 MR. HINZE: Thank you.

3 MR. FORD: That's very much on our table at this  
4 moment.

5 MR. HINZE: Is there any schedule in mind?

6 MR. FORD: We are looking at question 1 and  
7 comment 123 as we speak. I don't know if I can give you a  
8 firm deadline to decide what to do with that, but I hope  
9 it's sometime this spring. Hopefully much sooner.

10 We have to respond to the State of Nevada on the  
11 pneumatic issue. We received a letter from the State of  
12 Nevada the day before the Nye County meeting. The state has  
13 asked that we make their pneumatic concern an objection. So  
14 we have to respond to the state fairly quickly. My internal  
15 deadline is the middle of March. We will still continue to  
16 look at it even beyond that date whatever answer we give  
17 them.

18 Right at this point in time we have a team of  
19 about four or five people that are working on it. Some of  
20 them you know. Dick Codell, John Bradbury. Geochemists,  
21 fellows that have worked with interflow modeling; also some  
22 groundwater people. We'll be working with people at the  
23 center and be talking to people inside and outside on these  
24 issues.

25 MR. POMEROY: Just to refresh my memory, if you

1 have an objection, that's the most serious category of  
2 concern that you are stating and nothing can go forward in  
3 that area until that objection is satisfied; is that  
4 correct?

5 MR. FORD: That is correct. With the comments and  
6 questions they can proceed at their own risk, so to speak,  
7 but it's not considered that serious, that the site would be  
8 compromised or you would lose some important piece of  
9 information you absolutely have to have for licensing. So  
10 the criteria are strict for an objection, to have one, and  
11 also what it means.

12 MR. HINZE: Thank you very much, Bill.

13 MR. POMEROY: Yes, thank you.

14 MR. HINZE: Lynn, is there more that we should be  
15 discussing on this issue from your trip report?

16 MS. DEERING: I think that covers it. I'm glad  
17 Bill explained to us what staff was going to be doing. I  
18 knew they had to respond to the letter and also the  
19 accelerated plan. I think we should keep abreast of what  
20 they are doing. I'm not sure what action we need to take at  
21 this time.

22 MR. STEINDLER: Is any of this likely to come  
23 bouncing on the Commission's desk? For example, the  
24 definition of groundwater travel time, what's groundwater.  
25 Is that likely to come to the Commission?

1 MS. DEERING: I believe that went to OGC, but I  
2 don't know if the Commission would really get involved in  
3 that. I think Nye County recommended NRC develop guidance  
4 or a rulemaking to clarify the definition of groundwater,  
5 and if that were to happen, I suppose the Commission would.

6 MR. STEINDLER: If a letter from the state comes  
7 to the NRC requesting a particular action, such as make this  
8 an objection, does the response go back from the staff?  
9 Does the response go back from the Chairman? What's the  
10 mechanism of responding to the state for a request of this  
11 kind?

12 MR. FORD: For the objection?

13 MR. STEINDLER: Yes.

14 MR. FORD: I assume that it will be signed off by  
15 the division director. A letter will go back to the state  
16 saying, yes, we agree it should be an objection, or no, and  
17 anything else you want to say.

18 MR. STEINDLER: That's at the division director  
19 level?

20 MR. FORD: Yes.

21 MR. HINZE: I think, Marty, one of the concerns is  
22 whether we feel that this is not being adequately handled at  
23 this point and that there is the potential for jeopardizing  
24 the characterization of the site with the developer of the  
25 ESF. That might not land on the Commissioner's desk except

1 through an approach such as ours. My personal feeling is  
2 that the staff has this well in hand not only with the kind  
3 of work that Bill was talking about, but as part of the  
4 general ESF design guidance and construction guidance the  
5 topic of pneumatic pathways was prominent there.

6 I don't see that this is something that we should  
7 do anything with at this time, but I agree with Lynn that  
8 this is something that ought to be monitored. There is a  
9 lot of movement within DOE, within NRC and within our own  
10 discussions about groundwater travel time, and I think those  
11 things are going to come to a head rather rapidly. They may  
12 lead to some kind of communications.

13 MR. STEINDLER: I think basically that I would  
14 agree with you. I have got one issue, though, that I would  
15 like to raise, and it comes bouncing somewhat akin to what  
16 John was just saying. I wonder whether the NRC staff ought  
17 not to go through an almost back of the envelope mental  
18 exercise that starts out with the assumption that DOE may  
19 elect to use the hot repository concept, and let's assume  
20 re-saturation times of some fairly long period, say 10,000  
21 years, and then determine whether or not pneumatic pathway  
22 data will become an important part of the performance  
23 assessment process.

24 If that turns out to be trivial, then I think  
25 watching to see what DOE is doing is probably a good idea,

1 but that's as far as it needs to go. If it turns out not to  
2 be trivial, then prod the system just a little further and  
3 see whether or not the potential maximum disruption that you  
4 get for data collection or accuracy of data that you might  
5 collect on gas permeability of the two potential gas  
6 impermeable layers, although impermeability at that site  
7 strikes me as an oxymoron.

8 If those things are important, then at least the  
9 staff has some mechanism of commenting to DOE that, hey,  
10 hold it guys, there may be something here you need to look  
11 at.

12 I must say I am oversimplifying the ability to do  
13 that. That envelope may be very large, for all I know, the  
14 back of which you are using. I would think that somewhere  
15 in the staff's capabilities that rough estimate ought to be  
16 possible. That's not an issue that the Commission at this  
17 stage of the game needs to look at. If there is conflict  
18 between what the staff concludes and what the DOE is doing,  
19 then we ought to run up a flag to some extent, informally,  
20 perhaps.

21 MS. DEERING: Before we could take any action,  
22 would we need to have the staff down here to discuss with us  
23 how they are approaching -- the thermal loading is central  
24 to everything, it seems, for repository performance -- that  
25 problem, to know how to work with DOE? That might be an

1 idea.

2 MR. STEINDLER: That issue is complicated by the  
3 comments we've heard, either directly or indirectly, about  
4 the impact of a high temperature repository on the  
5 engineering properties of the associated rock and the  
6 inability to predict. That was the choice, apparently, when  
7 you have a high temperature. The corrosion people are happy  
8 as a lark because they don't have a liquid transfer path, et  
9 cetera, et cetera; the geo-engineering, the technical  
10 engineering people are panicked because predicting at high  
11 temperature the structural aspects of the surrounding  
12 geology gets more and more difficult. That kind of  
13 tradeoff.

14 If we move further with this, we certainly need to  
15 hear from the staff. I'm having some trouble figuring out  
16 how that would bounce up to the Commission. While I think  
17 it would be interesting for us, I'm not sure we could  
18 justify it.

19 MR. HINZE: Marty, if I might suggest a slight  
20 change in the agenda. It seems to me that the meeting on  
21 the ESF really pertains in some ways to this previous  
22 discussion. On page 36, Lynn has a status report on that  
23 meeting.

24 MR. FOLAND: Could I just interject to tie onto  
25 the last item. I'm not sure to whom I'm addressing this

1 question.

2           Looking at this as a generic phenomenon, which is  
3 one which I think is going to happen again and again as one  
4 punches holes and does all sorts of things and there are  
5 activities going on that are going to affect the future  
6 stability of the repository in many aspects and subsequent  
7 testing, are there mechanisms in place and is the staff  
8 prepared to know that these things are happening and then  
9 react in a timely fashion?

10           This issues seems to be well under control, but  
11 there is going to be a big machine grinding, doing all sorts  
12 of things in the near future, and this is a continuing,  
13 ongoing effort. Each time a new hole is punched it has  
14 other implications. Are all the mechanisms in place to deal  
15 with these as they arise?

16           MR. FORD: I will try and answer that. The  
17 primary way that NRC staff is trying to follow whether or  
18 not you are going to have test interference problems where  
19 data might be lost before it can be collected or whether or  
20 not the ESF might compromise the repository block is to  
21 review and observe DOE's design documents and the design  
22 control process and the design verification methods.

23           Having sat in a few presentations in the  
24 engineering shop, the Department of Energy has contractors,  
25 and I think it might be primarily Sandia, that do

1 calculations on estimating if they go with this particular  
2 plan what the effect might be. The NRC is looking at the  
3 engineering process that these designs and these  
4 calculations get wrapped up in and trying to trace that  
5 through and see who is making the decisions and conclusions  
6 they reached.

7 Does that answer your question?

8 Anyway, it's to the engineering documents that we  
9 are looking for that kind of information at this time.

10 MR. STEINDLER: There is a general approach that  
11 is based on a fairly good assumption, namely, that DOE does  
12 nothing out there in the field that they haven't in some  
13 fashion or another written down on a sheet of paper, and  
14 that that sheet of paper generally is accessible to the NRC  
15 in a reasonably timely fashion.

16 You've seen three qualifiers in that statement.  
17 There are plans and the Department, I think, follows a  
18 technical schedule that is written in a bunch of plans, and  
19 the staff's job is to try and weed through all that paper  
20 and look at it from two standpoints: does it make sense as  
21 far as they are concerned, and what are the impacts?

22 So far a new hole hasn't appeared without the  
23 staff having a clue that it was even there. I may be  
24 overstating it. Of course, the further you get under  
25 ground, the more anxious people get to be sure that the ESF

1 issue is the first of several. There was a time some years  
2 back when the mere notion of drilling a hole into the actual  
3 repository horizon was thought about long and hard because  
4 of the potential sealing problems of shafts and boreholes.  
5 Judging by the number of dots that were on Bill's map, that  
6 seems to have gone away.

7 MR. HINZE: Lynn.

8 MS. DEERING: I will try to give a summary of this  
9 meeting. Dr. Hinze and I attended this in Las Vegas. It  
10 was really a design and construction update on the ESF. It  
11 was mostly engineering that was being discussed.

12 I'm at tab 5, page 36, which is the status report  
13 on that meeting, and the meeting agenda is on page 38. You  
14 can get a flavor for some of the topics. They discussed  
15 their enhanced ESF design which accommodates the Ghost Dance  
16 fault which runs through the center of the repository block.  
17 They have got an upper and a lower portion of the ESF.

18 Bill might want to add to what I'm saying.

19 MR. HINZE: It's at two levels but not above each  
20 other.

21 MS. DEERING: Correct. On either side of the  
22 fault.

23 This is what they call their enhanced design,  
24 which I guess is becoming or already is the official  
25 conceptual design now.

1           There were many engineers at this meeting. Some  
2 of us had just been out in the field and we had seen the Sun  
3 Dance fault. The question came up, to what extent are the  
4 engineers and the geologists talking and communicating and  
5 were they aware of the recent discovery, mapping, naming of  
6 the Sun Dance fault and its size and what the geologists  
7 were learning about it.

8           The NRC did a very good job of asking the  
9 questions. I felt that they were on top of it. I don't  
10 know how good a job they did answering the questions. I  
11 would say that for the Sun Dance, their response was, well,  
12 it only recently was upgraded to a significant fault. They  
13 responded. we've set back from the Ghost Dance; we will  
14 probably set back from the Sun Dance. Although their  
15 current conceptual on the table in no way reflected that,  
16 because, like they said, it just recently came to our  
17 attention.

