

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

**Title: BRIEFING ON STATUS OF DOE'S HIGH-LEVEL
WASTE PROGRAM - PUBLIC MEETING**

Location: Rockville, Maryland

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2 NUCLEAR REGULATORY COMMISSION

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4 BRIEFING ON STATUS OF DOE'S
5 HIGH-LEVEL WASTE PROGRAM

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7 PUBLIC MEETING

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10 Nuclear Regulatory Commission
11 One White Flint North
12 Rockville, Maryland

13
14 Monday, October 31, 1994

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16 The Commission met in open session, pursuant
17 to notice, at 10:00 a.m., Ivan Selin, Chairman, presiding.

18
19 COMMISSIONERS PRESENT:

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21 IVAN SELIN, Chairman of the Commission
22 KENNETH C. ROGERS, Commissioner
23 E. GAIL de PLANQUE, Commissioner
24
25

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1 STAFF SEATED AT THE COMMISSION TABLE:

2

3 KAREN D. CYR, General Counsel

4 JOHN C. HOYLE, Acting Secretary

5 HUGH THOMPSON, Deputy Executive Director for Nuclear

6 Materials Safety, Safeguards & Operations Support

7 ROBERT BERNERO, Director, NMSS

8 DR. CARL PAPERIELLO, Director, Division of Industrial and

9 Medical Nuclear Safety, NMSS

10 MALCOLM KNAPP, Director, Program Management, Policy

11 Development & Analysis Staff, NMSS

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P R O C E E D I N G S

10:00 a.m.

CHAIRMAN SELIN: Good morning, ladies and gentlemen.

The Commission is meeting this morning to receive a discussion from the staff about its views on the status of the high-level radioactive waste program covered by DOE's proposed program approach. We intend to try to follow this closely since DOE intends to use this approach to address both site suitability and licensing issues.

Last month the Commission was briefed in a large panel meeting by a group including the Nuclear Waste Technical Review Board, the State of Nevada, affected units of local government, and Native Americans. The briefing covered high-level waste topics, including DOE's program approach. At that meeting, the Technical Review Board noted that its biggest concern about the program approach was whether the reduced scope of exploration and testing would provide sufficient information to support a license application.

I've got to start by saying in principle there are a lot of desirable characteristics of the approach that have been put up. The idea of spending money in proportion to the amount of information that has to be done, not trying to do concurrent development, et cetera. But nevertheless, in

1 addition to the other question that was raised, and namely
2 whether there will be a clear disposal concept that would
3 allow us to determine licensing because we can only license
4 the site, not when we know what it's being licensed for,
5 there's still this basic question of whether this program
6 approach provides enough information or not.

7 Since that briefing in September, DOE has met with
8 NRC managers of the high-level waste program and they have
9 released the Yucca Mountain site characterization project
10 five year plan, which includes some of the basic planning
11 assumptions for the program approach. They are, in effect,
12 building the repository without a license and then they plan
13 to come in to ask us if they can now use what they will have
14 built at that time.

15 We look forward to the staff's presentation today
16 to hear what relevant information and concerns have been
17 derived from their meetings with DOE and from their reviews
18 of the documentation for the program approach, including the
19 review of the five year plan. The Commission is
20 particularly interested in hearing from the staff whether
21 there are any significant policy concerns with DOE's program
22 approach to which we should direct our attention. In
23 particular, given this program approach, will the NRC be
24 able to accomplish Congress' direction that NRC and DOE
25 should work closely together throughout the process and not

1 just have a passive process of receiving the application
2 whenever it happens to be ready?

3 Commissioners?

4 Mr. Thompson?

5 MR. THOMPSON: Thank you, Mr. Chairman. This is
6 an appropriate time for us to brief the Commission with the
7 activities that are ongoing there and it's a fairly detailed
8 briefing today. So, I'd like to turn right to Dr. Knapp,
9 who's the Director of the Division of Waste Management, to
10 start the briefing and be prepared to answer questions at
11 the end.

12 Mal?

13 DR. KNAPP: I'd like to begin, if I may, with
14 slide B-1.

15 [Slide.]

16 DR. KNAPP: I have just a quick update I thought
17 you might be interested in on the status of the tunnel
18 boring machine which is shown in that slide. The Department
19 of Energy is beginning to use it in the tunnel. They tried
20 it for about one foot nine inches a couple weeks ago, ran
21 into some problems and had to shut it down to make some
22 changes because large boulders were getting caught in the
23 machine and it was unable to make progress.

24 To repeat, the tunnel boring machine ran very
25 briefly several weeks ago and then was down for certain

1 repairs. Those repairs have now been made.

2 [Slide.]

3 DR. KNAPP: You can see the machine in the next
4 slide, just partly into the tunnel. The current status is
5 that last Thursday it ran for about six feet, Friday it ran
6 for about eight feet. We do not yet know whether it has run
7 over the weekend, but they were authorized to run over the
8 weekend if needed. So, it is turned on and it is beginning
9 to make progress.

10 This adds interest to this briefing and certain
11 sense of urgency because we have concerns as documented in
12 our letter to them of the 13th of October, which I'll speak
13 to briefly later on, that we want to be sure that, in fact,
14 they do not make any irrevocable progress until we are
15 satisfied with the quality with which they're working. But
16 I thought you might just be interested to, as an aside, hear
17 the current status of the machine.

18 COMMISSIONER ROGERS: Excuse me.

19 DR. KNAPP: Yes, sir?

20 COMMISSIONER ROGERS: Did they have geologists
21 riding the back of the machine the way they planned to do to
22 examine what the borings look like?

23 DR. KNAPP: While the machine is in operation, it
24 would not be safe to actually ride on that. We have staff
25 out there who -- that is my staff are out there to look over

1 progress and the machine currently is running one shift a
2 day. So, the machine would run. We would then go in and
3 see what's happened while it's done. Exactly what's -- and
4 DOE has lots of staff out there. I do not know for certain
5 that they have geologists. I do.

6 COMMISSIONER ROGERS: Thank you.

7 DR. KNAPP: If I could now have slide number 2.

8 [Slide.]

9 DR. KNAPP: This morning I'd like to talk about
10 several aspects of the DOE program, mostly the program
11 approach. I would also like to talk about some comments
12 that, Mr. Chairman, you received from the ACNW on that
13 approach and recommendations to the staff how we react to
14 those comments and, time permitting, talk about quality
15 assurance and also briefly about the Department of Energy's
16 plans for us to certify and license multipurpose containers.

17 [Slide.]

18 DR. KNAPP: Moving on to slide 3, I note that the
19 title of that slide is DOE's program approach. You've heard
20 it called many times the proposed program approach. Since
21 it has been formally implemented as of the beginning of this
22 fiscal year, the word "proposed" has been deleted from the
23 title.

24 Mr. Chairman, you noted that we have received the
25 five year plan here. Our review of that is incomplete. It

1 will probably be another several weeks before the review is
2 done. So, we still have a limited understanding of that
3 program. Frankly, I suspect we will still have a limited
4 understanding when we've completed the review. It is not
5 that lengthy a document. The Department of Energy will be
6 bringing forward in November what they title, "The Yucca
7 Mountain Technical Implementation Plan for Fiscal '95," and
8 in March they'll bring forward the same plan for '96 and out
9 years. That, I understand, will contain considerably more
10 detail and I think we're going to have to look at that to
11 really know what's going on with the program. In fact,
12 beyond that, I suspect we're going to have to have numerous
13 meetings with DOE because, as you said in the September
14 meeting, the devil is in the detail and I think that's what
15 we're finding. However, I do believe we can give you some
16 initial insights this morning.

17 I'd like to summarize the program approach as we
18 understand it. I'd like to talk about how we will be
19 reviewing the site suitability findings. We would propose
20 that we review them on the basis of our subsequent
21 regulatory responsibilities and we have a protocol for how
22 we will be reviewing them, at least how we plan to review
23 them, that we think fits in with DOE plans. I'll speak to
24 the ACNW comments and briefly on the favorable and
25 potentially adverse conditions which occur in DOE's siting

1 guidelines but which at least at one time they felt they
2 would not be using in support of their site suitability
3 determination. I'll talk about our interactions with DOE on
4 that matter.

5 [Slide.]

6 DR. KNAPP: Moving to slide 4, if we were to
7 summarize the program approach in a sentence or a phrase
8 that might be the shortest, most cost effective path to
9 either recommend the site or to disqualify it. That
10 recognizes that DOE will be making their site suitability
11 determination in 1998 largely as a management decision as to
12 whether to pursue it. The Department of Energy, in pursuing
13 that approach, as I think you well know, is intending to try
14 to meet costs and schedules that they believe Congress and
15 the public would intend. They also want to establish and
16 measure their progress early on, not wait until 1998, but
17 have what they call metrics. These appear throughout the
18 five year plan, early on products whose presence or absence
19 or success or failure they can use to measure progress of
20 the program.

21 They want to improve their control of the program.
22 They've done this by changing the contractors and their
23 relationship with the contractors and I think they also
24 would say that the five year plan and the technical
25 implementation plan will give them additional control.

1 Although they have not stated it strongly, they certainly
2 intend to involve others and to reflect the concerns of the
3 state and local communities and the NRC. I've already seen
4 a couple examples of that recognition of comments by others.
5 I'll mention those as the briefing proceeds.

6 Currently, if I had to summarize my views of this
7 proposed program approach, I'm encouraged. I think that it
8 brings a motion to the program which is needed and I think
9 it will result in an integration of the program which I
10 think is sorely needed. I've seen technical work at DOE as
11 recently as last spring that I felt tended to be done
12 perhaps well but in isolation, without a focus on the final
13 product. I think this program approach is going to result
14 in much better integration of this work and in achieving
15 results or a decision that there are no results in a short
16 time, so that the research and development as needed can be
17 refocused. I think that's positive.

18 On the other hand, I also believe this approach is
19 challenging. I think it will require a great deal of effort
20 and management effort by DOE and, as you mentioned earlier,
21 to answer one of your questions earlier, it's going to
22 require considerable involvement by the NRC staff and we're
23 going to have to interact with them early on, not just in
24 reviewing the products they bring out, but I believe in
25 looking at how those products will be developed by

1 interacting with them on this five year plan and asking
2 questions like why are you developing this at this time?
3 What's your basis for this development? So, I see
4 considerable work in early interaction with DOE next year.

5 [Slide.]

6 DR. KNAPP: Moving to slide 5, to briefly overview
7 their approach, as you know, and their work both to make the
8 site suitability determination and eventually to get to a
9 construction license application, they will be focusing and
10 reducing the amount of data and analyses that they will use
11 to support these products. We don't yet see how they are
12 going to do that. That is, we do not understand the system
13 or the approach which they will be using to say, "This is
14 critical, this may be deferred, this may be set aside." We
15 need to work with them and learn how they are going to do
16 it. At present, I have just not understood the basis by
17 which they'll be making those decisions.

