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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

178th MEETING

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THURSDAY,

APRIL 12, 2007

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VOLUME III

+ + + + +

ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear
Regulatory Commission, Two White Flint North,
Room T-2B3, 11545 Rockville Pike, Rockville, Maryland,
at 8:30 a.m., Michael T. Ryan, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

- MICHAEL T. RYAN Chairman
- ALLEN G. CROFF Vice Chairman
- JAMES H. CLARKE Member
- WILLIAM J. HINZE Member
- RUTH F. WEINER Member

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1 ACNW STAFF PRESENT:

2 FRANK GILLESPIE

3 TIM McCARTIN

4 JOHN TRAPP

5 JIM RUBENSTONE

6 JOHN FLACK

7 NEIL COLEMAN

8 LATIF HAMDAN

9 KEITH McCONNELL

10 CHAD GLENN

11 MICHAEL LEE

12

13 ALSO PRESENT:

14 BRUCE MARSH (via telephone)

15 PAUL PICHULO (via telephone)

16 PAUL BEMBIA (via telephone)

17 COLLEEN GERWITZ (via telephone)

18 BRIAN BOWER (via telephone)

19 LYNN WINTERBERGER (via telephone)

20 TIM RICE (via telephone)

21 JOHN ZEH (via telephone)

22 BARBARA YOUNGBERG (via telephone)

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I-N-D-E-X

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

(8:30 a.m.)

VICE CHAIRMAN CROFF: Folks, let's come to order. Come to order, please.

Mike is still a bit scratchy, so I'm going to do the honors this morning.

The meeting will come to order. This is the third day of the 178th meeting of the Advisory Committee on Nuclear Waste. During today's meeting the Committee will consider the following: the white paper on volcanism, update on West Valley draft environmental impact statement, discussion of draft ACNW letter reports, and miscellaneous items.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Neil Coleman is the Designated Federal Official for today's session.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions. Should anyone wish to address the Committee, please make your wishes known to one of the Committee staff. It is requested that speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so that they can be readily heard.

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1 It is also requested that if you have cell
2 phones or pagers kindly turn them off or place them on
3 mute. Thank you.

4 CHAIRMAN RYAN: Given that Neil is not
5 here, it should be John Flack.

6 MR. FLACK: I'll take it.

7 CHAIRMAN RYAN: John Flack will be the
8 DFO.

9 VICE CHAIRMAN CROFF: Okay. And with
10 that, we'll turn the meeting over to Bill.

11 MEMBER HINZE: Fine. As we discussed
12 yesterday at our meeting, we will be -- you have in
13 front of you four different documents -- summary and
14 conclusions -- these are all drafts. Summary and
15 conclusions --

16 VICE CHAIRMAN CROFF: Bill, we have
17 nothing in front of us.

18 (Laughter.)

19 MEMBER WEINER: I'll go get them. They're
20 on Neil's desk.

21 CHAIRMAN RYAN: Why don't you get started,
22 and we'll just catch up.

23 MEMBER HINZE: So what we have are four
24 documents -- the summary and conclusions, the topics
25 table that goes with the summary and conclusions, the

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1 executive summary, as well as a draft of a cover
2 letter to Chairman Klein.

3 What you will have by the end of the
4 morning, as I understand it from Neil, is that you
5 will have a hard copy of the draft of the report as of
6 a few moments ago, and you will also have a CD. And
7 what we -- I've mentioned this in e-mails to the
8 Committee previously. What we're asking you to do is
9 to provide us with your review of the draft by the
10 23rd. That's a week from Monday. I know that's a
11 short time, but we're really on a short time fuse.

12 And the revisions are substantive, but
13 they're not very long, so I think you -- and you've
14 all reviewed the initial draft, so I don't think
15 that's asking too much of you.

16 We would like, if at all possible, for you
17 to provide your comments by line number. And if you
18 can't do that, mark up your copy and send it to Neil,
19 and he will make it available to us -- mark up your
20 hard copy.

21 Ruth, is there anything that I've
22 forgotten?

23 MEMBER WEINER: No, I don't think so. I
24 think -- no. That's about it.

25 MEMBER HINZE: All right. Neil, do we

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1 have copies of the four items that were discussed this
2 morning? Good show.

3 As I understand it, I am supposed to read
4 these into the transcript. So without further
5 considerations, I will start reading the summary and
6 conclusions.

7 The summary and conclusions consists of
8 six different elements -- an introduction, a
9 discussion of the nature, likelihood, or probability,
10 and consequences, and then there are two final
11 elements, one dealing with uncertainties and one
12 dealing with alternative models.

13 In the principal sections of this -- that
14 is, beyond the introduction -- we have tried to
15 summarize, and we have also commented on the material
16 that's in the -- summarized at the end of Chapters 4,
17 5, and 6 -- again, nature, likelihood, and
18 consequences.

19 And at the end of each section, we have
20 given an overall conclusion for the people that want
21 to do a -- do we have a problem? I see the -- no?
22 We're okay? All right.

23 With that, I'll start reading. As the
24 studies on the impact of igneous activity in the
25 proposed high-level waste repository at Yucca Mountain

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1 nature, it is appropriate to review and analyze the
2 current state of knowledge regarding igneous activity
3 that provides a technical bases for decisionmaking.

4 Due to inherent uncertainties in the
5 igneous process that have occurred and may occur in
6 the future in the Yucca Mountain region, and
7 limitations and knowledge of controlling parameters,
8 there is a range of professional views regarding the
9 features, events, and processes associated with
10 igneous activity and their impact on risk.

11 These views involve the nature of
12 anticipated igneous activity during the compliance
13 period of the repository, the likelihood that igneous
14 activity will occur, and the consequences of igneous
15 activity due to potential release of waste to the
16 environment.

17 This report summarizes these views and
18 analyzes them based on professional judgment and
19 quantitative considerations within the scope of
20 resources available to the ACNW. Taking into account
21 the different role and responsibilities of the
22 stakeholders in license preparation and review, the
23 views and positions of the DOE, NRC, and others have
24 been abstracted from the published literature and
25 public agency reports and presentations.

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1 In addition, a draft of this report was
2 distributed for review to the aforementioned
3 stakeholders and to an international group of experts
4 on igneous activity and high-temperature processes.
5 The response to the ACNW's request was generally
6 excellent. Also, written reviews and oral
7 presentations at an ACNW working group meeting held in
8 early 2007 have been used to revise this report,
9 taking into account the latest and best-available
10 information.

11 Several alternative models describe
12 potential future igneous activity at Yucca Mountain.
13 Although many of these are relatively mature, others,
14 particularly those involved in consequence modeling,
15 are undergoing continuing improvement. As a result,
16 this report, which serves as a benchmark for
17 evaluating the technical basis for igneous activity
18 decisionmaking, is a snapshot based on current
19 understanding of the views on igneous activity.
20 Ongoing studies by the DOE, NRC, and others will
21 modify the results presented in this report.

22 Based on current views regarding potential
23 igneous activity at Yucca Mountain, performance
24 assessment calculations by different stakeholders,
25 including NRC, DOE, and EPRI, indicate that during the

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1 first approximately thousand years the inventory of
2 radionuclides released in the extrusive scenario is
3 dominated by the highly radioactive fission products.

4 The major contributor to the RMEI dose,
5 however, would be the inhalation dose from alpha-
6 emitting actonides, half-lives of 400 years or more,
7 in the deposited ash which could be remobilized and
8 subsequently inhaled.

9 The probability-weighted dose associated
10 with this risk, according to present assessments, is
11 smaller than the 10,000 years dose standard of 15
12 millirem per year, and decreases gradually after 1,000
13 years, in proportion to the rate of decay of
14 radionuclides in the waste.

15 The risk from an intrusive event based on
16 current calculations reaches a maximum after several
17 tens of thousands of years, but the maximum
18 probability-weighted dose is only a fraction -- that
19 should be "a fraction" -- of the current 10,000-year
20 standards.

21 In determining risk, both the probability
22 and consequences of the igneous event are considered.
23 Factors important to the extrusive event scenario are
24 probability of the event, including both spatial and
25 temporal considerations, the number of waste packages

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1 entrained (the volcanic conduit diameter), the
2 eruption volume and dispersal of the contaminated ash,
3 the size distribution range of spent fuel particles in
4 ash, surface remobilization of contaminated ash by
5 water and wind, and the inhalation of contaminated ash
6 by humans.

7 In the intrusive scenario, the major
8 factors in determining risk, in addition to
9 probability of the event, are the number of waste
10 packages affected by the intruding magma, the distance
11 magma can flow into the drifts, which is determined by
12 the viscosity of the intruding magma, and the
13 magnitude and duration of the driving pressure upon
14 entry into the drifts, the degree of dissolution of
15 waste released from damaged waste packages into the
16 groundwater, the transport of waste contaminated
17 groundwater to the RMEI, and the injection of released
18 radionuclides by the RMEI.

19 The views of the NRC, DOE, and others
20 pertaining to igneous activity at Yucca Mountain are
21 summarized in the final sections of Chapters 4, 5, and
22 6. In addition, the accompanying Table 7.1 presents
23 a brief simplified summary of the current views on
24 significant igneous activity topics, as abstracted
25 from the published literature and public

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1 presentations. A fuller explanation of these views is
2 in the text of this report in the original documents
3 referenced in the report.

4 The germane sections of this report that
5 pertain to these items and the reference -- and that
6 reference original literature are cited in each cell
7 for ready reference by the reader. This table shows
8 that there is general agreement on many of the topics,
9 particularly those dealing with the nature and
10 probability of igneous events.

11 However, there is considerable difference
12 in the views pertaining to the consequences of igneous
13 -- consequences of igneous activity, especially those
14 involving the intrusive scenario.