18           So it's not clear how they are going to  
19 accommodate the Sun Dance fault because it's apparently  
20 every bit as wide as the Ghost Dance. They committed in  
21 this meeting to actually follow the NRC's guidance on fault  
22 avoidance, which basically implies, if you can, don't put a  
23 facility right near or emplace waste near a fault.

24           MR. STEINDLER: What is "near"?

25           MS. DEERING: I can't answer that. I'm sorry. I

1 would have to go back to that guidance.

2 MR. STEINDLER: Let me give you a range. Is it  
3 one foot, 100 feet, or 10 kilometers?

4 MS. DEERING: I think it's between 100 feet and 10  
5 kilometers.

6 [Laughter.]

7 MR. STEINDLER: That's close enough for  
8 engineering work.

9 MS. DEERING: Maybe Bill could answer. I don't  
10 know. Or Paul.

11 The point was that they said they were not going  
12 to emplace waste in or around the Sun Dance either, and  
13 depending on how many faults they find, their design could  
14 be ever changing and they could run out of space. That  
15 would be one potential consequence.

16 I would say there are still a lot of questions  
17 about the interfacing and integration between geology and  
18 engineering from what I heard in this meeting. It was heavy  
19 emphasis on their tunnel boring machine and how to protect  
20 it and how to make sure it does what it needs to do. Their  
21 concern about the Sun Dance was more from an engineering  
22 perspective. They say, hey, we'll learn a lot more about  
23 Sun Dance once we get under ground and you've got hard rock  
24 against hard rock in this particular fault. So, hey, it's  
25 no problem, no nevermind.

1           From an engineering perspective that is not a  
2 problem, whereas the Bow Ridge has presented problems for  
3 them already, which is where they were starting, because  
4 they had very soft unconsolidated material in contact with  
5 hard rock where they weren't really expecting it. From an  
6 engineering perspective, this has presented more  
7 difficulties and uncertainty whereas the Sun Dance they  
8 don't think they are going to have a problem, so they just  
9 want to get under ground as quickly as they can.

10           MR. POMEROY: Just as an aside, Lynn, Rick talked  
11 about some about geophysics that was done across the Bow  
12 Ridge fault in that soft rock area, indicating further  
13 faulting that would bring that soft rock up to the level of  
14 the tunnel boring machine several times. Did they talk  
15 about that at all?

16           MS. DEERING: I think they talked about some  
17 drilling that is being done right now to try to assess  
18 exactly where the contacts are in a lot more holes than they  
19 originally planned.

20           I might ask Bill Ford again, who was at the site  
21 and mentioned something to me about a large swimming pool  
22 that might be related to this topic. They call it a  
23 swimming pool. It's related to trying to understand better  
24 what is happening with that soft rock.

25           MR. POMEROY: I don't understand what swimming

1 pool means.

2 MS. DEERING: Maybe Bill can explain it.

3 MR. FORD: Near Trench 14, which is on the other  
4 side of the hill from the ESF, the ramp opening, the portal,  
5 there is a very large trench which has been built and will  
6 be kept open, I think, for another month or so.

7 The concern, as I understand it, is that they  
8 identified in their drill bores some very loosely welded  
9 volcanic tufaceous material, so much so that it would be  
10 almost like if you touched it, it would crumble like a  
11 sandstone.

12 The concern is that from a tunneling standpoint  
13 that when they go through this material they've got to  
14 understand it very carefully so their tunnel boring machine  
15 doesn't get stuck and they don't have problems with  
16 extensive roof collapse. This large trench -- and it is  
17 large. They call it the swimming pool. That's how it got  
18 that name -- had been built to look at this material, and  
19 they also uncovered a few faults when they dug into it.

20 If you are out at the site any time soon you might  
21 want to take a look.

22 MS. DEERING: They are going to fill it in soon,  
23 aren't they?

24 MR. FORD: Yes, in a couple months, for safety  
25 reasons.

1 MR. HINZE: You have to have water to have a  
2 swimming pool. There's not much water in that area.

3 MS. DEERING: Did you want to add anything about  
4 that meeting?

5 MR. HINZE: I would like to point out a couple of  
6 things and emphasize some of the things you have in the trip  
7 report. One is the decreasing slope of the ramp. That you  
8 will be particularly interested in, Marty, because that  
9 appears to be driven by the need for rail transport and the  
10 handling of the heavier MPCs. It looks like that is  
11 becoming much more glued into the design of the repository  
12 in total.

13 MR. STEINDLER: Is that stated as the rationale?

14 MR. HINZE: I can't answer that. There are some  
15 geological reasons, as I understand it, for changing that,  
16 but there is more than one reason. You don't know whether  
17 the reason you are hearing is the real driver or not. It  
18 struck me that this was focused on the MPC and rail  
19 transport. The fact of the matter is it's going to increase  
20 the length of this by about 10 percent. That means more  
21 time and more money, but it's felt that this is important  
22 enough to take that step.

23 A couple of other things. The north portal, that  
24 north ramp is going to be pushed all the way to the  
25 proximity of the Solitario fault. At the present time that

1 northwest area off of the designed repository may become  
2 important if one has to move some of the waste from the  
3 Ghost Dance fault area or the Sun Dance fault area into a  
4 less fractured region.

5 MR. STEINDLER: Is that where the turn is?

6 MR. HINZE: There is the turn, but then that north  
7 ramp goes straight on, if you will recall, and I think  
8 that's a significant thing.

9 Lynn emphasized the concern about the interaction  
10 between the geologist information and particularly the  
11 timely dispersal of information from these drill holes,  
12 which are really there to design the construction phase.  
13 Timely distribution of data from the geologists working on  
14 that to the design engineers.

15 I was very impressed by DOE's concern that the NRC  
16 and the state have a very good feeling about the fact that  
17 they are trying to incorporate this. They brought in extra  
18 people to discuss this matter. They discussed it at length,  
19 trying to assure everyone that the communication is there.  
20 I think in the summing up by the NRC there still was some  
21 concern in this area.

22 Other areas. As Lynn pointed out, there really  
23 was no consideration of the Sun Dance fault at this point.  
24 The latest movement on the Sun Dance fault appears to  
25 postdate the Ghost Dance fault, so this may become an even

1 more important fault in some respects than the Ghost Dance  
2 fault.

3 MR. POMEROY: In defense Bill, mapping of the Sun  
4 Dance fault is in a very preliminary stage. There is a  
5 great deal left to be done and there should be greater  
6 resources devoted to that mapping. It's a little hard at  
7 this point in time to start designing for something that  
8 you've just recognized a month ago.

9 MR. HINZE: The potential importance of it is very  
10 significant.

11 MR. POMEROY: Certainly.

12 MR. HINZE: They are going to have to take it into  
13 account. I'm impressed by the fact that they are avoiding  
14 the line that they show as the Ghost Dance fault. The Ghost  
15 Dance fault is 800 feet wide. I think the setback is going  
16 to become more of a problem as they define that.

17 I guess I would like to say that there was a  
18 discussion about the pneumatic testing in relation to the  
19 design and construction of the ESF. As we heard from Joe  
20 Youngblood several months ago, the ESF design and  
21 construction was one of the most important things on the  
22 high level waste platter and the NRC is doing an excellent  
23 job of cooperation with the DOE to get together essentially  
24 on a monthly basis. Is that right, Lynn? That was my  
25 impression.

1 MS. DEERING: Bi-monthly.

2 MR. HINZE: The NRC is doing an excellent job of  
3 tracking this and the NRC feels much better about it.

4 MR. STEINDLER: The field folks still only consist  
5 of Phil Justice, and that's it?

6 MS. DEERING: And Joan Gilray, who is a quality  
7 assurance specialist.

8 MR. STEINDLER: Any other scientific types?

9 MS. DEERING: No, just Phil.

10 MR. POMEROY: And Phil is due to come back in  
11 April, right?

12 MS. DEERING: Yes.

13 MR. STEINDLER: The tracking load, the  
14 surveillance of what is going on at least in the field is  
15 via trips from here to Las Vegas and back?

16 MR. POMEROY: Yes. Mr. Chairman, that's something  
17 I think we ought to consider at some point in the framework  
18 of all these trips that we have taken to the West. It seems  
19 to me that as soon as the tunnel boring machine comes on  
20 line we are going to see a huge increase in the amount of  
21 geological information and significant geological conditions  
22 that need to be observed. It seems to me that that onsite  
23 representative's office is severely understaffed to cope  
24 with that, and that's the appropriate place to cope with  
25 what they call reportable geological conditions.

1                   MR. STEINDLER: Would everyone in the geologic  
2     communit. agree that you have to be on site? I'm not asking  
3     geologists.

4                   MR. POMEROY: Let me answer it anyway. That's  
5     another train of geologists. The way they plan to do this  
6     is they plan to have a team of geologists immediately behind  
7     the first section of the tunnel boring machine. The concept  
8     by and large is to shotcrete much of the area within a  
9     relatively short period of time after the boring machine  
10    goes by. There is a window if you want to actually see  
11    the rocks. That's part of what the staff is currently  
12    negotiating with these reportable geologic conditions so  
13    that they can get somebody out to the site to look at those  
14    features prior to the time that they could get covered up.  
15    This is a safety matter, so it has to be done.

16                  MR. STEINDLER: Particularly in light of resource  
17    allocation and all the other things that the agency has been  
18    going through, it sounds like we need to draw this to  
19    somebody's attention in fairly emphatic fashion.

20                  MR. POMEROY: I think so.

21                  MR. HINZE: Marty, one other thing on this topic,  
22    and that is that I had hoped that we would hear at this  
23    meeting something about the alcoves. That hasn't reached  
24    that level where that can be discussed. This is extremely  
25    critical because what you are doing that for is to conduct

1 experiments.

2 MR. STEINDLER: Yes.

3 MR. POMEROY: I had heard, Bill, at another  
4 meeting that there were going to be four alcoves constructed  
5 along the 26-mile ESF initial tunnel boring. I believe  
6 there were a large number of alcoves planned for test  
7 purposes, but only those that were considered to be  
8 absolutely critical were going to be constructed relative to  
9 the tunnel boring machine, that the tunnel boring took  
10 precedence over the construction of the alcoves, a very  
11 disturbing situation.

12 MR. STEINDLER: Is it still drill and blast?

13 MR. HINZE: The alcoves, yes.

14 MR. STEINDLER: Doesn't that trouble anybody?

15 MR. POMEROY: Not me.

16 MR. STEINDLER: I've never heard of a gentle  
17 blast. If you guys don't care, I don't care.

18 Let's take a 10-minute break.

19 [Recess.]

20 MR. STEINDLER: The meeting will come to order.

21 Bill.

22 MR. HINZE: I think we will call on Lynn again,  
23 who brought together the notes on the field trip visit to  
24 the Ghost Dance and the Sun Dance fault.

25 MR. POMEROY: Before Lynn begins, can I offer a

1 few background words?

2 MR. HINZE: Please.

3 MR. POMEROY: We originally had planned during our  
4 December meeting in Las Vegas to visit the site of the Sun  
5 Dance fault and the Solitario Canyon fault during the field  
6 trip. I think it was on the 12th of December that it was  
7 scheduled. At the time that we actually did that field  
8 trip, when we got to the field operations center we were  
9 told basically that because of the snow we couldn't visit  
10 the Ghost Dance pavement and we couldn't visit the Solitario  
11 Canyon trenches.