18 As you also know, they anticipate compensating for
19 reduced information with bounding analyses and expert
20 judgment. That leads to some concerns such as to make
21 bounding analyses and to introduce conservatism if they do
22 this in a variety of areas. Will they be introducing so
23 much conservatism that it may be difficult to demonstrate
24 compliance? We also have to recognize that bounding
25 analyses may not be that simple. In a number of cases, for

1 example heat loading the repository, they might show that it
2 works well when the repository is relatively cool or when
3 the repository is relatively hot. There are a lot of non-
4 linear equations that describe its behavior and that does
5 not demonstrate that it will necessarily work well in the
6 middle. So, their bounding work may involve having to scan
7 the spectrum of, in this case, temperatures or other
8 phenomena.

9 So, while the use of bounding analyses and expert
10 judgment is appealing, there may be limitations as to how
11 far they can take it and we will be working with them to
12 look at those.

13 They also have identified in the five year plan a
14 four point isolation demonstration strategy. It would
15 appear to identify four major issues or functions of the
16 repository itself and the geologic setting that I'll speak
17 to in a moment. This would appear to be a basis for
18 focusing their program. They will make a site suitability
19 decision by 1998 which they are going to reach through the
20 summation of a series of higher-level findings which I'll
21 also speak to. One concern we have is that these higher-
22 level findings will be developed sequentially. That leads
23 to questions as to whether there are interactions between
24 the findings that DOE may miss. They certainly recognize
25 the interactions, but we'll need to be very careful as to

1 whether we are comfortable that those interactions will
2 occur.

3 Finally, in reviewing these higher-level findings,
4 they will be using an external peer review. I think their
5 interest is to bring additional credibility to their
6 program, and I'll talk about that peer review and how we
7 anticipate interacting with it in just a few moments.

8 [Slide.]

9 DR. KNAPP: Moving on to slide 6, which is a
10 difficult slide to see on the camera, television, but
11 hopefully your package will make it easier to see, this is
12 from the five year plan and it shows some of the products
13 they will develop for site suitability and for licensing.
14 There are a number of things we can draw from this figure.
15 We can see a certain parallelism that DOE is looking at
16 licensing at the same time they're developing site
17 suitability. One of the suggestions that I get from this is
18 that there are too many products here. I would like to see
19 if we can work with DOE and reduce the number of products.
20 I'm concerned that there may be redundancies between what
21 they produce for site suitability and what they produce for
22 licensing development. Hopefully we can find that some of
23 these products would serve a dual purpose.

24 Just noting a couple features of the future, the
25 stars on the top row, one and two, are the site suitability

1 decision and the recommendation to the President on using
2 the site, which they make in the year 2000. In the next
3 row, the diamonds are the higher-level findings I spoke to a
4 moment ago which will be used to support the site
5 suitability decision and the recommendation. This would
6 lead to our interest in these findings because if the
7 findings are folded almost directly into the recommendation,
8 upon which we will comment by law, then we have a keen
9 interest in exactly what is said in those findings.

10 Again, this leads to questions such as why are the
11 higher-level findings being made in this order at this time?
12 We need to understand better their rationale. Is it because
13 there is a performance assessment or performance allocation
14 that leads to these or is it simply that the data happens to
15 be there and they're doing them in this order? We need to
16 know that.

17 If you are interested in some of the specifics, a
18 slide which I will not show but which is included in your
19 package is number 7, which simply is the legend for all of
20 the information that you saw on the preceding page.

21 I'd like, if I may, to move on to --

22 CHAIRMAN SELIN: Dr. Knapp?

23 DR. KNAPP: Yes, sir?

24 CHAIRMAN SELIN: When do we get what you might
25 call a preliminary design of the waste disposal concept? Do

1 you have some idea about what we're talking about in terms
2 of heat load design, et cetera, so we can see for what is
3 the site to be considered suitable or not suitable?

4 DR. KNAPP: I don't know. That's one of the
5 things that we're pressing. I think that was an issue that
6 came up last month in the September meeting, when would such
7 a design be there. The issue which I think makes a great
8 deal of sense, absent that design, how do we know what we're
9 looking for in suitability because we can't say suitable for
10 what, we are pressing to learn when that will be forthcoming
11 and what it will contain.

12 In the short haul, we have asked for information
13 on such things as the design of the facility itself. For
14 example, the north ramp which they're now beginning to dig,
15 and we'll be meeting with them day after tomorrow to learn
16 more about when that design will be forthcoming. But that
17 does not answer your overall question. That's simply a
18 small piece of it. DOE has not clearly settled on such
19 things as the heat loading and at this point I don't know
20 how soon they will be bringing that in. We need to
21 accelerate DOE's delivery --

22 CHAIRMAN SELIN: Don't they need something of an
23 overall design before they get into detailed pieces or am I
24 missing something?

25 DR. KNAPP: I can argue probably on both sides.

1 Certainly I think they need to have a --

2 CHAIRMAN SELIN: You're our technical advisor not
3 our legal advisor.

4 DR. KNAPP: I've been reading too much law lately,
5 I guess.

6 I think realistically it's a bit of a
7 bootstrapping approach. They learn a little bit about the
8 site, they come up with a design which seems to be
9 consistent with that. With that design, that focuses them
10 on additional things they should learn about on the site.
11 This can be done through an iterative performance
12 assessment. In fact, that to a degree is what the word
13 "iterative" comes from, and performance allocation. But
14 yes, they need a fundamental design.

15 Now, currently the official design is that which
16 comes from the site characterization plan and we need to see
17 an update of that which reflects their present thinking that
18 would be responsive to the program approach. This is the
19 kind of thing that -- this is perhaps the biggest single
20 item, but it's the sort of item that causes me to believe
21 we're going to need a great deal of interaction with them
22 and I don't think that interaction will be done by, "Please
23 send us a plan and then we'll look at it." I think we're
24 going to have to have meetings and iterate on that subject.

25 MR. BERNERO: Mal, I'd like to add a few words to

1 that. This is based on my own interpretation of the pre-
2 decisional draft plan they have.

3 I think they are trying to keep the design as
4 flexible, as open as they can as they go through this
5 process toward site suitability. The multipurpose canister
6 program has a dramatic impact on how big or how hot, what
7 constraints they have physically to live with. In this pre-
8 decisional draft, they have a very interesting passage where
9 they describe the central thesis of performance for the
10 Yucca Mountain repository and that is that you basically
11 have a pyramid here with a repository horizon well above the
12 water table and separated from the water table by a very
13 resistive barrier, the Calico Hills deposit.

14 It appears that they're trying to make the
15 fundamental point that this site suitability hinges on
16 whether that central thesis is provable and that the other
17 things are secondary aspects. They're trying to focus on
18 that and have, as they get into this site suitability
19 finding, the ability to cope with whatever the design falls
20 out to be. That's a very broad range. The site
21 characterization plan design is probably as different from
22 what the final design with an MPC would be as you could
23 have.

24 But there is an evidence in this whole program
25 that they're trying to avoid freezing on the thermal design,

1 freezing on the mechanical design in advance of the need to.
2 They're trying to keep that open as long as they can.
3 Whether they can achieve that, it's pretty hard to say.
4 What do you do for bounding analyses to test whether you can
5 tolerate that kind of flexibility and cope with it later?
6 We don't know. But I think that whole tone, when you read
7 this report, is we're trying to focus on that central thesis
8 and keep our options open.

9 DR. KNAPP: One other item. If you were to look
10 at the legend on slide 7, you do find in the lower left-
11 hand corner some design products which they will be bringing
12 forward, including an advanced conceptual design I think in
13 March of 1997. The question in my mind -- and Mr. Bernero
14 has described what in fact will be in that design. Even if
15 it's all in the design, it raises the question March of 1997
16 is nearly two and a half years ago. Isn't that long if
17 they're going to be bringing in higher-level findings
18 earlier than that?

19 CHAIRMAN SELIN: It's only a year before they stop
20 collecting data.

21 DR. KNAPP: Yes. That's the sort of thing that -
22 - although that's hardly a detail, it leads to the statement
23 the devil is in the detail. As we see this thing
24 implemented, it looks good in the large pieces. I'm
25 concerned that as we get into the small pieces, are they

1 going to come together? I see, as I said earlier, a lot of
2 work trying to ensure that we're comfortable with how
3 they're going to fit.

4 COMMISSIONER ROGERS: Just on that one point, that
5 item is called final advanced design, conceptual design.
6 So, presumably, there's something that goes before that and
7 it would be very important to understand what the timing is
8 for those pieces before the final is arrived at. The March
9 '97 date refers to the final advanced conceptual design.

10 DR. KNAPP: Yes.

11 MR. THOMPSON: It's somewhat unclear. If you look
12 at the chart itself, it has a 1996 entry for the repository
13 waste package design with a one. So, I'm not sure whether
14 they have a preliminary there and just have that, another
15 one starred would be in '97.

16 DR. KNAPP: There are certain errata in both the
17 figure and the legend. We took those directly from the DOE.

18 COMMISSIONER de PLANQUE: You gave as an example
19 of the problem of the bounding analysis as temperature and
20 that's perfectly logical. Are there a lot of these or is
21 that really the key one?

22 DR. KNAPP: I'd have to turn to my staff and I may
23 give Margaret Federline a chance to see if she could
24 identify any specifics. Certainly some that come to my
25 mind, without being heavily into this technical work, would

1 be analyses involving geochemistry, for example. I can
2 envision a variety of geochemical water interactions which
3 in one direction would be positive but minor changes would
4 make them negative. Again, I see that as if you think about
5 the system, it's obviously complex and even if you could
6 describe it with equations, there'd be many non-linear ones.
7 That's one.

8 I think another question I might --

9 COMMISSIONER de PLANQUE: But even non-linearity
10 could be handled by a bounding analysis. It's where you get
11 the problem that you described with temperature or it may
12 oscillate in some way that the bounding wouldn't work.

13 DR. KNAPP: That's true, but it's immediately
14 intuitively. It's not obvious to me that, for example, if
15 we were to bound certain geochemical conditions that we
16 might have to be very conservative in those bounds. I'm
17 just not sure how comfortable I'd be with the bounds as we
18 proceeded, but Mrs. Federline is more adept than I am in
19 these things and perhaps she can comment.