15 In the following sections of this chapter,
16 the views on the nature of the anticipated igneous
17 activity affecting the proposed repository, the
18 likelihood of igneous activity, and its consequences
19 are summarized and commented on. Additionally,
20 conclusions are given in sections which summarize
21 uncertainties in igneous activity and the role of
22 alternative models in evaluating risk due to igneous
23 activity.

24 7.2, nature of anticipated igneous
25 activity. Two possible scenarios -- one, two possible

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1 scenarios that involve intersection of the repository
2 by igneous activity include different processes and
3 risk consequences. Extrusive scenario involves
4 intersection of a volcanic cone-forming conduit
5 through the repository to the surface, causing waste
6 in the conduct to contaminate the ash and be dispersed
7 over the Yucca Mountain vicinity.

8 The greatest risk from such an event will
9 occur during the first thousand years due to the
10 presence of high activity alpha-emitting
11 radionuclides. The intrusive scenario involves
12 intrusion of an igneous dike into the repository,
13 leading to destruction of the waste packages and
14 releases and release of the waste to infiltrating
15 waters passing through the repository, but does not
16 involve a conduit directly to the surface.

17 Two, one volcano has erupted near Yucca
18 Mountain during the time of modern humans. The
19 Lathrop Wells volcano, which erupted 80,000 years ago,
20 is generally agreed to represent the type of igneous
21 activity possible in the region during the compliance
22 period of the repository.

23 This is a small volume, single episode,
24 basaltic volcanic event lasting perhaps a year with
25 the largest volume of material in the form of ash and

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1 other ejecta in lesser amounts in lava flows in the
2 volcanic scoria cone. Other small volcanoes that
3 occurred during the past few million years in the
4 Yucca Mountain region are of a similar nature.

5 Three, there is general agreement
6 regarding the nature of any future igneous activity --
7 in other words, power and approximate duration of
8 event, volume, types of eruptive products, general
9 magma type and its volatile content, and dike
10 characteristics.

11 There is also agreement that dikes, which
12 can locally evolve into volcanoes, tend to follow
13 preexisting fault zones, where faults exist in
14 proximity to an ascending dike. Thus, current DOE
15 plans to avoid existing faults and constructing a
16 repository -- the setback strategy -- will minimize
17 the likelihood of an extrusive event intersecting the
18 repository.

19 Four, the current 50- to 75-meter width
20 assume for the volcanic conduit vents beneath
21 volcanoes appears to be a reasonable upper bound based
22 on regional land logs. This width is important
23 because it constrains the number of waste packages
24 that could become entrained and ejected in a volcanic
25 eruption -- in other words, less than five high-level

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1 waste packages.

2 Five, the majority of past volcanic
3 activity occurs within a basin. That is, in Crater
4 Flat, the northern Amargosa Desert, and Jackass Flat,
5 not on ridges like Yucca Mountain. Although one
6 ancient -- greater than 10 million year-old --
7 basaltic dike exists on the western flank of Yucca
8 Mountain, no volcanic activity is known to have
9 intersected the repository footprint since the surface
10 rocks were deposited 13 million years ago.

11 Six, igneous event definitions have
12 evolved during site characterization and analysis.
13 Prior to the mid-1990s, the event was largely
14 restricted to volcanic eruptions. Subsequently, the
15 importance of dike intersection with the repository
16 has been emphasized, as well as volcanic events.

17 Even more recently, similar studies of
18 small volume basaltic igneous events dating back to 10
19 million years ago in the nearby Nevada test site
20 suggest that igneous cells, which are near horizontal,
21 tabular igneous intrusions, should be considered an
22 event definition.

23 The evolution in event definition may be
24 important in evaluating published igneous event
25 probabilities because of the change in definition from

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1 point events to long dikes, and perhaps broad cells
2 events.

3 Seven, recent detailed studies of nearby
4 basaltic volcanoes in the Yucca Mountain region have
5 provided an improved understanding of nominal eruptive
6 behavior, including the style of lava effusion, that
7 places controls on the nature of the possible igneous
8 event scenarios.

9 Eight, in conclusion, there is general
10 agreement that igneous activity may occur in either an
11 extrusive or intrusive scenario. The nature of
12 igneous activity that could occur over the compliance
13 period of the repository will probably be similar in
14 composition, structure, and style to the 80,000 year-
15 old Lathrop Wells volcano, the most recent volcanism
16 in the area.

17 7.3, probability of an igneous event
18 intersecting the repository. One, published estimates
19 of the probability of an igneous event intersecting
20 the proposed repository range from 10^{-10} per year to 3
21 times 10^{-6} per year. See Table 5.3 for the full range
22 of probability estimates.

23 The 1996 DOE expert elicitation
24 probabilistic volcanic hazard analysis estimated a
25 range after adjustment for the size of the repository

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1 footprint (90 percent confidence interval) of 7.4
2 times 10^{-10} per year to 5.5 times 10^{-8} per year, with
3 the mean value of 1.7 times 10^{-8} per year, which
4 exceeds the limit for screening out events.

5 The mean value of seven of the 10 experts
6 was at or above the screening level. The highest
7 probabilities reported by the State of Nevada were
8 obtained by assuming a new cluster of volcanism is
9 about to occur, although there is limited evidence of
10 impending igneous activity.

11 Two, claims of frequent recurrence of
12 volcanism are inconsistent with events known to occur
13 during the past five million years. If the
14 probability of occurrence is 10^{-6} per year, 40 to 192
15 eruptions should have occurred in the outcome outreach
16 in the last million years. However, only 80 events
17 are known to have occurred during the past two million
18 years. No volcanism has occurred near Yucca Mountain
19 since the end of the Pleistocene Ice Ages some 15,000
20 years ago.

21 Knowledge of the number of volcanic events
22 occurring in the Yucca Mountain region during the past
23 few million years has improved as a result of recent
24 geophysical surveying and drilling. There is no
25 evidence that the proposed repository footprint has

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1 been intersected in the last 13 million years.

2 Three, interpreted trends in the eruption
3 rates and volume of basaltic volcanism within the
4 Yucca Mountain region suggest that the deep source of
5 igneous activity may be waning, although the frequency
6 of eruption has not notably decreased over the past
7 five million years. Waning of igneous activity is
8 consistent with the observed significant reduction in
9 crystal extension rates over the last 10 million
10 years.

11 These changes suggest that volcanism
12 recurrence rate over the last million years is most
13 important to use in projections of future volcanic
14 activity. Although there is some indication of
15 periodicity in the occurrence of igneous activity in
16 the Yucca Mountain region, the existence of periodic
17 relationships remains a matter of different opinions.

18 A range of sources of magnetic anomalies
19 -- four, a range of sources of magnetic anomalies that
20 were interpreted to originate in buried basalts near
21 Yucca Mountain were recently investigated by
22 exploratory drilling. This investigation showed that
23 most of the anomalies are either not due to basalts or
24 are caused by eight to 13 million year-old basalts
25 that are likely to have limited influence on

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1 recurrence intervals based on rates of activity during
2 the last five million years.

3 The overall result of the drilling is that
4 the probability estimates based on the possible
5 existence of numerous buried (hidden) basalts that are
6 less than five million years need to be reconsidered.

7 Five, based on review of available
8 information, the probability of intersection of the
9 repository during the compliance period is currently
10 believed to be in the range of 10^{-9} per year to 10^{-7}
11 per year. An updated estimate currently is being
12 developed by the expert panelists of the ongoing DOE
13 PVHA-U, which will incorporate a wide range of views
14 on alternative models for estimating intersection
15 probability.

16 The results of this update are not
17 expected until 2008. The results will include
18 appraisal of the probability over one million years as
19 well as 10,000 years.

20 Six, a single valued approach to assessing
21 the probability of an igneous event intersecting the
22 proposed repository is not risk-informed. It fails to
23 realistically capture the uncertainty in the
24 probability of volcanism.

25 Seven, in conclusion, the anticipated

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1 nature of future igneous events in the Yucca Mountain
2 region and the past record of volcanism, particularly
3 during the past five million years, suggests a variety
4 of alternative models for evaluating the probability
5 of future igneous activity. Considering the technical
6 bases of these views, the range of probability of an
7 igneous event intersecting the proposed repository is
8 believed to be between 10^{-9} to 10^{-7} per year.

9 The results of the ongoing PVHA, which
10 will incorporate the latest geophysical and drilling
11 data, and provide an updated credible estimate of the
12 probability -- will incorporate and provide an updated
13 credible estimate of the probability of an igneous
14 event intersecting the proposed Yucca Mountain
15 repository.

16 7.4, consequences of an igneous event.
17 One, magma drift waste interactions in the extrusive
18 scenario are incompletely understood. Accordingly, at
19 present the waste packages -- from a few to 10 --
20 located in a volcanic conduit are generally assumed by
21 DOE and NRC to be disintegrated and the contents
22 incorporated into the ash, which is distributed around
23 the -- across the surrounding countryside according to
24 prevailing winds.

25 Two, consequence modeling for the

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1 intrusion scenario is still evolving. This is
2 particularly true of modeling the movement of magma
3 into the drifts and of the interaction of magma with
4 the waste packages and with the radioactive material
5 from breached packages in the intrusive scenario. The
6 movement of magma into drifts depends upon the
7 viscosity of the magma and the magnitude and
8 duration of the magma pressure on entering the drifts.

9 According to recent studies, previous
10 studies and current views of the NRC and DOE appear to
11 have underestimated the magnitudes of viscosity by a
12 factor of 10^4 or 10^5 . The magma-driving pressure is
13 highly uncertain. The beneficial effects of quenching
14 and progressive solidification of invading magma on
15 the movement of magma in repository drifts and on the
16 waste packages may also have been underestimated, and
17 damage to and releases from waste packages,
18 consequently, overestimated.

