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NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE

Title: MEETING: 114TH ADVISORY
COMMITTEE ON NUCLEAR
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Docket No.:

Work Order No.: ASB-300-1013

LOCATION: Rockville, MD

DATE: Wednesday, November 17, 1999

PAGES: 1 - 112

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

NOVEMBER 17, 1999

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

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE

MEETING: 114TH ADVISORY COMMITTEE ON
NUCLEAR WASTE (ACNW)

U.S. Nuclear Regulatory Commission
Two White Flint North
Room T-2B3
11545 Rockville Pike
Rockville, Maryland
Wednesday, November 17, 1999

The Committee met, pursuant to notice, at 1:03
p.m.

MEMBERS PRESENT:

- JOHN GARRICK, Chairman, ACNW
- GEORGE W. HORNBERGER, Vice Chairman, ACNW
- RAYMOND G. WYMER, Member, ACNW

P R O C E E D I N G S

[1:03 p.m.]

1
2
3 DR. GARRICK: Good afternoon. The meeting will
4 now come to order. This is the first day of the 114th
5 meeting of the Advisory Committee on Nuclear Waste. My name
6 is John Garrick, Chairman of the ACNW. Other members of the
7 committee include George Hornberger and Ray Wymer.

8 In addition, we have Milt Levenson serving as an
9 ACNW Consultant.

10 During today's meeting we will discuss committee
11 activities and future agenda items, discuss the research
12 plan for environmental transport of radionuclides in the
13 geosphere, and discuss the rubblization approach.

14 Richard Major is the Designated Federal Official
15 for today's initial session. This meeting is being
16 conducted in accordance with the provisions of the Federal
17 Advisory Committee Act and we have received no written
18 statements from members of the public regarding today's
19 session. Should anyone wish to address the committee,
20 please make your wishes known to one of the committee's
21 staff.

22 As usual, we request that speakers use one of the
23 microphones, identify themselves.

24 Before proceeding, there are a couple of items we
25 would like to cover. Or course, we are all aware that on

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1 October 29th, Dr. Richard Meserve was sworn in as Chairman
2 of the U.S. Nuclear Regulatory Commission. We have some
3 Staff changes effective November 1st. Howard Larson has
4 been assigned to the position Associate Director of
5 Technical Support of the ACRS/ACNW. Howard brings to the
6 position a great deal of management experience in industry
7 and government and of course the nuclear Navy.

8 Andy Campbell will begin a six-month rotational
9 assignment in the Office of Nuclear Regulatory Research
10 beginning on Monday, November 22nd. Andy will join the
11 Radiation Protection Environmental Risk & Waste Management
12 Branch and we expect to welcome John Randall from Research,
13 who will trade positions with Andy for the time being.

14 The Nuclear Regulatory Commission has launched a
15 new study on spent nuclear fuel cask responses to severe
16 transportation accidents. As you know, many years ago this
17 was something that was studied extensively.

18 There is a meeting going on that is of interest to
19 the waste community. It is going to take place the first
20 part of December. Some 75 experts representing a broad
21 spectrum of opinion will meet early during the next month to
22 try to develop some consensus on issues around the health
23 effects of low level ionizing radiation including how to
24 regulate in the face of scientific uncertainty. If they
25 accomplish those goals, they will have achieved a miracle.

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1 There will be a follow-on meeting, a conference
2 call, "Bridging Radiation Policy and Science," and it will
3 be held at the Airlie Center in Warrenton, Virginia and
4 among the organizers of this meeting is Gail DePlanque,
5 former NRC Commissioner, and Manny Munson, President of the
6 International Nuclear Law Association.

7 Unless there's comments or some other
8 announcements that the members or staff would like to make,
9 I think we will proceed with our agenda and we are going to
10 hear about the research plan for environmental transport,
11 and it is nice to see Margaret Federline. We haven't seen
12 you for awhile.

13 MS. FEDERLINE: Yes, I really appreciate the
14 opportunity to be with you. I have missed you.

15 DR. GARRICK: Well -- you have the floor.

16 MS. FEDERLINE: Thank you very much, Dr. Garrick.
17 I appreciate it.

18 We really appreciate the effort that the committee
19 is putting into reviewing our research program in the waste
20 area. We appreciated the comments that you made on NUREG
21 1635 and let me just throw those up on the slide for the
22 benefit of the audience.

23 Ashok and I have looked at the processes in the
24 Office of Research and we couldn't agree with you more that
25 with limited funds we have to improve the focus of the

1 activities within the Office and to make sure that they
2 focus on the critical issues and that definitive goals are
3 set.

4 In order to do that, we initiated over the past
5 year a self-assessment. I want to talk with you -- Ashok had
6 an opportunity to talk with the ACRS and I wanted to take
7 this opportunity to talk with you folks and just give you
8 some background in terms of what we are trying to do in the
9 Office, which also directly affects the Environmental
10 Transport Program, so the objective of my briefing today is
11 to describe the process that we are using for planning and
12 prioritizing research activities. I will discuss it overall
13 for the Office and Cheryl Trottier will get into more detail
14 for the Environmental Transport Program.

15 I want to discuss the relationship of our waste
16 activities to NRC's performance goals and we are also really
17 interested in your ideas about how we should prioritize our
18 research. Let me just touch on a few points of background.

19 I know the committee is very familiar with
20 direction-setting Issue 22. This was the issue that the
21 Commission provided guidance to the Staff on the future role
22 of Research in achieving our mission, and as you will
23 recall, in that document the Commission told us to ensure
24 that we continue elements of confirmatory and anticipatory
25 research, that we are supposed to address both current and

1 emerging issues, and that we are to focus on the issues of
2 highest safety significance and that Staff should explore
3 cooperative research with DOE and the industry and that we
4 should also involve our stakeholders early in the processes
5 and also he urged us to participate with the international
6 community and make sure that we are learning the lessons
7 there and a number of these principles are very important in
8 the waste program and I will touch on those in just a
9 minute.

10 Now recently the Commission asked us to develop a
11 vision for the Office of Research and I want to discuss that
12 with you for a minute and get your feedback as to how it
13 fits in the waste arena.

14 We also realize that Research needs to be
15 responsive to the changing environment. A lot is going on
16 with the industry right now with deregulation, and of course
17 waste is one of the preeminent issues. If we don't, if it
18 is not possible to solve the waste issue in a safe and
19 effective manner, it is going to be difficult to proceed
20 with license renewal and other issues, so as we see industry
21 looking to use more efficiencies in the arena that we are
22 dealing with, several issues come to the forefront -- the
23 storage and transportation of spent fuel as well as the
24 successful disposal -- so we are focusing broadly in the
25 Office on all of those issues.

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1 Now as part of our self-assessment effort we have
2 defined a vision and objectives to guide the work in the
3 Office. I have listed here the NRC vision. I won't go
4 through it in detail, and I have also listed the Research
5 vision, to give you an idea of how the two fit together.
6 The Research vision flows in fact from the agency vision.

7 The next slide discusses the key elements of the
8 vision that we see. There are three really critical
9 aspects, as we see it, to our vision. The first is
10 technical independence from the licensees. We think it is
11 very important that there is a credible technical basis for
12 NRC regulatory decisions. Now this doesn't preclude joint
13 planning of experiments. In other words, there's advantage,
14 and we have done that with EPRI in a number of cases,
15 looking ahead and planning research so that we cannot
16 duplicate each other's work.

17 We also think that there is need for realism in
18 the technical basis and a focus of the Environmental
19 Transport Program is to bring more realism to the
20 decommissioning program right now.

21 We also feel that Research has a role to be
22 forward-looking for the agency. I think with the
23 responsibilities of the program offices to deal with
24 near-term and short-term problems Research is the Office
25 that is better equipped to sit back and sort of look at

1 where should we be five years from now, what issues do we
2 need to prepare for, so that is really a key element of our
3 vision.

4 Of course, underlying this is the maintenance of
5 technical expertise which underlies the vision and this is
6 an extremely important component of our work. The committee
7 expressed great concern about the size of the Research
8 program in Waste Management, and that is something that we
9 are very worried about too. We are trying to balance that
10 with the need to maintain a core research capability in that
11 area and I think that is one area that the committee can be
12 helpful to us in how best to do that.

13 Our operating plan is our management tool that we
14 are using to ensure that all of our activities are focused
15 on the highest priority activities. The Research Operating
16 Plan is directly tied to the four operating goals. This is
17 maintain safety, reduce unnecessary burden, enhance public
18 confidence, and increase the effectiveness, efficiency and
19 realism of the activities that we do.

20 This year we have gone to an outcome-based
21 budget -- in other words, no longer will you see
22 disciplinary efforts within the Office of Research. In the
23 past, you know, we have had efforts in the area of
24 hydrologic transport. We are now becoming more
25 outcome-oriented, which relates to the issues that we need

1 to be solved, and Cheryl is going to talk specifically about
2 the issues in environmental transport.

3 Now our goal is to both support customer needs and
4 anticipate fewer future issues, so this means that the
5 licensing offices are urging us to focus on the needs that
6 they have immediately, but we must balance that with a
7 long-term look in the area of waste management, and that is
8 another issue that we are struggling with and we will be
9 eager to hear your advice on.

10 Now an important aspect of our self-assessment was
11 the need to increase our contribution to the agency mission,
12 and our objective in doing that was really to define our
13 desired outcomes. What do we want to achieve with this
14 work, and key to that was a systematic, top-down look from
15 the Office level of what are the important things that we
16 ought to be focusing on in the Office, and out of that came
17 environmental transport and decommissioning as very
18 important to achieving Office goals -- this is bringing
19 realism and maintaining safety.

20 You will see, as Cheryl describes, that we have
21 given priority to work with the greatest outcome leverage.
22 There are a number of activities on our plate in the waste
23 management area, but because of resource constraints we have
24 been forced to ask ourselves what are the most important and
25 what weigh in with other priorities in the Office, and so

1 this has achieved some constraints in what we are able to do
2 in the waste management area.

3 We have also given attention to sunseting work,
4 which we don't think leverages our outcomes in a number of
5 areas.

6 So how did we approach this? Actually, the
7 self-assessment was a much broader activity, focusing all of
8 the processes in the Office of Research, looking at our
9 contracting mechanisms and determining if they were
10 effective and looking at our staffing. As a matter of fact
11 we have during the past year been through a reorganization
12 where we tried to better align the functions within the
13 Office to serve our needs, but today I'm mainly focusing on
14 our, what we call our pilot of the Performance Budgeting and
15 Performance Management process -- the PBPM Process, as is it
16 referred to in the agency.

17 Now we and NRR piloted this for the agency and we
18 are moving into sort of the second phase of this right now.
19 I have outlined on this slide our approach for doing this
20 planning effort, and I think two critical things that I want
21 to emphasize on this slide are the bottom two points,
22 developing outcome-based performance measures.

23 What we have tried to do with all of our work is
24 identify performance measures so we will know when we have
25 gotten there, and then we are managing to those performance

1 measures in our operating plan, and Cheryl will discuss some
2 of that with you as well in detail.

3 Just to give you an idea, as I mentioned earlier,
4 in the past we have been organized in the Office according
5 to Thermal Hydraulics and Severe Accidents. What we tried
6 to do in stepping back with this systematic process was to
7 ask ourselves where do we want to be and what are the
8 strategies that we need to use to satisfy the agency
9 mission, and on the left-hand side of the slide you can see
10 that developing the technical basis to address safety issues
11 and determining the regulatory significance of new
12 information, and preparing the NRC to make timely future
13 decisions.

14 We are now organized under these what we call
15 Planned Accomplishments, which we refer to as Key Issues.
16 Now under these we organize all of our activities, so all of
17 the activities which relate to developing and employing risk
18 information would be organized and we would prioritize and
19 we would manage those to performance outcomes, and you can
20 see on the slide that many of these Planned Accomplishments
21 have tied to more than one of our agency goals.

22 We did indicate to you that we were performing a
23 prioritization effort in the Office and as part of the 2001
24 budget submittal we tried to put everything on a level
25 playing field in the Office and using a multi-attribute

1 decision analysis method, using the analytical hierarchy
2 process we prioritized all of the Office activities in a 1
3 through N manner.

4 I have listed on this slide the criteria we used
5 to do this -- issue credibility -- in other words, what is
6 the real evidence of a problem? Do we have an actual
7 finding that shows it is important? Is it a result of a
8 risk assessment? What is telling us that the issue is
9 credible?

10 Also, what is the safety significance and to a
11 large degree we used risk assessment to the extent we could
12 in making that determination.

13 We measured the burden reduction significance --
14 in other words, what payoff would this activity have in
15 terms of burden reduction.

16 Applicability -- we looked at the number and types
17 of licensees that the activity would affect, and what we
18 actually through a parallelized comparison we came up with a
19 relative prioritization for all activities within the
20 Office.

21 Now was the process perfect? I would have to say
22 no, it wasn't perfect the first time around. It is a very
23 difficult process and we really think that we need to make
24 some improvements in the criteria. We also think that we
25 could make some improvements in the transparency of the

1 process and we are working on that right now for the next
2 budget cycle.

3 We also want to simplify the process. We had
4 developed a software tool that helped us, but we think that
5 we can simplify the process even further.

6 And another challenge that we have this year is
7 really improving our discussion of the tie between the
8 issues and the agency goals. I have included an example in
9 my briefing near the end which will give you an idea of how
10 we are trying to achieve this transparency.

11 So, in looking back over '99, we asked ourselves,
12 we have put a lot of effort into this activity, and what do
13 we think we really achieved this with effort? First, we
14 think we have, in our own mind, achieved a link between
15 research activities and agency goals. We think that could
16 be improved in our narratives and we are going to work on
17 doing that for the coming year.

18 We have developed an outcome-based budget. And
19 this has been extremely important for integration within the
20 office. What we have tried to do is tie together the
21 engineering, the risk assessment and other activities that
22 are all needed to support common issue resolution and make
23 sure that the timing of all those activities was such that
24 it would produce the outcome.

25 It promotes integration of activities. As I have

1 said, we are now finding that our divisions and branches are
2 having regular meetings on a weekly basis to talk about the
3 various inputs to the issue outcome, and I think that is a
4 very positive thing. We have developed and used a new
5 outcome-based prioritization for informing our budget
6 decisions. So as the Commission makes decisions about cuts,
7 we have a prioritization, and we have a documented basis for
8 our prioritization which helps us make our decisions.

9 In the waste area, I just wanted to give you an
10 example of what we are trying to do with this process. The
11 agency performance goal which I have used as an example is
12 reducing unnecessary regulatory burden. The research
13 planned accomplishment in this area is develop the technical
14 basis to facilitate reductions to unnecessary burden.

15 The budget issue is to develop realistic models
16 for assessing radiation exposure, and one of the activities
17 in the 2000-2001 timeframe is to examine the assumptions and
18 the conceptual model and parameters of existing models, and
19 to develop more realistic models which can be implemented in
20 computer codes. And one of our operating plan milestones is
21 to develop probabilistic version of RESRAD by August of
22 2000. So our effort in this regard is to make sure that we
23 can see, and staff can see, a clear link between what each
24 of the activities are and what the outcome goal will be for
25 the agency.

1 So let me just stop. I will be turning it over to
2 Cheryl who will discuss -- I know the committee is
3 interested in more details in the waste area, and Cheryl
4 will be providing those, but I thought it was important to
5 provide you sort of an upfront piece on where we are headed,
6 and I would be happy to answer any of your questions.

7 DR. GARRICK: Yes. I failed to mention that we
8 are asking George Hornberger to lead this discussion.

9 DR. HORNBERGER: Thanks, John. Thank you very
10 much, Margaret. Do we have questions?

11 DR. WYMER: I have one.

12 DR. HORNBERGER: Go ahead, Ray.

13 DR. WYMER: On your Viewgraph Number 10, where you
14 list your prioritization points, where in there does the
15 magnitude of the problem fit? That is, there is some
16 problems are a lot of sites, some are just at a few, but
17 some are at a single site, but it is a big problem at that
18 site.