20 COMMISSIONER de PLANQUE: I'm just trying to get a
21 general feel for how much of a problem the bounding is.

22 MS. FEDERLINE: Right. I think Dr. Knapp has
23 captured it. I just wanted to add one point. We're very
24 concerned about the interactions and those are going to be
25 the thing that cause problems. I can't define a specific

1 example right now, but with the natural system, the
2 interactions between the flow system and the retardation and
3 the geochemistry, many of those cases, depending upon how
4 the interactions go, can either be bounded or would have a
5 much wider range of uncertainty. So, we're attempting to
6 address that through auxiliary analysis in our iterative
7 performance assessment to sort of probe DOE's assumptions in
8 those areas of uncertainty to find out whether their
9 analyses are truly bounding.

10 COMMISSIONER de PLANQUE: Okay. Thanks.

11 [Slide.]

12 DR. KNAPP: If I may, I'd like to move on to slide
13 number 8, where we talk a bit about the isolation
14 demonstration strategy that DOE has. This is where they
15 look to having four phenomena or processes that they think
16 will be key to isolation. This is briefly treated in the
17 five year plan and we need to learn more about just how much
18 they're putting into these.

19 I'd like to go over what they are and to do that
20 I'd like to use slide number 9, if I may.

21 [Slide.]

22 DR. KNAPP: The scheme that they have in mind is
23 to confirm that their understanding that water infiltration
24 going from the surface to the repository occurs
25 intermittently in pulses through fractures. This could lead

1 to a conclusion that there will be considerably less contact
2 of water with the waste packages and therefore less
3 opportunity for corrosion or subsequent dissolution. They
4 anticipate confirming within the repository that the waste
5 packages themselves will -- they can design a long-lived
6 package. This is the second of the four parts of their
7 isolation strategy.

8 They believe that they can bound the rate of
9 dissolution and the solubility of some of the wastes from
10 the package within the repository, so that would limit the
11 amount of waste which would be transported down from the
12 repository to the aquifer. Within the aquifer, they hope to
13 be able to show that there is dilution, so that as the waste
14 in the aquifer pass to an area where they could eventually
15 reach the accessible environment, then the waste would be
16 diluted and this would give DOE an opportunity to be able to
17 demonstrate compliance with perhaps the individual dose
18 limit which may wind up being established by EPA following
19 the National Academy of Science recommendations in DOE's
20 work.

21 So, these are the four fundamental ways or
22 contributions to waste isolation that DOE sees as a part of
23 the strategy.

24 Now, this raises a variety of concerns or
25 interests that we have and I think if we could now return to

1 slide 8, I can just speak to those briefly.

2 [Slide.]

3 DR. KNAPP: We're not sure to what extent DOE used
4 performance allocation to arrive at these four points of its
5 strategy. To what extent is this sort of a general overall
6 picture and to what extent is this where DOE will be
7 focusing its resources over the next several years, and then
8 how did they arrive at these decisions?

9 There appears to be something of an assumption in
10 this scheme of physical and temporal stability. That is
11 that we will not have any problems in the future in terms of
12 at least limited impacts of things like seismicity or the
13 thermal pulse of the repository. It does not affect gas
14 phase release and transport, although that may be of limited
15 interest, depending on how the EPA standard is finally
16 issued. One concern that we have is they are placing
17 considerable reliance, as in the second bullet, on a long-
18 lived waste package and yet we don't see much of a coupling
19 at all between the MPC work that they're interested in.
20 They're currently focusing on transport and storage and very
21 little is said in this five year plan about how the MPCs,
22 multipurpose containers, will interact. Perhaps, again,
23 when we get the technical implementation plan next month, we
24 will say more about that. But that's a current concern.

25 COMMISSIONER ROGERS: Just before you leave that,

1 I'm just a little unclear about setting aside performance
2 allocation. Would you say a little bit more about what's
3 involved there?

4 DR. KNAPP: Well, just at the moment, this four
5 point strategy, as I said, is briefly articulated here. We
6 don't understand a rationale for why they came up with those
7 four particular concepts or the idea that these are
8 controlling phenomena, and saying that it appears to set
9 aside performance allocation.

10 We would have looked at obviously the overall
11 performance of the repository, identified particular parts
12 of it and said that these are key and then we would have
13 focused. We just haven't seen in their development of this
14 product that they did that. Perhaps they did and perhaps
15 there's a performance allocation that leads clearly and
16 obviously to these four elements of an isolation strategy,
17 but at this point we didn't see them use performance
18 allocation to get there. I would like to ask did they and
19 if they didn't, then why are these in fact the four points
20 they should most focus on? That's the basis of that.

21 COMMISSIONER ROGERS: Important point.

22 DR. KNAPP: I would now like to move onto slide
23 10.

24 [Slide.]

25 DR. KNAPP: This is similar to the earlier slide

1 that you saw, the very busy slide from DOE. It shows some
2 of the higher-level findings by name. Excuse me, it shows
3 all the higher-level findings by name and shows them into a
4 calendar that extends out through the license application.
5 The concern that we have is, as I mentioned earlier, how are
6 these higher-level findings being built into the site
7 suitability determination, eventually the site
8 recommendation and the license application? We anticipate
9 commenting on each of these higher-level findings and I will
10 talk for a few moments about how we anticipate commenting
11 and then -- excuse me, the process by which we anticipate
12 commenting and the basis for those comments.

13 COMMISSIONER ROGERS: Will these findings be the
14 subject of topical reports or are the topical reports
15 something else again?

16 DR. KNAPP: The topical reports, in my definition,
17 are something else. One could possibly call these topicals,
18 but a topical report is something that they submit to us for
19 comment. These higher-level findings are a part of their
20 scheme. This would be the basis for the DOE reaching their
21 site suitability decision. So, these will not be submitted
22 to us in any formal way.

23 I can probably speak to that best actually if
24 you'll let me just move to slide number 11.

25 [Slide.]

1 DR. KNAPP: This is the process as of October 12th
2 that DOE will be using to produce and review these higher-
3 level findings.

4 CHAIRMAN SELIN: Is there a logic path that says
5 that the answer to all those questions is yes and the site
6 is suitable?

7 DR. KNAPP: I think that's correct. My
8 understanding is that if in the best of all possible worlds
9 DOE would find each of these findings to come up with a yes,
10 that we and the public would consider there work as
11 appropriate and complete, and then they would not look at
12 those again. They would roll these up without further work
13 other than review of confirmation studies that would be
14 continuing and these would roll right into the site
15 suitability decision and then would roll further into the
16 recommendation to the President, which is why we have such a
17 keen interest in the products.

18 CHAIRMAN SELIN: But is there a logic that says
19 you must get yes answers to all of these and that is both
20 necessary and sufficient or if the answers to some of these
21 questions are hedged? In other words, is there a logic that
22 says what it will take to find a site suitable? Is it
23 defined as having an unequivocal yes to each of these
24 points?

25 DR. KNAPP: No, there is no we must have at least

1 five out of seven favorable and no more than one out of nine
2 potentially adverse or something like that. These will be
3 qualitative decisions and these will be taken into balance.
4 So, there is no, if you like, flow chart that says, "If this
5 is yes and this is yes and this is yes, we may go." These
6 will have to be considered individually. The idea would be
7 -- let me speak for a moment though about what a higher-
8 level finding is.

9 Against DOE's siting guidelines they have -- in
10 defining a higher-level finding, let's say they have a
11 qualifying condition and then they have disqualifying
12 conditions. There is obviously uncertainty in how strongly
13 they feel about whether the qualifying condition is present
14 and the disqualifying condition is absent. The higher-
15 level finding is a higher level of certainty. As an
16 example, they would find that a qualifying condition is
17 present, appears that any future information they gather or
18 analyses that they do will not change that view, so that
19 that would be the higher level. It is present. Similarly,
20 the disqualifying condition is absent and they foresee no
21 additional work that would cause them to think it might
22 appear. In that sense, there is a yes/no decision.

23 I don't know if I've addressed your question.

24 COMMISSIONER de PLANQUE: Maybe I can add to this.
25 Are any of the yeses "yes buts"? In other words, it's okay

1 as long as we build in certain parameters on the facility
2 itself?

3 DR. KNAPP: Frankly, most of the yeses, I think,
4 are "yes buts" because their qualifying conditions generally
5 are all linked back to the fundamental statement in the
6 beginning of the siting guidelines, which is that the EPA
7 standard can be met and 10 CFR 60 can be met. In
8 particular, the performance objectives in 10 CFR Part 60.
9 So, to find qualifying, for example, with hydrology, they
10 would have to find that the hydrology is such that viewed in
11 the context of overall performance the various things that
12 we have put up as performance objectives can be met. So,
13 there are very few of these that could be reached, if you
14 like, independently. There are a few. If you can't build
15 it any further from the surface than X hundred yards, that
16 can be a disqualifying condition. But most of the
17 qualifying conditions, in fact, are wrapped up into 10 CFR
18 60.

19 That is what makes this a bit entertaining because
20 if they do this then with limited data and analyses and they
21 use expert judgment and bounding analyses, then that means
22 they will have to be more conservative than they otherwise
23 would be and that's where I begin to become concerned about
24 folding conservatism and each higher-level finding together
25 to the point where all that conservatism added up may make

1 it difficult to demonstrate compliance.

2 CHAIRMAN SELIN: My concern is the other way
3 around. They might come in and say, "Well, we don't quite
4 need all of these, but since we have eight different
5 conservative assumptions back to back, it's probable that
6 the site is good enough. It doesn't meet these bounding
7 conditions that we met, but there are so many conservatisms
8 in the bounding conditions that it's close enough," and then
9 we're in an indeterminate situation.

10 DR. KNAPP: Well, obviously that would be a
11 Commission decision, but I would not be prepared to
12 recommend that you accept it.

13 MR. BERNERO: Of course, you can't tell from this
14 whether they'll do that or whether they --

15 CHAIRMAN SELIN: That's what happens when you have
16 so many bounding conditions and so many conservatisms one on
17 top of the other.

18 MR. BERNERO: Yes.

19 CHAIRMAN SELIN: You get to the point where you
20 can't meet that and they say, "It's not reasonable to expect
21 to meet that. But since we're 90 percent there, it's
22 probably okay because each one of these is so conservative."
23 It's really an indeterminate conclusion.

24 DR. KNAPP: In slide 11, DOE describes the process
25 by which it will reach the higher-level findings and here

1 are a couple of aspects of that that I think are kind of
2 interesting. I'm having a fine time with the pointer today.
3 I can't help it. I'm going to use the opportunity.

4 After they initially create a report which is the
5 basis of the finding, they will then, in this box here,
6 which I appreciate the screen does not permit you to see
7 outside of looking at your own handouts, they will submit
8 this for external peer review. This peer review will be
9 conducted according to their current plans by the National
10 Academy of Science, and there is provision included for
11 public participation. Here's an example of DOE's being
12 responsive over the last few months. Originally this was to
13 have been public observation. The people of the State of
14 Nevada wanted public participation and DOE has changed their
15 philosophy to accommodate this.