19 Ongoing studies may clarify these issues,
20 but the complexity of the analysis indicates full
21 resolution is unlikely before the presently planned
22 license application date.

23 Three, the so-called log-leg intrusion
24 scenario in which highly fluid, low viscosity magma is
25 assumed to enter and rapidly flow throughout the

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1 repository drifts, possibly breaking out to the
2 surface at a significant distance from the drift entry
3 point, is not the expected behavior of magma and
4 drift. Increased magma viscosity, quenching of magma
5 on waste packages and drift walls, and reduction of
6 magma pressure at a distance from the drift entry
7 point, would contribute to inhibiting secondary
8 breakouts to the surface.

9 Four, slightly more than half of the
10 eruptive products of basaltic volcanoes in the Yucca
11 Mountain region are ash that is dispersed from the
12 eruption plume. The remainder occurs as volcanic cone
13 fragments and lavas which are resistant to erosion.
14 Radioactive waste incorporated in the cone and lava
15 flows contributes little to the dose to the RMEI
16 because of this resistance to erosion.

17 Five, in the DOE and NRC performance
18 assessment codes, the assumption is made that all
19 spent fuel entrained in a volcanic conduit in the
20 extrusive scenario would be reduced to a very fine
21 powder and erupted into the atmosphere. However, the
22 ceramic pellets that comprise the spent nuclear fuel
23 have great strength and a melting point of 2600
24 degrees Centigrade, much higher than the magma
25 temperatures of about 1100 degrees Centigrade.

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1 Also, ejected fuel pellets and fragments
2 may be encased in a protective layer of quenched
3 magma, consistent with natural volcanic analogs of
4 wall rock materials that have been caught up in the
5 magma and brought to the surface in volcanic conduits,
6 in other words xenoliths.

7 Six, the presence of backfill either
8 intentionally placed or as a result of drift roof
9 collapse could be beneficial from the standpoint of
10 intrusive volcanism, because it would minimize contact
11 of magma with waste packages. Backfill would not
12 significantly alter the extrusive scenario, because if
13 a volcanic conduit intersects a waste drift it would
14 likely entrain both the waste packages and the
15 backfill itself.

16 Seven, modeling the redistribution of
17 deposited ash by water needs to account for the
18 preferential movement -- excuse me, removal of the
19 smaller-sized fraction of the ash and tephra from both
20 the catchment and depositional areas of drainage
21 systems. Remobilization models need to consider the
22 effects of large floods in Fortymile Wash that have
23 been transported -- that have transported sediments as
24 far as the Amargosa River and beyond.

25 Long distance transport of contaminated

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1 ash would result in extensive dilution of this
2 material by uncontaminated sediments along the
3 Fortymile Wash-Amargosa River drainage system that
4 would result in lower calculated dose to the RMEI than
5 if these effects are ignored.

6 Eight, in conclusion, a clear
7 understanding of the processes involved in interaction
8 between magma and drifts, waste packages, and waste is
9 still evolving. As a result, there is no consensus
10 regarding the consequences of igneous activity in
11 either the extrusive or intrusive scenario. The
12 proposed alternative models differed significantly
13 from each other. Ongoing work will be useful in
14 reducing differences and conservatisms, particularly
15 in the intrusive scenario.

16 7.5, uncertainties in igneous activity.
17 Limitations and differing interpretations of field and
18 laboratory data cause significant model and parameter
19 uncertain in the analysis of potential risk from
20 igneous activity at the proposed Yucca Mountain
21 repository. Uncertainties in defining conceptual
22 models appear to exceed parameter uncertainty in the
23 evaluation of probability of intersection with the
24 proposed repository.

25 Two, as a result of more than a quarter of

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1 a century of investigations of igneous activity in the
2 Yucca Mountain region, uncertainties in the general
3 nature of anticipated volcanism in this region are
4 relatively small. However, considerable uncertainties
5 still exist in quantifying significant details of an
6 igneous event -- for example, volcanic conduit size,
7 water content of the intruding magma, dike
8 characteristics, etcetera -- that are important to
9 probabilistic performance assessment.

10 Three, estimates of the probability of an
11 igneous event intersecting the proposed repository
12 include significant uncertainties because of
13 difficulties in predicting the temporal recurrence
14 rate as a result of limited activity over the past
15 five million years, as well as in identifying the
16 spatial distribution of events due to the few igneous
17 events that have occurred in the region over the last
18 few million years.

19 Additional uncertainties are caused by the
20 failure to identify magma sources within the
21 subcrustal rocks that are the source of the magma, and
22 the location of the proposed repository in the
23 spatially-sensitive region near the boundary of the
24 geologic/topographic Crater Flat structure, which has
25 been the center of volcanic activity in the Yucca

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1 Mountain region over the past five million years.
2 Uncertainties in defining conceptual models exceed
3 parameter uncertainty in the evaluation of
4 probability.

5 Four, consequence models are still
6 evolving and being improved. Recent detailed geologic
7 investigations of the Yucca Mountain region basaltic
8 volcanoes are adding significant new insights into
9 processes and parameters. Also, improved models
10 incorporating magma solidification effects on magma
11 flow and on quenching around waste packages are
12 providing new information for consideration in the
13 intrusive scenario. However, significant
14 uncertainties remain in evaluating igneous
15 consequences due to the model and parameter
16 uncertainty.

17 Five, in conclusion, significant
18 uncertainties exist in evaluating conceptual models in
19 estimating the probability of an igneous event
20 intersecting the repository, and in estimating the
21 consequences of such an event, particularly in the
22 intrusive scenario.

23 7.6, alternative models and risk from the
24 proposed repository. Determining the validity of the
25 differing professional opinions regarding igneous

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1 activity at Yucca Mountain, and its consequences with
2 certitude, is not possible, but it is possible and
3 useful to determine the bases and impact of the
4 alternative models and parameters.

5 Two, quantitative evaluation of the impact
6 of specific alternative models can determine their
7 significance and their importance -- and the
8 importance of further studies of the models in
9 understanding and constraining their uncertainties.

10 Available analyses of differing models of
11 igneous activity processes and scenarios have
12 generally not captured the importance of each model to
13 risk. This is particularly true of the consequence
14 models.

15 Four, in conclusion, assessment of the
16 performance of the proposed repository as a result of
17 igneous activity requires evaluation of a full range
18 of views on both extrusive and intrusive scenario, and
19 the range of parameter uncertainty, taking into
20 account observations supporting the parameters of the
21 assessment and their theoretical and physical bases.

22 These analyses will be useful in
23 determining the risk from the repository as well as
24 those aspects of igneous activity that are important
25 to risk and thus worthy of further investigation to

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1 reduce uncertainties. Presentation of the full range
2 of results of each analysis will be useful in
3 evaluating the model and parameters to which the
4 analysis is most sensitive.

5 Amen and hallelujah.

6 MEMBER CLARKE: Are you looking for
7 comments now, Bill, or how do you want to do this?

8 MEMBER HINZE: I'm certain we all are --

9 MEMBER CLARKE: Do you want to do this
10 page by page or --

11 MEMBER HINZE: Fine. I'm sorry that we
12 don't have line numbers on this, and I apologize for
13 that.

14 MEMBER CLARKE: Bill, I have a comment on
15 the -- well, it's 7.2, number 4. I don't have the
16 page number for you. It's about six pages in.

17 MEMBER HINZE: 7.2, 4, is the third page.
18 The current 50 to 75?

19 MEMBER CLARKE: Yes, it's the third page
20 of 7.2.

21 MEMBER WEINER: Yes, number 4.

22 MEMBER CLARKE: Number 4. As you know,
23 high-level waste means different things to the DOE and
24 the NRC. You might want to just call it waste
25 packages.

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1 MEMBER HINZE: Good show.

2 CHAIRMAN RYAN: Bill, before we get into
3 too many other review comments, could you just -- I
4 don't want to have you read the table, of course, but
5 can you just --

6 MEMBER HINZE: Oh, yes.

7 CHAIRMAN RYAN: -- maybe highlight the
8 content and the intent of the table.

9 MEMBER HINZE: Well, the difference from
10 the one you saw a couple of weeks ago is that we have
11 included some additional topics. We have fleshed out
12 more -- other topics. We have NRC, DOE, EPRI, and
13 other, and we have -- at your suggestion -- included
14 in each cell the section that is germane to this where
15 you can find further information.

16 And in the caption of the summary we have
17 the summary of general views on significant igneous
18 activity topics. This table is a simplification and
19 generalization of views that are reviewed in the
20 report. And I really want to emphasize that, because
21 there is a danger here in being too simplified.

22 You can't put in all the caveats that
23 sometimes are extremely important. The reader --
24 thus, the reader is encouraged to read the text on
25 each topic in the section of the report specified with

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1 each view, and tells in the table by a dash where we
2 have been unable to find information.

3 CHAIRMAN RYAN: And this is just another
4 effort to further roadmap where information was
5 gathered from and who the authors of that were, and
6 all of that, just so that there's a little bit more
7 roadmapping of that --

8 MEMBER HINZE: Absolutely.

9 CHAIRMAN RYAN: -- course material.

10 MEMBER HINZE: And to make it easier for
11 the reader to --

12 CHAIRMAN RYAN: Fair enough.

13 MEMBER HINZE: -- find what they are
14 interested in and go to it.

15 I guess the thing that really needs to be
16 emphasized here is that when we brought together the
17 executive summary in the original draft that you saw
18 what we did was we took the summary and we just
19 klugged it together, and it was -- you know, it was
20 very long and much too detailed. I think we all
21 agreed to that, but we were trying to get a framework.