19 MS. FEDERLINE: Right.

20 DR. WYMER: Which one of these nine does that fit
21 under?

22 MS. FEDERLINE: We would cover that under 2 and
23 under 5. Number 2 relates to the risk significance, what at
24 stake. If it is a big consequence issue, or is it a very
25 high probability, we would pick it up there. And then we

1 would look also at the numbers and types of licensees under
2 Number 5. And this is one shortcoming that I think we see
3 with the overall -- the agency goals are fine as goals, but
4 as a prioritization method, we think there are other factors
5 that need to be considered as sort of subfactors under the
6 performance goals for the agency.

7 DR. WYMER: Okay.

8 DR. HORNBERGER: John.

9 DR. GARRICK: You mentioned, I guess it was the
10 last slide, Slide 12, the NRC performance goal is to reduce
11 unnecessary regulatory burden. How are you going to measure
12 that? How are you going to measure burden reduction?

13 MS. FEDERLINE: We actually have an effort in our
14 regulatory effectiveness branch. What our intention is is
15 to go back and look at selected initiatives and see what is
16 realized when they are in place. You know, that will be, of
17 course, sort of an after the fact effort, but we believe
18 that we need to go back and look at these initiatives and
19 say, did they really pay off as we estimated they would?

20 DR. GARRICK: Yeah, the reason I bring it up is
21 because regulatory burden relief is also discussed in the
22 PRA policy statement and, of course, most applicants would
23 argue that the burden is increased, not decreased, because
24 we are in this transition period where we don't want to give
25 up the way we have done it in the past until we learn more

1 about ho to do in the future.

2 MS. FEDERLINE: Right.

3 DR. GARRICK: And that makes sense. But at the
4 same time, it seems that if indeed some regulatory relief is
5 a major component of a goal, that some sort of metric has to
6 be developed to see if you are making any progress on that.
7 That was really the reason.

8 MS. FEDERLINE: Yes. And that is really one of
9 our primary, -- as I said, we had the reorganization in the
10 office, and we felt that a regulatory effectiveness group
11 within the office that could look more broadly at office
12 activities and provide us feedback was sort of a
13 check-and-balance kind of system.

14 DR. GARRICK: Just one other comment, in your
15 multi-attribute approach, you talk about risk, safety
16 significance, et cetera. I guess one of the things I was
17 kind of looking for here was some of the underlying elements
18 of your strategy for implementing your vision statement. An
19 example of that would be that we are transitioning into a
20 risk-informed approach to regulatory practice. You do talk
21 about strategies, but I guess I was trying to -- maybe you
22 can help me see what some of the real foundations here are
23 of the strategy for implementing that vision.

24 MS. FEDERLINE: Yes, I think our strategy for --
25 you are talking about the strategies for implementing the

1 overall vision within the waste area?

2 DR. GARRICK: Right, right, right. And I am
3 looking for kind of a capstone component of that strategy
4 and what it is.

5 MS. FEDERLINE: What we have been doing is working
6 on an arena basis with NMSS and we are currently revising
7 the strategic plan. As part of that, there will be
8 strategies that we are working on, and many of them are
9 articulated -- of course, obviously, they are not the right
10 words, but many of those are incorporated in Slide 9, where
11 I am talking about improving analytical tools and data to
12 support realistic decisions. That is a key strategy for the
13 waste arena. How are we going to get to reducing burden and
14 maintaining safety?

15 DR. GARRICK: Do you think you have advanced to a
16 point now where, if you were challenged on the attribute of
17 risk, that you could put forth the risk relevance,
18 importance ranking of the research program?

19 MS. FEDERLINE: No, I don't think we have, and
20 that is one thing that Cheryl is going to be discussing with
21 you. One of our major strategies within our own program is
22 to look at a range of performance assessments. You will
23 probably recall, under DSI-22, the Commission said one of
24 the things that research does well is understand and develop
25 methods. And what we want to do is look at a range of the

1 existing risk assessment methods for waste, and look at
2 where the underlying uncertainties are. Where are the
3 uncertainties that make the most difference?

4 And my belief is that that should drive our
5 research program, and we have seen that in the
6 decommissioning area and the -- Cheryl -- the building --

7 MS. TROTTIER: Indoor resuspension.

8 MS. FEDERLINE: I'm sorry. Indoor resuspension.
9 I can't keep that in my mind. But our performance
10 assessment drove that as a key factor and so we were able to
11 actually go out and get some information from industry.
12 There are going to be places where are not going to be able
13 to get that information from industry, that we might have to
14 do some actual research. But I would see our agenda in
15 waste be more driven by our understanding of the risk
16 assessment methodologies as they exist.

17 DR. GARRICK: Okay. Thank you.

18 DR. HORNBERGER: Milt, did you have anything?

19 Cheryl, I have two questions, one quite specific
20 and the other more general. Let me do the specific one
21 first. In your new program areas, one of them, at the
22 bottom, is enhancing public confidence. And I am curious as
23 to whether you are doing research in that field, that is,
24 how NRC might improve the techniques, or whether that just
25 means that you are participating in informing the public and

1 engaging the public to create the confidence.

2 MS. FEDERLINE: I think at this point there is an
3 effort afoot to develop a communications strategy for the
4 agency, and so it is not really played out what each office
5 is going to be doing. But I can tell you in the research
6 area, one of our goals here is to enhance our communication
7 with our stakeholders, to engage our stakeholders earlier in
8 the development of the research process. Make sure that we
9 are in sort of an agreement as to what the planning is that
10 needs to be done. So our public confidence effort is mainly
11 an information exchange, a confidence.

12 DR. HORNBERGER: Okay. The more general question
13 is a difficult one because, on the one hand, as -- well, as
14 you pointed out in your first slide, we suggested that one
15 of the things that we thought that you should be doing is
16 just what you described, going through some form of
17 prioritization. Now, the trick is, of course, when you are
18 dealing with research, is how one does that and doesn't get
19 so focused on short-term objectives that you can't do some
20 of the other things that a research organization has to.

21 MS. FEDERLINE: Right.

22 DR. HORNBERGER: For example, maintaining your
23 core of excellence, or whatever your exact words were, may
24 not jibe with purely short-term payoff items.

25 MS. FEDERLINE: Right.

1 DR. HORNBERGER: How are you balancing this?

2 MS. FEDERLINE: That is a very difficult area and
3 that is an area where we would interested in your advice.
4 Let's see, if we look at -- let's see. If we look at Slide
5 10, you can see that using these criteria, for instance,
6 issue credibility, if it is a long-term issue, it is going
7 to get a lower score. It was very hard for us to capture
8 criteria in here that would adequately reflect the emerging
9 technology area. And if you can think of any that could
10 help us, we would be -- this is a problem we struggle with
11 all the time. But we have thought about it, and, you know,
12 we just haven't come up with a good answer yet.

13 DR. HORNBERGER: Of course, like most people, we
14 are better at pointing out problems than suggesting
15 solutions.

16 MS. FEDERLINE: Well, but we haven't given up on
17 the problem.

18 DR. HORNBERGER: No.

19 MS. FEDERLINE: We are still thinking about it.
20 It is just very difficult.

21 DR. HORNBERGER: And we will think also. But I
22 don't want to promise you that we will have any creative
23 suggestions for you.

24 MS. FEDERLINE: Okay.

25 DR. HORNBERGER: It is a very tough problem.

1 DR. WYMER: Actually, you are sort of on the horns
2 of a dilemma here because to be prepared for long-range
3 problems, you have to maintain a general expertise, which
4 isn't consistent with addressing specific problems. So I am
5 not sure how you ever do resolve the issue.

6 MS. FEDERLINE: Yes.

7 DR. GARRICK: One of the things I was struck by is
8 this change from a discipline-oriented approach to what I
9 might call a program- or project-oriented approach. Is
10 there any problems with that in terms of maintaining quality
11 or recruiting, or what-have-you? Because researchers tend
12 to want to be identified with a discipline more than they
13 want to be identified with a program or a project.

14 MS. FEDERLINE: Well, the way we have tried to
15 address that is by keeping a functional organization, in
16 other words, our planning and budget categories are based on
17 -- and project is not a good characterization. We have
18 tried to look at broader issues.

19 DR. GARRICK: Yes.

20 MS. FEDERLINE: You know, more sort of, more -- a
21 longer scope or broader scope issue. But the way we have
22 tried to get at that is the importance of people doing
23 important work, working together, and drawing synergy from
24 one another. We have tried to make our organization more
25 functional and bring together relationships of people. In

1 other words, risk people, you know, need to work with the
2 severe accident folks, for instance, to try to get a clear
3 relationship, to try and bring the related functions
4 together.

5 DR. GARRICK: Yes.

6 MS. FEDERLINE: It is just very difficult to go
7 and explain a thermal-hydraulics program, or an
8 environmental transport program without putting it in the
9 context of what it is we are trying to solve, or where we
10 are trying to get long-term.

11 DR. GARRICK: So it is kind of issue-based, I
12 guess would be --

13 MS. FEDERLINE: Yes.

14 DR. GARRICK: Yes.

15 MS. FEDERLINE: Yes. These are our 10 key
16 technical issues.

17 DR. GARRICK: Right, right. Yes. Now, that opens
18 up a few more questions.

19 MS. FEDERLINE: Forget I mentioned it. I would
20 like to turn things over to Cheryl Trottier. She is our
21 Branch Chief in this area.

22 DR. HORNBERGER: Thanks very much, Margaret.

23 DR. GARRICK: Yes, thanks.

24 MS. FEDERLINE: You are welcome.

25 DR. HORNBERGER: We will have to do more about

1 research just so we can get to interact with you more
2 frequently.

3 MS. FEDERLINE: Absolutely, I would really look
4 forward to that Your ideas are always very helpful to us.

5 MS. TROTTIER: Good afternoon. As Margaret has
6 said, I am Cheryl Trottier, and I am the Chief of this
7 branch. It takes too much to say it, but it has a very long
8 name, we have to change our name. But, anyway, this is the
9 first time I have come to you in this new role. As of our
10 reorganization in the spring, we have basically merged our
11 former Radiation Protection and Health Effects Branch with
12 the Waste Management Branch, so there are a lot of things
13 that, within the branch, we do differently, but it is nice
14 to see there are a lot of things which have caused
15 cohesiveness. There is a lot of interaction between the
16 kinds of work that the former Waste Management Branch did
17 and the kinds of work that we are doing in Radiation
18 Protection these days, so it is turning out to be a very
19 good mix.

20 Margaret did a good job of introducing
21 prioritization, which I am glad she did, because it is much
22 better when she does it than when I do it. But what I am
23 going to try and do is walk you through how this process
24 worked in the waste arena. And I thought I would first just
25 give you a couple of summary slides that speak to the kinds

1 of issues that were identified, and then I will talk in more
2 detail for each of those issues, the kinds of projects that
3 we are engaged in that fall under those issues.

4 So under the performance goal, maintain safety,
5 three issues came out. The first one basically dealt with
6 developing monitoring techniques for volumetric
7 contamination. And this can cover a variety of areas and,
8 as I said, I will get into more detail with that.

9 The second issue that came out was a need for
10 realistic analysis of groundwater systems.

11 And the third issue that came out was one of
12 developing monitoring strategies for the decommissioned
13 sites, because there will be cases where the licensing
14 office we believe will need some support there.

15 Then the next performance goal, and, really, for
16 the waste arena, even though they could have probably fit
17 under three categories, for the waste arena, they basically
18 fell into these two categories of maintain safety or reduce
19 unnecessary burden reduction. And as we walk through these,
20 you will see a lot of these could have fallen into
21 effectiveness and efficiency, but, in fact, for this part of
22 the process anyway, maybe down the road, they might change,
23 but at this point they are under the unnecessary regulatory
24 burden aspect.

25 And the first one, which I will spend quite a bit

1 of time on, was -- the first issue identified was to provide
2 and maintain integrated computational tools. We have talked
3 about that before, but I will give you an update on where we
4 are with that. And then the rest of these basically support
5 that and some other initiatives that are currently of
6 interest in the licensing office, that is to develop
7 realistic analysis, models that support realistic analysis
8 of radionuclide transport, data and models to support
9 realistic analysis of groundwater flow. Again, data and
10 models to assess the effectiveness of engineered systems,
11 and I will talk a little bit about that, because we may not
12 have discussed that recently. And then the last one is
13 develop data and models on contaminant degradation and
14 release.

15 I will mention that for most of these projects,
16 they were ongoing projects within the office. There is one
17 new initiative that came out of this prioritization effort,
18 and that, in fact, is on this first slide. So then to talk
19 about the projects that fell under these issues, the first
20 issue, which was the maintaining safety issue, has these
21 three projects and -- or, actually, there is more than three
22 projects because under the first issue there are two
23 projects. The first issue is the one that dealt with
24 volumetric contamination. And I want to apologize because I
25 am suffering with a cold today. I am getting to the end of

1 it, but anyway.

2 This really addresses both decommissioning and
3 support for the development of a possible rulemaking, -- we
4 are not in rulemaking space yet, -- that would support
5 clearance of material that is released from licensee
6 control. It deals with the issue of how you measure
7 volumetrically contaminated radioactive material. In other
8 words, if you are sending off soil from the site, or in the
9 case of decommissioned site, our current guidance really
10 only addresses the first few centimeters. The modeling does
11 not go down with depth. The survey techniques really don't
12 address depth. And so this work that we are having done in
13 both of these contracts will help with the techniques, the
14 survey methods, the instrumentation that will enable
15 licensees to do those kind of measurements.

16 And the next project -- excuse me -- that falls
17 under this safety performance goal is one that addresses
18 parameter uncertainty.

19 Yes, thank you, John. Gosh, you brought my water.
20 Thank you, Margaret. That is called management support.
21 Thank you.

22 Parameter uncertainty and groundwater modeling.
23 We have had that project going on for several years, and we
24 believe that this is one of the aspects that is critical to
25 the licensing office to assist them in making a lot of the

1 decommissioning decisions that face them today.

2 And then this is one of our new -- oh, I am going
3 to mention to you I have a little coding system on this
4 chart that may help make more sense out of it. I have
5 ranked these in order of priority, and those priorities were
6 really assigned by the licensing office. During the process
7 of doing our prioritization, we also met with the licensing
8 office and gave them the initial results of our
9 prioritization. And they came back to us with their
10 assessment of how close we were to the mark in identifying
11 the important issues.

12 And so the items here, or the projects that are
13 identified as high priority are those that the licensing
14 office indicated to us were a high priority. Under that
15 first bullet, I also indicated that this supports the SRM
16 that the Commission issued to the staff to go and
17 investigate a potential rulemaking on volumetric release.

18 And the reason I went back to that is this last
19 project is one of our anticipatory research initiatives.
20 That is really the reason why it has a "no priority,"
21 because NMSS focused on those areas where they had user
22 needs, and they had already identified work that they
23 needed.

24 We believe this is a critical component for the
25 Office of Research, to continue to do anticipatory work. In

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1 fact, that is why we have the experts that we have, so that
2 we can look down the road to see where the needs may be in
3 the future, because many times the research takes more than
4 a year to complete, and oftentimes a licensing office needs
5 an answer in a year. So if we just simply wait for them to
6 come to us with their needs, then many times we won't be
7 able to be responsive. So we will continue to try to
8 identify -- that is one of the things that we will get to
9 when I get to the end of this, where we are trying to refine
10 that process of how we effectively identify where the future
11 needs are. But that is a new initiative that I currently do
12 not have money for this year, but we will start it in
13 probably either the end of this fiscal year or the beginning
14 of '01.