12 At that point both Dr. Hinze and myself said,  
13 well, we certainly want to do that at some point. We did  
14 have a briefing during that meeting at the field operations  
15 center by Rick Spengler, who told us not only about the  
16 current status of the Ghost Dance fault work but also the  
17 first reports that we had heard on the fault that had been  
18 recently recognized and upgraded to a significant category,  
19 the Sun Dance fault.

20 We were able to ask some questions on that subject  
21 because we had been alerted a few days previously by the  
22 nuclear waste contacts at the Nuclear Waste Technical Review  
23 Board and contacts in the USGS with regard to this matter.

24 Our concept at that time was to revisit it, for  
25 Bill and I in essence to come back and talk to Rick

1 Spengler, who is the geologist in charge of the mapping. At  
2 that point there were three people, I believe.

3 After far too much work on the part of Lynn in the  
4 next month and a huge number of telephone calls to try to  
5 set this up, it became clear that any small-scale field trip  
6 like that was not possible within the political framework in  
7 which we operate. At one point we tried to limit it to only  
8 geologists.

9 MR. GARRICK: You've got some support now.

10 MR. STEINDLER: John, I'm glad you're here.

11 MR. POMEROY: That didn't work either. We finally  
12 had about 30 people on this field trip. So it was somewhat  
13 limited.

14 Its basic purpose, however, at that point was  
15 essentially still, in terms of the Sun Dance fault, to talk  
16 to Rick Spengler in detail while looking at the actual  
17 mapped features in the field.

18 During the process of setting up the details we  
19 were in contact with the NRC staff. The NRC staff said that  
20 it was very interesting that we were going to be able to do  
21 this because they weren't scheduled to be briefed on this  
22 particular fault until May, I believe was the time frame.  
23 We then, of course, requested that one or more  
24 representatives of the staff come along. Independent of  
25 that, we had requested that Keith McConnell be allowed to

1 come as an adviser to ourselves. NMSS agreed to send Keith  
2 and then it became clear that Charlotte would come also to  
3 represent the staff's interest.

4 That accounts for the other participants here,  
5 which are a long and lengthy list.

6 Our purpose basically was to look at the field  
7 data and to get a briefing on what exactly had been observed  
8 in the field. We did that.

9 Lynn, I can pass it to you for a few minutes. I  
10 have some comments I would like to make as we go along, and  
11 I'm sure we all probably do.

12 MR. HINZE: I would like to add to that, Paul,  
13 that we don't want to give the impression that DOE in any  
14 way diluted our view of these sites by virtue of having a  
15 large group. They always deferred to the ACNW. It was an  
16 ACNW meeting. They deferred to, did the ACNW have enough  
17 information, et cetera.

18 MR. POMEROY: Absolutely.

19 MR. HINZE: We don't want to give the wrong  
20 impression. They really were very hospitable and  
21 cooperative.

22 MR. POMEROY: There was no question that they do  
23 an outstanding job in that organization and the liaison  
24 people that Lynn works with and that we work with are truly  
25 outstanding and they do really ensure that we get exactly

1 what we were looking for. It's not always possible to do it  
2 in small groups, however. In fact, it's impossible to do it  
3 in small groups.

4 MS. DEERING: I would agree. I really would like  
5 to credit Dr. Pomeroy and Dr. Hinze for pushing to do this.  
6 They persevered and pushed and insisted that we go back and  
7 see these things, and it happened. I think it's one of the  
8 best things we have done in months, because we learned a lot  
9 there. We are very much on top of the issue and now staff  
10 has benefited as well from our efforts, and I think we will  
11 discuss some options to communicate to the Commission on  
12 this particular matter.

13 I don't really want to go into too much detail of  
14 what we saw in the field unless you'd really like to hear  
15 about it.

16 MR. STEINDLER: Isn't that why you were there?

17 MS. DEERING: It's why we were there, yes, as  
18 geologists. I think it's really more the implications than  
19 the details. The Sun Dance fault, as Paul was saying, is  
20 newly mapped. There is a lot of excitement right now, it  
21 seems, about this, and literature is just beginning to  
22 emerge right now. At the International High Level Waste  
23 Conference Rick Spengler will present something. And there  
24 is also a USGS open file report that was passed around.  
25 Nobody could keep it, but we were allowed to see it. This

1 was an attempt by the USGS to get the information out  
2 rapidly. That should be out now, actually.

3 More information will be coming out. Rick  
4 Spengler and his team of mappers continue. They are doing  
5 very detailed mapping, which has not really been done out  
6 there before. That is one of the reasons they discovered  
7 the Sun Dance and its extent and its width. They have a  
8 study plan in place to continue at this very highly detailed  
9 level. They have reason to believe from previous maps with  
10 linear routes on the maps and also brecciated zones that  
11 they are going to find more features similar to the Sun  
12 Dance. That's the way I understand it.

13 MR. STEINDLER: I need a definition. When you say  
14 a fault is wide, do you mean long?

15 MR. POMEROY: No. This is a zone of faulting that  
16 in toto constitutes -- The Sun Dance is a linear feature  
17 trending to the northwest, but the actual dimensions of this  
18 zone are in this case at least -- I understood it to be at  
19 least 800 feet. That's a minimum width. There are actually  
20 something like six parallel faults that are mapped in  
21 different areas that make up the zone of faulting.

22 MR. STEINDLER: So you actually do mean what you  
23 say.

24 MS. DEERING: Wide. As far as its length and  
25 depth, I believe that is unknown. It is difficult to get

1 exposures of this thing. It's a very difficult job to  
2 understand what was actually happening, the ages of these  
3 things, how recently they have had movement. As Bill  
4 pointed out, the Sun Dance does appear to offset the Ghost  
5 Dance, which means that it's younger. As far as the  
6 significance of that, I don't know if I'm in a position to  
7 say what the significance of its age is.

8 MR. HINZE: We don't know the age of the Ghost  
9 Dance and so we can't really say, unless the Sun Dance can  
10 be extended into the Solitario, as was mentioned in your  
11 write-up. It's very obvious that needs to be investigated.  
12 Not only under ground, but it has to be investigated on the  
13 surface, and there are some indications that it does extend  
14 up into that region. The question is what it does at the  
15 Solitario.

16 MR. POMEROY: Right. As we said earlier, there is  
17 still a great deal of mapping to be done. We ought to  
18 ensure that that mapping does get done in whatever way we  
19 can contribute to that. This is part of the surface-based  
20 testing program. The distribution of resources between  
21 surface-based testing and tunnel boring machine will  
22 continue to be a sore point in resource allocation  
23 discussions, I'm sure.

24 Let me try a shot at why this is important, Marty.  
25 There are several conditional statements here. If the

1 mapping continues to show this as a continuous zone, if it  
2 extends to depth as a zone, and by extending to depth I mean  
3 to the repository, and if the LCR stays with its statement  
4 that we just talked about in the engineering design category  
5 that they will set back from any type I fault -- this would  
6 certainly be in a type I fault category -- then you begin to  
7 run into a question that if the boundaries -- there are now  
8 four conditionals, so I beat the Chairman's previous three  
9 conditionals -- if the boundaries of the repository, the  
10 footprint of the repository exists as it did on the slide  
11 that Bill Ford showed you, then you begin to lose a  
12 significant portion of the available repository area, so  
13 much so that you could begin to lose the 70,000 metric ton  
14 capability for the site.

15 So there are so many conditionals on that that one  
16 needs to be careful, but it is clearly important.

17 I want to make another point. This is not an  
18 unexpected feature of extensive surface-based testing, be it  
19 geophysical, geological or otherwise, especially in a highly  
20 faulted area like this. It's not surprising to find  
21 additional faults. This is an area where you have to look  
22 very carefully at the data, as Lynn pointed out. It's only  
23 by this very careful looking that you identify these.

24 This particular fault is perhaps in some way  
25 representative of other faults that we might find within the

1 area, and the totality of those faults may begin to be a  
2 significant and overwhelming problem.

3 MR. STEINDLER: Excuse me. When you say  
4 overwhelming problem, are you talking about in the context  
5 of reduction in the available aerial size for waste disposal  
6 or some other aspect such as a disqualifying feature or  
7 whatever?

8 MR. POMEROY: One could argue about the  
9 potentially adverse condition, but you certainly have not  
10 only the possibility of losing some of the real estate, but  
11 you also have the possibility of these additional faults  
12 providing some conduit for groundwater that you weren't  
13 aware of before.

14 MR. HINZE: There is another concern here. There  
15 are similar indications to the south of the Sun Dance fault  
16 in this major area which have been set aside for the  
17 repository on the Scott & Bonk original geological map, the  
18 same types of indications of these breccia zones that indeed  
19 have led to the Sun Dance fault. So there is substantiation  
20 that you've got a good chance of having these distributed in  
21 this main repository area.

22 In the licensing arena, what this does get back  
23 to, it seems to me, is whether you engineer around geology,  
24 the old problem, because DOE has taken the stance that they  
25 will not engineer around these geological barriers.

1           MR. STEINDLER: I don't think that's quite  
2 accurate. I think NRC has beat up on DOE not to engineer  
3 around such things.

4           MR. HINZE: In the advanced design they have  
5 accepted that in their provision.

6           MR. POMEROY: Let me throw one thing in here. If  
7 you look carefully at the branch technical position, the  
8 branch technical position on setbacks from type I faults is  
9 couched in positive terms. There is no requirement for a  
10 setback, contrary to what it says in here someplace. There  
11 isn't an NRC requirement that there be a setback. I think  
12 what NRC says is that prudence would suggest that if you  
13 have the option not to put a repository or waste directly in  
14 or over a fault zone, and if you do, you'd better come and  
15 talk to us early about what the implications are and what  
16 your design is to account for this.

17           I think beating up may be too harsh a word.

18           MR. STEINDLER: When the NRC says prudence, it's  
19 very difficult for a person to get away from the label of  
20 imprudence. Whether you call that compelling or not I think  
21 may be kind of a moot point.

22           MR. HINZE: If you look at the flow chart,  
23 however, in the staff technical position, it isn't clear to  
24 me that the Sun Dance rates as a type I on the basis of the  
25 present evidence.

1 MR. POMEROY: I don't think we have sufficient  
2 evidence to do that.

3 MR. HINZE: We just don't have that evidence, and  
4 this has important ramifications.

5 MR. STEINDLER: Help me out a little bit. What is  
6 the reason that somebody would give me for not putting a  
7 waste canister directly on a fault? Is it because it  
8 potentially represents an enormously interesting groundwater  
9 path or because it's going to go cracking in?

10 MR. HINZE: Accelerations are going to be higher  
11 if there is an earthquake on that fault.

12 MR. STEINDLER: But so what?

13 MR. HINZE: You're risking the canister. The  
14 question is whether the canister has been weakened by some  
15 mechanism which is taken advantage of in terms of movement  
16 of the fault.

17 MR. STEINDLER: So the issues are groundwater  
18 travel, potentially increased significantly, I assume,  
19 acceleration in case of some tectonic activity.

20 MR. GARRICK: I think that's an interesting line  
21 of questioning. The canisters are pretty finite in their  
22 lifetime in any event. We're talking about a dose profile  
23 here of many millions of years. So in the context of the  
24 lifetime of the repository, I guess I would still like to  
25 hear more discussion in response to the "so what" question

1 with respect to the destruction of the canister.