22 The important thing there is that the
23 summary of Chapters 4, 5, and 6 are pretty detailed in
24 discussing the different views of DOE, NRC, and EPRI,
25 and that's what we built upon.

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1 CHAIRMAN RYAN: Okay.

2 MEMBER WEINER: Could I just add
3 something? The table is a snapshot, and it's a very,
4 very brief snapshot. So drawing conclusions from the
5 table was not what we intended. It was just to
6 highlight certain things, so that people could go back
7 and really read them if they were interested.

8 MEMBER HINZE: Yes. Frankly, it was an
9 excellent exercise for us.

10 MEMBER WEINER: Yes.

11 MEMBER HINZE: Because for one thing we
12 found that we were missing some things in the report,
13 and we needed to include those. And we refined the
14 results. And, frankly, this table -- we've talked
15 this morning that there are a couple of other topics
16 that we are trying to bring in here.

17 One that I would like to see brought in is
18 -- and where there seems to be a considerable
19 difference of opinion and where there -- it's quite
20 important is the flux rate of the magma, the velocity,
21 and particularly the flux rate. And I'd like to see
22 that brought in, and we're going to be working with
23 Bruce to try to bring some of those things in.

24 CHAIRMAN RYAN: That's great. I mean, I
25 think this is a tool and an exercise to accurately

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1 explore the range of views, is really right on the
2 goal of the report. And, again, just for everybody's
3 benefit, you know, this report is designed to explore
4 a range of views, not to depict one that, you know,
5 wins the applause meter. It's really to explore that
6 range. And if this kind of approach helps get that
7 done, that's great.

8 MEMBER HINZE: And we've tried to capture
9 -- Mike we've tried to capture -- in the SRM it says
10 to review and analyze, and the conclusions -- we've
11 tried to really summarize in a few words what people
12 are saying, but we also have tried to comment on them
13 in the spirit of the SRM.

14 CHAIRMAN RYAN: Okay.

15 MR. HAMDAN: Can I ask a question? You
16 know, I hope this is not too difficult a question. I
17 know that the usefulness of what's here in general --
18 like you just said, that you are articulating the
19 views of many parties and stakeholders. But if one
20 were to ask you just to go one step further and say
21 how do you think they can use this report for beyond
22 what was said? Would you be able to say something
23 about that or not, or --

24 MEMBER HINZE: Well, you mean beyond what
25 was said in terms of making a decision?

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1 MR. HAMDAN: Yes.

2 CHAIRMAN RYAN: Latif, let me jump in.

3 MR. HAMDAN: Yes.

4 CHAIRMAN RYAN: I think you've got to
5 understand what the goal for this report was. The
6 goal for this report was to carefully, thoroughly
7 examine and document the range of views on the related
8 topics. That's it.

9 MR. HAMDAN: Okay.

10 CHAIRMAN RYAN: And to provide it to the
11 Commission to aid in their decisionmaking. It's not
12 to tell them the answer.

13 MEMBER HINZE: We have resisted every
14 effort to put in a final statement summarizing what we
15 think --

16 CHAIRMAN RYAN: The answer is: we're not
17 going to do that.

18 MEMBER HINZE: -- because we don't --
19 frankly, we don't have all of the information, and
20 critical information. I think making a decision now
21 would -- or trying to push one point of view would
22 really be scientifically unsound.

23 CHAIRMAN RYAN: And I think, frankly, a
24 disservice to everybody from -- you know, all the
25 participants who have participated with us in trying

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1 to get this documented range of views.

2 I think just the opposite of your
3 question, we want to explicitly say we're not doing
4 that.

5 MR. HAMDAN: Okay. Actually, it was --
6 what I was getting at, I'm not looking for an answer
7 to my question. What I was looking for, maybe a
8 little section in the report that kind of addresses
9 that, maybe what's not in the report or what -- or
10 points out, you know, some useful things, but not
11 necessarily a decision or taking sides, but how the
12 report can just be used to aid the decisionmaking.
13 Something like that.

14 CHAIRMAN RYAN: I think in the
15 introduction that is covered fairly well.

16 MEMBER WEINER: Yes.

17 MR. HAMDAN: Okay. Thanks.

18 MEMBER WEINER: Could I jump in on that?
19 Latif, I think we kept going back to the SRM and what
20 the SRM asked, and we wanted to stick very closely to
21 that without expanding that, because this is -- we
22 recognize that there are -- is a wide range of views,
23 and we keep saying that. And we cannot go any further
24 than that.

25 CHAIRMAN RYAN: Bill, what input are you

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1 looking for now?

2 MEMBER HINZE: I'm looking for that we're
3 -- that in principle that the Committee is in
4 agreement with the summary and conclusions. You know,
5 there are editing things and there may be
6 redundancies. And, you know, every time you read it
7 you find something more you want to delete, and that's
8 not what we're looking for.

9 We're -- in principle, what we're looking
10 for -- what we are looking for, that the Committee
11 subscribes to this summary and conclusion, in
12 principle, so that we can move ahead with the rest of
13 the document. You know, you will be receiving this
14 draft which will have line numbers and which will have
15 these. And if you want to make editorial comments, we
16 can certainly -- I mean, we need those.

17 CHAIRMAN RYAN: Okay.

18 MEMBER HINZE: And with that, I would like
19 to move to the executive summary.

20 CHAIRMAN RYAN: Let's do it.

21 MR. FLACK: Could I just -- I know it's
22 kind of late in the game, but there's one point here
23 that I thought I should really bring up, because it --
24 I thought about it before, and it's the point that is
25 being made on the probability and risk-informing, and

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1 so you're using the single-point probability as not
2 being risk-informed.

3 I think risk-informed in this agency is
4 used many different ways, not only here but in the
5 reactors, and they have the same problem about bottom-
6 lining things. But I think the intent of being risk-
7 informed is to say there is really a deterministic
8 world and there's a probabilistic world.

9 And when you move -- a lot of the
10 regulations, especially reactors, is a deterministic
11 world. And what the Commission did when they put
12 forth the PRA policy statement was to make people
13 think about the likelihoods of things, not so -- and
14 to move away from just saying this is the way it's
15 going to be.

16 And when you do that, people -- in a broad
17 sense of the word -- across the agency consider that
18 as being risk-informed. Now, the use of the
19 information is different. You could say that using a
20 single point isn't -- it could be misleading in the
21 decisionmaking process without the consideration of
22 uncertainties, and so on.

23 But in the context of what the Commission
24 intended to do when they said to risk-inform
25 regulations was to think of things in probabilistic

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1 terms, so -- you know, and just the fact that you have
2 thought about something probabilistically, in some
3 sense you're risk-informing the process. And so that
4 -- it seemed like a very strong statement to say it
5 that way. That's my view.

6 MEMBER HINZE: John, I understand where
7 you're coming from, and if you'd like to make a
8 recommendation on how we can change that, you know,
9 we'd --

10 MR. FLACK: Sure.

11 MEMBER HINZE: -- be happy to -- and
12 you're emphasizing the word of use and --

13 MR. FLACK: Right, right.

14 MEMBER HINZE: -- and I think that could
15 be incorporated, to make certain that it's as clear as
16 possible.

17 MR. FLACK: Sure, sure.

18 MEMBER HINZE: And, you know,
19 clarification is one of the bugaboos. This is a
20 complex topic.

21 MR. FLACK: Yes.

22 MEMBER HINZE: You know, Britt would --
23 and the ASLB, when he reads this, he will know. You
24 know, but, you know, the --

25 MR. FLACK: Sure. I was thinking about,

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1 you know, how it would be said and getting your point
2 across about using a simple -- a single point, the
3 danger of just using a single point.

4 But just to follow up a little bit on what
5 Latif had to say, with uncertainties, recognizing
6 there's a lot of uncertainties within the discussion
7 and the points that you're trying to make, the
8 question that could be helpful, though, is even if you
9 started to take bounding cases -- I mean, if you have
10 a very small number in large uncertainties, it still
11 may not be a big deal. Of course, as that number gets
12 larger, the uncertainties become more important.

13 And if there was some way of putting it
14 into perspective to say, well, we recognize there's a
15 lot of uncertainties at this point, and you certainly
16 flesh all that out, the question of whether or not
17 they still have to be larger than what they are to
18 have a really big impact on the decisionmaking,
19 something like that, just putting it into some sort of
20 perspective may --

21 MEMBER HINZE: Actually, something like
22 that is said in there, and that's particularly with a
23 consequence. And it really frustrates me, because we
24 have -- we have some pretty interesting discussions
25 going on about different models, conceptual models and

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1 parameters involved in the intrusion scenario and the
2 consequences.

3 And yet we don't have any feeling for the
4 risk from those -- the differing risks. And we may be
5 worrying about differences in uncertainties that
6 really aren't warranted from a risk standpoint. And,
7 you know, if there's one thing I've really learned
8 from this effort is that -- is that we -- you know, if
9 I were to -- if I were to be a party to writing a
10 letter to the Commission suggesting some things for
11 NRC staff to do, it would certainly be to move towards
12 that as soon as possible, because we can be wasting a
13 lot of time, we can be spinning a lot of wheels when
14 the -- if we know enough about -- if we have a
15 reasonable bound on those uncertainties we should be
16 able to put that into a performance assessment,
17 determine risk, and say, hey, you know, there is a
18 real difference of risk from these, so we do have to
19 determine that.

20 But we haven't done that. I mean, we
21 haven't seen that. It is not seen in the public --

22 MR. FLACK: Okay.

23 MEMBER HINZE: And I think that's really
24 what -- kind of what you're getting at.

25 MR. FLACK: Yes, right. Exactly.

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1 MEMBER HINZE: And that's stated in here.