15 Okay. Now we will move into the second
16 performance goal area, and that is unnecessary regulatory
17 burden. I will begin here with the issue addressing the
18 integrated computational tools, which at this time involve
19 three projects, enhancements to the Sandia Environmental
20 Decision Support System, which I know we have brief the
21 committee on before, and that is an ongoing project.

22 The development of a probabilistic version of
23 DandD. Now, what this is really doing, and I will speak to
24 this further as we get to the next slide, is removing some
25 of the conservatisms that are inherent in DandD. There are

1 some conservatisms that you can't get rid of because it is
2 screening code, but there are some that were put in mainly
3 in order to get the code developed quickly. The mechanisms
4 for developing the original set of defaults added
5 conservatisms that weren't warranted.

6 And the third is a fairly new initiative, and we
7 may not have come before the committee with this before, and
8 that is to develop a probabilistic version of the RESRAD
9 code.

10 I thought it might be worthwhile to digress a
11 little from the overall prioritization effort and walk
12 through a little of where we are on these computational
13 tools. Again, under DandD, the version that we have out
14 today really produces bounding estimates, and it is
15 important to remember that part of the reason for that is it
16 is based on a model that was developed to support
17 rulemaking, not necessarily as an implementation tool.

18 It has worked as a handy screening tool, and
19 really serves as a basis to help licensees make decisions in
20 that they don't actually have to know anything about their
21 site to run DandD. And in some cases, there will be
22 licensees who won't need to do anything other than run
23 DandD, and they can then make decisions about terminating
24 their licensee. They won't need to run a more sophisticated
25 code or go out and collect site data in order to make those

1 decisions.

2 Currently there is a version of RESRAD that is
3 available that has been used by licensees. The licensing
4 office specifically asked us to look at developing another
5 version of RESRAD because, while licensees are very
6 comfortable with using RESRAD, it creates a burden on the
7 licensing staff in having to review each submittal because
8 RESRAD was really developed for DOE sites, where there is a
9 lot of characterization, and you can't really run RESRAD in
10 default mode, it is not intended to be run in default mode.
11 So, therefore, the licensing office needs to have some
12 assurance about the parameters that licensees select, and
13 the effort that we are underway with now will help them do
14 that.

15 SEDSS is available today. Unfortunately, it is
16 very hard for the average user to use SEDSS. It is
17 something that the staff has been able to make sure of, but
18 the current version of it is not what we call really user
19 friendly.

20 Okay. This is what we are going to accomplish
21 this year. In fact, I believe we now have, or are about to
22 have a beta version of DandD available. Again, the primary
23 purpose of this version is simply to reduce the amount of
24 conservatism in it. It is still a screening code, it is
25 still based on the 5512 model. And, again, its only real

1 purpose is to be useful as a first step, and for a few
2 licensees who really do not have significant amounts of soil
3 contamination, I believe it will be a very useful tool for
4 all of their decommissioning decisions.

5 The work we are doing on RESRAD is similar to the
6 work that was done to develop the version of DandD that we
7 have today, in that they are using a Monte Carlo approach
8 for treating parameter uncertainty, and what that will then
9 produce is a distribution which will be sampled and
10 licensee's submittals then can be compared against those
11 distributions.

12 And the work we are going to accomplish with SEDSS
13 this year is to put together basically a PC version of
14 SEDSS. That version will still use the same modeling that
15 it has in the version we have today, and what that means is
16 it only has a one-dimensional groundwater model. So it is
17 still not going to be the kind of SEDSS we eventually hope
18 to get to, but at least it will have some improvements in it
19 this year.

20 And just to give you an indication of where we are
21 going with these, we're anticipating that by the end of
22 FY2000, the work on D&D and RESRAD will be primarily done.
23 There will be some documentation that will still be needed
24 to be completed. But the actual code work will be done and
25 will be available for licensees to use.

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1 Then the future work will focus on SEDSS. And
2 what we are doing is, a lot of the work within the Branch
3 today will support these enhancements to SEDSS. And I list
4 a few here of the areas that research that we see needed
5 down the road to help reduce the uncertainties. And that is
6 to focus on the forms of the radionuclides during release
7 and transport, during inhalation and ingestion by people,
8 and the metabolism and dosimetry of the forms once they're
9 ingested -- in other words, completing the whole process
10 eventually is our goal.

11 Now I'd like to give some examples of some of the
12 specific projects that go into supporting the development of
13 more realistic models. And under the first, which deals
14 with absorption process, there are actually two projects
15 ongoing; one dealing with the mechanisms primarily, and one
16 which is focusing on field studies. And that is a
17 cooperative effort with the USGS. And both of these are
18 ongoing efforts that are about halfway completed. Both of
19 these projects, you'll notice, were under user need, but the
20 Office has identified them as a low priority.

21 The second bullet here is model uncertainty in
22 groundwater models. This is also work that's about halfway
23 completed. And this falls into the area of anticipatory.
24 The user needed -- the Licensing Office did not provide us a
25 user need. And we do believe that the work that's being

1 done in this project will eventually feed into SEDSS.

2 The last project on this sheet, which is the last
3 bullet, is a project that is addressing engineered barriers.
4 And you've probably been briefed on this in the past, which
5 is the 4SIGHT code. That work is being done in cooperation
6 with NIST. Again, this is anticipatory work. This work, I
7 think, was originally started to support low-level waste
8 research. And what it now appears is, a lot of the
9 information that can be obtained through this code may help
10 the Staff in making decisions for any situation where a
11 licensee may choose to use the entombment option for
12 decommissioning, because it's a very useful code for
13 evaluating the concrete degradation issues that would be a
14 key element of an entombment decision.

15 This is also one of the projects that I like to
16 speak about from the standpoint of how I think the Office is
17 effectively using the research expertise that it has,
18 because in this case the Staff person actually works at NIST
19 at least one day a week. And really, that's an effective
20 way to keep researchers interested in their work and it's a
21 very effective way to use the dwindling dollars that the
22 office has because the more cooperative efforts we have
23 through the resources that are available locally -- and
24 there are a lot of resources available locally -- the more
25 benefit I think we're gonna get in the long-run. And I

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1 really encourage the staff to seek out these kinds of
2 research programs, where they can do a cooperative effort
3 with another Federal agency or university, which has the
4 equipment and tools that enables them to do the research.

5 These are examples of the last two projects -- we
6 have other projects going on in the Office, but I focused on
7 those things for which future year money, or 2000-year money
8 has been allocated. There are some projects that are near
9 in completion that did not use current dollars.

10 These are, this is the last two projects that I'm
11 gonna speak to. And these really did come under a user need
12 that supports the decommissioning decisions for the
13 licensing office dealing with primarily slags and, in
14 particular, looking at solubility and leach rates.

15 The second project is another one of the in-house
16 cooperative work. In fact, almost all of it is done
17 in-house, where the researcher spends considerable time at
18 Hopkins University doing the research. And you know, we're
19 getting very good results out of that for very little money,
20 and that's a really important feature of it.

21 And now I come to our last slide, which is the one
22 where I said of the -- primarily asking for some guidance
23 from you. The process that we went through was an
24 office-wide process. But in identifying issues, one of the
25 things the Staff has to be able to do is have some idea of

1 where to look. How do I know where the problems are? And
2 so, what this slide really lists is our ideas as to sources
3 for input in defining where future research is needed.

4 Margaret talked about self-assessment. And beyond
5 the work that we did in-house is the idea that by doing, or
6 looking at, different performance assessments, it's a way
7 for us to gain other information on areas which may need
8 further work.

9 Another area where we thought we could gain some
10 insight was from going out to stakeholders. And lumped into
11 that group is having peer review of research results to
12 identify where further work may be needed: of course,
13 working with the program offices who frequently know what's
14 needed, at least short-term; seeking guidance from groups
15 like the ACNW; participating in outside meetings, having
16 research staff participate in outside meetings and technical
17 conferences, to know how others are coming in their research
18 efforts and, and hopefully identifying where gaps exist.
19 And also that's an effective way to avoid duplication of
20 research.

21 And in some cases we have had a lot of success in
22 conducting public meetings and in doing program reviews,
23 which we have recently tried to do in a much more formal
24 way. I think last year, maybe in the Spring, Staff told you
25 about the program review that we did at Sandia last

1 December. Well, in June we conducted a program review at
2 Beltsville, Maryland on hydrology, and it was a very
3 successful program review, where numerous scientists came in
4 and discussed their research. And we shared with other
5 agencies as well at that meeting.

6 And then the third source is really industry
7 initiatives, because sometimes industry does identify
8 problems. And a good example is entombment. There are some
9 licensees out there who have indicated an interest, that
10 they may like to pursue the entombment option. Well that
11 then is a challenge for the Licensing Office, and those are
12 sometimes areas where research can help by filling in the
13 gaps on what the licensing office doesn't have in their data
14 for making those kinds of decision.

15 And that ends my formal presentation, so I'll take
16 questions.

17 DR. HORNBERGER: Thank you very much, Cheryl.
18 Don, do you want to start it?

19 DR. GARRICK: Looking at this list of sources of
20 input in defining future research, in the past, what have
21 been the top two or three sources that you've depended on or
22 that's been the most effective?

23 MS. TROTTIER: I would guess -- and see, here I'm
24 going to call on my vagrant assistant branch chief who's
25 gone off to the EDO's office for hopefully only six months

1 to maybe help because I'm very new. But I would suspect
2 staff expertise and peer review, but Bill, can you add to
3 that?

4 MR. OTT: I would say -- Bill Ott, Office of
5 Research. I guess I'll cling to that affiliation right now.

6 MS. TROTTIER: That's great.

7 MR. OTT: One particular avenue that Cheryl didn't
8 mention explicitly is that we maintain a small contract with
9 the National Academy of Sciences -- to general support for
10 one of the committees. Every year we go to that committee
11 and we discuss parts of our research program. Generally,
12 it's been in the areas of hydrology, the work on 4SIGHT, and
13 things like that. The National Academy then gives us back
14 informal feedback. We don't give them enough information or
15 enough money to come back with a formal report, but we do
16 get informal feedback from them on the content of the work
17 and the direction of the work.

18 We do, of course, aggressively go after peer
19 review. We've always done that. That's an office policy.
20 Stakeholders internally -- of course, the Office of Nuclear
21 Material Safety and Safeguards; our own staff; attendance at
22 professional meetings in which we make presentations and
23 actively go out and solicit interactions from the
24 participants.

25 This year is the first year that we aggressively

1 went out and tried to expand the program reviews. And we
2 did this in two way. First, instead of holding individual
3 project reviews, we tried to hold two or three project
4 reviews together to increase the number of scientists
5 themselves who were interacting in the program. Then we
6 invited, actually sent out letters of invitation, to a lot
7 of people. We sent them out to EPA. We sent them out to
8 USGS. Other -- the Department of Energy. We sent even
9 letters out to some of our international partners with whom
10 we do information exchange.

11 We got probably 30 percent response in terms of
12 people coming into those meetings. But Sandia one was the
13 first one and had the least participation. The hydrology
14 one in Beltsville was the second one. We had more
15 participation in that one. And some of those people said,
16 next time you go to do the chemistry, give us the call
17 rather than someplace else where you send it in the Agency
18 because we think we should have been there in Sandia.

19 We got a lot of positive feedback from the other
20 Federal agencies, both DOE and EPA, at the meeting in
21 Beltsville with regard to the applicability of the work we
22 were doing, how it would benefit them, and things they were
23 doing that were relevant to us and whether we were on track
24 to help them and that kind of thing. So it's a case of, I
25 think it's evolving. And I think we're actually making

1 progress.

2 DR. GARRICK: What's the principle mechanism of
3 getting industry feedback?

4 MR. OTT: We invited -- as I said, before this
5 year we didn't really actively invite the industry. We
6 invited NEI and EPRI to participate in both the Sandia and
7 the Beltsville workshops. EPRI participated in both of
8 them. Did NEI -- NEI did not participate in either one of
9 them, but the NEI people said that they would consult the
10 EPRI people that attended the Beltsville meeting. They just
11 didn't respond to us on the meeting out in Sandia. But
12 principally right now, that's the mechanism that we're going
13 through trying to get them to come in and see the work at
14 the ground level, where the individual researchers are
15 presenting the guts of what's going on in the program review
16 context.

17 MS. TROTTIER: And I will point out, we've had a
18 lot of public meetings as we're finalizing this guidance for
19 the license termination rule. And licensees are usually
20 eager to point out areas where they need further work. So I
21 think those kinds of exchanges are helpful in identifying
22 areas where there may be shortcomings.

23 DR. GARRICK: Yeah. Now, you said earlier that
24 you rely a lot on performance assessment work, and you also
25 made specific reference to going to the licensing people to

1 get that input.

2 MS. TROTTIER: Um hmm.

3 DR. GARRICK: Is there good correlation between
4 those kinds of searches? Are the licensing people
5 increasingly going to the performance assessments to
6 evaluate what's important?

7 MS. TROTTIER: I believe they are using
8 performance assessment more and more, and in fact that's how
9 they have identified some of the flaws that we've needed to
10 work on in the existing models.

11 DR. GARRICK: Thank you.

12 MS. TROTTIER: Bill did you want to add something?

13 MR. OTT: Yeah, I wanted to add one thing to that.
14 When you talk performance assessment in this context, you're
15 talking about it in a broader sense than applying one of
16 these models?

17 DR. GARRICK: Right.

18 MR. OTT: Because I think what we get a lot from
19 the licensing office is experience from the licensing
20 review, which may not have employed one of these models.

21 DR. GARRICK: Right.

22 MR. OTT: But they detect it in trying to do
23 analyses, no matter how they did them, that there was a
24 problem and they needed information.

25 DR. GARRICK: Yeah.

1 DR. HORNBERGER: I don't have a question; I have
2 an observation. Your page 8 viewgraphs, viewgraph you have
3 items A, B, and C. A and B are basically speciation
4 concerns.

5 MS. TROTTIER: Um hmm.

6 DR. HORNBERGER: And about three weeks ago, there
7 was a work shop held by the Nuclear Science Committee of the
8 Nuclear Energy Agency of the OECD --

9 MS. TROTTIER: Um hmm.

10 DR. HORNBERGER: -- that was specifically directed
11 at speciation in the context of waste management and
12 environmental pollution. And they're in the process of
13 preparing a report on that. And I'd be happy to give you a
14 contact if you'd care to pursue it.

15 MS. TROTTIER: Yes. We would appreciate that.

16 MR. LEVENSON: I've gotta couple of questions that
17 are "new boy on the block" questions, so they're for
18 clarification.

19 On slide 2, you talk about the need for realistic
20 analysis of groundwater systems. Is that chemical analysis
21 or computer modeling analysis? Which definition of the
22 word?

23 MS. TROTTIER: Mostly computer modeling analysis,
24 but I think I would like Tom to answer that because Tom is
25 doing more than modeling, really.

1 MR. LEVENSON: Okay, see, because the other two
2 items on that page are monitoring techniques rather than
3 modeling.

4 MS. TROTTIER: Um hmm.

5 MR. NICHOLSON: With regard to the modeling of
6 groundwater --

7 DR. HORNBERGER: Tom, give your name please.

8 MR. NICHOLSON: Excuse me?

9 DR. HORNBERGER: Give your name for the record.

10 MR. NICHOLSON: Oh -- Tom Nicholson, Office of
11 Research. With regard to the groundwater models, one of the
12 dilemmas is that depending on how the licensing staff
13 chooses their code, it may represent a very simplistic view
14 of the groundwater system and maybe a one-dimensional model.
15 It may handle things in a very lump-parameter fashion. And
16 so therefore, some people want us to take credit and give
17 information with regard to realistic groundwater flow
18 systems. And so therefore, we're trying to capture those
19 realistic flow systems by varying the code, as Cher went
20 through. We're also looking at the conceptualization of
21 groundwater flow systems.