2           There is also the possibility that from a pathway  
3 standpoint you wouldn't always change that into a less  
4 favorable direction. You could conceivably change it into a  
5 more favorable direction. If we are talking about time  
6 constants of package integrity that is small compared to the  
7 profile of the threat of the repository, then I think it's  
8 an interesting and fair question.

9           While we have all these geological and  
10 seismological powerhouses around, I was going to ask, is  
11 there a baseline hazard curve for Yucca Mountain in the  
12 manner that we build hazard curves for nuclear power plants.  
13 I mean the frequency of occurrence of earthquakes at  
14 different magnitude, the family of curves that tend to  
15 display that.

16           Number one, has there been such a curve developed  
17 for Yucca Mountain? I assume there probably had been, but I  
18 guess not.

19           Number two, in the context of that hazard curve,  
20 where do the Sun Dance and Ghost Dance faults fit?

21           I guess all these parameters that you are talking  
22 about, age and footprint and width and depth, you are really  
23 trying to get an insight into the real thing of interest,  
24 and that's the activity of the fault. Is that correct?

25           MR. POMEROY: That's correct. You know better

1 than I seismic hazard analysis involves a delineation of  
2 where the zones of activity are coming from and a  
3 determination of exactly what the attenuation is, and so  
4 forth, between the source zones and the site.

5 One could do a calculation like that but one would  
6 be making a lot of expert judgment assumptions in the  
7 process of doing that. The existence of this fault is  
8 probably reasonable at this time, but that's all we know,  
9 practically speaking. It's very early in the cycle to start  
10 to say whether that represents a potential seismic zone, if  
11 you will, or a seismic source that you would factor into a  
12 probabilistic seismic hazard calculation.

13 MR. GARRICK: As you know, Paul, we have been  
14 faced with that problem many times at nuclear power plant  
15 sites, and, of course, the way we tend to deal with that is  
16 to present our hazard curves in the form of a family of  
17 curves with each curve being your best shot of how likely it  
18 is that that is the right curve. I was curious as to why  
19 somebody hadn't attempted to do that on Yucca Mountain given  
20 that this is a nice way to begin to elevate the tectonic and  
21 the seismic problem into the horizons of consideration of  
22 volcanic events and other events.

23 MR. POMEROY: One certainly could do that on the  
24 basis of expert judgment. One could handle that. But two  
25 months ago expert judgment wouldn't have included this as a

1 potential source zone. Probably in another few months  
2 expert judgment would include this as a potential fault  
3 zone. So you've got a better chance here.

4 In areas like the eastern United States I'm a  
5 strong advocate of probabilistic seismic hazard assessment  
6 being the dominant determinant of hazard for a nuclear power  
7 plant site simply because we don't know about these faults.  
8 Here we have the opportunity of actually mapping them. So  
9 there is a difference, in my mind. We can still use  
10 probabilistic seismic hazard assessment, and I certainly  
11 agree with you one could have been done at a very early  
12 stage here. It hasn't been, as far I know, however.

13 MR. STEINDLER: I thought it had been done.

14 MR. POMEROY: I could be wrong.

15 MR. GARRICK: I did too. That's why I raised the  
16 question, and I was curious as to whether anybody was  
17 attempting to put these two faults in the context with that  
18 seismic risk curve.

19 MR. POMEROY: Robin may have done this. Robin  
20 McGuire may have done one that is not in the DOE framework.

21 MR. HINZE: I don't think there is one that has  
22 been qualified or accepted. That's the point. That is part  
23 of one of the study plans.

24 MR. STEINDLER: Is it possible to learn about the  
25 dimensions of that new fault in some reasonable time? Are

1 there methodologies available in geophysics or some other  
2 fashion without having to drill 300 holes or whatever you  
3 guys do?

4 MS. DEERING: Yes. I would like to say that part  
5 of Rick Spengler's understanding of faults on the site, a  
6 big portion of it is ESF-related. Much of his knowledge  
7 will be gained from mapping once they get under ground.  
8 It's not all surface-based to learn about the faults, their  
9 geometry and structure, and so forth. So he's looking very  
10 much forward to getting under ground to learn about all the  
11 faults.

12 Somebody asked him in the pneumatic pathways  
13 meeting about roughly how long is it going to take for him  
14 to find all of the faults out there. I think he said two  
15 years, if I'm correct. It seems that they have funding to  
16 do what they have to do. That's the impression I get.

17 The NRC staff went back home and they are probably  
18 drafting a letter to DOE saying we think this is  
19 significant; it implies there are probably more of these  
20 things; we think you should crank up your effort here to  
21 find all the faults; and if it means taking money from  
22 something else, we suggest doing it.

23 They are not going to say that, but that's the  
24 implication, that this is a very high priority. From a site  
25 suitability perspective it could be a show stopper and you

1 might as well know now rather than later.

2 I don't know what else is going to go in the  
3 letter, but I think because they came along with us at this  
4 early date it gives them the advantage of writing a timely  
5 letter and getting in the loop, whereas, as Dr. Pomeroy  
6 said, it would have been May or later when they had one of  
7 these organized technical exchanges and everything was  
8 established on schedule.

9 I think one of our main points here is that we as  
10 the ACNW have flexibility to get out there and see things.  
11 Everybody in the world has seen the Sun Dance fault. There  
12 have been bus tours going out there. The NRC staff still  
13 would be sitting back here in Washington not really knowing  
14 exactly what is going on. I think that we could informally  
15 discuss with the Commissioners the importance of flexibility  
16 and taking timely action as opposed to a very structured  
17 organization that is bound by schedules and protocol.

18 MR. POMEROY: This again ties into our discussion  
19 of the onsite representation, because the onsite rep did  
20 know about this but the staff hadn't been given the  
21 opportunity to have an extensive briefing by the principal  
22 investigators involved. They were upset about that.

23 MR. STEINDLER: Let me take the side I don't  
24 normally take in these arguments. I think we have to be a  
25 little careful not to try and pry open and break the

1 existing bureaucratic system. In spite of what it appears  
2 on the surface, if you'll pardon my saying so, it may well  
3 be that there are some other more hidden important aspects  
4 to it largely that deal with the legal aspect of the  
5 interaction between the potential licensee and the NRC  
6 staff.

7           While I begin to sound like Mr. Wolf from the  
8 Office of General Counsel -- in fact he was here a few  
9 minutes ago -- there may well be some rationale for the  
10 structured nature of their interactions and to keep it as  
11 formal as possible. So while there may be some occasional  
12 interest in taking high visibility, high priority, high  
13 importance items and springing loose from the structured  
14 system such as this one, I think as a general rule it is not  
15 really our function to try and break down the bureaucracy.  
16 If it were, I think we would be deemed a failure.

17           MS. DEERING: I wouldn't recommend that they do  
18 away with their organized technical exchanges. Those are  
19 extremely valuable. As we have been told numerous times by  
20 the staff, you're getting out ahead and we don't like it,  
21 meaning we can't handle or accommodate your flexibility  
22 because it disrupts our structure. That attitude is so  
23 strong that I just feel that they need to be reminded that  
24 as we proceed further with site characterization and the  
25 testing and the ESF there are going to be surprises and they

1 just need -- I don't mean to go outside the legal structure  
2 -- more open-mindedness to be able to pick up the phone and  
3 move something ahead of something else in terms of  
4 priorities.

5 MR. POMEROY: I think that's right. I think  
6 basically you are right. The problem is always in these  
7 things that there is a legal structure. On the other hand,  
8 in this kind of a situation some flexibility in that  
9 structure is useful and perhaps desirable.

10 MR. STEINDLER: I just want to remind us that we  
11 don't run the NRC staff and we don't have the same  
12 responsibilities they do. They have both priority  
13 limitations as well as resource limitations, and while we  
14 think that their priorities ought to be shifted and they  
15 ought to move faster in certain areas, that's fine for us,  
16 but I'm not sure that that's a complete view of the poor guy  
17 who is in fact being addressed with this urging.

18 MR. GARRICK: That's right. I don't want to go  
19 one way or the other here, but I do want to applaud Lynn's  
20 spirit.

21 MR. POMEROY: I do think that at some point we  
22 should somehow inform the Commission that there is a  
23 potential area of concern. There are too many conditional  
24 statements on it at this point to make any statement other  
25 than it's a source of potential concern with regard to the

1 viability of the site. We should provide them that much of  
2 a heads-up so that if any one of these issues should cross  
3 their desk at some point in the future we have given them  
4 that head start.

5 MR. STEINDLER: Let me suggest that there may be  
6 another way to look at this. I don't know whether it makes  
7 sense. Let me just tell you about it.

8 We've heard now two things that I think are  
9 critical. One is that there is a new, moderately clearly  
10 identified crack called the Sun Dance fault which has  
11 implications because of its width and its interaction with  
12 an existing fault, et cetera.

13 I've also heard that this isn't the only one they  
14 are going to find. Let's assume that that's correct. I  
15 don't hear an upper bound to that second statement.

16 So my next question is, if that isn't the only one  
17 they are going to find and they've now found two of  
18 significance close to the horizon, what are the odds that  
19 they are going to find enough close to the horizon so that  
20 acceleration, groundwater movements, setback issues will  
21 make this perhaps a viable site of one-tenth the capacity it  
22 is now?

23 If those odds look like they are significant, then  
24 it would be foolish for both parties to continue pushing on  
25 that site. We can't do much about DOE, but we sure are

1 supposed to be advising the Commission. What would you tell  
2 the Commissioners that they ought to urge the staff to do to  
3 address that issue as rapidly as possible, shifting very  
4 quickly resources to focus in on that site suitability  
5 issue?

6 What can the staff do on its own? Normally they  
7 wait for somebody like USGS or DOE someplace to uncover  
8 these things. The staff isn't out there drilling holes, as  
9 far as I know. Nye County is drilling holes but the staff  
10 isn't, which I find kind of interesting.

11 Is there something that we should be telling the  
12 Commissioners concerning a shift in the approach that the  
13 staff ought to take on its own, if necessary, urging DOE, if  
14 necessary, to settle at least to the extent that you can  
15 this question of whether faulting by itself -- just focusing  
16 on that narrow issue -- will screw up the site? Is that a  
17 doable thing? Does it make any sense?

18 MR. HINZE: I think there are two things, Marty,  
19 that I would do in this situation. Number one, I would be  
20 concerned about the setback problem. There is nothing  
21 saying that these are type I faults. There is nothing in  
22 this document about setback.

23 MR. STEINDLER: That document you are waiving at  
24 me is the staff technical position?

25 MR. HINZE: The STP, 1451.

1 MR. POMEROY: But that's not the setback.

2 MR. HINZE: It's the seismic hazards and the fault  
3 displacement.

4 MR. POMEROY: There is another document that is  
5 floating but isn't out yet that specifically addresses the  
6 setback question.

7 MR. HINZE: I have tried to find that information.  
8 I went through all of my data this past weekend and I  
9 couldn't find it. I thought it was very much germane to  
10 this whole point and we should do our best to try to get  
11 that from the staff if we possibly can.