16 Following the peer review, DOE will make a
17 decision as to whether they, in fact, think that the higher-
18 level finding has been appropriate and, if not, they will go
19 back and do additional work. If they have, then they will
20 submit this for a second public comment period in which the
21 public may say, "We do or do not believe the conclusions
22 you've reached based on the peer review makes sense."

23 It's my expectation that the NRC staff would
24 comment here during the first public comment period. We
25 would look at how DOE has responded to our comments and in

1 the second comment period we would say whether or not we
2 felt their response had been appropriate. This would be
3 involvement as a federal agency commenting as opposed to
4 their submitting it directly to us. This would go out to
5 the public, we would comment as an agency, as part of that
6 public, but DOE is certainly receptive to our comments.

7 They have produced this process, as I mentioned
8 earlier, to have a certain control over what they do. By
9 their having this review and their setting the time tables,
10 they are able, at least presuming that the comments can be
11 dealt with on time and the reviews can occur on time, a
12 review process where they can control what happens. One
13 could argue that we should wait until they've reached their
14 decision over at this location and then comment on it. In
15 my view, we should comment in parallel with the peer review
16 by the National Academy of Science.

17 MR. BERNERO: Excuse me, Mal.

18 This is a source of some concern in the idea that
19 there is a parallelism going on here, the site suitability
20 thought or decision being developed in parallel with the
21 longer range continuum of developing a licensing case. So,
22 this public review, almost like a pseudo-licensing review,
23 is a source of some concern.

24 There is also a question that occurs to me and
25 that is for someone to schedule a National Academy of

1 Sciences review on a relatively close coupled basis, is
2 perhaps not a good idea. I think this process might have
3 difficulties implementing a reasonable cycle of review and
4 decision just because of the mechanics of doing National
5 Academy reviews.

6 CHAIRMAN SELIN: I'll tell you, my concern is not
7 whether we should wait until all the suitability is done,
8 but whether we should have more of a role than just of
9 public commenter because -- well, for two reasons. As a
10 practical reason, I wouldn't like to see the Commission
11 faced with \$15 billion of investment on a take it or leave
12 it basis when all that work is done. Also, the statute
13 clearly calls for more than just casual cooperation between
14 the DOE and the NRC during the development of this work.
15 So, although there's a kind of a superficial analogy that an
16 applicant does the work and then comes to the NRC, given
17 that the construction work that has to be done for
18 suitability is going to be a major part of the construction
19 work, it's as if somebody had constructed two-thirds of a
20 power plant before they ask for a construction permit. You
21 know, I can be pacified, maybe not satisfied, pacified that
22 it's okay, but from my point of view I'm looking for
23 assurances that we'll have enough of an input early that
24 we're not faced with a fait, more or less, accompli.

25 MR. BERNERO: That's our very concern in this.

1 Just to follow up your analogy, we're not so much concerned
2 about the actual construction, the physical boring, because
3 in any of the schemes for the site characterization you
4 literally have to drill some of the tunnels and so forth.
5 But construction in the sense of developing the logical
6 basis for this site characterized in this way is acceptable
7 and it's the \$15 million, billion, whatever the investment
8 is. It's the construction of the basis of acceptability.
9 That is a real concern to us. This pseudo-licensing is a
10 difficulty.

11 CHAIRMAN SELIN: We're in a position if we ask too
12 many questions now we could be legitimately accused of
13 slowing down a reasonable process. If we don't ask the
14 questions now and we ask them later, after all that money
15 has been spent, why didn't we ask it earlier?

16 MR. BERNERO: Yes.

17 CHAIRMAN SELIN: I'd rather handle the former than
18 the latter. I read the legislation to say, "Thou shalt not
19 sandbag the American public," and that's really how I think
20 we ought to go about it.

21 DR. KNAPP: And I think that is where we are
22 headed. That's something that as we provide to your our
23 plans, we'll be looking for your comments on that.

24 I'd like to move on to slide 12, which I think we
25 have already spoken to, at least in part.

1 [Slide.]

2 DR. KNAPP: As we've just discussed, we really
3 don't have a formal role in site suitability, but we
4 certainly have ample reason to review the products. We'll
5 be looking at these from the perspective not of commenting
6 unnecessarily on DOE's internal decision, but on whether or
7 not we think they are providing the information necessary
8 eventually to reach licensing and site recommendations.

9 CHAIRMAN SELIN: Let me make this clear.
10 Suitability is an administrative management decision that
11 we're not involved in. Absolutely clear. However, it's not
12 the suitability that's the problem, it's the decision that
13 at the end of the suitability decision there shall be enough
14 information available to build a license application. So,
15 the suitability is just the red herring. There is a process
16 going away which is supposed to produce enough information
17 by 1998 to allow DOE to produce their license application.
18 Our job is not to kibitz on the suitability question, but to
19 make sure that it is a process which, A, is reasonably
20 likely to produce the information necessary for an
21 application by '98, and B, that we're reasonably sure that
22 we know whether the answer to A is yes or not. So,
23 suitability just happens to be a parallel process which I
24 don't even think we have to discuss. What we do have to
25 discuss is this continued process of rolling back the

1 frontiers of uncertainty and is it likely to get to that
2 point. I do think that we owe it to the public to be deeply
3 involved in those questions and not just to sit back and say
4 yes or no when the application comes in.

5 DR. KNAPP: I think that is our intent and the
6 direction we wish to head. In fact, in slide 12, about the
7 fourth bullet down where we will be using the license
8 application review plan as our review, this will have us
9 focusing on those issues which we need to address rather
10 than site suitability and ask the questions is the data --
11 are the data and the analyses going to be there. We're also
12 going to be asking from the perspective of the overall
13 system approach to the plan, is it together or are these
14 things being dealt with individually and therefore perhaps
15 inappropriately.

16 We have some concerns with DOE's approach. I've
17 spoken earlier about whether the bounding assumptions, in
18 fact, may be workable. We are concerned that if they reach
19 these higher-level findings separately, they may need to
20 make bounding assumptions about what would be happening in a
21 subsequent finding and this may introduce additional
22 conservatism. As the discussion I had a moment ago with
23 Commissioner de Planque, these higher-level findings, it
24 seems difficult to reach them without looking at overall
25 repository performance.

1 Now, to DOE's credit, if we were to return to --
2 and please don't put the slide up. If we were to return to
3 slide 6, you will find they are running system performance
4 assessments annually as a part of the process. So, it would
5 suggest they're trying to address this. But I will be very
6 concerned as to whether they will address it effectively.

7 CHAIRMAN SELIN: The question is not whether the
8 old process is better than this one, the question is whether
9 this process will achieve what DOE wishes to achieve, which
10 are objectives with which we agree, or whether it needs to
11 be modified in the near future to achieve that. The status
12 quo ante is not the alternative that we're looking for.

13 DR. KNAPP: Right. And I had a final bullet there
14 on our concerns about the workability of the DOE peer review
15 process which Mr. Bernero has already spoken to, will this
16 process be consistent with the way that the National Academy
17 of Science is accustomed to doing business.

18 CHAIRMAN SELIN: Or will we be presented with a
19 document that has favorable signatures for 17 eminent Ph.D.s
20 and our poor person in the branch has got to say, "That may
21 be, but it doesn't answer my question."

22 MR. BERNERO: Yes.

23 DR. KNAPP: I have a lot of confidence in my staff
24 and in the skills of the Center and I'm prepared to be
25 guided by what they have to say.

1 [Slide.]

2 DR. KNAPP: In slide number 13, we move on to the
3 ACNW comments on the program approach and I'll address these
4 very briefly. They recognize, as do we, that DOE's near-
5 term studies will be reduced and that DOE will be using
6 bounding assumptions. We agree entirely.

7 We've already spoken to the concern about NRC
8 input not being required for site suitability decisions but
9 it would be subsequently required for a recommendation.

10 The Academy raised a concern as to how we might be
11 resolving conflicts that might come up during this process.
12 I am hopeful that the parallel reviews with the National
13 Academy would tend to minimize those conflicts. They're
14 also concerned about constraints of having 17 signatures,
15 the external peer review process constraints that might put
16 on our staff to comment subsequently. Again, by working in
17 parallel I hope that that will not happen, but the fact is
18 we have the right and the responsibility to comment
19 regardless of the number of signatures if we find a problem.

20 [Slide.]

21 DR. KNAPP: Of somewhat more interest in slide 14
22 are the ACNW recommendations to the NRC staff. They believe
23 that in view of the reduced amount of data and analyses and
24 the additional expert judgment that we should develop
25 protocols for eliciting expert judgment and guidelines for

1 resolving conflicts. That makes sense to us and in fact
2 we're working on it, although we do not have a final product
3 out. This is something that my staff and the Center in San
4 Antonio has been working on and we're anticipating a Center
5 report on this subject early next year which we think will
6 be turned into a staff technical position late in the year.

7 COMMISSIONER de PLANQUE: Mal, this expert
8 judgment concept has worried me for quite some time and
9 especially now looking at DOE's process with all
10 stakeholders involved in reviewing it, and of course expert
11 judgment is going to be a large part of what's presented in
12 those kinds of meetings.

13 Is DOE developing any protocols for the use of
14 expert judgment? And further, are they anticipating how you
15 would communicate the use of expert judgment in the public
16 arena so that it's understood and credible?

17 DR. KNAPP: I'm going to ask if anyone on my staff
18 has extracted that information either from the five year
19 plan or from other conversations with DOE. What, frankly,
20 I've heard is a statement that they will be relying on
21 expert judgment, they will be relying on bounding analyses.
22 Exactly how they're going to get there has not come up in my
23 reading or in my conversations with them, but let me just
24 turn around and see if anyone can speak more expertly than I
25 can.

1 COMMISSIONER de PLANQUE: And then also, are we
2 doing anything in that area of how we deal with presenting
3 expert judgment in a public arena?

4 MS. FEDERLINE: To answer your first question, DOE
5 has conducted a number of elicitations, the SE and various
6 other programmatic decisions using expert judgment. I'm not
7 aware that they have established a protocol. They've not
8 presented it to the NRC or they've not presented it in the
9 international arena in any way in terms of a protocol.

10 Also, we're not aware that they have -- they're
11 working in terms of how to present an elicitation in the
12 public arena. We have been working in this area. We have
13 developed a background for how to conduct an elicitation.
14 We've done our own elicitation and we're preparing a
15 guidance document on how DOE could do it.

16 One of the aspects that we're looking at in the
17 background is how to convey, how to appropriately convey
18 expert opinion, so that will be a part of our document that
19 we produce.

20 COMMISSIONER de PLANQUE: But it's an area on
21 which I assume NRC and DOE have not had any or much
22 interaction? Is that correct?