22 MR. LEVENSON: You're giving me more information
23 than I wanted.

24 [Laughter.]

25 MR. NICHOLSON: Okay.

1 MR. LEVENSON: My question basically is, what's
2 the difference between Item 2 on page 2 and Item 3 on page
3 3?

4 MR. NICHOLSON: Item 2 on page 2 is to basically
5 look at groundwater flow systems so we can think of it in
6 terms of one-, two-, three-dimensional models. We can also
7 look at various processes. We can handle heterogeneities
8 with regard to realistic groundwater flow models. So Item 2
9 on page 2 is more oriented toward modeling. Now what we the
10 other question, Sir, on page 3?

11 MR. LEVENSON: Page 3, Item 3, which I think is
12 what you just said.

13 MR. NICHOLSON: Yes. That is almost identical.
14 Yes, it is.

15 MS. TROTTIER: Actually, Tom -- because we had
16 this confusion with trying to write these short. This is
17 the, the -- Item 1, page 2, is the PNNL work.

18 MR. NICHOLSON: Okay.

19 MS. TROTTIER: And item on page 3 is the Arizona
20 work.

21 MR. NICHOLSON: Okay. With regard to the PNNL
22 work, the investigators at PNNL are looking at uncertainties
23 with regard to the parameters. So it's parameter
24 uncertainty they're looking at. And some of the models used
25 in decommissioning have generalized to use default values.

1 And now people want to put in what would be more realistic
2 values. So PNNL is coming up with distributions of
3 parameter. So if you know the soil textural class, you can
4 go then to a table and look at what the ranges would be in
5 sampling from those.

6 With regard to the other project, conceptual model
7 uncertainty, that's going on at the University of Arizona.
8 And that's what I described earlier, looking at issues of
9 dimensionality, looking at issues of scale, heterogeneity,
10 the type of assumptions you make when you choose your model.

11 DR. GARRICK: Are analogs being used in the
12 conceptual model uncertainty analysis?

13 MR. NICHOLSON: No.

14 MR. LEVENSON: One page 4 -- I hope the third
15 bullet where you say "no priority" was intended to be "no
16 priority from licensing people"?

17 MS. TROTTIER: Yes --

18 MR. LEVENSON: As I think --

19 MS. TROTTIER: And resisted -- the first time I
20 did these slides, I didn't put anything there because it
21 bothered me so much to see "no priority." But for accuracy,
22 I put it in. What it means is that priority designation
23 came from the licensing office. And if it was an
24 anticipatory activity on the part of Research, which meant
25 they did not have a user need, then they labeled it as "no

1 priority."

2 MR. LEVENSON: Okay, but I hope it's your office
3 priority --

4 MS. TROTTIER: It is our office priority.

5 MR. LEVENSON: -- would not automatically follow
6 necessarily any of their priorities.

7 MS. TROTTIER: No. No, no it doesn't. But it
8 was, if you remember from what Margaret spoke with you
9 about, user need was an aspect of our prioritization.

10 MR. LEVENSON: I just have one other question. On
11 page 11, on the input on defining future research, having
12 been on quite a few Academy committees over the years and
13 having been on many peer reviews, normally the guidance you
14 get is to review what people are doing. Does your request
15 to the Academy committee ever say, don't bother reviewing
16 what we're doing; what's more important is, can you identify
17 what we're not doing that we should be doing. Is that
18 question ever posed?

19 MR. NICHOLSON: Yes it is, Sir. Jake Philip and I
20 go to these National Academy of Science -- Jake is the
21 liaison to the Board on Rock Mechanics. I'm the liaison to
22 the Water Science and Technology Board, and yes, we do ask
23 that question.

24 MR. LEVENSON: But that's a very limited area if
25 it's only asked of that Board, isn't it?

1 MR. NICHOLSON: We have -- last March, we were the
2 principle sponsor, along with DOE, of a workshop on flow
3 through the fractured vadose zone. It was dealing with
4 conceptual models. And we and the National Academy of
5 Science organized a panel and brought in a large
6 international group to look at conceptual models of flow
7 through fractured rock in the unsaturated zone. And at that
8 time, we were actively looking obviously for input from a
9 variety of scientists -- source scientists, hydrogeologists
10 --

11 MR. LEVENSON: Well, I didn't mean extremely
12 limited in your source. I mean, you're asking a very, very
13 narrow question. There are many other questions in the
14 waste area. There should be research going on. So if you
15 ask experts in rock mechanics what you should be doing, you
16 may get a very good list of things, but there are a lot of
17 things other than rock mechanics. How do you get -- is the
18 National Academy committee that narrowly defined for this
19 purpose, this group?

20 MR. NICHOLSON: Well, as I said before, the other
21 committee we interact with is the Water Science and
22 Technology Board. And there's also a Board on Radioactive
23 Waste. Now, we're not the contact on that; that's NMSS.
24 But we actively attend the meetings and discuss with them
25 various projects. They review every year, they go through a

1 process where they bring in invited speakers and go through
2 a variety. Often it's DOE, either DOE clean-up of former
3 material sites, or Yucca Mountain. And we learn an awful
4 lot through that also.

5 DR. HORNBERGER: But to follow up just a moment on
6 Milt's questions, research does not liase with BRWM. You
7 simply, you liase with rock mechanics and WSTD.

8 MR. NICHOLSON: Right. Right --

9 DR. GARRICK: I guess the connection I'm trying to
10 make there is, Margaret talked about moving away from a
11 disciplinary approach, more to a multi- or interdisciplinary
12 program approach. And just as an observation, the Board on
13 Radioactive Waste Management is much more oriented toward
14 the latter than the former and it could be an important
15 inter-liaison for research as well, especially if this is a
16 change in the strategy.

17 MR. NICHOLSON: Um hmm.

18 MS. TROTTIER: Yes, I think we need to make sure
19 Research participates in those meetings and asks those
20 questions.

21 DR. HORNBERGER: From the other side, I'll just
22 make a remark, because one of the other things I do is chair
23 the Commission on Geosciences and Environment Resources,
24 under which is the Water Science and Technology Board and
25 the Board on Radioactive Waste Management. At any rate, we

1 just went through a review of the Board on Radioactive Waste
2 Management, and one of the messages that was certainly
3 suggested to them is that their meetings could really play
4 an important role if it provided a forum, not be so tightly
5 restricted to DOE issues, but not to have broader issues.
6 So BRWM might be quite responsive to hearing from you.

7 MS. TROTTIER: Good.

8 DR. GARRICK: We've got a lot of incest.

9 [Laughter.]

10 DR. HORNBERGER: Any other questions? Cheryl, I
11 have, let's see, a couple of questions.

12 On page 9, where you went through several of the examples,
13 my question is, do, would I expect to see the listing in
14 terms of the priority rankings somewhat different in the
15 future after having heard Margaret's pitch as to how you've
16 gone through prioritizing. Because, when I go down this the
17 user need, low priority; the next ones are anticipatory --
18 anticipatory. So I don't see any on here that are user-need
19 high priority. I'm, am I right in inferring that in the
20 future I might expect to see one or two there?

21 MS. TROTTIER: Well, what I didn't mention is I
22 listed these in order of their priority. So when I got to
23 page 9, I was moving into the lower priority things. And
24 the one under reducing unnecessary burden that were highest
25 on the priority were the three codes. Those three came out

1 as very high -- or at least that issue. I shouldn't say
2 those projects, because this was an issue-based
3 prioritization. That issue came out high on the
4 prioritization because it was high as a user need.

5 I think the future prioritization may change this
6 some. It's hard to say. You know, this was our first
7 attempt --

8 DR. HORNBERGER: And I, I don't mean to do
9 anything like cast dispersions on any particular project.

10 MS. TROTTIER: Yes.

11 DR. HORNBERGER: I was asking a much more general
12 question. Just in general, might I anticipate seeing more
13 that don't either fall into the anticipatory or the low
14 priority category?

15 MS. TROTTIER: Yes, you might. You most likely
16 will.

17 DR. HORNBERGER: John, did you have a follow-up?

18 DR. LARKINS: Yes. If you use the attributes that
19 are listed in Margaret's presentation on page 10, then
20 aren't you always going to come out with your anticipatory
21 programs being ranked lower --

22 MS. TROTTIER: Yes.

23 DR. LARKINS: -- than those for which you have a
24 research request?

25 MS. TROTTIER: Yes.

1 DR. LARKINS: And in times where you have
2 competing dollars, it seems like that might automatically
3 eliminate the anticipatory work from the other.

4 MS. TROTTIER: That's going to be a challenge for
5 the Office. It's going to be a particular challenge if we
6 go to agency-wide budgeting by arena. In other words, not
7 office-wide budgeting, but if we go to agency-wide
8 budgeting, then that anticipatory work is going to be really
9 hard to compete in the face of licensing.

10 DR. LARKINS: Right.

11 MS. TROTTIER: So, I --

12 DR. LARKINS: I might suggest that when you do
13 your multi-attribute decision or AHP, that you look at
14 weighting different factors.

15 MS. TROTTIER: Differently.

16 DR. LARKINS: Differently.

17 MS. TROTTIER: Yeah, that's my fear is how we
18 maintain our -- it's important to maintain our anticipatory
19 program.

20 DR. HORNBERGER: Absolutely. Absolutely. That's
21 again one of the difficult issues that I painted for
22 Margaret that I wanted to disabuse her the notion that we
23 might solve that problem for you.

24 MS. TROTTIER: Right. I understand that. Bill,
25 did you want to add something?

1 MR. OTT: Margaret made the observation that the
2 process we used was fairly complex. It's complex only in
3 the number of factors that are used; conceptually, it's not
4 that difficult. But it's almost too simple to say that it
5 automatically ranks low if it doesn't have user need,
6 because there are so many factors that were considered that
7 if something with a user need doesn't also have some factor
8 like leverage or something like that that can boost a
9 project above one that has a user need because it's only one
10 of -- I think if you total the number of factors, it's
11 something like 20 that get various scores in this process.

12 DR. LARKINS: So there are more than nine that are
13 listed.

14 MR. OTT: The nine that are listed are the primary
15 criteria. Under them there are sub-criteria, and then there
16 are importance measures and things like this. So things
17 can, can adjust based on relative scores because they're not
18 always necessarily related to user need.

19 MR. KING: Tom King. Let me follow up on that.
20 There are only nine factors. Each one has a different
21 weighting to it, so they're not all weighted equally. And
22 under each of the nine factors, there are some sub-criteria
23 that tell you, for that factor, should it get the full
24 weight, should it get some fraction of that weight,
25 depending upon how well, for that factor, certain

1 sub-criteria are met.

2 So there's really only nine factors, but there are
3 a score -- each of the nine factors, and then each of the
4 nine factors themselves have different weighting. And we
5 can get you the numbers, the weighting scheme if you want to
6 see it. But it is complex.

7 DR. LARKINS: I guess the only question I would
8 have is, how do you do budget reductioning significance?
9 And then you have to have an estimate of what the impact of
10 once you develop an outcome, how that outcome is going to
11 reduce the burden, for individuals, for licensees, for
12 staff.

13 MR. OTT: Believe me, we struggled with issues
14 like that.

15 DR. HORNBERGER: Yeah.

16 MR. OTT: And the other point that Margaret made
17 is that it's changing. This was the first attempt. And
18 there could be a change in the criteria structure as well as
19 the weighting scheme in this next go-around based on the
20 experience that we had last time.

21 DR. HORNBERGER: And I think that it's clear. And
22 I think everybody who's gone through anything like this is,
23 recognizes that there's a certain arbitrariness to how you
24 assign the weights and how you divvy things up and how you
25 estimate this. But I think that the important thing is that

1 you go through the process and you recognize those nine
2 factors. And what you wind up with, you hope, I think, is a
3 balanced portfolio, which is I believe what you're all
4 looking for.

5 MR. KING: Yeah, and we didn't blindly follow the
6 numbers that came out. They informed the decision process.
7 Other factors came in as well.

8 DR. HORNBERGER: Of course. Well, I would hope
9 so.

10 MR. KING: Cheryl, my other question has to do
11 with your, on the slide you list the sources of input in
12 defining future research and how you get outside input, if
13 you will. And my question has to do -- so you conducted
14 these public meetings, and I think I -- I certainly talked
15 to Bill and probably Tom, and they both told me that the
16 June workshop in particular they were very happy with.

17 MS. TROTTIER: Right.

18 MR. KING: Now my question is, when you conduct
19 these things, is there some written record? Is there a
20 written report?

21 MS. TROTTIER: Yes. And in fact, on the June
22 workshop we published proceedings or are publishing
23 proceedings.

24 MR. KING: Okay.

25 MS. TROTTIER: We normally transcribe them, so

1 there is a written record.

2 MR. KING: Okay, but proceedings, that would be
3 the presentations.

4 MS. TROTTIER: Right.

5 MR. KING: What I am wondering is, when we think
6 about how ACNW might give its input, if there were some
7 record of, ah, here are the lessons that we learned. Here
8 is the evaluation. Here is somebody's comments, outside
9 comments on the research. Or here's the Staff's take on
10 what we learned. Is there anything like that written?

11 MS. TROTTIER: There is a transcript. But you're
12 really looking for more than a transcript.

13 DR. HORNBERGER: A transcript --

14 DR. GARRICK: We're looking for an evaluation of
15 the -- yes.

16 MR. OTT: We need to back off on that a little
17 bit. The decommissioning workshops, we had transcripts for.

18 MS. TROTTIER: Right.

19 MR. OTT: The research program reviews, we did
20 not.

21 MS. TROTTIER: I know that. We did not.

22 MR. OTT: We did not have a transcript for those.
23 It was our intention for the Sandia workshop to put together
24 a summary. Our intentions were better than our performance
25 and we didn't do that. I don't know if you did that for --

1 MR. NICHOLSON: We did put a short summary
2 together.

3 MR. OTT: Tom put a short summary together for
4 the hydrology workshop. So the first one, our intentions
5 were great. We didn't quite follow through. We've begun
6 following through on hydrology. Hopefully, the next time
7 we'll have our act together and we'll have a good written
8 summary after the conclusion, sort of learning this process
9 as we go along and trying to get, you know, more input into
10 the program.

11 Our primary reason for not having a transcript was
12 to not have it be a detriment to open flow of information.
13 And there were people there from other Federal agencies that
14 have licensing responsibilities and all the rest of that.
15 And they won't necessarily say things on the public record
16 that they will if it's not recorded. So we deliberately did
17 not do that. And any summary would necessarily, not
18 necessarily attribute views to individuals to individuals as
19 much as views to discussion or summaries of the discussions
20 that went on.

21 DR. HORNBERGER: Believe me, I don't want to read
22 a transcript of any of these anyway.

23 [Laughter.]

24 DR. HORNBERGER: That wasn't my point.

25 MS. TROTTIER: Right.

1 DR. HORNBERGER: But if there is a summary, for
2 example, that Tom has prepared, it would be very useful for
3 that to be provided to ACNW. It would also, to tell you the
4 truth, be useful, I think, to us -- you have your solicited
5 input from outside experts who attend meetings at technical
6 conferences. And I understand that this is all done in the
7 hallways for the most part. Nevertheless, if your people
8 write a trip report when they come back from such things,
9 particularly if the trip report says, yes, in the discussion
10 this is an issue that came forward, these kinds of things I
11 think would be useful to us to see.