12 MR. POMEROY: I don't think that's a problem. We  
13 have a copy of it someplace. I do, anyway.

14 MS. DEERING: This is the new hazard assessment.

15 MR. POMEROY: This is the second of three.

16 MS. DEERING: They will be talking to us about the  
17 first one next month, because they finalized that now. We  
18 commented and so we can certainly discuss aspects of the  
19 second one too next month. I'll try to get that, Dr. Hinze.

20 MR. HINZE: Good. The first thing is the whole  
21 problem of setback and the stance that the NRC takes and the  
22 reaction to it that DCE takes.

23 The second thing is thermal loading. You may have  
24 a smaller footprint in which to put the waste, and since  
25 these faults at least at the level of the repository tend to

1 be vertical or steeply dipping, this means that you may have  
2 to go to a duplex, triplex, or you may have to enhance the  
3 thermal loading. It seems to me that this is a real  
4 possibility and the possibility of a duplex has been  
5 discussed. The advantages of a hot repository have been  
6 elucidated.

7 Those are the two things that I would say are  
8 implications that derive from where we stand at the present  
9 time.

10 MS. DEERING: I would also add the hydro-geologic  
11 significance is unknown but it could be significant with  
12 respect to infiltration, increased amounts of water coming  
13 in, lateral flow. They don't know what the impact would be  
14 of building more and more faults into the model, but it has  
15 to be tested. As I mentioned before, understanding the  
16 characteristics of these faults already is a very difficult  
17 problem. This just means that much more data and  
18 information and difficulty in characterization, I would say.

19 MR. POMEROY: I don't think you've gotten an  
20 answer to your question yet, Marty.

21 MR. STEINDLER: I'm still struggling. If I knew  
22 something about the subject matter, I suppose it would help  
23 a lot.

24 MR. POMEROY: If we weren't aware that the staff  
25 was in the process of writing a letter urging DOE to put

1 more effort into mapping this and other features like this  
2 we probably would at least informally suggest to the staff  
3 that they do that. I believe within that context they are  
4 also trying to deal with this issue of reportable geologic  
5 conditions to develop that flexibility that I was talking  
6 about a minute ago relative to the structure that does  
7 exist.

8 MR. STEINDLER: Let me ask one other question and  
9 then I'll get off this hobbyhorse. Is it feasible to  
10 identify the number of additional faults of the Ghost Dance  
11 variety that would have to be found before a significant  
12 fraction of the NRC technical community would agree that  
13 this site is beginning to look less and less suitable, in  
14 fact to the point where it doesn't look like it's going to  
15 fail? Can that number be identified?

16 [unclear] the same properties, whatever you know, so  
17 [unclear] to worry about what you know and you don't  
18 know, supposing I find 50 more Sun Dance faults optimally  
19 arranged so that their interaction zones almost touch,  
20 giving you relatively little space.

21 By the way, I would worry, Bill, about a two-  
22 story repository. Engineering-wise, I don't think I've seen  
23 a serious recommendation from DOE on that.

24 MR. HINZE: That's one of their options.

25 MR. STEINDLER: It may be one of their options,

1 but I don't think I've seen a serious design.

2 MR. HINZE: You may know of valid reasons for not  
3 doing it but I can't see any valid reasons except from the  
4 thermal aspect.

5 MR. STEINDLER: I think the thermal aspect is the  
6 critical one.

7 MR. POMEROY: Why does it make a difference that  
8 it's a two-level one?

9 MR. STEINDLER: All the thermal calculations that  
10 I've seen so far have assumed essentially a planar source.  
11 It's bad enough to try and do 3-D calculations for heat  
12 transfer. I think it becomes significantly difficult.

13 MR. POMEROY: It's more difficult. You do two  
14 planar sources offset from one another in a vertical plane.

15 MR. STEINDLER: Except they interact.

16 MR. POMEROY: That's certainly true.

17 MR. HINZE: If I were a Commissioner and I saw  
18 this coming ahead, I would be concerned about the thermal  
19 load because of the need to package the material closer  
20 together. I think the Nuclear Regulatory Commission may  
21 well want to expand or make certain that they are doing a  
22 sufficient amount of work in the thermal modeling area to  
23 consider this problem.

24 The other concern is these faults may be 8 million  
25 years old. Why are we getting back? Why are we worrying

1 about this? Why is the NRC telling the DOE to set back?  
2 We've got to do some site characterization to try to  
3 determine if these are type I faults.

4 I think those are the two things that I would  
5 focus on. I think those are reasonable things for the  
6 Commission to know.

7 MR. GARRICK: So the response to Marty, the answer  
8 possibly is that it's not a matter of the number of faults  
9 that are found as much as it is the activity of the faults?

10 MR. HINZE: It depends upon the stance you take  
11 with respect to setback. If the DOE now has the position  
12 that they will set back from the Ghost Dance fault, if they  
13 do that same thing with the other faults, then there is  
14 concern about the volume of rock that will be available that  
15 has a high integrity so that you could use it as a  
16 repository.

17 MR. POMEROY: Marty, could I offer you one more  
18 thing? Do you see any reason not to alert the Commission to  
19 this possibility at this point?

20 MR. STEINDLER: My a priori answer is yes, simply  
21 because I don't know exactly the frame of reference in which  
22 we are doing the alerting. If we are saying to the  
23 Commission, hey, guys, it looks like the NRC has a potential  
24 problem in trying to figure out what advice to give to DOE,  
25 then we should do that and provide for them our suggestion

1 on what advice they should give the DOE.

2 If our communication is, hey, fellas, it looks  
3 like DOE has a problem, period, then I think that's not a  
4 very important letter, because it doesn't become an issue  
5 directly for the Commission until that problem for DOE is  
6 translated into something that relates to the Commissioners'  
7 concern and mission and focus and whatever else you want to  
8 call it.

9 So it's in that context that I would reserve  
10 judgment as to whether or not we should write a note until I  
11 figure out what it is that we want to really tell them,  
12 because presumably what we want to do is tell them several  
13 things. One is alert them to an issue but then provide them  
14 with some commentary on what they ought to do in this now  
15 alerted state.

16 It may turn out that we would be coming from the  
17 same direction as the staff, and that's fine.

18 MR. POMEROY: We've tried very hard to coordinate  
19 our efforts with the staff so that we are not out in front  
20 of the staff and the staff is not out in front of us.

21 MR. STEINDLER: What I am suggesting in part is  
22 that I wonder whether the NRC shouldn't go out and become  
23 ahead of the DOE and do the estimate of how many more faults  
24 can you find before in fact it looks like you ought to  
25 retrench. That's a terrible term here. Let's try something

1 else. Move back.

2 MR. FOLAND: Is this something that perhaps the  
3 staff should be asked to come to a meeting and address?  
4 There are a number of possible reasons why this is a big  
5 problem. The people who are looking at performance  
6 assessment from the various factors, from engineering, from  
7 providing pathways, from setbacks, and so forth, they should  
8 be able to identify whether or not this is really going to  
9 demand entirely scrapping it or redesign, and so forth.

10 MR. POMEROY: We certainly could ask them to come  
11 in the context of this letter that they are writing to DOE,  
12 to come and talk to us about that.

13 MR. STEINDLER: I would like to have them come and  
14 speculate.

15 MR. POMEROY: You won't get that. They won't do  
16 that.

17 MR. HINZE: I'm reluctant to write a letter.  
18 Despite the fact that we have had some personal  
19 communication, I'm reluctant to write a letter until I  
20 really know what the staff is going to say in their letter.

21 On the other hand, we keep hearing from some of  
22 the Commissioners that they want to learn about the  
23 "ologies" and they would rather learn about it from their  
24 troops than from DOE. Invariably when the Commissioners  
25 talk about the site, they know about the Ghost Dance fault.

1 I think it's important as they go through their thinking  
2 process on this that they have a visualization of what the  
3 Ghost Dance fault really is, that it is not that planar  
4 feature that we were going to cut through in about 20  
5 seconds with a tunnel boring machine, and that there are  
6 more substantive -- I didn't say significant -- faults.

7 Even if on an informal basis, I think we have a  
8 responsibility to make certain that those that are  
9 interested know that.

10 MR. POMEROY: You asked once, implying that NRC  
11 should make a site suitability determination. That is not  
12 NRC's job.

13 MR. STEINDLER: No. It may be in fact still not  
14 be NRC's job, but what I am suggesting is that at some point  
15 in time it seems to me that the staff ought to have a fairly  
16 clear idea at what point they would write a letter to the  
17 Commission saying, hey, we've now had DOE discover 14  
18 faults, and our zero order estimate is that they've reached  
19 the point where it doesn't make any difference anymore and  
20 they ought to quit. But the staff needs to know that in  
21 advance, it seems to me, rather than to keep calculating,  
22 well, now we are at two; in another six months we may be at  
23 six.

24 That was my only point.

25 MR. POMEROY: I see.

1           MR. HINZE: Could I make a suggestion here as to a  
2 way that we might get on with this? One of the things that  
3 we have talked about is saying something to the Commission  
4 about an onsite representative. Perhaps what we can do is  
5 while we are doing that is slip in a discussion of why this  
6 is particularly significant at this time.

7           MR. STEINDLER: Absolutely.

8           MR. HINZE: The fact that these new faults have  
9 been discovered, et cetera, and we get some information  
10 across without having the letter directed at that. What we  
11 can do is suggest that as soon as the staff has some kind of  
12 position on this they can come and talk to us.

13           MR. STEINDLER: Let me suggest, Bill, one of the  
14 places where we come unglued is the place where you  
15 suggested that we need to wait to see what the staff is  
16 doing, what the staff's position is on this thing. I don't  
17 believe that that serves the Commission too well. I think  
18 we need to provide them our independent view regardless, and  
19 if the staff says, fine, we agree with the ACNW, great, but  
20 if our view is that this is an important issue, then we need  
21 to say to the Commission this is an important issue. If we  
22 think to the contrary, we need to say that to the  
23 Commission. The Commissioners will get advice from the  
24 staff and what they have asked us to do is give them  
25 independent advice on the same type of topics.

1 MR. HINZE: I quite agree with you.

2 MR. STEINDLER: So we are not unglued at all.

3 MR. HINZE: But there is no point in us just  
4 regurgitating what the staff is saying to the Commissioners.

5 MR. STEINDLER: Maybe. Maybe we are unglued.

6 MR. HINZE: Maybe we are.

7 MR. POMEROY: I might have a problem about the  
8 balance of that letter. I'm not sure that the solution is  
9 just to slip this in somehow.

10 MR. STEINDLER: It's not an "Oh, by the way." It  
11 can't be an "Oh, by the way," because it's a critical issue,  
12 apparently.

13 MR. POMEROY: This is a critical issue. It has  
14 the potential of being a critical issue.

15 MR. HINZE: If we put this in on the onsite  
16 representative, that doesn't eliminate the possibility of a  
17 further letter that would expand upon this topic.

18 MR. STEINDLER: As you find out some more.

19 MR. POMEROY: Several months later or whatever  
20 time it takes to develop that additional information.

21 MR. STEINDLER: Should we move on, Bill?

22 MR. HINZE: I don't know where we are.

23 MR. STEINDLER: We've heard from Lynn on several  
24 issues, the most recent one being the Sundance fault, which  
25 I suppose has a niche of its own. Extreme erosion, where

1 you were there and Ken was there and Lynn was there.