23 MS. FEDERLINE: We have been interacting primarily
24 in the international community. The international community
25 is very interested and two weeks ago I gave a presentation

1 to the NEA Performance Assessment Advisory Group and DOE and
2 other members were there, so we have not had a formal
3 technical exchange on the subject.

4 COMMISSIONER de PLANQUE: Okay. Thanks.

5 DR. KNAPP: The second recommendation of the ACNW
6 is to reevaluate our high-level waste research projects,
7 narrow their scope to bring them to bear on the modeling
8 assumptions, provide for timely completion.

9 They also recommended we consider reevaluating the
10 overall high-level waste program and I think that we will
11 definitely need to do that.

12 I can see potential for substantial changes, for
13 asking for some of the development of our license
14 application review plan, for example, at an earlier time so
15 that it would match the timetable that DOE has for the
16 higher-level findings with respect to individual products.

17 I can see the potential for shifting the research
18 program in the way the ACNW has recommended and so we're
19 going to consider this pretty carefully. I would like to
20 think that our review of the five year plan will give us
21 enough insight into the DOE program that we will be able to
22 begin to restructure our program or at least make
23 recommendations on restructuring our program as a result of
24 that review. Certainly I think that the large steps that we
25 could take are identified here from the perspective of what

1 DOE is doing so we could look at what we need to do to match
2 that timetable, but it's not clear we can do that. Again,
3 we may need to look at their subsequent plans.

4 The third recommendation is that we be prepared to
5 comment on a possible reduction in reliance on the defense-
6 in-depth approach. I think they foresee increased reliance
7 on a waste package and reduced reliance on the geologic
8 setting. Certainly we will be alert to that possibility,
9 but any shift in the defense-in-depth approach is a decision
10 that we would bring to you. That would be a dramatic
11 rethinking of how, at this point, we are looking at geologic
12 disposal.

13 CHAIRMAN SELIN: Do you believe that the DOE
14 approach does foresee a lesser dependence on the geological
15 characteristics of the site -- well, let me put it more
16 precisely, a lower standard for the site?

17 DR. KNAPP: I have not seen that yet. It's one of
18 these things that seems to crop up in meetings. I
19 participated in a panel about three weeks ago where the
20 question of reconsidering multiple barriers and defense-in-
21 depth was on the table and the question arose, I think, from
22 the difficulties of demonstrating the geologic setting, but
23 I have not heard DOE bring this forward.

24 Certainly DOE does have plans, as you saw a little
25 earlier in this presentation, to have a long-lived waste

1 package and to gain a great deal of performance from it, but
2 I have not heard the other shoe drop which would be "and
3 therefore we may place less reliance on the geologic
4 setting." That has not come forward yet from DOE.

5 MR. BERNERO: I'd like to add something to that,
6 Mr. Chairman. There's a little bit of historical baggage
7 here. As you probably know, in our subsystem performance
8 criteria the most meaningful subsystem performance criterion
9 is the package lifetime and the least meaningful, especially
10 for the Yucca Mountain site, is the pre-emplacement ground
11 water travel time, so on the geology we don't have a good
12 figure of merit in the subsystem performance criteria.

13 And going back in this program for quite a few
14 years, DOE somehow had the impression that they could not
15 get credit for a longer-lived package, that they had to show
16 1,000 years but they couldn't get credit in performance
17 assessment for a better package, and we have assured them
18 historically, "You meet the subsystem performance criteria,
19 but you also do logical performance assessments, and, if
20 that means credit for 10,000 years, so be it."

21 So historically I think that they would be going
22 to what they say now, going to a longer-lived package and
23 taking credit for it in the performance assessment, but I
24 don't think that would necessarily mean to make up for real
25 problems or deviations in the site characteristics.

1 DR. KNAPP: In the fourth bullet, they want us to
2 urge DOE to prepare a reference design. Obviously we agree.
3 Obviously you agree.

4 The fifth bullet is that we should reexamine
5 performance assessment under the assumption that some of the
6 data, models, and understanding will not be developed. I
7 think that this is something we will need to do.

8 Now, I don't foresee at this time changing the way
9 that we develop our performance assessment. We are still
10 going to proceed that way, but I think we have to recognize
11 that in the implementation of performance assessment that
12 areas where at one point we might have been debating with
13 DOE over the merit of certain data and analyses we may now
14 be debating over bounding assumptions and expert judgment
15 and I think we simply need to be prepared to reflect that in
16 the way we implement.

17 The question we may have to ask is to what extent
18 are we willing to accept expert judgment and at what point
19 do we draw the line and say, "No, here is the location where
20 you must have data and analyses and expert judgment simply
21 will not resolve this issue."

22 If I were to summarize the ACNW recommendations, I
23 think we in general agree with all of them. We found their
24 letter to be constructive and I think the question that we
25 may ask is what's the timing at which we should implement

1 most of the recommendations as we learn more about the DOE
2 program.

3 [Slide.]

4 DR. KNAPP: One last aspect of the program
5 approach has to do, as shown in slide 15, with favorable and
6 potentially adverse conditions. These are conditions which
7 appear as part of our siting criteria in 10 CFR 60 and which
8 DOE took in some cases verbatim and some cases with similar
9 statements into their siting guidelines in 10 CFR 960 in
10 addition to their statements of certain qualifying and
11 disqualifying conditions.

12 The staff became concerned in August when DOE made
13 the statement that it would not consider the favorable and
14 potentially adverse conditions in making higher-level
15 findings but would only focus on qualifying and
16 disqualifying conditions. This raised a concern with the
17 staff. From a regulatory perspective, it wasn't clear how
18 they could -- one could argue that it would be difficult for
19 them to make a site recommendation without considering the
20 favorable and potentially adverse conditions, and, if they
21 didn't address them in the earlier work, then we weren't
22 sure that they would necessarily bring them into focus and
23 look at them in the final site recommendation, that the
24 favorable and potentially adverse conditions might be back-
25 burned and not be considered.

1 Again, DOE does appear to be responsive. About
2 three weeks ago in a meeting DOE announced that they were
3 going to reconsider using these conditions. We're hopeful
4 that they will and we would like to think that this issue is
5 going to be readily resolved.

6 [Slide.]

7 DR. KNAPP: Moving on to slide 16, I want to talk
8 briefly about our current relationship with DOE on quality
9 assurance. That's been a difficult relationship with us, I
10 think, for several years.

11 When we originally reviewed the site
12 characterization plan, we raised quality assurance as one of
13 our principal objections and that was lifted in 1992 when
14 DOE submitted contractor plans that appeared to address most
15 of our concerns and addressed other concerns that we'd
16 raised. We had concerns with their design control process
17 that led to an objection which we lifted in November of
18 1992.

19 Some of these concerns seem to me to be fairly
20 straightforward, easy to deal with. For example, DOE had
21 reviewers. If they had work being developed by a contractor
22 there might be quality assurance reviews done by the same
23 contractor, which would cause one to wonder about
24 independence. When I say they're fairly straightforward, it
25 makes you wonder a bit how they got that way in the first

1 place.

2 Subsequently we have had issues with them. In
3 August of '93, we were concerned about their audits. We
4 found things such as -- excuse me, they found things in
5 their audits which we recognized, such things as a concrete
6 mix where there was a specification in the design for
7 certain materials. They went and accepted the design, but
8 it didn't meet the specs. Somewhere along the line they had
9 dropped the ball and not had the people talking to each
10 other. They addressed these in September of last year with
11 a design control improvement plan in which they were going
12 to review their design control process, identify weaknesses,
13 resolve the weaknesses, and it was their expectation that
14 this would take care of the problem.

15 In March of '94, we had not yet seen the
16 implementation of this. It was still underway and we
17 continue to have problems. For example, the exploratory
18 studies facility on certain study plans, one of the two
19 documents would be changed and there was no clear process
20 for reflecting the changes in the other document. So, we
21 continue to be concerned about their implementation.

22 [Slide.]

23 DR. KNAPP: Moving onto slide 17, we began to get
24 into the concerns that led to the October 13th letter to
25 DOE. Based on what we were seeing, it was not clear to us

1 that the management and operations contractor was
2 implementing the plan and it was not clear to us that DOE
3 was demonstrating its ability to get the M&O contractor to
4 do that. Again, continuing through the summer, just DOE's
5 own audits identified problems: numerous CARs, corrective
6 action requirements, that the auditors found; the finding
7 that DOE was doing trending analyses -- or excuse me, the
8 M&O contractor was doing trending analyses but these did not
9 seem to be captured in corrections and reversals of negative
10 trends.

11 We are concerned about work on the North Ramp
12 design. This is the tunnel boring machine that I mentioned
13 first thing this morning is going into. Some of the
14 decisions they were making appear to be non-conservative.
15 For example, they assume such things as perfect bonding
16 between the rock and the rock bolts, which would not appear
17 to me to be a conservative assumption. And we had concerns
18 with the flow down of design requirements. That is that
19 Part 60 should lead to design specifications, which should
20 lead to a design. The design in the design specifications
21 seemed to work well, but we couldn't trace how Part 60 led
22 to the design specification. So, we had these concerns and
23 we raised the issues in the October 13th letter.

24 [Slide.]

25 DR. KNAPP: As I think I mentioned earlier in the

1 briefing, as we turn to slide 18, DOE, I believe, heard us
2 loud and clear and they're going to be in on Wednesday and
3 give us the first of a series of products and Wednesday
4 they're going to be talking to us about how they plan to
5 address the concerns that we've raised, and we have a lot to
6 learn. We are concerned about the impacts of construction
7 on both waste isolation and the ability to characterize the
8 site.

9 CHAIRMAN SELIN: These are topics of great
10 interest to the Commission and we would appreciate knowing
11 about such concerns a little earlier than we did with the
12 October 13th letter.

13 DR. KNAPP: We have heard the message and we will
14 strenuously endeavor to be responsive.

15 CHAIRMAN SELIN: It's not an objection to the
16 substance of the letter.

17 MR. BERNERO: Yes, the timing. I regret that I
18 did not inform the Commission as quickly as I should have.

19 DR. KNAPP: That moves us to the last slide, which
20 has to do with multipurpose canisters.

21 [Slide.]

22 DR. KNAPP: At this point, DOE is keenly
23 interested in NRC's certification and licensing of these
24 canisters. Their present plan, as we understand it, is to
25 select one or two vendors for the certification phase and

1 each vendor will submit six designs. So, we will be in a
2 position to review either six or 12. As you can see from
3 the table, they would anticipate a large and a small BWR
4 storage canister and a PWR storage canister and then a
5 transportation cask that could handle either of the large or
6 either of the small canisters.