12 MS. TROTTIER: Okay. We can do that.

13 DR. HORNBERGER: Anything else?

14 DR. GARRICK: No.

15 MS. TROTTIER: Thank you.

16 DR. GARRICK: Thank you. We're right on schedule
17 -- unless there's another presenter. You don't have another
18 presenter?

19 MS. TROTTIER: No.

20 DR. GARRICK: All right. Then we are right on
21 schedule, and our agenda says at this point, we have a break
22 and we'll take that break right now.

23 [Recess.]

24 DR. GARRICK: Could we come to order, please.

25 Our next agenda item is on rubblization and the committee

1 member that's gonna lead the discussion on this is Dr.
2 Wymer. And I guess Larry Camper and Larry Pittiglio are
3 going to conduct the briefing.

4 DR. WYMER: Well, you just stole my thunder.

5 [Laughter.]

6 MR. CAMPER: That's it, huh?

7 DR. WYMER: So please proceed.

8 MR. CAMPER: Well good afternoon. It's a
9 pleasure to be with you again. And we're going to cover
10 with you this afternoon a concept on this rubblization. And
11 it is interesting and challenging concept.

12 The license termination rule went into effect in
13 August of 1996. That rule established criteria in Part 20,
14 Subpart E for restricted and unrestricted release of sites
15 and unrestricted released in 20.1402. And now the Staff is
16 implementing that rule. And we find that license
17 termination plans are coming in. Concepts are emerging from
18 industry to fulfill the requirements of the rule. And what
19 we're going to discuss with you today is one of those
20 concepts.

21 I emphasize that it's a concept because we don't
22 have an application yet, and therefore it's, it's somewhat
23 difficult to talk about the specifics of a particular
24 application, perhaps to go into a meaningful discussion in
25 terms of quantitative data and things of those nature. But

1 the concept is coming and there will be variations of this
2 concept, we believe. So I think that there are two very
3 valuable things that the Committee can do for us at this
4 juncture.

5 One is, having reviewed the paper and these
6 slides, if you have major observations or thoughts, concerns
7 about the concept, the approach, or the approach the staff
8 is taking, it would be interesting to hear those.

9 And probably more even more important would be,
10 given that the Staff does not believe that there's a policy
11 matter here, rather there is a concept and informational
12 issue here -- which is why we prepared the Commission paper
13 -- if you have thoughts that might aid us as we review
14 applications and go about the concept of rubbleization, that
15 would be of great value to us.

16 Rubblization -- what is this term? -- which, by
17 the way, no one can agree upon how to spell.

18 [Laughter.]

19 MR. CAMPER: -- simply stated, it's the
20 demolition of concrete structures combined with the use of
21 some or all of the resulting rubble as on-site fill. Next
22 slide.

23 We do, as I pointed out, believe that this is an
24 implementation issue rather than a policy issue, but we have
25 prepared a Commission paper for the Commission's awareness.

1 We want to do this because it is controversial in nature.
2 If you had the opportunity to review the Commission paper,
3 you'll note that it contained a number of enclosures. The
4 enclosures cover a broad spectrum of views. Some for; some
5 strongly against, and some in between.

6 What I'm sharing with you today, of course, is the
7 Staff's views as presented in the Commission paper.
8 Obviously we will see what the Commission has to say about
9 it in the near-term.

10 One of the things that makes this concept somewhat
11 sensitive is that it was not specifically considered within
12 the statements of consideration. But as the Staff points
13 out in the paper, we believe that it is consistent with the
14 license termination rule and would be an acceptable means
15 for meeting the license termination rule, provided obviously
16 that the conditions of the rule are satisfied.

17 Rubblization concepts applies to contamination
18 concrete buildings, primarily at reactor sites, although
19 they would not have to be limited to reactor sites, but
20 primarily reactor sites. Removing equipment from the
21 buildings, obviously in the early stages of dismantlement
22 and decommissioning.

23 Decontaminating the building surfaces using
24 scabbling or some other means. These building are primarily
25 the turbine building, the reactor building, spent-fuel

1 building, and some auxiliary buildings, and demolishing the
2 above-grade part of the structure, which is going to then
3 create rubble materials ranging from gravel size to very
4 large blocks. It's going to result in a very heterogeneous
5 mix of contaminated and non-contaminated materials. Next
6 slide.

7 The next step then is to place the concrete rubble
8 into the below-grade structure. Perhaps three walls would be
9 left standing, and some of the approaches as they were being
10 put in below surface. Grading the site to a restored
11 condition.

12 And in couple of minutes Larry particularly is
13 going to show you exactly what that looks like. This is the
14 classic green field effect, if you will. It will involve
15 modeling, how the licensee will consider these elevated
16 areas of contamination, the fact that it's a heterogeneous
17 mix, possible intruder scenarios. And this may vary from
18 licensee to licensee. It probably will, and they have the
19 capacity to propose different models.

20 It means satisfying the license termination rule
21 -- i.e., 25 millirem and ALARA; all pathways considered.
22 And there will probably be variations on this theme. Next
23 slide.

24 A number of issues or considerations had emerged.
25 Some of them were controversial, resulting from a number of

1 stakeholder concerns. The papers, issues papers are
2 contained within the Commission paper, and I'll come back to
3 those key issues in a couple of minutes.

4 Leaving rubblized concrete on-site is not new.
5 Similar approaches were taken at Shoreham Nuclear in Ft. St.
6 Vrain, and the large concrete blocks were left on-site.

7 The sites were subsequently released for
8 unrestricted use. However, there are new aspects under the
9 rubblization concept. Those being, placing the rubblized
10 concrete below grade structure and below grade structure;
11 demonstrating compliance with the 25 millirem per year,
12 which wasn't in place at the time we released the earlier
13 sites that I mentioned; and higher levels of residual
14 contamination.

15 Now, the higher levels of residual contamination
16 is one of the more sensitive issues of the concept. These
17 values can be several times higher than the building
18 occupancy scenario using the D&D. Those values were
19 published in the Federal Register notice in November of
20 1998. So the licensee would decontaminate up to a point,
21 and the values may be higher, may be higher than would be
22 the values in the table that I cited in the Federal Register
23 notice. Next slide.

24 NUREG 1496, which is the generic environmental
25 impact statement in support of the radiological criteria of

1 the license termination rule at nuclear facilities did not
2 specifically address the concept of rubblization. However,
3 the Staff believes that there is encompassing language
4 within that GEIS, and we point that out in the Commission
5 paper, that gets at the concept of recycling and the doses
6 associated with recycling. And we believe there's an
7 adequate level of conservatism built into the GEIS to
8 address this type of approach because of dilution and so
9 forth of the material.

10 The licensee of course though will have to
11 identify and address possible exposure pathways. These can
12 be groundwater considerations, resident farmer
13 consideration, and possible excavation. And we'll have to
14 develop intruder scenarios.

15 There is a need for guidance for dose assessment
16 modeling. We have not yet received an application. We've
17 not yet reviewed conceptual models. Therefore, the Staff is
18 going to have to develop guidance along the way as we
19 receive these, and we plan to do that as we go through a
20 case-by-case review.

21 There are two big things that drive this concept
22 for the industry -- that being, a reduction in the volume of
23 low-level waste. The point is that walls would be scabbled
24 to a certain point. Somewhat higher levels of residual
25 contamination would be left behind; therefore, there would

1 be overall less material to be removed and taken away to a
2 burial site.

3 And there is substantial potential cost savings.
4 The Staff includes in the Commission paper, or will include
5 in the Commission paper, an example of what those savings
6 might be. The value is somewhere on the order of \$8- to \$16
7 million per site, so there is a substantial economic driver
8 in this for industry. Next slide.

9 There are a number of stakeholders. We did hold a
10 public workshop recently in August, and there was a session
11 during that workshop on rubblization. We did that because
12 we wanted to afford an opportunity to get direct input from
13 stakeholders. And there was a lot of dialog.

14 The stakeholders, the most viable stakeholders or
15 the most readily apparent stakeholders that we have
16 identified thus far are NEI, utilities, the public,
17 environmentalists, states, Federal agencies -- in
18 particular, EPA -- and low-level waste compacts. Now the
19 issues papers that are included within the draft Commission
20 paper includes issues papers from NEI, from the Sierra Club,
21 and from the State of Maine. There are two letters from the
22 State of Maine. We have nothing in writing at this point
23 from EPA. We have a verbal indication of EPA's concerns,
24 and the concern that we've heard expressed thus far is
25 whether or not this type of site would require a RCRA

1 permit.

2 We did have a meeting with EPA last week on some
3 other issues, and at that time they indicated to us that
4 they would try to provide us with a one- to two-page summary
5 expressing their concerns. And if we can get that in a
6 timely manner, we will include that in the paper as well.
7 If not , we'll provide it to the Commission as an addendum
8 to the Commission paper.

9 DR. HORNBERGER: Larry, could I interrupt for
10 just a second?

11 MR. CAMPER: Sure.

12 DR. HORNBERGER: RCRA would apply even if there
13 were no hazardous materials other than radionuclides?
14 That's EPA's interpretation?

15 MR. CAMPER: Yes, because of the concrete and the
16 water leaching through the concrete and that type of thing.

17 DR. HORNBERGER: But nothing but, besides
18 radionuclides to lead to contamination?

19 MR. CAMPER: I believe they have, they've really
20 not articulated fully their concerns. They've only
21 indicated to us that they believe that this type of approach
22 may warrant a RCRA permit. They've really not been specific
23 on that point. We would love to get more of an
24 articulation, frankly. And we hope that we will.

25 So the issues papers that are contained within the

1 Commission paper support the number of a concerns. What
2 we've tried to do in this particular graphic is to cull out
3 the big ones, the first being ALARA. There is some concern
4 that the approach would not be ALARA. Leaving some material
5 behind is not consistent with ALARA in the minds of some.
6 Now the Staff intends to review these applications on a
7 case-by-case basis, and we will be looking closely at the
8 ALARA consideration.

9 I think that that fundamental question that you
10 get into when you look at ALARA -- there are really two.
11 How far do you go in scabbling? How much material is left
12 behind? And does that seem reasonable, considering the fact
13 that costs to do further decontamination, given that you're
14 already in the dose range of 25 millirem or less and it
15 costs a lot of money to do decontamination.

16 And if you compare that to the value of \$2,000 per
17 person rem averted exposure, you can readily see that you
18 can spend a lot of money very quickly in reducing that
19 exposure only a very few millirem, if any. So I think
20 that's going to be a challenging issue for the licensees and
21 it's going to be a challenging issue for the Staff. And I
22 think that's probably going to be one of the biggest
23 challenges that the industry and the NRC faces as we look at
24 these. DG-4006 does address the ALARA concept. It provides
25 guidance for licensees to follow as they go about dealing

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1 with this issue.

2 There's a concern by some that this approach would
3 represent a departure from previous practice -- i.e., take
4 away as much material as you can. We have had sort of an
5 operating philosophy, if you will, that we would remove all
6 possible radioactive material.

7 However, the Staff looks at the license
8 termination rule, which contains now a dose-based standard
9 which says 25 millirem an ALARA. And that seems to imply
10 that some material, albeit small quantities, could be left
11 behind. And therefore, we believe that the approaches can
12 be consistent with the license termination rule, but there
13 are those that are concerned that it is a departure from
14 previous practice.

15 There's also the concern in the minds of some that
16 this is equivalent to a proliferation of low-level
17 radioactive waste burial sites, that there would be multiple
18 sites across the country -- where there were previously
19 operating reactors, now there are piles of rubble buried
20 beneath the surface that contain trace amounts of
21 radioactive material, or minor amounts of radioactive
22 material. And the question that is asked, isn't that really
23 the same as a low-level waste burial site?

24 And another question that gets asked: Isn't that
25 really the same as a low-level waste burial site? Another

1 question that gets asked is, does that warrant the Part 30
2 license? Or, isn't this really a Part 61 type of activity.

3 The Staff, as we stated in the draft paper,
4 doesn't think so. We think there's a distinct difference
5 between relatively small amounts of radioactive material
6 being left behind, consistent with the dose-based standard
7 in Part 20, Subpart (e), versus operating a low-level
8 radioactive waste site license under Part 61 to receive
9 materials from other licensees and so forth.

10 The first three points -- ALARA, departure from
11 previous practice, proliferation of low-level sites -- are
12 somewhat philosophical in nature, as opposed to being purely
13 technical in nature. But be that as it may, they are issues
14 that the Staff has tried to address in the paper, express
15 our thinking on and will continue to deal with, I'm sure, as
16 we interface with licensees, possible hearings, and that
17 type of thing.

18 The last point is that there is a feeling by some
19 that there is a potential conflict with the proposed
20 initiative on control of solid materials. Again, the staff,
21 at this juncture, draws a distinction between release or
22 control of release of solid materials at operating
23 facilities versus release for unrestricted use in a site
24 that is undergoing license termination. However, we think
25 that this point will need to be clearly addressed in the

1 statements of consideration for the control of solid
2 materials initiative, should that initiative come to
3 rulemaking.

4 Next slide. So, how are we trying to deal with
5 this? We've been talking about it a lot amongst ourselves;
6 we have been interfacing with industry on it; we have
7 discussed it at great length within the decommissioning
8 board; and we are preparing a Commission paper to make the
9 Commission aware of this emerging concept.

10 We don't believe that there is a policy issue
11 here, which is why the paper is structured as an information
12 paper. We believe that the approach provided for licensee
13 clearly demonstrates satisfying the criteria the License
14 Termination Rule is an implementation issue. But because it
15 is controversial and because there has been some concern
16 expressed, for example by the State of Maine, we believe
17 that we need to be very sensitive to those concerns and we
18 want the Commission to be aware of those issues; and should
19 the Commission have some concern and, of course, tell the
20 staff as to what those concerns would be, then we would make
21 modifications accordingly.

22 Now, this concept rubblization is the first of
23 these types of concepts, but there will be others and there
24 will be variations to rubblization. But -- and I think that
25 the staff will continue to keep the Commission informed

1 along the way, if there are sensitive and controversial
2 approaches that emerge. We, also, stated in the paper that
3 prior to approving the concept of rubblization in a given
4 license termination plan, review, and approval, we would
5 inform the Commission.

6 We're going to do a case-by-case review. Given
7 that there is no guidance currently on this in particular or
8 given that there is still some modeling issues to be thought
9 about and worked through, it may be a little bit slower
10 process, as a result of that. But until such time as we get
11 some of these, can see how it actually goes, what is the
12 actual submittal to us, we'll have to do these on a
13 case-by-case basis and develop guidance along the way.

14 The licensee will have to meet the License
15 Termination Rule, obviously. The licensee will need to
16 clearly demonstrate that they've satisfied ALARA and that
17 they've met the 25 millirem and ALARA standard. If they do,
18 as we expressed in the draft Commission paper, the staff
19 believes it would be appropriate to approve the concept.

20 I mentioned we are informing the Commission, at
21 this point, as to how we want to proceed and why. We'll
22 keep the Commission informed along the way, as we gain
23 additional experience and knowledge with the concept, and we
24 would go to them on each specific approval.

25 Larry is going to -- Larry Pittiglio, and I think

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1 most of you know Larry. Larry is an engineer within the
2 Division of Waste Management in my branch. Larry is the
3 project manager for the rubblization paper. He's been very
4 involved from the beginning. He is the author of the paper.
5 He has been actively involved in the discussions and
6 presentations. And what he is going to try to do now is
7 sort of put this into some pictures for you, which I think
8 helps to see, and then I'll come back and make a few summary
9 comments.

10 MR. PITTIGLIO: The first picture you see is
11 simply a picture of the Maine Yankee facility. That's the
12 way it is today and that's the way it looked when it
13 operated. But, it's just a presentation of the facility.