2 MR. HINZE: No. What I was speaking about is  
3 where we are with relationship to this topic. What is the  
4 Committee going to do with regard to letters, to further  
5 briefings, whatever, or to meeting with the Commissioners,  
6 whatever? If we are not ready to make that decision, fine.

7 MR. POMEROY: Let me throw in here also that if we  
8 don't formally via means of a letter convey some information  
9 to the Commissioners, then I think we ought to do it  
10 informally. They ought to be aware.

11 MR. STEINDLER: So there's a clear consensus that  
12 we need to inform the Commissioners. I guess my view is,  
13 for what it's worth, that we should do this by letter and  
14 that the letter include -- the letter's focus is our concern  
15 about the under-staffing of the geology-trained people of  
16 NRC's at Yucca Mountain.

17 The rationale for increasing the capability of the  
18 NRC at Yucca Mountain is twofold; one, the tunnel-boring  
19 machine, no matter what its schedule is, is going to pose a  
20 significant stress on information collection visible in the  
21 field, based largely on the planned very short time between  
22 exposing a rock surface and shotcreting it; and, secondly,  
23 there may be other -- we've learned about the Sundance  
24 issue. We believe it to be critical, etcetera, etcetera,  
25 and there may be other equally important geologic phenomena

1 that would become uncovered as the tunnel-boring machine  
2 moves ahead.

3 It's for those reasons that I think we could make  
4 an excellent case for urging the Commission to increase the  
5 number of folks that are on-site, expressly on-site, not  
6 shuffling back and forth between here and there.

7 My recommendation is that that should be a letter  
8 to the Commissioners and that one of you two geologists that  
9 know how to spell the words can put it together.

10 MR. HINZE: Paul, let me ask you a question. The  
11 designed ESF is not going to cover that southern rim  
12 completely, but try to make a pass parallel to the Ghost  
13 Dance fault and presumably should be intersecting the other  
14 northwest faults to follow the bridge patterns. So the  
15 DOE, indeed, will be investigating via the ESF at the  
16 horizon the repository.

17 How significant do you think it is to map these  
18 also on the surface?

19 MR. POMEROY: Well, let me answer that in an  
20 indirect way. I think it's important to map them on the  
21 surface because where that ESF goes is critically dependent  
22 upon where these things are at depth. To go backwards a  
23 little bit, that ESF design that you saw on Bill's slide was  
24 specifically done and laid out to effectively avoid a  
25 crossing, other than very quickly, the Ghost Dance fault.

1           In fact, Rick Spengler told us in December that  
2 his principal job between December and January was going to  
3 be to draw them a line, not a zone, but a line on a map  
4 showing them where the Ghost Dance fault was at depth and  
5 that that was going to determine where the ESF actually  
6 went.

7           If that design philosophy continues, they're going  
8 to want the best estimate that they can get of where this  
9 fault is to try to cross in and avoid it in the most  
10 effective manner because of the possibility that they're  
11 trying to avoid at the Ghost Dance fault.

12           So I would say I think it's absolutely critical to  
13 see it on the ground, obviously, because we don't even know  
14 for certain that it extends to the repository level. We  
15 certainly don't know that. It would be amazing if it  
16 didn't, but we don't know that.

17           So there are so many things that we don't know.  
18 I'm sure that ultimately DOE is going to recognize that  
19 that's a design requirement to know where that is. So all  
20 that I wanted to do was to ensure that that determination,  
21 the surface mapping and the determination of any other  
22 surface features goes on at the fastest possible pace.

23           MR. HINZE: I am somewhat pessimistic about  
24 altering the design of the ESF based upon additional  
25 information. The background of that is that there doesn't

1 seem to be a great deal of worry about Sundance in terms of  
2 the location of the ESF as it is now laid out.

3 MR. STEINDLER: But is that a fair assessment?  
4 When they first designed the path for that ESF, did they  
5 have a clue that there was a Sundance?

6 MR. HINZE: To be very honest, they didn't have a  
7 clue that the Ghost Dance was that wide either.

8 MR. STEINDLER: Then they subsequently shifted the  
9 path in order to avoid the Ghost Dance. Do you expect them  
10 to do some shifting once the Sundance information is in?

11 MR. POMEROY: That's what Bill was saying, he  
12 doesn't think that.

13 MR. HINZE: I'm pessimistic about how much they  
14 can do, and they're controlled by engineering --

15 MR. STEINDLER: Where will they shift to?

16 MR. HINZE: They're controlled by engineering  
17 factors, the curvature that they can take with the TBM.  
18 It's not a simple thing. I'm just pessimistic.

19 But I agree with you totally, Paul, that if you're  
20 going to understand the site and you're going to understand  
21 things like the potential of these faults at pathways for  
22 the movement of water or vapor, liquid or water or vapor,  
23 you've got to know where these things are. You've got to  
24 know them on the surface.

25 As a result of our meetings, I'm not clear that,

1 indeed, there is the money directed by DOE to the USGS to  
2 map that southern block there. Certainly, there's money to  
3 look at the Sundance, but to this other block, I'm not -- I  
4 didn't get a warm fuzzy feeling about that.

5 MR. FOLAND: I didn't, either. It seemed to me  
6 that the mapping was going to be very constrained. It also  
7 seems to me that the pragmatic or the end product is going  
8 to be that it takes a lot longer probably to map than it  
9 does to do tunnel boring.

10 MR. POMEROY: That's right. I think it is going  
11 to be a longer process.

12 MR. FOLAND: And to assume that all the features  
13 that one looks back on the Scott & Bunk map that can be  
14 checked out in a period of time that's very quick, if it's  
15 field mapping on the ground, it's going to be a very slow  
16 process. Those of you who haven't been at the site can just  
17 imagine. They're stripping the side of the hill to clean it  
18 off so they can see some of these brushes and relationships.

19 That's a slow process of mapping and I don't know  
20 how many square feet are added each year, but not a lot.

21 MR. HINZE: There's a kicker in that, and that is  
22 the magnetic mapping, because the evidence that we have  
23 indicates that these faults can, indeed, be mapped by  
24 magnetics. If you get a helicopter survey, you can survey  
25 that thing in a week and you could analyze it in another

1 month and you would know where to go to do -- you wouldn't  
2 have to do huge expanses, except for confirmatory pieces,  
3 but you could focus where you would do the trenching.

4 That could be accelerated. But you would really  
5 have to integrate -- you would have to integrate the  
6 geophysics with this mapping.

7 MR. STEINDLER: Isn't magnetic mapping  
8 sufficiently precise, accurate, so that it would have found,  
9 for example, the Sundance fault?

10 MR. HINZE: Very probable, yes.

11 MR. POMEROY: With appropriate -- with the correct  
12 interpretation, it would have.

13 MR. HINZE: The problem, Marty, is that the USGS  
14 does not have, from the information that I have at this  
15 time, they do not understand the geology nor the physics of  
16 where those anomalies are coming from. Until you have that,  
17 you don't want to go very far out on a limb to interpret it.

18 MR. POMEROY: They say these are faults, right. I  
19 have two things I wanted to say with regard to what Ken said  
20 previously. I asked a couple of specific questions, one of  
21 Larry Hays, whether he had gotten sufficient money to do  
22 this mapping. He indicated that he had been able to pry  
23 some additional funding from DOE to do this mapping. That  
24 whole situation may change in the next year depending on  
25 what happens to the funding.

1           But I also asked Rick Spengler if he had unlimited  
2 funds, could he do this work much more rapidly. Rick is at  
3 least honest. He said no. He said there aren't people who  
4 are trained to do this. As you know well, Ken, this is  
5 really extraordinarily difficult mapping.

6           He said he you need time to train those people and  
7 that's on the order of -- he said on the order of a year or  
8 so. So he didn't think that you could significantly enhance  
9 his workforce and get to an answer somewhat quicker.

10           MR. GARRICK: Let me ask our earth science  
11 colleagues here a question. Are we suggesting that an  
12 accelerated program of mapping would be important to the ESF  
13 design or are we suggesting something beyond that, such as  
14 answering the broader question of seismic activity  
15 associated with the site?

16           Is the mapping issue focused on ESF design, I  
17 guess, in terms of location of the tunnel, in particular?  
18 Is that what we're talking about?

19           MR. HINZE: In the ideal world, what you would do  
20 is you would not be doing an ESF at this time, in my view.  
21 What you would do is do a sufficient amount of scoping, I  
22 think you know that word. You'd be doing a site  
23 characterization and that would lead you then to the optimum  
24 exploratory study facility.

25           MR. GARRICK: Mr. Chairman, it seems to me that if

1 this is what we're talking about, we are surfacing an issue  
2 of some importance, if the feelings are strong about that.  
3 It depends upon what our conviction is, because the schedule  
4 for ESF is a pretty definitive one in terms of it having  
5 pretty much top priority now.

6 MR. STEINDLER: Yes, but it has one significant  
7 difficulty. That issue is not ours. Its' DOE's. Even if  
8 Bill is right -- I assume that there may be some argument on  
9 it since there's a very large amount of money being spent on  
10 the other side. But even if Bill is right, this is a DOE  
11 call and the Commission has, and I think correctly, not  
12 entered into the question of whether DOE's priorities of  
13 expenditure of funds and how they go about doing the program  
14 is really their specific concern.

15 MR. GARRICK: I agree that as far as the decision  
16 and the commitment and so forth, but in the grander scheme  
17 of things, it's hard for me to appreciate the decoupling of  
18 activities that could have a major bearing on the licensing  
19 of this facility from the NRC concerns. I guess I'm looking  
20 at it from a much broader perspective.

21 MR. FOLAND: Can I chime in here?

22 MR. STEINDLER: Sure.

23 MR. FOLAND: I've mostly said very little, but  
24 having seen the feature and looking at the geologic maps, it  
25 seems to me the Committee has correctly identified a

1 potential giant dilemma with the disruption of the block  
2 into many, many blocks.

3 If the ship next door is sinking, it's probably  
4 not a good idea to say, well, that's that captain's  
5 responsibility and we'll just sail along. So it seems to me  
6 it is an important point to bring up and have the  
7 Commissioners recognize it.

8 MR. HINZE: We haven't quite answered John's  
9 question, though. I think it was a very good question.  
10 That is is the study of not just the Sundance, but those  
11 potentially existing to the south of the Sundance, is that  
12 important to the ESF construction or is it in the site  
13 characterization?

14 The implication is that if there is a significance  
15 to the ESF, that maybe this is important enough that we  
16 should alert the Commissioners that this is a -- or alert  
17 someone that you really have to accelerate this before you  
18 do the ESF.

19 MR. STEINDLER: Let me suggest to you that the  
20 ESF, according to the Department, is there to do site  
21 characterization. Now, there are a lot of cynical comments  
22 that have been made about why that ESF is being drilled or  
23 tunneled or whatever, but I think the statement of the  
24 Department that I remember is that we're going -- it used to  
25 be called an exploratory shaft, after all.

1           The exploratory studies facility is designed to  
2 elucidate whether or not that site is suitable, because they  
3 didn't either think or knew how or wanted to do what you  
4 urged two years ago or three years ago; namely, come on, do  
5 a little bit more surface space geophysical studies.

6           They said no, we're going to go dig a hole in the  
7 ground. Now, there may be other political ramifications to  
8 it, but their rationale was that's what they wanted to do.