7 At one point it was DOE's hope that we would be
8 able to complete the reviews, complete whatever
9 certification was needed and whatever licensing was needed
10 within about 18 months. That's a very optimistic schedule.
11 I believe Dr. Paperiello may wish to speak more to this, but
12 three years is more like the amount of time it would be
13 taking, about half of that time for the staff review and
14 then about half of the time for further work such as the
15 license.

16 CHAIRMAN SELIN: Have you figured out what work on
17 this canister relevant to disposal is feasible at this
18 point? Obviously we can't license for disposal without a
19 much more detailed disposal concept, but what can we do?

20 DR. KNAPP: Well, of course, we wouldn't be
21 licensing for disposal at all. This would be a
22 certification licensing for storage and transportation,
23 simply looking at the issues as far as disposal is
24 concerned. I recognize that multipurpose canister can
25 somewhat be a bit misleading. It implies that there will be

1 one canister which can be used for storage and then without
2 change for transportation and without change for disposal.
3 In fact, the canister would be used for storage. There
4 would be an overpack for transportation and a different
5 overpack, I would expect, for disposal. So, our interest
6 with respect to disposal would be largely in this disposal
7 overpack. Nonetheless, questions could be asked. For
8 example --

9 CHAIRMAN SELIN: It's not obvious that you could
10 still use the same canister regardless of --

11 DR. KNAPP: No.

12 MR. BERNERO: No.

13 DR. KNAPP: No, it's not. A canister material
14 that might do well in these applications might interact with
15 the geochemistry of the setting. That would be abysmal.

16 CHAIRMAN SELIN: Or just not have enough endurance
17 for the disposal.

18 DR. KNAPP: Right. And, of course, this gets back
19 to your early comment, how are we going to do this without
20 some sort of an understanding of the design, of the heat
21 loading, of the various aspects of the repository?

22 DR. PAPERIELLO: We are going to be faced with the
23 situation when they apply for the license, if they meet the
24 schedule in 2001, that you are going to have fuel in
25 potentially four different sized packages in the MPC,

1 there's fuel sitting in spent fuel storage pools like GE-
2 Morris as well as fuel is going to be in canisters that
3 we've already licensed. So, obviously there's going to be a
4 variety of heat loadings just based on the size and the type
5 of the fuel that's in there.

6 MR. BERNERO: As far as review for disposal is
7 concerned, you may recall when you received Dan Dreyfus'
8 letter with this very ambitious MPC schedule, there was a
9 companion letter from Sam Russo to me addressing just this
10 issue, what they hope to establish for the disposal phase.

11 In general, I would describe it as assuring that
12 they have enough analysis of the configuration and behavior
13 over time with respect to such things as reactivity given
14 the ingress of water, because ultimately the repository is
15 assumed to be wetted, and then reanalyzing the reactivity of
16 the residues in the canister in the year 50,000 or 10,000 or
17 whatever. They're basically trying to take a topical report
18 approach to that to get as many issues out and ventilated
19 and commented upon or questioned by the NRC in advance of
20 the licensing under Part 60, so as to avoid surprises. But
21 it could get us into extensive dialogue about things like
22 backfilling a canister, the possibility of filling the
23 canister to fill the voids prior to disposal, the nature and
24 metallurgical compatibility of the disposal overpack against
25 the MPC, which is basically the unit of disposal now, many

1 issues like this.

2 It's not clear how far we can go, but certainly we
3 can cover a lot of ground on things like configuration
4 control or reactivity.

5 CHAIRMAN SELIN: You've actually raised a question
6 I didn't think of. I was always thinking about the
7 multipurpose canister for future spent fuel which would be
8 transported in this canister, stored and eventually perhaps
9 disposed. But is DOE thinking of using the same canister as
10 the only canister for all the fuel that exists today?

11 MR. BERNERO: Yes. What seems to be happening,
12 and I think it's the thing Carl was just referring to, it is
13 the national system for storage, for transport and for
14 disposal and presumably would be made in sufficient quantity
15 that you could take all of the existing spent fuel from the
16 pools, from GE-Morris, from previously licensed dry storage,
17 put it into these transports and move them and dispose of
18 them. That's the way the program seems to be laid out.

19 DR. PAPERIELLO: You're going to have your fuel in
20 the inner sleeve and you're going to put it in one container
21 for storage at the reactor site. You're going to shove it
22 into another overpack when you move it on the highway and
23 presumably you'll put it in a third type of overpack when
24 you dispose of it at Yucca Mountain.

25 CHAIRMAN SELIN: That part I understand, but the

1 retroactive part that says it's cheaper or more efficient to
2 use the same canister for all the fuel that exists as
3 opposed to more of a specialized canister for just the
4 transportation and disposal for fuel that's already stored,
5 that's a program job, not a regulatory job.

6 MR. BERNERO: Yes.

7 DR. KNAPP: Right.

8 MR. BERNERO: Yes.

9 CHAIRMAN SELIN: It's just interesting.

10 MR. BERNERO: This is a major system analysis
11 issue that it's not clear to me from what system analysis
12 they have done because it depends greatly on the
13 availability of spent fuel storage and the repository itself
14 because in theory it's possible that no more than about 10
15 or 15 percent of the fuel might need a multipurpose canister
16 and then the subsequent generations could be a reusable
17 variation of this, might be more economical. But that's not
18 the way the program appears to be laid out. The program
19 appears to be laid out to start serial production of the
20 thing we call MPC and just make them so that they handle all
21 70,000 tons or whatever the inventory turns out to be.

22 MR. THOMPSON: That completes the staff's
23 briefing, Mr. Chairman. We are prepared to answer any
24 questions.

25 CHAIRMAN SELIN: Commissioner Rogers?

1 COMMISSIONER ROGERS: The early phases of our
2 interaction with DOE gave us an opportunity to calibrate and
3 cross calibrate each other, particularly on information
4 gathering, to some extent at any rate. That was one of the
5 big problems to begin with. How do you see a recalibration
6 taking place for their new proposed information gathering
7 program? It seems to me that it may be a very, very
8 difficult thing to arrive at the standards of acceptability
9 to us on information with this new approach. It's got to be
10 done in a systematic way rather than just haphazard.

11 DR. KNAPP: I can only share your concern. This
12 is the kind of thing that causes me to believe we just have
13 a tremendous amount of up front work to do. For example,
14 ideally for each of the higher-level findings from the
15 perspective of our review, we'd have the applicable portions
16 of the license review plan completed and we could give these
17 to DOE early and say, "This is what we will be looking for.
18 This is the kind of information that we would expect you to
19 either provide or explain through your bounding analyses why
20 it's unneeded." Ideally we would provide that to them and
21 perhaps we might meet with them and say, "Okay. Now, what
22 are you going to do? How do you plan to get there from
23 here?" I'm concerned that even though we are looking at
24 this much earlier than we would if they just handled us a
25 license application, that even the development of these

1 higher-level findings, waiting until that product comes out
2 I think is likely to be unacceptable.

3 Now, we may not have a lot of choice. I think the
4 first of these, according to at least a flimsy understanding
5 of the DOE program, is that surface processes may be out for
6 review within four or five months. So, obviously, that work
7 has already got to be pretty well completed by DOE if that
8 schedule is correct. But in the future, what I would like
9 to do is to work with them comfortably before these higher-
10 level findings come out to see if we can get some sort of
11 balance on what data they will take. To meet that schedule
12 of findings and then to accelerate it so we can have these
13 early interactions is going to be quite a chore. But I
14 think we must do our best to try to do it.

15 COMMISSIONER ROGERS: With respect to the research
16 work going on down at the Center, is there anything
17 contemplated in the way of a shift of emphasis to take into
18 account in any different way the use of bounding analyses in
19 connection with the performance assessment program?

20 DR. KNAPP: I don't think we're in a position to
21 contemplate those shifts just yet because we don't really
22 know where the bounding analyses are coming from. That is
23 where they'll be doing bounding analyses. Again, I see that
24 as sort of a bootstrapping process, learning with DOE and
25 then working with the Center.

1 I can see a shift in research at the Center. I
2 can argue in favor of one that says that we should look at
3 the ongoing research and ensure that it's directed to help
4 us have the information we need for the decisions we'll have
5 to make over the next few years rather than to have longer
6 term work. At the same time, I can argue that the ongoing
7 research stay approximately where it is because it is
8 research and that it would be inappropriate to truncate some
9 of that work prematurely.

10 I think what we're probably going to have to do is
11 to look at those on a case by case basis and there may be
12 some where we're going to seek early results and others
13 where it will obviously be the right answer to leave the
14 programs intact.

15 COMMISSIONER ROGERS: Well, I just want to thank
16 you very much for a very complete exposition of what we
17 know, as limited as it is. Excellent job.

18 COMMISSIONER de PLANQUE: I have no further
19 questions, but this was extremely helpful.

20 CHAIRMAN SELIN: I would like you to consider
21 writing a letter to DOE before they come to us on December
22 12th, something to this affect. The two presentations we've
23 had from Dr. Dreyfus were pretty much procedural. We're now
24 starting to get a feeling for the outline of what is
25 substantive in the program and you seem to be favorably

1 impressed as far as you can perceive that. So, you might
2 communicate that.

3 The first step is the Commission really would like
4 to get much of a feeling for the substance of the program
5 than we've had in the two presentations. However, these
6 questions of process have arisen and I think it has to be
7 clear, and on behalf of the Commission I hope you'll inform
8 the DOE briefers that we do have these questions about how
9 do we meet our responsibilities. It's not just good
10 government responsibilities, that wouldn't it be better if
11 we had a chance to give you an indication in advance about
12 how we will pass on some of these questions before you
13 finish your papers? We have statutory responsibilities as
14 well. So, this concern about having enough communication up
15 front to develop a review plan before their work gets past
16 the point where it could be affected by the review plan, I
17 believe the Commission would like to hear from DOE how they
18 propose to make that feasible.

19 MR. BERNERO: Yes.

20 MR. THOMPSON: We'll do that.

21 CHAIRMAN SELIN: It doesn't have to be a very
22 formal letter, but it's just clear indication. As an
23 extreme case, we might have to revisit our concurrence on
24 Part 960 if we weren't satisfied that the process will give
25 us this information. We might still be content to receive

1 the application, but not be able to give these intermediate
2 up-ticks along the way.

3 Thank you very much. It was an excellent
4 presentation.

5 [Whereupon, at 11:21 a.m., the above-entitled
6 matter was concluded.]