14 This next picture I'm going to put up is what the
15 facility will look like with rubblization. Basically, the
16 licensee, in a proposed decommissioning or license
17 termination plan, had committed to green field the facility.
18 That meant removing of all the structures. So, that's an
19 artist type conception of what the facility would look like
20 after decommissioning is complete.

21 This particular picture right here shows the
22 containment. The red represents the concrete part of the
23 structure. As Larry had mentioned, in the rubblization
24 approaches that we've seen, all of the equipment would be
25 removed from the facility and the above-grade part of the

1 structure would be knocked down and rubblized and placed
2 into the below-grade structure.

3 Basically, the over piece that I just set on it is
4 what you would see below grade. That would be what would
5 remain. The blue represents the concrete shelf filled with
6 rubblized concrete material. That would be between three
7 and ten feet below grade, depending on the approach. And
8 the green field picture is really what the site would look
9 like as it's regraded.

10 What is rubblization? We just have a couple of
11 construction pictures to show you. That's typically what
12 rubblization is, variation in chunks of concrete. This
13 particular picture just shows a building being knocked down,
14 the rebar. What we'll see, as far as a proposal, whether it
15 be large pieces of rubble with rebar or granular sizes, we
16 don't know. The concept allows significant variation.

17 And, again, I just have one more construction
18 picture to put up. Again, that's just some more rubblized
19 concrete.

20 MR. LEVENSON: It looks more like destruction than
21 construction.

22 SPEAKER: It does, doesn't it.

23 DR. GARRICK: The size of that rebar is
24 considerably smaller than the containment rebar.

25 MR. PITTIGLIO: Yes.

1 MR. CAMPER: So, in the final analysis, you'll see
2 that this concept is interesting; it's challenging; it's
3 somewhat controversial. It is the first of many, as I've
4 mentioned, to address the License Termination Rule. The
5 staff believes that we have a dual goal. One the one hand,
6 we need to be performance oriented and risk informed, as we
7 evaluate this concept, and we do believe that it is
8 consistent with what we interpret it as a performance
9 oriented rule; yet, we have to ensure that we satisfy the
10 specific criteria of the rule -- i.e., 25 millirem and
11 ALARA.

12 There are a number of technical and policy issues
13 to work through. We've identified those with an attachment
14 and we'll address those as we go along case-by-case. And we
15 may see this as early as the Maine Yankee LTP, which we
16 actually anticipate getting very soon now. There has
17 actually -- there's been talk of us receiving it in
18 November. I notice representatives from Maine Yankee are
19 here today; perhaps, they can give us their current thinking
20 and time line. But, it is coming very soon. And so, that
21 is why we feel a sense of urgency in getting your
22 perspectives and we do appreciate you putting us on your
23 agenda. And we feel a sense of urgency, obviously, in
24 getting the Commission paper up to the Commission and their
25 staff, so that they can take a look at this, because we will

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1 be dealing with it in real time, in a real case, we think,
2 very shortly.

3 So that's all of our formal comments. We'll be
4 happy to try to entertain your questions and hopefully have
5 some good answers for you. Thank you.

6 DR. WYMER: John, do you have any questions?
7 Comments?

8 DR. GARRICK: Well, yeah, a little bit. What can
9 you say about land use for the option of rubbleization?

10 MR. CAMPER: Well, the approach that is being
11 proposed is unrestricted use. As you know in Part 20,
12 Subpart E, there are two pathways that a licensee might
13 follow: restricted use or unrestricted use. This is being
14 envisioned -- this is envisioned under unrestricted use.

15 DR. GARRICK: Well, suppose somebody wants to
16 build a big facility, where it's required that they dig into
17 the rubble. Is that -- does that present any unusual
18 problems?

19 MR. CAMPER: It doesn't present an unusual
20 problem, but it does present a problem, in that the licensee
21 is going to have to consider intruder scenarios, including
22 excavation or possible excavation of the site; subsequently,
23 someone coming in and removing the rubble and deciding to
24 turn the remaining three walls into some type of living
25 quarters. Therefore, there is an occupancy consideration

1 that will have to be considered. There is intruder
2 scenarios that will have to be considered. There is the
3 resident farmer scenario that will have to be considered.
4 And we will be expecting the licensee and, in turn, we will
5 be reviewing for adequacy all of those kinds of
6 considerations. Because, I mean, obviously, if it's
7 released for unrestricted use and a number of years go by,
8 no one can truly predict what will be -- this land will be
9 used for. So, we have to consider those kinds of
10 contingencies, at this point.

11 MR. PITTIGLIO: And we have identified that in the
12 conclusion section of the Commission paper as a
13 recommendation.

14 DR. GARRICK: But, I don't know. Something --
15 you're complying with the License Termination Rule, but not
16 with Part 20, necessarily.

17 MR. CAMPER: The License Termination Rule is part
18 of Part 20 --

19 DR. GARRICK: Well --

20 MR. CAMPER: -- Part 20(e).

21 DR. GARRICK: But, you're not required, as I -- I
22 thought I heard you say you're not required to comply with
23 20 Part 2.002 or whatever it is.

24 MR. CAMPER: Well, the staff believes that
25 20.2.002 is not applicable, because that part states that

1 you may request approval to dispose of a material by a means
2 not authorized by the regulations. The staff looks at Part
3 20, Subpart E, the License Termination Rule, which has 25
4 millirem and ALARA, and interprets that to mean that the
5 Commission intended that some material could be left behind.
6 Therefore, in this concept, I'm not seeking approval to do
7 something that's not inherently authorized from the
8 regulation.

9 DR. GARRICK: Yeah. When you get an application,
10 are you going to ask for risk cost benefit type of analysis
11 of alternatives?

12 MR. PITTIGLIO: Alternative?

13 DR. GARRICK: Alternative to rubblization?

14 MR. PITTIGLIO: No, we would not. We would -- the
15 only thing in the cost benefit side of the analysis would
16 certainly be the ALARA part of it, to demonstrate ALARA.
17 But, if the licensee elects to present one and one only
18 approach, rubblization, we would review it and make a
19 finding. But, we're not asking them to come in with other
20 options and other costs.

21 DR. GARRICK: Do you have a sense of what the risk
22 benefit of this approach is versus hauling the stuff away,
23 considering the scenarios that would be involved with both
24 cases?

25 MR. CAMPER: No, not specifically, because, again,

1 we don't really have any specific applications that we
2 could, you know, turn the numbers on and crunch the data; so
3 the answer really is no.

4 As I pointed out in my comments, I believe that
5 one of the toughest parts of this is going to be for the
6 licensee to make the clear, logical argument that it is
7 ALARA. It's not to say that it can't be done, because I
8 think that it can be. But, that's going to be something
9 they're going to have to do.

10 Now, there may be other alternatives. What you're
11 -- the essence of your question really gets at, there may be
12 various means for satisfying the rule versus carrying the
13 material away.

14 DR. GARRICK: Right.

15 MR. CAMPER: There's occupational exposure
16 involved in that. There's other possible exposure due to
17 transportation, so forth and so on. We have to look at that
18 generically along the way.

19 DR. WYMER: Doesn't one of the decommissioning
20 modules require alternatives?

21 MR. PITTIGLIO: No.

22 DR. WYMER: Yeah, it does.

23 MR. PITTIGLIO: The other part that's important to
24 point out is that the rule, not only does it say ALARA and
25 millirem, it says you should reasonably represent the

1 conditions of the site, at the time the license is
2 terminated. If the licensee is clearly committed in the
3 license termination plan to -- and made the statement that
4 we -- the buildings will not be left standing, that we
5 intend to knock the buildings down, that, to me, indicates
6 you need -- that's a condition that's going to exist or
7 reasonably represent the site, at the time the license is
8 terminated. And I think it's one direction why they're
9 going -- if they elect to go to rubbleization, one, they
10 committed to take the building down and then, two, they are
11 even in the cost of filling in the hole is significant
12 savings by using the rubbleization concept.

13 DR. WYMER: Well, either you or me or both of us
14 need to reread the modules, I guess.

15 MR. CAMPER: What module are you referring to,
16 sir?

17 DR. WYMER: I don't remember which -- I don't
18 remember it by name. There's too many of them. But, I just
19 read through them very recently and one of them called for
20 alternatives.

21 DR. HORNBERGER: Did EPA indicate that the four
22 millirem groundwater standard would be -- groundwater
23 protection standard would be -- have to be met? And even
24 though that might not be your direct responsibility for
25 license determination, it might be very critical to an

1 evaluation.

2 MR. CAMPER: Well, much -- even though much more
3 broadly than rubblization. I mean, the difference that
4 exists between the positions, in our case, a rule -- the 25
5 millirem all pathways versus a position, if you will,
6 derived from risk-based regulations that result in the 15
7 and four. EPA has never said to us, specifically in the
8 context of rubblization, these licensees are going to have
9 to meet the four millirem groundwater consideration. No,
10 they've never said that to us. But, clearly, we are
11 concerned about that and, frankly, so are the licensees.

12 We have a lot of discussions with licensees that
13 are worried about that very issue. And every time we get an
14 opportunity, either myself or John Greeves, the Division
15 Director, we express our concerns about finality. And,
16 ultimately, that issue needs to be resolved. It's, we
17 think, beyond our capacity to resolve it, certainly in the
18 context of this particular issue that we've discussed. But
19 that is a major issue that, at some point, will need to be
20 addressed. But, it's far beyond just rubblization.

21 DR. HORNBERGER: Yes, it is. I recognize that,
22 obviously. Now, let me just rephrase it, to make it an
23 easier question for you.

24 MR. CAMPER: Sure.

25 DR. HORNBERGER: Have you looked at -- or has

1 anyone looked at any calculations? And I realize you don't
2 have a specific application, but just in a general sense, as
3 to whether or not such a standard -- a four millirem
4 groundwater protection standard would, indeed, cause
5 problems for things like rubblization. No one has done the
6 calculations or anything?

7 MR. CAMPER: No, not -- not that I'm aware of, no.

8 DR. HORNBERGER: That's all I have.

9 DR. WYMER: Milt?

10 MR. LEVENSON: I've got a couple of questions,
11 again, primarily for clarification. On page two, where you
12 say, "removing equipment from the buildings," does the
13 concept, as it stands now, permit --

14 MR. CAMPER: Excuse me, are you in the slides or
15 the paper?

16 MR. LEVENSON: The slides.

17 MR. CAMPER: Okay; thank you.

18 MR. LEVENSON: Removing the equipment from the
19 building, is the implication that no metal debris will be
20 allowed to be part of the rubble? Because if the answer is
21 yes, then what do you do about rebar? And if the answer is
22 no, can small pieces of equipment, also, be buried there?

23 MR. PITTIGLIO: The proposals that we have
24 discussed clearly had the equipment and structural -- major
25 structural steel components removed. Whether or not the

1 rebar will be left in the concrete is an issue that we'll
2 have to look at on a case-by-case basis and it probably is
3 related to the size of the component. For the proposals
4 that we have seen, where the rubble material was a gravel
5 size, obviously, the rebar is removed. For other
6 conversations we've had, where components could weight four
7 or five tons, it may well be that the rebar will be left in
8 place and the concrete will be cut into a large box.

9 The paper addresses the concept. Certainly, there
10 is many, many different combinations. There may be a
11 combination of gravel and large box. We don't -- we haven't
12 had an application and we don't know what we'll get, until
13 we receive them. And it's highly probable that if we get
14 more than one, they'll be different.

15 MR. LEVENSON: At the moment, then, the concept
16 either includes nor excludes things other than concrete,
17 namely metal?

18 MR. PITTIGLIO: Right; that's right.

19 MR. LEVENSON: Because the next piece after the
20 rebar, the picture you showed, is the steel liner of the
21 containment building at the below-grade part. Your concept,
22 that has to be removed or is that just additional --

23 MR. CAMPER: Well, in the industry's concept that
24 has been proposed, in conceptual space, what's left behind,
25 what has been discussed is concrete, possibly rebar, but no

1 steel liners and no metal equipment. And there are people
2 here from industry, who could address that probably even
3 better than us. But, that is our understanding, that it
4 would be limited to concrete, possibly rebar.

5 MR. PITTIGLIO: However, one of the
6 recommendations that we did make in the paper, for the shell
7 that remained in place, to which the rubblized material was
8 inserted, that it be addressed as building surface
9 contamination limits, unless the licensee can come in and
10 clearly demonstrate that it would not be reused as a
11 building for some -- at some time. I don't know if that
12 helped or not.

13 MR. LEVENSON: On the question of radiation, the
14 exposure in ALARA -- I'm a little confused by some of the
15 things you said, because I had never heard ALARA being
16 applied to some potential low probability exposure in the
17 future. I've always heard it applied to exposure in the
18 here and now. And so, doing the ALARA for this, you're
19 going to have to include all of the exposure of the people
20 doing the waste disposal, if you ship it off site; is that
21 right, handling the burial ground people, etc.?

22 MR. CAMPER: Cheryl, you were shaking your head
23 there?

24 MS. TROTTIER: Actually, I think our analysis
25 simply requires them to do basically a cost benefit analysis

1 on their choice of decommissioning option. If that means
2 that they're going to ship material, then that part needs to
3 be considered. But, they're not doing an ALARA analysis on
4 what's happening at the low level waste site. The ALARA
5 analysis is the cost to meet a certain value compared to the
6 \$2,000 per person rem. I mean, that's the base line. In
7 other words, if it costs significantly more, then that's
8 part of their decision process.

9 MR. LEVENSON: Well, that's my understanding of
10 it, but there was some implication that the residual 25 mr
11 in exposure of future people might be part of the ALARA
12 analysis and I didn't understand that. Maybe that wasn't
13 intended.

14 MR. CAMPER: Well, Cheryl -- Cheryl is the branch
15 chief of Research and was involved with the rule when it was
16 written, which is why I deferred the question to her. So,
17 Cheryl, do you want to add to that?

18 MS. TROTTIER: Calculations, if I remember
19 correctly, are basically a thousand year calculations, but
20 the site use can be the kind of use you would expect at the
21 time you terminate the license. You don't need to
22 hypothesize what society will be doing a thousand years.
23 You could assume they're doing the same thing today that
24 they're going to do a thousand years from now. But, the
25 actual dose calculations are supposed to cover that time

1 period, not beyond.

2 MR. LEVENSON: Cover -- the hypothetical one is a
3 thousand years out on site and don't cover the very real
4 doses that people get this year at a waste disposal site
5 handling the material?

6 MS. TROTTIER: Now, in order to meet -- this is
7 not the ALARA analysis. This is demonstrating that you meet
8 the rule --

9 MR. LEVENSON: Yeah, okay, that's --

10 MS. TROTTIER: -- the modeling you do for that.

11 MR. LEVENSON: -- that's specifically about the
12 ALARA.

13 MS. TROTTIER: Yeah. I don't believe to do the
14 ALARA analysis, that we even address that issue in the
15 guidance that we've put out so far.

16 MR. CAMPER: It is interesting, though. Your
17 question is interesting from a practical standpoint, because
18 if you look at exposure to individuals in the future, the
19 rule doesn't say 25 millirem. It says 25 millirem and
20 ALARA. Therefore, as a practical matter, the staff is going
21 to be looking to see that the licensees have decontaminated
22 to the maximum extent possible that's consistent with the
23 ALARA guidelines and cost considerations. Now, from that,
24 one can imply that there are implications of exposure or
25 reduction of exposure to members of the public in the

1 future, not just ALARA, as we classically think of it. And
2 you're right, which is normally occupational work, this type
3 of thing. That's a really very astute question.

4 DR. WYMER: I have several comments and then a
5 couple of specific technical questions. And you have to
6 realize that we're very new to this rubblization concept.

7 MR. CAMPER: Well, so are we.

8 [Laughter.]

9 DR. WYMER: That's my excuse; because I want to
10 say, if I say something that's obvious or stupid, you want
11 to give us some leeway here.