2 MR. FLACK: Yes. Okay.

3 MEMBER HINZE: I mean, that --

4 MR. FLACK: Something like that. Okay.

5 MEMBER HINZE: Somebody tried to pull that
6 out last night, and I just put my knife in the desk.

7 MR. FLACK: A little bit -- yes, it's
8 getting it across in the proper -- right way I guess
9 is important.

10 MEMBER HINZE: Okay. We'll move on to the
11 executive summary, then?

12 CHAIRMAN RYAN: Yes.

13 MR. McCARTIN: Just if I -- one thing I
14 heard -- and I may have heard it wrong -- and it was
15 with respect to the viscosity. And it sounded like
16 the statement was made that -- an implication that we
17 were four or five orders of magnitude off in the
18 viscosity.

19 And while I will agree that in the
20 workshop there is differences of that nature, but it
21 seemed like everyone had evidence that they believed
22 for their number. And it sounded more like there was
23 a definitive statement that we were wrong, and I guess
24 that's the only thing that to me the workshop said.

25 There certainly was a difference of

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1 opinion, but I don't know if there -- if it was clear
2 who was --

3 MEMBER HINZE: Yes. You're talking about
4 7.4.2, and I -- and that's a perfectly legitimate
5 concern. Let me read that sentence again, okay?
6 According to recent studies, previous studies and
7 current views of the NRC and DOE appear to have
8 underestimated the magnitude of the viscosity by a
9 factor of 10^4 to 10^5 .

10 Would you care to expand upon that, Bruce?

11 MR. MARSH: Sure. For example, all
12 through the previous work in the DOE documents they
13 are using -- they used 40 to 60 pascal-seconds for the
14 data. And that's actually what we'd see for a dry or
15 waning basalt.

16 Now, if you take into account the wetness
17 of these and the temperature they're coming out --
18 that number should at least be 10^4 or 10^5 , which is
19 what Sparks talked about here. I think it could be
20 even a little higher, 10^7 , 10^8 .

21 MR. McCARTIN: Okay.

22 MR. MARSH: So all the stuff that Sparks
23 talked about here, he gave numbers of 10^4 , 10^5 pascal-
24 seconds, and from talking to him he said maybe even
25 10^6 . So, but it all depends on if you have the right

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1 magma and if the -- but it's certainly not 10 -- it's
2 not 40 to 60 pascal-seconds, which is --

3 MR. McCARTIN: Okay.

4 MR. MARSH: -- really pervades a lot of
5 the modeling that we were --

6 MR. McCARTIN: Okay. I --

7 MR. MARSH: -- so that's actually --

8 MR. McCARTIN: I just remember there was
9 a lot of debate about it, and I didn't --

10 MEMBER HINZE: And the ICRP -- the igneous
11 consequence review panel is one of the beautiful
12 illustrations of that. I think -- let's take that
13 under consideration. I've got some ideas on how that
14 might be modified so that we really don't step on too
15 many toes here, but we are really trying to present
16 the right --

17 MR. TRAPP: Just one very minor thing, and
18 it kind of ties into that. There are many sentences
19 in here which appear to be giving the opinion of the
20 ACNW as scientific fact. I would suggest that when
21 you go through there that you just take a look at this
22 and make sure when you're stating your opinion and
23 when you are stating --

24 MEMBER HINZE: Yes.

25 MR. TRAPP: It's my appearance.

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1 MEMBER HINZE: Yes.

2 MR. TRAPP: That's all I'm saying.

3 MEMBER HINZE: You know, there were a lot
4 of suggest appears, etcetera, included in the last
5 couple of days. And I think sensitizing us to that is
6 important.

7 MEMBER WEINER: Yes. I was going to say
8 we really tried to scrub that, scrub the entire
9 document of those. And if you have any specific
10 suggestions where you see something, John --

11 MR. TRAPP: Well, like I say, I'm just
12 stating it as a general suggestion. It's up to you.
13 It's your report.

14 MEMBER HINZE: Okay. If there are no
15 more, then, I'll go to the executive summary, and I
16 think my voice is good enough to hang on. Basically,
17 there is some boilerplate up front, and then we
18 discuss the different scenarios, and then the nature,
19 likelihood, and consequences, and we end up with
20 observations, with a series of observations. And
21 those are really our view, if you will.

22 Okay. Executive summary -- 80,000 years
23 ago a small volume basaltic volcano (Lathrop Wells)
24 erupted about 15 miles south of the Department of
25 Energy's proposed high-level waste repository in Yucca

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1 Mountain, Nevada. This is one of a series of
2 infrequent basaltic volcanoes that have occurred near
3 the proposed repository during the past 10 million
4 years.

5 This report presents the Advisory
6 Committee on Nuclear Waste and Materials summary and
7 an analysis of the range of current technical views on
8 the nature, likelihood, and potential consequences of
9 future igneous activity at the proposed repository.

10 Our report responds to the request of the
11 Commission, the SRM. The technical views have been
12 abstracted from the published literature and public
13 agency reports and presentations. The alternative
14 views, which are still evolving, are due to both
15 inherent uncertainties in the igneous processes that
16 have occurred and are likely to occur in the region,
17 and limitations in the knowledge of controlling
18 parameters.

19 Analysis of the views and observations
20 regarding them are based on professional judgment and
21 quantitative considerations within the scope of the
22 resources available to the ACNW&M. Two possible
23 scenarios that involve different processes and --

24 CHAIRMAN RYAN: Bill, let me just let you
25 catch your breath there for a second. ACNW&M is

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1 consistent with our draft action plan and charter
2 request -- revisions requested by the Commission. So
3 don't let the acronym fool you. If that's not
4 approved or whenever the timing is, it will be
5 whatever the right acronym is. Just so everybody
6 understands.

7 MR. FLACK: Yes, right. We have to make
8 sure it goes out as the right document.

9 MEMBER HINZE: I put that in just to wake
10 people up --

11 (Laughter.)

12 -- on the Committee in one of the drafts.
13 But, you know, it's likely by June or -- I don't know.
14 Tell me --

15 MR. FLACK: It should be. Well, we'll
16 make sure it goes out with the right acronym.

17 CHAIRMAN RYAN: Just wanted to let
18 everybody know what that meant.

19 MEMBER HINZE: Two possible scenarios that
20 involve different processes and consequences can be
21 associated with the potential intersection of the
22 repository by igneous activity. The extrusive
23 scenario involves the intersection of a volcanic cone-
24 forming conduit through the repository to the surface,
25 possibly causing destruction of the waste packages

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1 intersected by the conduit and dispersal of
2 contaminated volcanic ash over the Yucca Mountain
3 vicinity.

4 Very small particles of radioactively-
5 contaminated ash from the volcanic eruption could be
6 available for inhalation by the reasonably maximally
7 exposed individual. Current performance assessment
8 calculations indicate that the largest possible risk
9 from igneous activity is from a volcanic intersection
10 during the first few thousand years after closure of
11 the repository when relatively high-activity
12 radionuclides are present in the waste.

13 These calculations suggest that the
14 maximum probability-weighted dose is only a fraction
15 of the current dose standard and decreases with time.
16 The principal factors in determining risk from the
17 extrusive scenario are the probability of the event,
18 including both considerations of the probable location
19 of future events and their recurrence rate, the number
20 of waste packages entrained in the erupted ash, the
21 eruption volume and the dispersal of the contaminated
22 ash, the size distributions of the waste particles and
23 ash, surface remobilization of contaminated ash by
24 water and wind, and inhalation of ash by humans.

25 The other scenario involves intrusion of

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1 an igneous dike into the repository, leading to
2 destruction of waste packages and release of the waste
3 to infiltrating waters that pass through the
4 repository to the vicinity of the RMEI, where
5 radioactive materials in the waste could be ingested
6 directly or indirectly from vegetation and animals
7 that have taken up radioactively-contaminated
8 groundwater.

9 The effects of the igneous intrusion
10 scenario are not expected to occur for tens of
11 thousands of years due to slow movement of water from
12 the repository to the vicinity of the RMEI. Present
13 performance assessment calculations indicate the
14 maximum probability-weighted dose from the intrusive
15 scenario is likely to be only a fraction of the
16 current standard.

17 The major factors in determining risk from
18 the intrusive scenario, in addition to the probability
19 of the event, are the number of waste packages
20 affected by the intruding molten rock (magma), which
21 is determined by the viscosity of the magma and the
22 magnitude of duration to the pressure upon entry, the
23 dissolution of the waste released from damaged waste
24 packages into infiltrating groundwater, the transport
25 of the waste contaminated groundwater to the vicinity

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1 of the RMEI, and the ingestion of released
2 radionuclides by the RMEI.

3 The risk from these scenarios depends upon
4 the likelihood of the occurrence of an igneous event
5 during the compliance period of the repository and the
6 effect of the consequences from the event.
7 Consequences depend on the nature of the anticipated
8 igneous activity, which is informed by investigations
9 of past geologic and tectonic activity in the Yucca
10 Mountain region, interpreted within the constraints of
11 knowledge of geologic and physical processes.

12 More than a quarter of a century of study
13 of the volcanic history of the Yucca Mountain region
14 has provided an almost unprecedented amount of
15 information on igneous activity that is useful for
16 predicting future volcanic activity. As a result, the
17 divergence of views among investigators regarding the
18 nature of future igneous events is relatively small.

19 General agreement exists that future
20 igneous activity is likely to be a small volume,
21 single episode basaltic volcano, similar to the 80,000
22 year-old Lathrop Wells volcano. Although
23 uncertainties remain, this agreement extends to
24 related parameters of the event such as power and
25 duration, volume and type of erupted products, size of

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1 volcanic vent supplying lava to the surface, spatial
2 relationship of the eruption to the topographic
3 surface, geochemical characteristics of the magma, and
4 igneous dike characteristics from which the volcano
5 originates.