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CERTIFICATE

This is to certify that the attached description of a meeting of the U.S. Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON STATUS OF DOE'S HIGH-
LEVEL WASTE PROGRAM - PUBLIC MEETING

PLACE OF MEETING: Rockville, Maryland

DATE OF MEETING: Monday, October 31, 1994

was held as herein appears, is a true and accurate record of the meeting, and that this is the original transcript thereof taken stenographically by me, thereafter reduced to typewriting by me or under the direction of the court reporting company

Transcriber: Carol Lynch

Reporter: Peter Lynch



STAFF VIEWS OF DOE'S HIGH-LEVEL WASTE PROGRAM

October 31, 1994

Malcolm Knapp

Contact: Joseph Holonich
Phone: 415-6643

STAFF VIEWS OF DOE'S HIGH-LEVEL WASTE PROGRAM

- **DOE'S Program Approach**
- **ACNW Comments**

-
- **Quality Assurance**
 - **Multi-Purpose Canisters**

DOE'S PROGRAM APPROACH

- **Summary of Program Approach**
- **NRC Staff's Review of Site Suitability Findings**
- **ACNW Comments on Program Approach**
- **Favorable and Potentially Adverse Conditions**

SUMMARY OF PROGRAM APPROACH

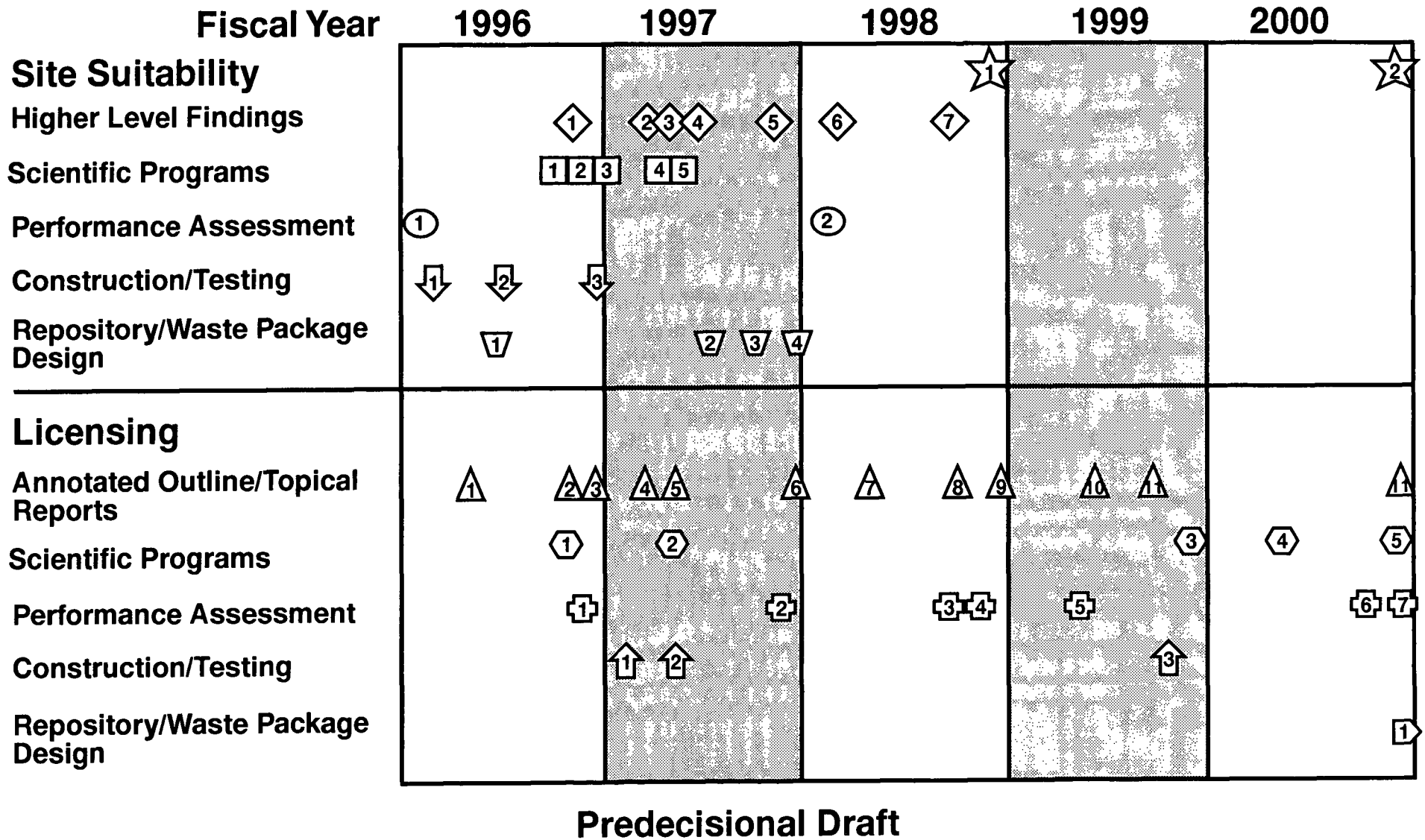
- **The Shortest, Most Cost Effective Path to Either Recommend the Site to the President or to Disqualify it**
- **Goals**
 - **Meet Costs and Schedules Intended by Congress**
 - **Establish and Meet Objective Measures of Progress**
 - **Control the Program**
 - **Involve Others (State, Local Communities, Public)**

COMPONENTS OF PROGRAM APPROACH

- **Apply for Construction License in 2001**
 - **Focus (and Reduce) Data and Analyses Used to Support License Application**
 - **Compensate for Reduced Information with Bounding Analysis and Expert Judgment**
 - **Use a Four-Point Isolation Demonstration Strategy**
- **Make Site Suitability Decision by 1998**
 - **Reach Site Suitability Decision Through Higher Level Findings**
 - **Use External Peer Review**

Predecisional Draft

Figure 1-1: Major Metrics



Site Suitability

◆ Higher-Level Findings

1. Preclosure Rock Characteristics (7/96)
2. Postclosure Tectonics DSQ (12/96)
Preclosure Tectonics QC/DSQ (12/96)
3. Human Intrusion/Natural Resources DSQs (1/97)
4. Reasonably Available Technology (3/97)
5. Preclosure Radiological Safety/Supporting Technical Guidelines (7/97)
6. Postclosure Geohydrology (GWTT) DSQ (12/97)
7. Postclosure Systems Guideline QC and QCs for Tectonics, Geohydrology/Climate, Geochemistry Rock Characteristics, & Human Intrusion (6/98)

↓ Exploratory Studies Facility

1. Complete Excavation of North Ramp/Start Main Excavation (11/95)
2. Complete Excavation of 1st Ghost Dance fault Exploratory Drift (4/96)
3. Complete Excavation of 2nd Ghost Dance fault Exploratory Drift (9/96)

☆ Suitability Determination

1. Technical Site Suitability (9/98)
2. Site Recommendation Report (9/00)

○ Performance Assessment

1. TSPA 1995 Summary Report (10/95)
2. TSPA 1997 Summary Report (11/97)

▽ Repository/Waste Package Design

1. Final Advanced Conceptual Design/Subsurface Final Conceptual Design (3/97)
2. Preliminary Waste Form Report (4/97)
3. Preliminary Materials Report (6/97)
4. Waste Package Final Title I Design (9/97)

Predecisional Draft Figure 1-1 Key: Major Metrics

□ Scientific Programs

1. Human Intrusion/Postclosure Rock Characteristics & Geochemistry Technical Basis Report (5/96)
Preliminary Integrated Geol/Hydrol/Geochem. Model (5/96)
2. Preclosure Rock Characteristics Technical Basis Tectonics Technical Basis Report (7/96)
3. Potential Effects of Postclosure Climate Report (9/96)
4. Geohydrology/Transport Technical Basis Rpt (1/97)
5. Intermed. Integrated Geol/Hydrol/Geochem. Model Geohydrology/Transport Technical Basis Report (2/97)

Licensing

△ Annotated Outline/Topical Reports

1. Annotated Outline Revision 1 (2/96)
2. Ground-water Travel Time Topical Report (7/96)
3. Third Seismic Hazard Methodology Topical Report (9/96)
Initial Burnup Credit/LT Criticality Topical Rpt (9/96)
4. Process Models Topical Report (11/96)
5. Annotated Outline Revision 2 (2/97)
6. Interim Burnup Credit Topical Report/Initial Repository License Application Design (9/97)
7. Annotated Outline Revision 3 (2/98)
8. Subsystem Models Topical Report (6/98)
9. Final Burnup Credit Topical Report (9/98)
10. Dose Assessment Radiological Release Methodology/Topical Report (3/99)
11. Annotated Outline Revision 4 (6/99)
Total System Performance Assessment Models Topical Report (6/99)
12. Waste Package Topical Report (9/00)

⬡ Scientific Programs

1. Seismic Design Input to Repository ACD (7/96)
2. Near Field Environment & Altered Zone Rpts (2/97)
3. Climate Report (9/99)
4. Radionuclide Transport Model & Altered Zone Rpt (2/00)
UZ Model for License Application (2/00)
SZ Model for License Application (2/00)
Near-Field Environment Report (2/00)
5. Final Update of Geol/Hydrol/Geochem Model (9/00)

⊕ Performance Assessment

1. PA Recommendation to Site Characterization/Testing (8/96)
2. PA Recommendation to Site Characterization/Testing (8/97)
3. Waste Package/EBS PA for LAD (6/98)
4. PA Recommendation to Site Characterization/Testing (8/98)
5. TSPA 1999 Summary Report (2/99)
6. Final Report Waste Package/EBS PA (7/00)
7. TSPA for License Application (9/00)

↑ Construction/Testing

1. Complete Excavation Heater Test #1 (11/96)
2. Complete South Ramp/Daylight (5/97)
3. Complete Excavation Heater Test #2 (7/99)