12 The comments relate to things that you already
13 addressed, but I think they're important enough to stress.
14 One was that this probably is precedent setting and it
15 probably will be extrapolated into areas that are not
16 presently anticipated. There will be some clever people out
17 there saying this is just like rubblization; therefore, we
18 can do it, too. So, I think it's worth stressing that you
19 need to be very sensitive to the fact that you're setting a
20 precedent here very likely. You know that and you've
21 already alluded to that. But, I felt it was worth
22 stressing.

23 The other thing is that, to my mind, at least, the
24 line between rubblization and low-level waste disposal is
25 very blurred. If you're to take this concrete and can it up

1 and send it off to Enviro Care, it would be a low-level
2 waste disposal issue. You're leaving it on site and you're
3 calling it something else, that's all, and you're alluded to
4 that, too. But, it is a pretty darned blurred line. So,
5 those are the two general comments.

6 Specifically, in most of what I've seen written,
7 what little I've had a chance to read so far, you're
8 addressing primarily radioactivity from neutron activation
9 of constituents of a reactor containment vessel. There are
10 other kinds, as I'm sure you know, of possibilities of
11 containment of the structure. For example, the storage
12 pool, you could have some leakers that are going to be
13 contaminated and it's not activation products, it's fishing
14 products, actinides. And there are other kinds of
15 facilities, other than reactors. But, I grant you, reactors
16 are certainly the big ones right now.

17 But some specific technical questions: how in the
18 world will you go about measuring the bulk contamination
19 that you have in this concrete -- this rubble that's being
20 pushed into a hole? I noticed, we heard from the research
21 people, they're going to take a look at this over the next
22 couple of years and it seems to me, that's a really -- a
23 really tough issue, unless you get into some fairly detailed
24 analysis of that stuff, and the whole idea of rubblization
25 is to -- one of the ideas is to reduce cost, so you don't

1 get into a lot of additional work. So, the measuring of the
2 bulk contamination seems to me to be an important issue.

3 And then in the modeling business, how in the
4 world are you going to evaluate the leaching behavior of
5 this porous material that may be shot through with rebar
6 that's activated and it will rust and leach out? How will
7 the leaching be addressed? You know, this is not a trivial
8 question, I don't think, that again requires more input than
9 would be -- the people will likely be ready to provide.
10 Those were essentially the technical list.

11 MR. CAMPER: Let me try to address a couple of
12 your points, the first one being -- you know, we have moved
13 into an era of much more emphasis upon performance-based
14 risk informed regulation, and that's a positive thing. I
15 think most of us would agree with that. But, it does
16 present a number of challenges to the staff, as licensees go
17 about identifying approaches that are performance oriented.

18 This is something that I often talk with our staff
19 about. We -- in this case, it's rubblization; there will be
20 others. We're going to have to devote a fair amount of
21 intellectual energy into addressing various approaches that
22 are performance based. And that will be -- as you said,
23 there are clever people out there and they will come up with
24 some unique concepts that none of us have thought about yet.

25 DR. WYMER: I'm sure they do.

1 MR. CAMPER: And the staff will have to deal with
2 them one at a time, as they come in the door, and take the
3 lessons learned and put it into guidance and hopefully
4 improve the process along the way. But, that's what it
5 means. That's one of the things that happens, as you move
6 into performance-oriented regulation. And that's the
7 challenge we face and we're going to have to do the best we
8 can to meet it.

9 With regards to measuring bulk material, the idea
10 is that these walls will be evaluated and characterized, if
11 you will, following like a MARSSIM type approach, prior to
12 demolition and burial.

13 The leaching issue, you're absolutely right. The
14 modeling considerations with this are a challenge. Leaching
15 is one of those. There are others. But the licensees are
16 going to have to do a thorough and adequate job
17 demonstrating modeling and dose assessment to us and we, in
18 turn, are going to have to do a good job at evaluating it
19 and ensure that's acceptable. But, you're right, that is a
20 challenge.

21 And as I mentioned in my comments, to, it may slow
22 down the process. I mean, you know, like everything else,
23 you know, there's a good and a bad. I mean, the good is
24 that their licensees are trying to find ways to have more
25 flexibility, introduce you to new concepts. The downside of

1 that is since you're not following a purely prescriptive
2 predefined approach, the staff will have to wrestle with
3 that. They will have to work its way through it. That may
4 take time. That may require some further communications
5 with the Commission along the way. But, that's the trade
6 off. But, your points are on the mark.

7 DR. GARRICK: In many ways, this is a very
8 interesting concept, because it does attempt to simplify
9 rather than complicate the process of waste management. And
10 we don't see enough alternatives that do that. We're always
11 seeing alternatives that require more processing, more
12 treatment, more handling, and what have you. So, if this is
13 a concept that really can work, it could have really far
14 reaching implications, given the number of sites that we're
15 talking about.

16 Given that I would think that one of the
17 institutions of industry, like the Electric Power Research
18 Institute or INPO or Edison or somebody, would have provided
19 an analysis -- or the NRC or DOE or somebody would provide
20 the analysis that would make it clear what the case is for
21 rubblization. And yet, we sort of are sitting here saying
22 that let's wait until we get an application and then we'll
23 put the total burden of that question on our first
24 applicant.

25 Something here doesn't quite hang together.

1 You're talking about a new concept of waste management and
2 it's pretty dramatic and it's a total consideration. And
3 yet, there does not seem to be a case, from a technical
4 standpoint, for why we should do this. And the answer seems
5 to be, well, we're going to wait until the applicant comes
6 in and then we're going to beat the hell out of him, until
7 he gives us what we want.

8 MR. CAMPER: I didn't say that.

9 [Laughter.]

10 DR. GARRICK: So, I'm surprised that the case for
11 rubblization, it hasn't been advanced. And I'm critical of
12 both industry and government for not providing that, given
13 the implication here, which seems to be -- which could be
14 significant and it could be very much in the public's
15 interest to go in this direction, if a real genuine
16 risk-based and cost-based analysis was performed.

17 MR. CAMPER: Well, let me take an attempt at
18 trying to answer your question or your comment and,
19 certainly, I can speak to it from our side. In the
20 decommissioning arena, we have a lot of activity going on.
21 There are a lot of sites being decommissioned. The staff is
22 working feverishly to provide all the guidance that is
23 necessary to implement the LTR, whether that be DG40006 or
24 the standard review plan or working within our NUREG 1700
25 and so forth. We have been spending the mainstay of our

1 energy in dealing with actual case work in decommissioning
2 sites.

3 Now, we have LTPs coming on line. In fact, we
4 actually have an LTP in house right for the reactor site.
5 So, we're using the staff that we had to deal with actual
6 casework or develop or refined guidance of a generic nature.
7 We simply don't have the resources to put into further
8 analyzing or creating the type of scientific data that we'd
9 all like to see for this particular concept or for others
10 that might come along. We really have no choice but to deal
11 with them, as they present them to us. Because for one
12 thing, while we believe there's a pretty high probability
13 that we're going to a rubblization application. We don't
14 know that for sure. We think that's the case. We believe
15 that to be the case, but we don't know with virtual
16 certainty. So, we just don't have the resources to do that.

17 With regards to industry, and there are industry
18 representatives here who can speak on their behalf far
19 better than I, the industry has, at least this point, given
20 us an issues paper that expresses their position. NEI, for
21 example, has a paper within the Commission paper, but that's
22 certainly not the type of analyses or study that you're
23 alluding to, obviously, and I don't know what inclination
24 the industry might have to do more on those lines.

25 Paul Genoa of NEI, if you want to comment on that,

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1 or other members of the industry.

2 DR. GARRICK: Please give your name and
3 affiliation.

4 MR. GENOA: Yes. My name is Paul Genoa and I
5 represent the Nuclear Energy Institute and, in fact, was
6 involved in both the presentation on the rubblization issue
7 and helping to shepherd an issue paper on rubblization. And
8 my comment would just be that, you know, this is brand new
9 and we are right at the -- right at the inception of, you
10 know, what these different concepts could be and so we
11 provided the paper in that context. We haven't even scoped
12 out all the different specific ways you might approach this
13 to lay out a detailed analysis, like you suggest. That
14 could happen; but as often as the case, if we wait for the
15 research to be done, the people who are actually want to use
16 this approach, the licensees, may be ahead of us. In this
17 case, they are. I think it's very likely you're going to
18 see a concrete example of a rubblization approach sooner
19 than we would get a generic approach together for you.

20 MR. PITTIGLIO: And in all honesty, I'm not sure
21 that we can develop generic guidance that would cover the
22 number of spectrum of potential cases under the rubblization
23 concept. We've certainly --

24 DR. GARRICK: Well, if you could do it just for
25 reactors, you would have done a major thing. In other

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1 words, if you just picked one specific facility type --
2 there are facility types that represent the billions of
3 dollars of decommissioning costs. So, as far as wouldn't
4 know where to start, there's probably some candidates out
5 there that would be a source of learning a great deal about
6 the concept, I would think.

7 MR. PITTIGLIO: Well, yeah, I agree with you. I
8 mean, I think the concern is that if you don't make an
9 assumption regarding the size of the rubblized component to
10 support your modeling and so forth, your analysis isn't
11 going to be effective. Yet, if one approach uses the
12 component that's a sizable piece of gravel and another
13 application comes in with blocks that weigh between four and
14 six tons each, the guidance that we develop for the
15 rubblized gravel size probably would be of no benefit to the
16 concept that may come in that's significantly different,
17 even though it is "rubblization."

18 DR. GARRICK: Well, that may be; but I still think
19 that because this has become an issue to the point it has,
20 that somebody has some pretty good ideas as to the benefit
21 that they ought to receive from this. And given that it is
22 a concept that can be replicated many, many, many times and,
23 therefore, has widespread impact on the whole waste
24 management field, I can't think of too many things where a
25 little bit of analysis could have as much payoff. And

1 that's the thing that I think is missing here, is -- so why
2 do you want to do this. And I think it's -- conceptually,
3 it's quite appealing; but I think to make a decision on it,
4 I would want to know a lot more about the costs and benefits
5 and risks.

6 MR. LEVENSON: John, since I'm not a member of the
7 committee, I'll talk a little -- I don't have to have the
8 same limits that you do maybe. Historically, such a thing
9 would be handled --

10 DR. GARRICK: I don't have any limits.

11 MR. LEVENSON: -- by EPRI forming a owners group
12 and starting preliminary negotiations with the NRC. I don't
13 think the initiative is with the NRC.

14 DR. GARRICK: Well, that's why I --

15 MR. LEVENSON: I think the initiative is with the
16 owners.

17 DR. GARRICK: Well, I started from that
18 perspective. I'm surprised that EPRI or owners group or
19 Edison Electric or INPO or somebody that's concerned about
20 this issue hasn't come forward with a more convincing case
21 and I'm surprised that, you know, we're waiting for the
22 first application to really come to grips with an attempt to
23 quantify the impact of rubblization; but, maybe that's --
24 maybe that's inevitable.

25 MR. LEVENSON: The first applicant may be a

1 masochist and wants to do it on its own.

2 DR. GARRICK: Well, that may be. It may postpone.
3 Because if I were interested, I think I would want to be at
4 least the second applicant.

5 [Laughter.]

6 MR. LEVENSON: Back to one comment that Ray made
7 and flew by very quickly, because I, also, had circled it in
8 a letter, you refer to neutron activated materials and, in
9 fact, the bulk of the contamination on the concrete and
10 rubble and surfaces and everything else are fission
11 products, not neutron activated materials. And if there's
12 some special case for neutron activated materials or even
13 the use of the term, I don't understand it, because there
14 are some isotopes that are both neutron activation and
15 fision products. The implication, you want people to
16 differentiate? I don't understand the use of the word
17 "neutron activated," when we're talking about removing
18 radiation, radioactive materials.

19 MR. PITTIGLIO: The first part of the paper
20 basically dealt with the surface contamination limits and
21 the majority of the contamination, we believe, exists in,
22 from what we've seen or from approaches that have been
23 addressed by the licensees, less than the first quarter inch
24 of material, so that the scabbling approach to remove it to
25 a certain level and the surface contamination limits were

1 how the rubblization concept was addressed.

2 We do have some concern about activated
3 components. Basically, I think that when we looked at --
4 what we've seen is that if the contamination is in a very
5 surface -- the first couple of centimeters of the surface,
6 we're not going to have a problem with activation in the
7 rebar and so forth. But, we didn't want to not identify
8 that as a concern in the paper. That's why I think that
9 that --

10 MR. LEVENSON: I don't understand the
11 differentiation. I mean, the 25 mr --

12 MR. PITTIGLIO: That's correct.

13 MR. LEVENSON: -- sets the total, whether the
14 source term is an activated material or a fision product.

15 MR. PITTIGLIO: That's correct.

16 MR. LEVENSON: I don't understand the use of this
17 at all. I don't know what this -- this would tell me
18 nothing, if I were trying to interpret what this meant. Is
19 this outside the limit of the 25? Do I have to remove all
20 activation? I don't understand it.

21 Norman?

22 MR. EISENBERG: I'm Norman Eisenberg, Division of
23 Waste Management. The concern is that the paper states that
24 if you meet the building occupancy requirement, you'll be
25 okay for rubblization. That's only true if all the

1 contamination is on the surface. If you've got neutron
2 activated components that are deep in the walls, then that
3 is not the case. So that caveat was put in there just to
4 cover that.

5 MR. LEVENSON: But that doesn't cover anything,
6 because most concrete structures have cracks and I could
7 have stuff deep in the concrete that's a fision product. I
8 don't understand the differentiation here.

9 MS. TROTTIER: Can I add a little clarification
10 here? The License Termination Rule is 25 millirem all
11 pathways plus ALARA. There are two scenarios that we
12 analyzed: one, a building is left intact. Remember one
13 thing: NRC only requires that the radioactive material be
14 removed to the level that meets the rule. This is a
15 dose-based rule. So, what it says is, if I'm going to leave
16 the building and walk away from the building, the dose the
17 person is going to get working in the building meets the
18 rule.

19 But if there is buried material, a licensee is
20 supposed to include that in their dose estimate, if there is
21 a way that that can get to the person working in the
22 building. Now, you know, it's unlikely buried in concrete
23 that's going to happen, but piping and things like that -- I
24 mean, you know, you can have ventilation systems, etc. But,
25 anyway, the concept behind those values was you were leaving

1 the building there and then you can walk away. The building
2 can be torn down. But, conceptually, because of the concern
3 of nature of the modeling, you were going to be protective.

4 Then the other model, of course, is you have no
5 building and you are measuring soil activity for
6 demonstrating compliance with a farming type of scenario,
7 because, you know, that's the most restrictive case. But,
8 the concept where those values that were used for the
9 building was that you were going to leave the building there
10 and that would be the dose you would get from working in the
11 building.

12 MR. LEVENSON: I understand that and that doesn't
13 differentiate what the source of the source is. That's what
14 this --

15 MS. TROTTIER: You're right.

16 MR. LEVENSON: -- this is confusing.

17 MS. TROTTIER: It does not.

18 MR. EISENBERG: Perhaps a better distinction would
19 have been whether the contamination was solely on the
20 surface or whether there was a possibility for components to
21 be deep within the walls, that would then become available
22 for providing a source --

23 MR. LEVENSON: I have no problem with that.

24 MR. EISENBERG: -- under rubblization. But, those
25 deep components would only get there if they were activated

1 components.

2 MR. LEVENSON: That's not true.

3 MR. EISENBERG: Well, there is a report that
4 models the fusion of fision products, primarily from the
5 surface into the concrete, and even with cracked concrete,
6 the penetration was -- dropped off dramatically with
7 distance, whereas activation products could be several
8 meters in. But --

9 MR. LEVENSON: I don't know about the computer
10 model. I have been involved with the complete dismantling
11 of a number of reactors and I can tell you that fision
12 product activity gets fairly deep some places.