6 One of the more challenging aspects of the
7 igneous activity investigation is to estimate the
8 likelihood of the occurrence of future igneous events.
9 There are no contemporary indicators of igneous events
10 that could occur thousands of years in the future,
11 sources of magma have not been found in the nearby
12 earth, there is no evidence that the repository
13 footprint has been intersected by igneous activity in
14 the last 13 million years, and the number of volcanic
15 events in the region from which to extrapolate into
16 the future is limited compared to other basaltic
17 volcanic regions in the southwestern U.S.

18 As a result, there is a range of views on
19 conceptual models used to predict probability of
20 igneous events, and uncertainties exist in parameters
21 used in evaluating the models. Nonetheless, there is
22 general agreement based primarily on the location and
23 recurrence rate of volcanism over the past five
24 million years that the range of probability of an
25 igneous event intersecting the proposed repositories

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1 from 10^{-9} to 10^{-7} per year.

2 The assumption of igneous event
3 probabilities larger than 10^{-7} per year is
4 inconsistent with the number of volcanic events that
5 have occurred during the past five million years.

6 Moreover, care is necessary in comparing
7 probability estimates because of changes in igneous
8 event definitions during the past few decades that
9 have progressively included the probability of
10 increasing dikes and sill material in addition to
11 volcanic activity. Including the former increases the
12 footprint of the igneous activity.

13 The consequences of an igneous event are
14 less well understood than other components of the risk
15 triplet. The study of consequences from igneous --
16 the igneous intrusion scenario has been limited -- has
17 been more limited than other aspects of the igneous
18 activity program, and there is no generally
19 appropriate analogs. Thus, the models and
20 parameterization for intrusion consequence analysis
21 are less mature than other segments of the program,
22 and considerable uncertainty exists in both
23 consequence models and parameters.

24 The principal difference in views of the
25 intrusive scenario is associated with the magma drift

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1 waste interaction, and the distance that intruding
2 magma flow into the drifts as a result of
3 uncertainties in the viscosity of the magma, and the
4 magma and duration of the pressure upon entry into the
5 drifts.

6 Models that do not incorporate evidence
7 that magma may have relatively high viscosities,
8 consider quenching of magma on the drifts and waste
9 packages, evaluate the role of progressive
10 solidification of invading magma, and consider
11 potential barriers to magma flow from drift rock
12 collapse may overestimate -- may overestimate both the
13 number and extent of damage to waste packages.

14 Additional uncertainties exist in the
15 extrusive scenario consequence analysis -- for
16 example, the range of size of spent fuel particles and
17 ash and the effects of large floods on the transport
18 of contaminated ash of significance to the inhalation
19 dose.

20 Consideration of the full range of current
21 views on the nature, probability, and consequences of
22 igneous activity lead to the following general
23 observations.

24 One, the nature of the occurrence and
25 consequence of an igneous event in the Yucca Mountain

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1 vicinity leads to different professional judgments and
2 alternative views on the potential impact of igneous
3 activity on the proposed high-level waste repository.
4 As a result, evaluation of risk from an igneous event
5 requires quantitative consideration of credible
6 alternative views, taking into account geological
7 evidence and their physical bases. These analyses
8 will be useful in evaluating risk and determining
9 whether further investigations are warranted to reduce
10 uncertainties.

11 Two, there is general agreement on many
12 aspects of the nature of potential igneous events and
13 the range of probability of these events in the
14 future, despite the broad range of conceptual models
15 and parameters that have been used to investigate the
16 potential effects of an igneous event intersecting the
17 proposed high-level waste repository.

18 The consequences of an igneous event on
19 the repository are more controversial and less well
20 understood, but these models and their
21 characterization are evolving. The significance to
22 risk of differences in these views is not well
23 documented.

24 Three, limitations in fundamental
25 information and knowledge of processes result in

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1 inherent uncertainties in evaluating igneous activity
2 models. For example, the low level of basaltic
3 activity over the last five million years in the Yucca
4 Mountain region, in comparison with other areas of the
5 region, reduces the threat of potential risk from
6 igneous activity, but limits the ability to
7 extrapolate activity into the future without
8 uncertainty.

9 Four, both the extrusive (volcanic) and
10 intrusive scenario are viable for the Yucca Mountain
11 region. The extrusive scenario is likely to cause the
12 largest relative risk, but the effect is greatest
13 within the first -- is likely, but the effect is
14 greatest within the first thousand years.

15 In subsequent time, the high-activity
16 radionuclides in the waste will largely have decayed.
17 The effects of the intrusion scenario on the RMEI will
18 not occur for several tens of thousands of years.
19 Preliminary performance assessment indicates that the
20 probability-weighted dose from both scenarios would be
21 only a fraction of the current dose standard.

22 Five, future igneous activity in the Yucca
23 Mountain region will likely be similar to the
24 characteristics of the small volume, single episode
25 basaltic Lathrop Wells volcano, and will likely occur

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1 within basins as has most of the igneous activity over
2 the past several million years in the region.

3 Six, general, but not total, agreement is
4 that the igneous activity at Yucca Mountain is waning,
5 with the probability that future igneous activity
6 based on nearby volcanism over the past several
7 million years is in the range of 10^{-7} to 10^{-9} per year.

8 The current expert elicitation of volcanic
9 experts in the DOE's probabilistic volcanic hazard
10 update, which incorporates the latest geophysical and
11 drilling data from the Yucca Mountain region, will be
12 the most up-to-date credible estimate of the range of
13 igneous activity intersection with the proposed
14 repository.

15 Seven, possible significant disagreements
16 exist regarding the nature of the flow of magma into
17 drifts of the repository by an intersecting igneous
18 dike and the effects of this type of event. The dog-
19 leg scenario in which the invading magma breaks out to
20 the surface through a secondary event after traveling
21 along the drifts and interacting with the waste
22 packages is discredited by most groups on the basis of
23 available evidence.

24 Even without considering the development
25 of secondary events, differences occur in views

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1 regarding the number of waste packages that will be
2 destroyed by invading magma.

3 Eight, the current technical bases of
4 several aspects of igneous activity appear to be
5 insufficiently developed or supported by available
6 information and analyses. These include the range of
7 waste particle size in the ash and the ash that will
8 contribute to inhalation dose, the effects of large
9 floods on the volume and distribution of contaminated
10 ash in the vicinity of the RMEI, the amount of waste
11 incorporated into ash versus lava during early
12 eruptive phase of the extrusive scenario, and the
13 importance of setbacks of the repository from faults
14 and fracture zones that are likely locations for
15 dikes, leading to either eruptive or intrusive
16 scenario events.

17 CHAIRMAN RYAN: Comments? John?

18 MEMBER CLARKE: I think this, Bill, is
19 very well done. I really -- I'd like to go through it
20 again. I may pick up a typo or two, but I have no
21 comments of any substance.

22 MEMBER HINZE: Thank you.

23 CHAIRMAN RYAN: Allen?

24 VICE CHAIRMAN CROFF: One specific thing.
25 On the -- on your item 7 here, this is the nature of

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1 flow of magma in the drifts, the implication of the
2 summary item that -- this is sort of a euphemism for
3 the viscosity issue, as I understand it.

4 MEMBER HINZE: Yes, and the quenching
5 issue.

6 VICE CHAIRMAN CROFF: Okay. As I read
7 this, it seems to focus on the intrusive only. Is the
8 viscosity -- are the viscosity differences or the
9 differences of opinion not important to the extrusive?

10 MEMBER HINZE: I think I'll turn to our
11 consultant for that, if you don't mind.

12 MR. MARSH: Well, it's a less-known
13 factor, because during the Strombolian phase or
14 Plinian phase of eruption everything is fragmented, so
15 there is much less sort of difference of opinion on
16 that aspect of at least the eruption dynamics and what
17 the material is like.

18 The differences of opinion are really on
19 the -- in the lava stage, the magma stage, the
20 degassed system, whether we --

21 MEMBER HINZE: If you'll notice in the
22 report, and there was in the draft -- there were --
23 there was a diagram which showed -- that Bruce put
24 together that was excellent that put together the
25 viscosities in the early effusive phase of the tephra,

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1 of the ejecta. And then, alongside of it, the same
2 except for the lava phase. And that's the lava phase
3 that is of concern in the entrance into the drifts.

4 And there is quite a difference in the
5 viscosity between those two phases, and the agreement
6 on that ejecta phase are much better, much closer than
7 they are in the --

8 VICE CHAIRMAN CROFF: But what you're
9 saying is in the extrusive event, basically by the
10 time you get to the lava phase the radionuclides are
11 already -- well, may already be gone. In other words,
12 that happens in the -- the radionuclides would have
13 been ejected earlier before you get to the lava phase.

14 MR. MARSH: Well, not exactly. I mean,
15 the erupted phase -- the early, the violent phase, for
16 example, is -- really involves just the cross-section
17 of the drift, more or less, and any canisters it hits
18 and anything that happens to the canister as it is --
19 and the impact of that.

20 The lava phase has to do with how much
21 magma goes down the drift and how many canisters are
22 contacted by the lava. So they're in some ways
23 different phenomena, and one is an interaction of the
24 lava encapsulating canisters or waste packages in the
25 drifts, and the other one is really almost the cross-

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1 section that's involved, and also some of the possible
2 effects of ash going down the drift, and things like
3 this. But --

4 MEMBER HINZE: And we have to be concerned
5 about making that too simple, too, because there is
6 lava that comes out in that early phase.

7 MR. MARSH: They could go back and forth,
8 but --

9 MEMBER HINZE: Yes, right.

10 MR. MARSH: -- this dog-leg scenario thing
11 you talked about, we actually -- most of the stuff
12 that we talk about here, just summarizing other
13 people's views on the dog-leg scenario, not ours
14 really.