9           So in that context, they are doing what I think  
10 they should be doing in the sense of doing site suitability  
11 explorations. I'm not sure that we have license to comment  
12 negatively on the fact that, in the real world, what they  
13 should have done is something different.

14           MR. HINZE: We've gone by that marker, as far as  
15 I'm concerned. It's a fait accompli.

16           MR. STEINDLER: Let me suggest this.

17           MR. HINZE: Also, it's an -- when I answered  
18 John's question, I said in an ideal world.

19           MR. STEINDLER: Yes. I would agree to that. Let  
20 me suggest this. Let's finish up the reports. Let's set  
21 the issue aside as to what we're going to do.

22           Let's finish up the reports, go through the rest  
23 of the agenda, and then come back to the question, having  
24 given it, presumably, some thought as to how we should  
25 handle this question of the -- I think that we ought to

1 think about the combination of urging some additional  
2 resources in Nevada on the part of the NRC and alerting the  
3 Commission that there is, in fact, a thing out there called  
4 the Sundance fault, which maybe a unique item, but is likely  
5 not to be, and that there may be others, and that they  
6 should at least be aware of the fact that there are some  
7 serious issues coming up.

8 If that's acceptable, let's move on to whoever is  
9 going to talk about -- is it you, Bill, that's going to talk  
10 about the extreme erosion?

11 MR. HINZE: No.

12 MR. STEINDLER: Lynn? Lynn has joined the  
13 Committee.

14 MR. POMEROY: This is the price to pay for all  
15 these exotic trips.

16 MS. DEERING: All these vacations.

17 MR. HINZE: But in credit to Ken Foland, she will  
18 soon pass the baton to Ken.

19 MR. STEINDLER: I would assume so, yes. Lynn, why  
20 don't you start out? I think we're on Page 19 of our little  
21 section, aren't we?

22 MS. DEERING: Thank you. I've lost track.

23 MR. STEINDLER: I think I would like to hear at  
24 least somebody comment as to why this is important at all to  
25 anybody, to the repository performance or whatever.

1 MS. DEERING: Okay. This was February 1 and 2. We tagged  
2 along with a lot of other people on a -- they called it a  
3 technical exchange/site visit. I think the objective of  
4 their meeting was to discuss -- the NRC is currently  
5 reviewing the erosion topical report. It's in progress.

6 DOE wanted to discuss and point out in the field  
7 actual observations to make their case. They also held a  
8 lot of discussions and lectures on the outcrops about dating  
9 methods and theories behind the dating method that they've  
10 used throughout.

11 It was -- I was just going to say it was pretty  
12 torturous, the whole thing was, because it was so cold out,  
13 but that's the side issue. We suffered pretty badly and I  
14 think it was deliberate on DOE's part.

15 The purpose was to --

16 MR. STEINDLER: Remember your words are being  
17 recorded.

18 MS. DEERING: That's fine. I'm entitled to my  
19 opinions.

20 MR. GARRICK: In that case, you'll repeat it.

21 MR. STEINDLER: It's not on edible paper.

22 MS. DEERING: At any rate, DOE tried -- their  
23 contention in the report is that there is not the  
24 potentially adverse condition of extreme erosion at the  
25 Yucca Mountain site. Their topical report they feel

1 addresses that and they took us to show us all of their  
2 sample locations and all the evidence in the field that  
3 they've gathered to make that case.

4           The NRC and the state clearly did not agree the  
5 entire time with what was being presented. That was  
6 obvious. I'm working up to why this is important. I'm not  
7 quite there yet.

8           The DOE used an approach that they felt was the  
9 way to go, either through legal counsel or whatever. They  
10 took one hypothesis, and that was we've got old boulders  
11 here on the hill slopes and, therefore, because they're old  
12 -- they're old because we've used the cation exchanged  
13 dating method, which is very controversial, but we've used  
14 this method, one method, and we've dated these boulders and  
15 they are this age and we can, therefore, say that the slopes  
16 are stable and we do not have much extreme erosion occurring  
17 -- we do not have extreme erosion occurring at Yucca  
18 Mountain.

19           Within this premise, there are many assumptions,  
20 including many aspects of the dating method that are to be  
21 debated, and that's what happened on this field trip for two  
22 days.

23           MR. STEINDLER: What age did they attribute to the  
24 boulders?

25           MS. DEERING: The boulders are --

1 MR. STEINDLER: Ballpark estimate.

2 MR. HINZE: 150,000.

3 MS. DEERING: Yes, 150,000 years old.

4 MR. FOLAND: Some of them up to a million years,  
5 though, actually, in place on the steep slopes.

6 MR. POMEROY: Lynn, can I ask you a question, or  
7 Ken and Lynn, or all of you? Is there anyone on the NRC  
8 staff who seriously believes that the extreme erosion exists  
9 as a potential adverse condition at Yucca Mountain?

10 MR. FOLAND: I can't really answer that question,  
11 but I'll just say I don't know of anyone who questions that  
12 extreme erosion is a problem. I think that there is a  
13 question of whether or not the topical report has shown that  
14 it's not a serious condition.

15 MR. POMEROY: Yes. That's what I wanted to know.

16 MS. DEERING: That's the issue right there. The  
17 NRC staff even said in the wrap-up meeting we think you  
18 would have a more difficult case showing that there was  
19 extreme erosion as opposed to showing that there's not  
20 extreme erosion; but in everything you've shown us today and  
21 in your topical report, you have not made the case.

22 And NRC suggested through comments, as well as  
23 verbally, data that could be used to make the case, but the  
24 topical does not do that. So DOE has taken a position --  
25 it's not entirely clear. I have heard various things.

1 They're done. There's no more budget to work on erosion.  
2 They feel pretty strongly -- they really don't understand.

3 I think it's genuine, but it seems we do not  
4 understand why NRC is making a big deal out of this, and I  
5 think they believe they've made their case. But there's a  
6 clear communication gap, giant gap between the two sides.  
7 Like I said, it got really contentious and very hardheaded  
8 on -- well, I just saw little yielding to the others' points  
9 of view.

10 Why it's important is we -- I guess we're  
11 concerned -- the overall concept of issue resolution, in  
12 that context. This is one example of a topical report, at  
13 this point, very unsuccessful in its attempt to resolve any  
14 issue. If this is indicative of where we're headed, where  
15 the NRC and the DOE are headed with issue resolution, it  
16 could be of concern to the Commission.

17 Particularly, you would assume the Commission  
18 would be interested in resolving issues if they have a  
19 topical report, they've bought into the concept. It's in  
20 their best interest, as well. The process isn't -- possibly  
21 is not going to work the way it's on its current course.

22 MR. STEINDLER: Are you differentiating between a  
23 topical report that is scientifically or technically  
24 deficient in some demonstrable sort of ways versus the  
25 process, per se?

1 MS. DEERING: I think that those definitely need  
2 to be differentiated. I would say because of communication  
3 problems that are apparent, I don't know that that's obvious  
4 to either side or to DOE right now. One, the process is  
5 different than an inadequate report or what NRC believes to  
6 be an inadequate report, even though extreme erosion, most  
7 would agree, is really not one of the highest priority and  
8 most significant technical issues at Yucca Mountain. But  
9 it's sad that we -- where we're at on this.

10 MR. STEINDLER: Does it sound like to you that a  
11 subject like extreme erosion that's believed to be  
12 intuitively by everybody who looks at it, most people who  
13 look at it to be a no-never mind, is viewed as being  
14 treatable as essentially a no-never mind without much  
15 attention to the scientific basis for conclusions by the  
16 Department? And, therefore, the thing they fired into the  
17 staff was governed -- the quality of the thing they fired  
18 into the staff was governed more by the original intuitive  
19 conclusion about no-never mind than it was by the evidence  
20 that they actually assembled.

21 MS. DEERING: Yes. And I think that because it's  
22 the first one, I kind of get the impression that they chose  
23 to go with the minimum amount of information to see if it  
24 would fly and, if it does, then that could set a precedent  
25 for further -- regardless of the complexity of the issues,

1 this was the simple issue, let's give them the minimum and  
2 see where we get with this.

3 But it's not clear where they go from here and NRC  
4 staff would like to talk to us informally today about  
5 options that they want to consider for their review now that  
6 they've --

7 MR. HINZE: Are they here?

8 MS. DEERING: They'll be here this afternoon.

9 MR. FOLAND: The other parties in this -- namely,  
10 the state and other affected groups -- I don't think are  
11 prepared to say that this is not an important factor and  
12 extreme erosion may be important.

13 I think a lot of the discussion in the field was  
14 initiated by state people. They've made the statement  
15 several times that the rates may be off by a factor of ten.  
16 If that's the case, then it's going to be perhaps a  
17 significant factor. So there is that.

18 And one of the reasons that they will not buy off  
19 on the topical report is the basic method that Lynn talked  
20 about, this varnished cation ratio dating that is a point  
21 that really can't be -- it's a technique that really is very  
22 difficult to justify. I think that compromises the entire  
23 report, certainly from the viewpoint of the state.

24 MR. STEINDLER: Aside from the implications on the  
25 topical report management process that we've heard here, is

1 there anything else in that general subject that we either  
2 need to be alerted to or should make comments on?

3 MR. FOLAND: One of the things that that meeting  
4 did for me is it made it clear that we do not need to hold  
5 the working group meeting on cation ratio. I think that  
6 would, at this point in time, be a fruitless effort. So we can  
7 scratch that one. I apologize for even bringing it up, but  
8 I think it was -- really, the workshop was taken care of by  
9 the discussions on the outcrop. Most of the leaders were  
10 there.

11 MR. FOLAND: I think that what the working group  
12 would have accomplished was accomplished on this field trip,  
13 but it was important to do that, I think.

14 MR. HINZE: That's right, yes. It's been  
15 accomplished and we're moving out.

16 MR. STEINDLER: Does that leave the Department  
17 without any acceptable method of doing the job?

18 MR. FOLAND: Not really. What they need to do is  
19 to put some resources into this which will come back to  
20 looking at movement on faults and so forth. There are other  
21 methods. Some of them are ideas. But they're not doing it.  
22 In fact, some of the strongest evidence for the lack of  
23 extreme erosion probably are these calcic soils.

24 But we kept hearing, well, these are 500,000 years  
25 old, which was opinion. They may be 500,000 years old and

1 we were told repeatedly that these will be worked on, but  
2 nothing has happened. That's another area, I think, which  
3 is, at the present, under-funded because of other  
4 priorities.

5 MR. GARRICK: Can somebody briefly tell me what  
6 the safety issue is here as a result of extreme erosion?

7 MS. DEERING: They think it's such that it would  
8 impact the isolation capability of the repository and it's a  
9 potentially adverse condition that the regulation requires  
10 be investigated. I suppose DOE could either say it's  
11 present or it's not present, the evidence of extreme  
12 erosion, and then if it were present, they would have to, in  
13 their performance assessment, look at the impacts, be it  
14 through increased infiltration or actually waste being  
15 uncovered. I suppose that would be an extreme.

16 MR. HINZE: We are, unfortunately or fortunately,  
17 depending upon your viewpoint, dealing with a 60, which is a  
18 generic document. It's not focused on Yucca Mountain. And  
19 if you were doing this in central Wisconsin, maybe this  
20 would be an erosion -- erosion might be a problem, because  
21 you'd be -- the repository would be close to the surface.