13 DR. GARRICK: Especially the volatile ones --

14 MR. LEVENSON: Yeah.

15 DR. GARRICK: -- the more volatile ones.

16 MR. LEVENSON: I mean, that's just the physical
17 world. It doesn't necessarily conform to the model.

18 DR. GARRICK: But, I can understand a little bit
19 of Norm's perspective on this; that if you didn't mention
20 induced activation, someone would surely ask, well, what
21 about induced activation.

22 MR. LEVENSON: But, it's total activity you're
23 measuring.

24 DR. GARRICK: Yes, I know that; I know that. But,
25 I'm, also -- I can, also, appreciate why --

1 MR. CAMPER: That is why the --

2 DR. GARRICK: Yeah, why it was culled out. It's a
3 more subtle source than fision product contamination.

4 MR. CAMPER: I was going to say, the comment was
5 suggested by Dr. Eisenberg's group and it was for that
6 clarifying point. Now, if there's a better way to say that,
7 we still have time to --

8 DR. GARRICK: We now know who to blame, then.

9 DR. HORNBERGER: I think the more I learn about
10 this, the curiouser it gets. It strikes me now that you're
11 telling me that a site could pass the License Termination
12 Rule with a building intact --

13 MR. CAMPER: That's possible.

14 DR. HORNBERGER: -- and fail, if they knocked the
15 building down and left the rubble there. You're telling me
16 this is a possibility?

17 MR. PITTIGLIO: No.

18 MR. CAMPER: No, I don't draw the same --

19 MR. PITTIGLIO: What we're saying is that first of
20 all, the building should be left standing. You could use
21 site specific surface contamination limits or you could --
22 if you met the screening limits, you would have to do
23 nothing else.

24 DR. HORNBERGER: Yeah.

25 MR. PITTIGLIO: All right, and that would meet the

1 25 millirem.

2 DR. HORNBERGER: Right.

3 MR. PITTIGLIO: After the license was terminated,
4 you could knock the building down with no argument. You
5 could knock the building down with no argument, as far as
6 we're concerned, if you met those limits. This particular
7 concept, though, because of the way it's done and because of
8 the conversations we've had with those that are proposing
9 it, they are going to, in most cases, have a significantly
10 higher surface contamination number of value than would --
11 than our screening or even your site specific value
12 resulting from a D&D run for an occupancy scenario. The
13 reason that they wind up with that number is because they
14 take the contaminated surface material, place it in the
15 shell, and the analysis they do with leaching and so forth
16 and because of the time it takes for leaching, allows them
17 to have a number that would be higher than if they left the
18 building in place.

19 DR. HORNBERGER: yeah, but it strikes me -- I
20 understand that, all right.

21 MR. PITTIGLIO: Okay.

22 DR. HORNBERGER: But, it's -- unless misheard, I
23 thought that we were just talking about if you pass the
24 screening for the surface contamination, you still now have
25 to do an additional analysis, because when you rubblize, you

1 could have, for example, activation products that we
2 wouldn't have exposed, that the surface wouldn't lead to
3 exposure in an intact building and, therefore --

4 MR. CAMPER: Well, you're going to have to
5 evaluate a number of scenarios: intruder scenarios; the
6 occupancy scenarios, where someone can go back in there
7 later and take the rubble out and occupy the building.

8 DR. HORNBERGER: Yeah. No, I'm just trying to
9 understand it.

10 MR. CAMPER: I understand that.

11 DR. HORNBERGER: It strikes me that if you can
12 terminate a site with a building intact --

13 MR. CAMPER: Right.

14 DR. HORNBERGER: -- but it's still -- I haven't
15 heard you tell me why that same site, if they proposed to
16 knock it down and rubblize it, it might not pass. I'm not
17 saying it wouldn't, but it might not, because you're
18 considering an additional source.

19 MS. TROTTIER: Can I comment on that?

20 MR. CAMPER: Please.

21 MS. TROTTIER: Part of it is making it seem too
22 simplistic. We have those screening models and licensees
23 can use them, but we have a big caveat in our guidance, if
24 they apply. So, if you had a site, where you think you
25 might have some major problems internal to the building, the

1 staff would not likely approve someone just using a
2 screening model. They would want some site specific model.

3 And, again, there's nothing to prevent the
4 licensee from walking away and someone later on demolishing
5 the building. What we hope -- and I will say this, because
6 this is the -- this is the risk in performance based
7 regulation, is the licensee has the obligation to
8 demonstrate that they meet the criteria and they have to do
9 it responsibly. You know, they are not to be hiding truth,
10 and there's no way for the NRC staff to go in and do
11 thorough checks of building interiors like this. So, it's
12 important that the licensee, as all cases through the
13 licensing process, tell the truth. We rely on that. It's
14 the key of our program.

15 DR. HORNBERGER: Just to clarify, my question did
16 not -- I did not mean to imply, by any stretch of the
17 imagination, that I was talking about somebody lying.

18 MR. CAMPER: No, of course not.

19 DR. HORNBERGER: That had nothing to do with my
20 question.

21 MR. CAMPER: Accurate -- she means accurate and
22 thorough.

23 DR. CAMPBELL: So far I haven't heard what the key
24 radionuclides are; what kinds of total activity it is you're
25 talking about and the kinds of concentration you're talking

1 about. What I'm hearing for this discussion is an issue
2 about pathways. I believe the building standing, the
3 exposure to someone working in the building is probably a
4 gamma exposure of some sort, presumably. If you break it
5 down into pieces, pour it all into the basement of the
6 reactor, you could possibly have some sort of a pond
7 forming, containing water. You cover -- your scenario for
8 the site as a green field doesn't show the covered limiting
9 water getting into the system. So, you could have a backup
10 type of effect of leaching.

11 So, you could conceivably have a situation where
12 an exposure scenario, if you will, of somebody working
13 inside a building has one dose; whereas an exposure scenario
14 with an intruder farming on the site, drinking water from a
15 well -- and a lot of these sites, and Maine Yankee was
16 chosen -- they're chosen because they're close to water; the
17 water table is shallow. These are all things that would
18 preclude a site under Part 61, although I will say, you
19 know, Barnwell and the other -- and Richland were
20 grandfathered in; but, nevertheless, it would preclude a
21 site from being selected for a low level waste site for Part
22 61. So, there are issues about the total amount of
23 radioactivity, its concentrations, what those radionuclides
24 are and, therefore, the issue Ray raised about speciation,
25 it's the leachability and then the site issues, themselves,

1 about how much water is going to get in, how you're going to
2 model the leaching, and so on. So, there are a lot of
3 issues that are --

4 MR. CAMPER: Yes, they are and they --

5 DR. CAMPBELL: -- kind of enter into all of this
6 discussion.

7 MR. CAMPER: -- all ultimately come back to
8 whether or not the dose criterion is satisfied. The
9 proposal -- we've seen -- we've talked about a number of
10 conceptual approaches with licensees thus far. But, the
11 numbers of residual contamination that would be left behind,
12 in some cases, are several times, perhaps even on the order
13 of magnitude, they are more higher than the screening
14 values. But, ultimately, whatever those materials are that
15 are left behind are going to have to be properly
16 characterized, in terms of concentrations, nuclides, and,
17 ultimately, whether or not this satisfies the dose criteria.
18 It is a dose based regulation.

19 DR. CAMPBELL: So, you don't know, at this point,
20 what the key radionuclides are, the kinds of concentrations
21 they're talking about?

22 MR. CAMPER: Well, we've not seen the application.

23 DR. CAMPBELL: Okay. Well, that means there are
24 pathways and those pathways --

25 MR. CAMPER: But on your bathtub effect, the

1 answer to that is absolutely yes. In fact, one of the
2 models that have been discussed was conceptually included
3 the flooding -- flooding the rubblized structure.

4 DR. CAMPBELL: Which will probably --

5 MR. PITTIGLIO: Which will drill a hole in shells
6 to allow the water to come in and put a well --

7 MR. CAMPER: Right.

8 MR. PITTIGLIO: -- on top of it.

9 MR. CAMPER: But, again, the issue there is 25
10 millirem all pathways.

11 DR. CAMPBELL: Or possibly four millirem.

12 MR. CAMPER: Well, now, that -- again, in our
13 regulatory space, it's 25 millirems all pathways.

14 DR. CAMPBELL: Okay.

15 MR. CAMPER: But, yes, I mean, they're good
16 points.

17 DR. GARRICK: But that's part of, Andy, what I'm
18 referring to, when I say it's too bad there isn't an
19 analysis that answers some of these questions.

20 DR. CAMPBELL: Well, I had written down, before
21 you even said an EPRI research, a question mark.

22 DR. GARRICK: Yeah.

23 DR. CAMPBELL: This is clearly something EPRI
24 ought to be working on.

25 DR. GARRICK: This is such an industry-wide

1 opportunity; if they really see major savings here, that you
2 would think that somebody would be motivated to do that.

3 MS. TROTTIER: I can add one clarifying point to
4 Andy's question. To support the 1998 decommissioning rule,
5 we did do a GIS, looking at the process of decommissioning
6 for a number of facilities. And Cobalt 60 and CZ-137 were
7 the prime components there and I would expect for most
8 licensees that to be the case.

9 DR. GARRICK: Yeah.

10 DR. HORNBERGER: Oh, sure.

11 DR. GARRICK: Strontium, cobalt, and cesium, and
12 maybe some of the volatile -- more volatile.

13 DR. HORNBERGER: Have we exhausted this or we've
14 exhausted the speakers here?

15 MR. CAMPER: It's entirely up to you.

16 DR. GARRICK: When do you expect your first
17 application?

18 MR. PITTIGLIO: The licensee, at one time, had
19 indicated possibly by Thanksgiving. Is that still --

20 MR. CAMPER: I was going to ask, did you want to
21 comment on that, Maine Yankee, as to when?

22 MR. ZINKE: I am George Zinke from Maine Yankee.
23 We had anticipated -- well, initially, we had anticipated by
24 first of November and, in fact, our LTP is all prepared,
25 reviewed, and on my desk ready to submit. We're delaying

1 submittal, because of the controversy in what we've been
2 discussing and the controversy in our State over the 25,
3 which then brings in EPA and just a whole raft of issues
4 that we are trying to come to agreements with our State, as
5 far as what the actual condition of the site will be left.
6 And we're trying to come to that agreement before we submit,
7 because if we submit prior to getting some of those
8 agreements, we create a real emotional contentious
9 situation. So, you know, we're hoping that we will submit
10 this year, but it's --

11 DR. WYMER: Let me ask, is the issue of 25 versus
12 15 important to you?

13 MR. ZINKE: It's important to our State. And it's
14 not a 25 versus 15 anymore; it's 25 versus lower numbers
15 than that. So --

16 DR. WYMER: Yeah, for your State?

17 MR. ZINKE: Yes.

18 DR. WYMER: And these are -- these become
19 important to you --

20 MR. ZINKE: Yes.

21 DR. WYMER: -- with respect to the analysis you've
22 made?

23 MR. ZINKE: Yes.

24 MR. CAMPER: In our discussions with various
25 reactor sites, the 25-15 is not a particular difficult

1 issue, if an issue at all. Twenty-five versus four might
2 be.

3 DR. WYMER: Yeah. I was just wondering, in a
4 practical case, whether these things were reaching the
5 cutoff point for you, and you said yes.

6 MR. ZINKE: Yes, and it's a matter that -- you
7 know, we've done now cost evaluations, well, what if I have
8 25, what if I have 15, what if I have 10, what if I have
9 four, so that as we talk with the State, we have an
10 understanding of what it's going to end up costing us.

11 DR. WYMER: Some place in there, you cross the
12 line and the cost starts going up?

13 MR. ZINKE: Yeah. The cost goes up every place
14 you keep dropping.

15 DR. WYMER: It's conceivable that it wouldn't. It
16 could be so low that it wouldn't matter in the first case;
17 but that isn't the case, obviously.

18 MR. ZINKE: Yeah, there is -- I mean, the 25 is a
19 limit and so our license termination plan shows how we would
20 meet the limit. And in all practicality, when you scabble
21 and when you're doing remediation, you're going to be well
22 below the 25.

23 DR. WYMER: Yeah.

24 MR. ZINKE: But, then, you, also, have to consider
25 the cost of -- you know, the samples and the surveys to

1 prove it's lower. So, it cost more to prove that it's
2 lower, even if it's the same ground or the same stuff, than
3 it would be to prove that it's at 25.

4 DR. WYMER: Well, that's one of the points I made,
5 I think, earlier.

6 MR. ZINKE: Yes.

7 DR. WYMER: Okay.

8 MR. LEWIS: Excuse me.

9 DR. WYMER: It gets you around the ears pretty
10 good.

11 MR. LEWIS: I have -- my name is Steven Lewis
12 from the Office of General Counsel. I wanted to try to help
13 out on the question that I think was posed by the Committee
14 earlier and I didn't -- I didn't hear the kind of answer
15 that I wanted to totally leave you with, and that had to do
16 with evaluation of alternatives. The staff's position is
17 that the GEIS that was prepared for the License Termination
18 Rule encompassed within it not specifically something called
19 rubblization, but other types of scenarios that encompassed
20 -- are inclusive enough to encompass the rubblization that
21 we're seeing now.

22 What I did want to assure you about is that staff
23 is well aware that we have to comply with NEPA in this
24 process. For example, at the license -- at the stage of
25 amending a license, to approve the license termination plan,

1 we will have to do whatever NEPA requires of us and the
2 Commission may tell us, in response to a paper -- that in
3 the paper that we give them, they may give us some guidance
4 with respect to how we go about meeting our NEPA obligation.
5 But, we are well aware of it and that's why it's being -- it
6 definitely will be addressed in the paper we give to the
7 Commission.

8 DR. WYMER: Which means alternatives?

9 MR. LEWIS: Well, that's clearly -- clearly one of
10 the things that we have to -- we have to make sure that
11 everyone understands and is comfortable with the scope of
12 the generic environmental impact statement that has already
13 been done and that rubblization fits within it. And, yes, I
14 am speaking in terms of analysis of alternatives, yes.

15 DR. WYMER: Thank you.

16 DR. GARRICK: Okay.

17 DR. WYMER: Well, thank you, very much, for your
18 forbearance.

19 MR. CAMPER: Well, thank you. I'd, also, like to
20 thank Steve and Cheryl and Norm Eisenberg for their
21 comments. It is a challenging and complicated history.
22 Cheryl has a great history of the rule, Steve is our legal
23 counsel, and Norm is a modeling performance assessment guru,
24 so I appreciate all their input, as well.

25 Thank you for your questions and as you formulate

1 your thoughts about this, again, if -- the things that
2 you've heard today, or there are questions we've answered,
3 if there are things that we can have on our scope and we're
4 implementing and considering this on a case-by-case, that
5 would be extremely helpful to us. And you've raised a lot
6 of good points. Thank you.

7 DR. GARRICK: Thank you. I think the plan is that
8 we'll declare a short break here. And I don't think we'll
9 need the reporter following the break, because we're going
10 to go into discussion of reports and letters for the rest of
11 the day. So with that, let's have -- let's take a short
12 break, a five-minute break.

13 [Whereupon, the recorded portion of the meeting
14 was recessed, to reconvene at 8:30 a.m., Thursday, November
15 18, 1999.]

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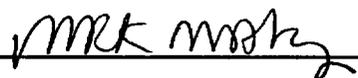
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This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

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COMMITTEE ON NUCLEAR
WASTE (ACNW)

PLACE OF PROCEEDING: Rockville, 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.



Mark Mahoney

Official Reporter

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