15 MEMBER HINZE: Yes.

16 MR. MARSH: We didn't really say much
17 about it, but de Tourney, et al., and other people,
18 the consequence review panel, and almost everyone else
19 who has considered this is basically --

20 MEMBER HINZE: Numerous consultants at
21 the --

22 MR. MARSH: Yes.

23 CHAIRMAN RYAN: Is there a comment, Jim?

24 MR. RUBENSTONE: I'm just a little
25 confused. When you're talking about the initial

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1 phase, what you're saying is the effusive phase. Are
2 you saying that no magma will enter the drift during
3 that initial effusion? Because you say the --

4 MR. MARSH: No.

5 MR. RUBENSTONE: -- only time you'd worry
6 about magma entering the drift is during the lava
7 phase.

8 MR. MARSH: No. I mean, what are you
9 talking about for magma? Which --

10 MR. RUBENSTONE: I'm talking about magma
11 -- molten rock and crystals, etcetera, and gas, and so
12 -- so that's why I'm confused why you're only
13 considering lavas as entering the drifts as opposed to
14 -- as opposed to once the eruption -- once the conduit
15 intersects the drift and may continue to the surface,
16 that's the material you're concerned about, whether
17 it's going to the surface, filling the drift,
18 etcetera, and you don't --

19 MR. MARSH: We did not consider magma in
20 the drift at any time.

21 MR. RUBENSTONE: Okay.

22 MR. MARSH: Any time whatsoever in the
23 sequence.

24 MR. RUBENSTONE: As only a lava, or as a
25 gas-charged --

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1 MR. MARSH: Well, magma -- a gas-charged
2 mixture is not magma, by definition. Magma is the
3 viscous material with or without bubbles and stuff in
4 it, but you're talking about an ash eruption. That
5 isn't magma, that's --

6 MR. RUBENSTONE: That's not magma.

7 MR. MARSH: Well, that's not magma in the
8 context of what we're talking about.

9 MR. RUBENSTONE: Okay.

10 MEMBER HINZE: But we are talking about
11 the tephra going into the --

12 MR. MARSH: Sure, and we reviewed that.
13 We reviewed the --

14 MEMBER HINZE: And that's very important.
15 You know, I think where you're coming from is -- yes,
16 that's a very important part of it. That will have an
17 effect.

18 MR. TRAPP: There is one other little
19 nuance that has got to be covered there. You're
20 talking about the dog-leg, and the way the dog-leg has
21 normally been discussed is discussed during the
22 original phase of the eruption.

23 One of the things that we have gone
24 through in the various papers is to the conclusion
25 that, yes, during the original phase of eruption it

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1 probably cannot occur, but there are too many examples
2 of both the secondary events on volcanoes of this type
3 that this secondary type of rupture, not the original
4 event but another event, needs to be considered in the
5 entire consequence. And that's really where our
6 emphasis is at the present time, not the first 30
7 seconds, not the first couple minutes, but basically
8 these long-term secondary events that you do see.

9 MEMBER HINZE: John, I hate to be that
10 ignorant, but can you -- which publication are you
11 referring to that specifically directs itself to
12 that --

13 MR. TRAPP: It really would be directed in
14 our reply to I believe igneous activity, 2.18. I can
15 go and look it up, but I'm sure that's --

16 MEMBER HINZE: Do we know where that is,
17 Neil?

18 MR. TRAPP: If you take a look at our
19 reply to igneous activity, KTI agreement, 2.18, I
20 believe that would be the best spot to look it up.

21 MR. GILLESPIE: 2.1?

22 MR. TRAPP: 2.18. I'll check, but I
23 believe that's the best place.

24 MEMBER HINZE: I don't think we've
25 captured that, because we didn't have any public

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1 material on it. But there is some public material.

2 MR. TRAPP: In the talk that Britt gave,
3 he was trying to point out -- and some of his diagrams
4 are showing the secondary events that you do see.
5 This is just making sure that the secondary events are
6 considered in the analysis.

7 CHAIRMAN RYAN: I'm sorry. I'm going to
8 ask kind of a dumb guy question. What's the
9 difference between a secondary event in time versus a
10 long enough period of time that's a new event?

11 MR. TRAPP: What we're talking about is
12 the main vent, the main conduit, etcetera, which we're
13 really mainly looking through in the emphasis.
14 however, if you remember the work of -- that Andy
15 Woods came up here when he was talking about the --

16 CHAIRMAN RYAN: Yes.

17 MR. TRAPP: -- various studies showing how
18 the differences in pressure, etcetera, could change
19 these flows, he was really trying to understand how,
20 as time goes on, a possible secondary breakout could
21 occur. Like I said, this is not during the initial --

22 CHAIRMAN RYAN: Okay.

23 MR. TRAPP: -- it was analyzed by
24 de Tourney and all of the other kind of stuff, long-
25 term events.

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1 MR. RUBENSTONE: The thing to remember,
2 Mike, is even during the formation of these single
3 episode -- what we call monogenetic volcanoes, the
4 eruption -- the time it takes to form them is months
5 to a couple of years.

6 So during the course of that eruption, it
7 has been observed within those kind of eruptions that
8 have happened during historic times that you form
9 these -- you form a cone, and then at some time over
10 the next few months you can have a secondary breakout
11 forming at some lower elevation away from the main
12 cone. And that has been observed many times, and you
13 go in the geologic record, even of these monogenetic
14 volcanoes that aren't observed in eruption, and you
15 can find the evidence of that.

16 CHAIRMAN RYAN: Trying to make it all the
17 way, some that don't, you know, that kind of thing.
18 Yes, I remember you talking about the ranges.

19 MR. RUBENSTONE: Right. So that's why you
20 have to consider it, because it's out there in the
21 observations for these sorts of volcanoes.

22 CHAIRMAN RYAN: Okay. Thanks.

23 MR. MARSH: A little bit of a difference
24 is here, and we have to really emphasize this, is that
25 the difference is that when you have a fissure, a dike

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1 that is erupting, and then it moves down the fissure
2 to somewhere else -- in fact, the cone plugs up the
3 dike in one place, and it starts erupting in another
4 place.

5 What they're talking about here actually,
6 though, is completely different. It says that the
7 magma actually runs down the drift, pressurizes the
8 drift and breaks out to --

9 MR. RUBENSTONE: No, we're not saying that
10 specifically. We're just -- we're saying that because
11 you get these secondary breakouts, which may or may
12 not form along what the original dike was, because not
13 -- some -- in many cases you form BOCA's off the trend
14 of the original fissure. So it's not limited to just
15 where the original fissure was.

16 If these occur in nature, then there is
17 some mechanism by which magma can decide it would
18 rather come out somewhere else than these kind of
19 eruptions than in the main conduit that it started
20 forming at. And that's some of the theoretical work
21 that Andy Woods did to try to explain these in nature.

22 CHAIRMAN RYAN: Right.

23 MR. RUBENSTONE: How that happens when
24 there's a drift involved, we don't have observations
25 of that.

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1 CHAIRMAN RYAN: Right.

2 MR. RUBENSTONE: So that's all we're
3 saying.

4 CHAIRMAN RYAN: And, of course, the second
5 -- I mean, I think about the radioactive material more
6 than I think about the magma, but, you know, and how
7 that range of possibilities would interact with a
8 package and the radioactivity in it and --

9 MR. RUBENSTONE: Sure.

10 CHAIRMAN RYAN: -- whether it would mix,
11 become uniform, become particulate, chunks, who knows.

12 MR. RUBENSTONE: I agree that --

13 CHAIRMAN RYAN: Fair enough.

14 MR. RUBENSTONE: -- that's a slippery
15 question, Mike.

16 CHAIRMAN RYAN: Okay. So --

17 MR. RUBENSTONE: And it's -- we do not
18 know how to model that explicitly.

19 CHAIRMAN RYAN: I'm with you, and I just
20 wanted to make sure I was understanding that. Again,
21 it's time and --

22 MEMBER HINZE: Well, these secondary
23 eruptions, though, have -- do not have a very strong
24 plume, there are fire foundations, and they locally
25 occur in the area. They are not the kind of plume

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1 that you envision coming from the main vent. It's
2 totally a different ball game.

3 MR. TRAPP: Not all the time. That's not
4 a 100 percent type statement.

5 The thing I would suggest also is if you
6 take a look at the presentation that Britt Hill gave,
7 there are a couple of diagrams that depicted these
8 type of vents.

9 MEMBER HINZE: We have put that risk --

10 CHAIRMAN RYAN: You have to speak into the
11 microphone, Bill.

12 MEMBER HINZE: We have put the risk
13 diagram from the risk insights. We have it in there.

14 MR. TRAPP: Okay. I'm just trying to make
15 sure that the difference between these two, the dog-
16 leg and the secondary breakouts, is understood and
17 well covered.

18 CHAIRMAN RYAN: So the real question for
19 -- do we need to -- I mean, do you have what you need
20 to adjust this write-up in the summary, Bill, so it's
21 a little bit clearer and points back properly?

22 MEMBER HINZE: Right. Well, I think -- I
23 think maybe the comments that we're hearing are ones
24 that need to be addressed in the main body of the
25 report.

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1 CHAIRMAN RYAN: Okay. And I think
2 something like a full discussion of this and related
3 issues is found -- it's found that is not a bad thing
4 either.

5 Okay. What do you want to do now?

6 VICE CHAIRMAN CROFF: I'm not finished.

7 CHAIRMAN RYAN: Oh, I'm sorry, Allen.

8 (Laughter.)

9 Why did you ask that hard question?
10 That's good.

11 VICE CHAIRMAN CROFF: I didn't. They
12 hijacked my question.

13 (Laughter.)