22 In my view, it is extremely unfortunate that DOE  
23 did not do this in a fashion that would be acceptable by the  
24 state, the counties, and NRC, because this is such a readily  
25 closable issue and it would have set a good precedent for

1 this whole issue resolution, because issue resolution is  
2 going to be a very helpful way.

3 MR. GARRICK: Is there something that says that  
4 the Committee can't suggest to the Commission that the  
5 problem is the regulation, not a technical problem  
6 associated with the repository?

7 MR. STEINDLER: I'm not convinced that that's the  
8 focus. I think if I were -- just having listened to the  
9 conversation here and not having read the report, and even  
10 if I read it, it wouldn't do me a whole lot of good, it  
11 sounds to me as though the document that was fired in for  
12 NRC technical review was a technically deficient document.

13 MR. FOLAND: I'm not sure there's a problem with  
14 the regulation. It's not the regulation which is the  
15 problem, that I see.

16 MR. STEINDLER: Bill got it right. If DOE had  
17 done that job in a thorough scientific fashion, then I think  
18 some of the issues we're talking about here would --

19 MR. GARRICK: Well, it just seems to me that  
20 whatever, whether it's regulation or a poor job on the part  
21 of DOE, that it's extremely important for us to focus on the  
22 technical issue and is there an issue here. Obviously, we  
23 can't skirt the regulation or we can't walk away from a poor  
24 analysis, but I would hate to see the Committee suggesting  
25 activities or going down a path where lots of resources

1 could be consumed when the body of the Committee was  
2 convinced that this was an issue that could be resolved with  
3 some field visits or some simple observations or a simple  
4 study.

5 MR. STEINDLER: I think, unfortunately, the high  
6 level waste domain requires that every -- even semi-rational  
7 scenario that somebody can propose that endangers the  
8 repository has to be treated on a fairly scientific basis in  
9 order to put it aside, even though the collective judgment  
10 of a whole raft of people may say, boy, that's a pretty  
11 trivial issue, you ought not to worry about it. That's not  
12 an adequate method of disposing of it.

13 So it's incumbent in DOE, no matter how trivial  
14 somebody might think the issue is, if the scenario has been  
15 brought up and it looks even vaguely plausible, somebody's  
16 got to go do some work.

17 MR. GARRICK: Yes. And I'm not suggesting that we  
18 don't do that. I'm not suggesting that we don't consider  
19 all the scenarios. I think that, however, it's very  
20 important for us to be consistent with respect to how we  
21 consider everybody's scenario. That's the advantage that  
22 ultimately a well conceived performance assessment will  
23 provide.

24 We can put this scenario in the performance  
25 assessment and test it in the same way we've tested every

1 other scenario and intelligent and technically-based  
2 answers. But I do believe that there is a point beyond  
3 which when you see something that doesn't seem to warrant a  
4 lot of resources and a lot of effort that it's not out of  
5 order for judgment to be a source commentary or an  
6 opinion about an event.

7 It seems to me this is in the category of looking  
8 at those things that are lurking in the dark corners that  
9 may or may not be important.

10 MR. STANFIER: I think you've hit on a very  
11 critical point in the area of judgment. I think the  
12 allowance for the use of judgment is limited at the moment  
13 only to those areas where you can do nothing else. I don't  
14 know whether that's an accurate statement or not.

15 But if you have a clearly visible path for  
16 obtaining hard data, then in fact, the NRC staff has  
17 made, I think, emphatic comments to DOE that they ought not  
18 to substitute expert judgment processes for the collection  
19 of information from the field.

20 MR. HINZE: But you still have to interpret that  
21 data and that's a judgment. That's an individual judgment.

22 Could I go back and respond and put your mind at  
23 ease just a bit, John, about the resources that might be put  
24 into this?

25 MR. POMEROY: Watch your wallet.

1           MR. HINZE: John, keep your hands out of your  
2 pockets. I was going to pontificate here, but I guess I  
3 won't. No. What I wanted to say is that there was a  
4 feeling on the part of many people that were on that field  
5 trip that what we were listening to was the science that had  
6 been done and developed and interpreted several years ago.

7           I'm suggesting that it was somewhat out of date,  
8 even. There have been additional data that have been  
9 collected, not just cation ratio, but other data that are  
10 rather readily available or that can be performed in very  
11 simplistic ways that would provide the kind of technical  
12 support that would make this acceptable, I think, to the  
13 three elements.

14           That can be done rather readily. There was a lot  
15 of talk about a geomorphic map, a rather classic way of  
16 getting at this problem. I have my own misgivings about  
17 just how much that's going to be -- how much good that's  
18 going to do, but that's the classic way for geologists to do  
19 this kind of thing.

20           Well, a geomorphic map is, as I understand it, in  
21 the process of being developed and we're really not calling  
22 for new monies and new resources to be involved in this.  
23 The extra effort to do a good job wouldn't have been that  
24 much.

25           ... FOLAND: I think, in fact, there is no

1 program, extreme erosion, that this report is cobbled  
2 together from other programs which are funded. For example,  
3 the dates which would be very useful to address erosion  
4 wouldn't be done under erosion. It would be done under the  
5 trenching to look at Solitario Canyon fault, that sort of  
6 things, tectonics program. It's exactly tectonics.

7 So this is not, in fact -- this is an almost  
8 trivial, in itself, budgetary item probably limited to those  
9 people's salaries, the people who are preparing the topical  
10 report. But the overall -- I think Lynn said this. Perhaps  
11 the issue of real concern with respect to this topical  
12 report is not the technical details of whether or not  
13 erosion is significant, but is the actual topical report,  
14 the methodology used and the patterns set for bringing these  
15 topics to a point of discussion and then resolving the  
16 differences of points of view.

17 MR. HINZE: Mr. Chairman, I --

18 MR. STEINDLER: We're only two hours behind.

19 MR. HINZE: But as long as we're discussing  
20 interesting things, who cares? Ken went on a field trip  
21 which Lynn and I did not attend because we were at the ESF  
22 meeting. Ken, you've written a little bit about that, but I  
23 really think it would be helpful to get on the record a  
24 couple of the most important points that came from the field  
25 trip down to Death Valley and so forth.

1 MR. FOLAND: Right. This was -- I, consequently,  
2 went on the trip led by, I guess, consultants for the state,  
3 Roger Morrison and Marty Mifflin, the next day, which was NRC  
4 staff, the DOE representatives, state representatives, the  
5 same basic crowd that looked at the Takopa Valley in the  
6 northern Mojave part of the Amargosa drainage and the  
7 Amargosa Valley near Indian Springs.

8 I think the ideas there were basically three. One  
9 is to show evidence of extreme erosion. Two was to, I  
10 think, show that there can be rapid development of these  
11 calcic soils. The third is that there is the cation -- or  
12 the rough varnish can develop very rapidly. So two of these  
13 were looking at timing.

14 We visited some ancient deposits, ancient meaning  
15 pleistocene deposits ranging in age from about 200 to  
16 apparently about 150,000 years old in the Takopa basin,  
17 extreme erosion when this lake was breached, this alluvial  
18 lake was breached 150,000 years ago. No doubt, lots of  
19 erosion of deposits in that valley.

20 The point is, though, what does that have to do  
21 with erosion on Yucca Mountain, and apparently nothing.  
22 We're in a very different environment.

23 The second aspect -- namely, the development of  
24 the soils and, to some of us, at least to me, some of the  
25 most compelling evidence for having ancient surfaces in

1 Yucca Mountain was the development of these soils that,  
2 judging from the literature, take a considerable period of  
3 time to develop.

4           There is evidence in the Takopa Valley that the  
5 surfaces there are well calcified, and I'm not really a soil  
6 geologist at all, so I'm out of my element, but how they  
7 advanced in state, I guess about Stage C-4, were only about  
8 150,000 years old. So these apparently developed quite  
9 quickly.

10           Further discussion, though, indicated that, one,  
11 it was not clear how reliable that timing was, because it  
12 was based upon a couple of uranium series dates that are a  
13 couple among many, of which probably most of the many don't  
14 make good sense. So the timing is not well established  
15 there.

16           The second point is there's a tremendous amount of  
17 carbonate detritus around in the form of boulder and other  
18 material that probably accelerates the rate of soil  
19 development. So this rate implied here may not be  
20 characteristic of Yucca Mountain.

21           The third aspect was visiting some well defined  
22 ancient surfaces related to spring mounds, I guess,  
23 basically, near Indian Springs, that are on the order of  
24 --surfaces that are on the order of 10,000 years old,  
25 relatively well established, young surfaces.

1           These boulders had nice varnish to them and to the  
2 naked eye, at least, looks like well developed varnish in a  
3 period of only 10,000 years, not hundreds of thousands of  
4 years. The reply there from the varnish workers -- namely,  
5 Chuck Harrington and John Whitney -- is that this is a  
6 different kind of varnish and this forms in low boulders due  
7 to wetting near the surface and, in fact, that the cation  
8 ratio apparently of some of these boulders indicated a very  
9 young age.

10           So there is some ambiguity, but apparently there  
11 are varnishes and varnishes. So all in all, it's not clear  
12 to me that there was any real agreement, nor was there any  
13 real information that entirely would be compelling and  
14 conflicting information with the idea that erosion is not a  
15 problem at Yucca Mountain.

16           MR. POMEROY: Ken, are those just a point of  
17 clarification? Is there some documentation in the  
18 literature about different types of varnishes or anything  
19 like that? Is this just something they thought up at the  
20 moment to explain why they were clearly rapidly developing  
21 varnishes?

22           MR. FOLAND: I think there is something. There is  
23 material in the literature. I don't know all the literature  
24 by any means on the varnishes. I really can't answer that.  
25 But I think there is support in the literature. It's not

1 something that was thought up on the spur of the moment,  
2 because, in fact, Harrington and Whitney had examined these.

3 So I take it that there, in fact, are different  
4 sorts of varnishes. I didn't have a problem with that.

5 MR. POMEROY: Thank you.

6 MR. STEINDLER: Does that take care of the agenda  
7 until 10:00?

8 [No response.]

9 MR. STEINDLER: I would suggest that the afternoon  
10 session between ten and one does not have to be recorded. I  
11 think the thing to do is to break off the formal recorded  
12 part of this meeting, declare a lunch break of whatever, an  
13 hour perhaps, come back at ten minutes to one and begin our  
14 Committee activities, future agenda.

15 That meeting this afternoon at ten minutes to one  
16 and thereafter is open to the public and will be simply  
17 conducted the same way we've always done it, except without  
18 being recorded.

19 MR. POMEROY: Mr. Chairman, is there any -- are we  
20 going to discuss -- one of the items for discussion is the  
21 appointment of new members.

22 MR. STEINDLER: Yes. At that point, we would have  
23 to close it. That's correct. If that's agreeable, let me  
24 call this meeting to a close. Thank you all and thank the  
25 Reporter for his continued perseverance. I'm sure he'll be

1 around to try and get the spelling of some of the terms you  
2 folks have used.

3 We'll start again at about ten minutes to one.

4 [Whereupon, at 11:50 a.m., the recorded portion of  
5 the meeting was concluded.]

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REPORTER'S CERTIFICATE

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

NAME OF PROCEEDING: 61st ACNW Meeting

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, MD

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

Michael Paulus  
Official Reporter  
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