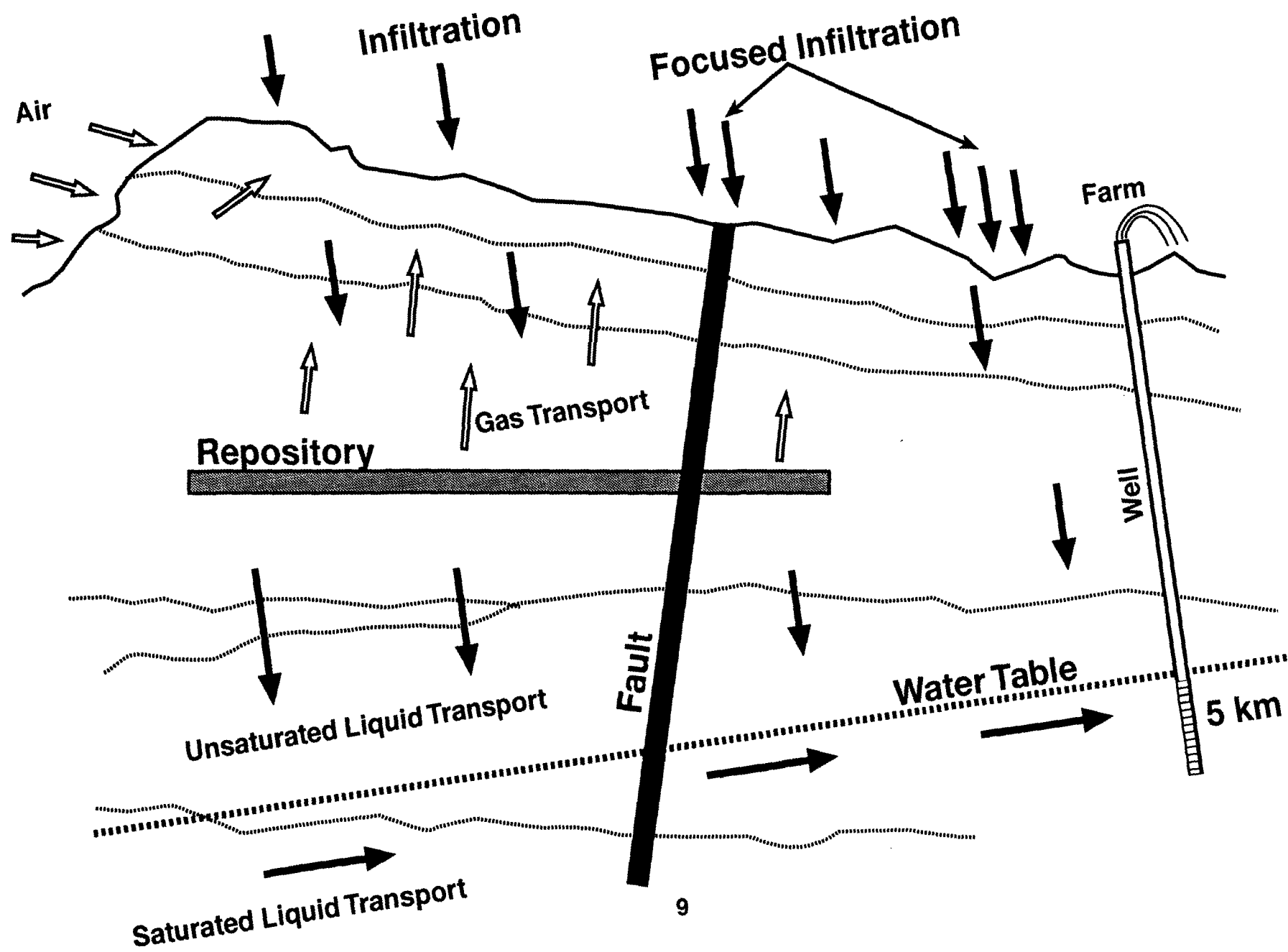
▷ Design

1. Final LAD (9/00)

ISOLATION DEMONSTRATION STRATEGY

(From DOE Five Year Plan)

- **Confirm Bases for Bounding Water Contact with Waste Packages**
- **Confirm the Basis for Designing Long-Life Waste Packages**
- **Bound Dissolution and Transport**
- **Demonstrate Substantial Dilution in Saturated Zone Aquifer**
- **NRC Staff's Initial Concerns:**
 - **Appears to Set Performance Allocation Aside**
 - **Appears to Assume Physical and Temporal Stability**
 - **Appears to Ignore Gas Phase Release and Transport**
 - **Appears to be Decoupled from MPC Development**

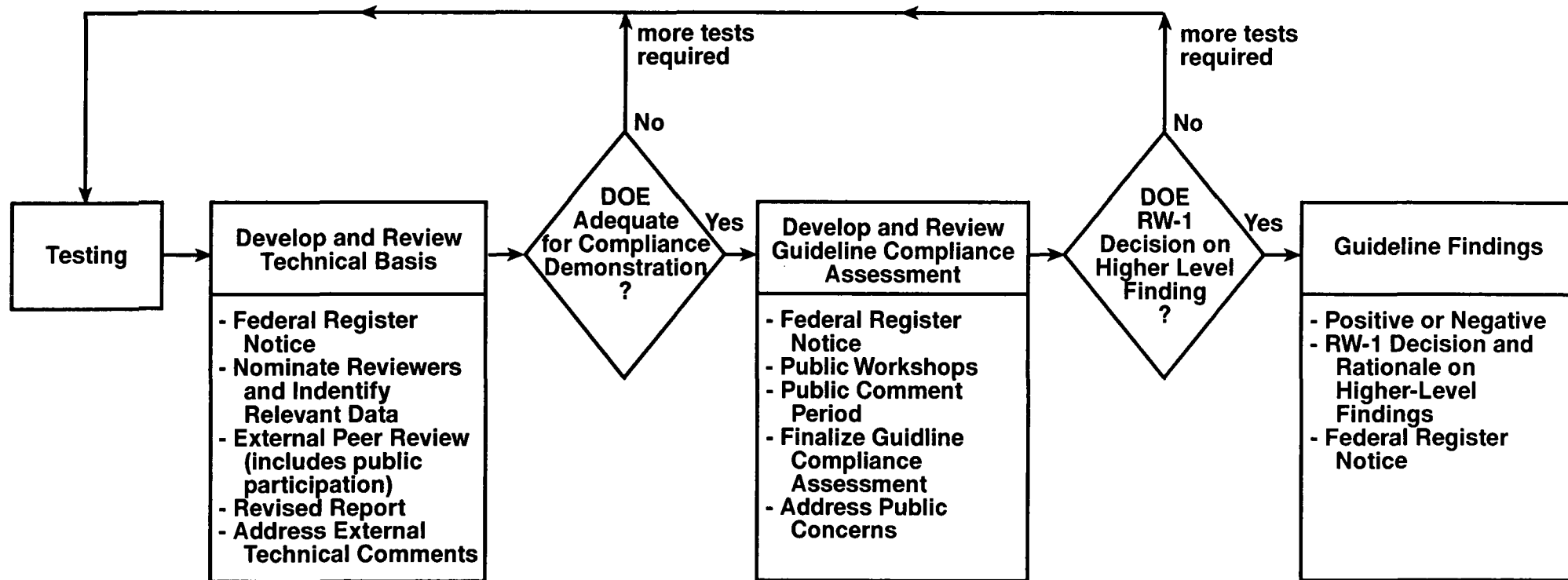


DOE'S SITE SUITABILITY DECISIONS

(September 28, 1994)

Item	FY94	FY95	FY96	FY97	FY98	FY99	2000	2001
	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Surface Processes		◆						
Preclosure Rock Characteristics			◆					
Tectonics				◆				
Reasonably Available Technology				◆				
Geochemistry/Postclosure Rock Characteristics				◆				
Geohydrology/Transport					◆			
Total System Performance Assessment					◆			
Preclosure Radiological Safety				◆				
Technical Site Suitability Evaluation					◆			
License Application								◆

SITE SUITABILITY EVALUATION PROCESS



From DOE Presentation to NWTRB (October 12, 1994)

STAFF REVIEWS OF SITE SUITABILITY

- **NRC Has No Formal Role in Site Suitability**
- **DOE Suitability Decisions Do Directly Impact Future NRC Responsibilities**
- **Staff Comments Will Be in the Context of These Responsibilities**
- **Staff Will Use the License Application Review Plan**
- **Staff Will Review Higher-Level Findings in Parallel With DOE's Peer Review**
- **Concerns**
 - **Will the Use of Bounding Assumptions be Workable?**
 - **Can DOE Make Higher-Level Findings Separately?**
 - **Is DOE's Peer Review Process Workable?**

ACNW COMMENTS ON THE PROGRAM APPROACH

- **DOE's Near-Term Studies Will Be Reduced**
- **DOE Will Use Bounding Assumptions**
- **NRC Input is Not Required for Site Suitability Decisions, But Would be Required for the Site Recommendation**
 - **Resolution of Potential Conflicts is Not Clear**
- **DOE's External Peer Reviews Might Constrain Subsequent NRC Regulatory Actions**

ACNW RECOMMENDATIONS TO NRC STAFF

- **Develop Protocols for Eliciting Expert Judgment, Including Guidelines for Resolving Conflicts**
- **Reevaluate HLW Research Projects, to Narrow their Scope, to Bear Directly on DOE's Modelling Assumptions, and Provide for their Timely Completion**
- **Be Prepared to Comment on a Possible Reduction in Reliance on the Defense-In-Depth Approach**
- **Urge DOE to Prepare a Reference Design of the Repository System at a Significantly Accelerated Schedule**
- **Reexamine Performance Assessment Under the Assumption that Data, Understanding, and Models of Some Phenomena Will Not be Developed**

FAVORABLE AND POTENTIALLY ADVERSE CONDITIONS

- **Favorable and Potentially Adverse Conditions Appear in 10 CFR Part 60 as Siting Criteria**
- **10 CFR Part 960 has Qualifying and Disqualifying Conditions and Favorable and Potentially Adverse Conditions Similar to 10 CFR Part 60**
- **In August DOE Said it Would Not Consider Favorable and Potentially Adverse Conditions in Making Higher-Level Findings**
- **NRC Staff Raised Concern That Substantive Issues Might Be Neglected**
- **DOE Will Reconsider Using the Conditions**

QUALITY ASSURANCE

- **Review of Site Characterization Plan Caused Two Objections**
 - **Quality Assurance - Lifted March 1992**
 - **Design of the Exploratory Studies Facility and Design Control Process - Lifted November 1992**
- **Subsequent Issues With Quality Assurance**
 - **August 1993, NRC Concerned About Audits and Surveillance of Ongoing Design Work**
 - **September 1993, DOE Provided Design Control Improvement Plan**
 - **March 1994, NRC Commented on Plan, Noting that DOE Needed to Demonstrate Implementation**

CONCERNS LEADING TO OCTOBER 13, 1994 LETTER

- **DOE and its Management and Operations Contractor's Ability to Implement Get Well Plan Not Yet Demonstrated**
- **Work on North Ramp Design Continued and was Not Conservative**
- **Flowdown of Design Requirements from 10 CFR Part 60 is Not Traceable**

STAFF'S CURRENT VIEW ON REINSTATING OBJECTION

- **Awaiting Additional Information from DOE**
- **Need to Learn Impacts of Construction**
 - **Waste Isolation**
 - **Ability to Characterize the Site**
- **Would Issue Objection If**
 - **Problems are Not Resolved**
 - **DOE Starts Construction Work that Would Cause Irreparable Damage**

MULTI-PURPOSE CANISTERS

- DOE Will Select 1, or Perhaps 2, Vendors for Certification Phase
- Each Vendor Will Submit:

	Large	Small
Transportation Cask	1	1
BWR Storage Canister	1	1
PWR Storage Canister	1	1

- The Fuel Canister is the Only Component That is Common for Both Storage and Transportation. Therefore, Other Portions of the Review are Different and Somewhat Separate