14 I have a general nagging concern about the
15 whole ball of wax here, and that is that we're not
16 answering the mail. Now, maybe we're going to answer
17 the mail later on, but I look at this quote from the
18 SRM that starts out just about all of the summaries
19 and everything. And having read a few SRMs before,
20 I'm concerned maybe we're overreading this phrase and
21 trying to parse it like a bunch of lawyers in court,
22 as opposed to addressing what the Commission needs to
23 hear, if you will.

24 You know, they obviously sense there is a
25 lot of information out there, and there is a

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1 divergence of views, and they wanted this pulled
2 together. And what we've got here does a pretty good
3 job of it. I think maybe, like Jim, I want to read
4 the report. I haven't seen the report in a long time,
5 and I want to read that first before I go final on
6 that.

7 But then, I sort of stand back and say,
8 well, okay, what is the Commission going to do with
9 this thing? You know, maybe some day, assuming an LA
10 comes in and all goes well, they are going to be
11 called on to decide whether, you know, the projections
12 of igneous activity are acceptable, whether they're
13 safe enough or whatever that is. But that's a lot of
14 years away and a lot of water is going to go under the
15 bridge before we get there.

16 I think much earlier the decision I would
17 foresee them wanting to make is, is the staff ready to
18 review the license application? Have they put
19 themselves in a position where they have the -- you
20 know, the analytical tools and the understanding and
21 all this kind of thing?

22 And, well, that doesn't -- you know, that
23 doesn't come through to me here. In other words, the
24 ACNW hasn't made a recommendation or an observation or
25 anything else that really gets to the essence of that

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1 question.

2 Now, you know --

3 CHAIRMAN RYAN: I don't think that was the
4 question we were asked to answer.

5 VICE CHAIRMAN CROFF: Well, maybe it
6 wasn't, maybe it wasn't. That's what I'm talking
7 about.

8 CHAIRMAN RYAN: I'm saying it wasn't.

9 VICE CHAIRMAN CROFF: Okay.

10 MEMBER HINZE: Well, you know, we have not
11 even heard from TSBA for, what, almost two years. And
12 that's an essential ingredient to the review of the
13 license application.

14 We I think have identified in this
15 exercise several areas that we would like to have the
16 Committee explore a little further and come back with
17 some letters to the Commission that would be more
18 directive in terms of the NRC. I think that -- I
19 think I'm speaking for the IA group when I say that.

20 And that I think would capture some of the
21 things that you're talking about. But, as Mike said,
22 you know, we -- if you went out to answer the
23 question, "Is the staff ready to review the license
24 application regarding igneous activity?" we would have
25 done it somewhat different, quite a bit different.

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1 CHAIRMAN RYAN: The other point to me is
2 that this white paper wasn't designed to look
3 specifically at the staff's preparedness that I
4 pointed to. To me, the explanation was to try and
5 understand a very complex topic with lots of parts and
6 pieces, what different groups' views were, and to get
7 that down in one place.

8 The next step is, okay, now that we've got
9 this, what do we do with it? And so I'm trying to
10 take your question, Allen, and let's see what the
11 Commission might want to ask us to do, or what we
12 might recommend might be the parts and pieces that
13 Bill just talked about, to do a cover letter or a
14 follow-up letter after the report is done.

15 VICE CHAIRMAN CROFF: You know, if we're
16 going to continue on with this topic beyond this, and,
17 you know, look into specific aspects and write our
18 more typical letters, which are observation/
19 recommendation letters, you know, I mean, I understand
20 the need to get this paper out, and I think it's time
21 to get it out, you know, and I can live with that.

22 Like I say, I worry that we've overread
23 this charge. And I worry that, you know, and I -- you
24 know, at the same hand, the word "analysis" is in
25 there, and we've sort of not done a lot of what I

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1 would call analysis. You know, we've done a lot of
2 documentation.

3 CHAIRMAN RYAN: Well, I mean, quite
4 frankly that's splitting hairs for me.

5 VICE CHAIRMAN CROFF: Well, okay. But --

6 MR. FLACK: Could I just raise a point?
7 I think, Mike, you're right about the SRM and wanting
8 the range of views. But I think in the end the
9 Commission is going to look at this as whether this is
10 going to be a showstopper or not. I think in the end
11 that's going to be definitely the question that is
12 going to be asked. Is this going to really stop the
13 show?

14 And I think by laying everything out
15 you're giving them the information to understand
16 whether it will or not, and that's I think what they
17 wanted. Now, you know, the question is how you
18 present it in that kind of form, but staying within
19 the boundaries of the SRM, which Mike is right on. I
20 mean, they're just asking for this kind of range of
21 views, making sure it's all on the table, you know, is
22 the way I read it.

23 MEMBER HINZE: I think back to
24 February 14th, if you look at the transcript of that,
25 Mike, you said something about this being an organic

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1 document. I mean, we all know we have emphasized that
2 this is a point in time, and that it -- if you wish,
3 it could be expanded and grow, as more information
4 becomes available.

5 CHAIRMAN RYAN: Well, the other -- I mean,
6 if we believe Mr. Sproat's schedule, there's not a lot
7 of time left to do an awful lot of extra stuff. So
8 documenting where we are and, you know, what the range
9 of views are in these various points is not a bad
10 thing to do at this point. And I agree with you,
11 let's get the report out, and then let's see what
12 reactions we get from the Commission and go with next
13 steps based on that. This was a very specific
14 direction from them.

15 VICE CHAIRMAN CROFF: Well, I hear you,
16 but I am concerned we've overread it and we made an
17 interpretation at the start --

18 CHAIRMAN RYAN: What do you want to do
19 about your concern?

20 VICE CHAIRMAN CROFF: With the
21 understanding we are going to have some additional
22 letters in the future, and, you know, subject to, you
23 know, reading through and specifics, I don't propose
24 to do anything about it right now.

25 CHAIRMAN RYAN: All right. Fair enough.

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1 VICE CHAIRMAN CROFF: But, you know, I
2 think -- I think we need to think about it just a
3 little bit.

4 CHAIRMAN RYAN: Okay.

5 VICE CHAIRMAN CROFF: And, you know, they
6 gave us some positive direction here, but they didn't
7 say to not do some things. So anyway, that having
8 been said, I'll shut up.

9 MEMBER HINZE: Okay. Well, you know, I
10 think that when we present this to the Commission,
11 that there will -- I hope that there will be some
12 interchange that will suggest different paths that
13 they wish for us to take.

14 VICE CHAIRMAN CROFF: Yes. I mean, well,
15 I fully expect that, you know, when we brief them --
16 what is it, October now, or something? You know, from
17 them I fully expect the "so what" question. Okay.
18 Yes, we've seen your document, we've read the summary,
19 our TAs have talked to us about it. You know, so
20 what? You know, what does it mean to us?

21 MEMBER HINZE: Excuse me for one second.
22 One of the things that I have been kind of kicking
23 around in my mind, is there any chance or is there any
24 need for a group of us to inform the Commissioners/TAs
25 on this white paper, if they wish --

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1 CHAIRMAN RYAN: They're going to get it
2 anyway when we're done, Bill.

3 MEMBER HINZE: Okay.

4 CHAIRMAN RYAN: Let's just stick with our
5 process and get it done.

6 MEMBER HINZE: I'm talking about after we
7 get it done. I mean, after we get it done, if they
8 want --

9 CHAIRMAN RYAN: They can ask.

10 MEMBER HINZE: Yes. If they want to have
11 a presentation on this, we'd be very happy to --

12 CHAIRMAN RYAN: They're all smart guys.
13 They can read, so --

14 MEMBER HINZE: Well, they --

15 CHAIRMAN RYAN: And they've got a process
16 they follow, too. I'm not even sure exactly how it
17 works.

18 MEMBER HINZE: Just a thought, that I want
19 to make certain that the TAs are with -- at least
20 understand what we're doing.

21 CHAIRMAN RYAN: I think the cover letter,
22 you know, asking for any feedback or followup is the
23 right way to go.

24 MR. HAMDAN: Yes. Can I make -- I think
25 there are some very useful things in here. For

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1 example, this item 4, this observation 4, if you look
2 at it and read the last sentence there, "Preliminary
3 performance assessment indicates that the probability-
4 weighted dose from both scenarios would only be a
5 fraction of the current dose standard." That I think
6 is very, very useful -- about all uncertainties in
7 both scenarios.

8 The only comment I would make is, does
9 this connect with any -- I'm not seeing it connecting
10 with any of the summary and conclusions. For example,
11 in Section 7.6, the last -- you know, if you read the
12 conclusions there, I'm not seeing that in there.

13 MEMBER HINZE: It's in there.

14 MR. HAMDAN: Okay.

15 MEMBER HINZE: Yes, it's in there.

16 MR. HAMDAN: So, but the main point I want
17 to make is there are things here that are potentially
18 very, very useful. It's just we need to perhaps try
19 to communicate -- highlight them.

20 CHAIRMAN RYAN: Great. What's next, Bill?

21 MEMBER HINZE: The letter, and that's
22 really just a paragraph at this point, because --

23 CHAIRMAN RYAN: Let me just make a minor
24 comment while I've got it circled. It's on the first
25 page of the executive summary. It's in the -- about

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1 four, five lines from the bottom, high-activity
2 radionuclide. What the hell is that?

3 (Laughter.)

4 I don't know what that is.

5 MEMBER HINZE: I --

6 MEMBER WEINER: Can I respond to that,
7 since that was --

8 CHAIRMAN RYAN: It's wrong is what it is.

9 MEMBER WEINER: Well, if you can suggest
10 -- we did not want to go into detail about -- and --

11 CHAIRMAN RYAN: What are you talking
12 about? Tell me what you're talking about.

13 MEMBER WEINER: I'm talking about anything
14 about the sum of radionuclides that contribute to the
15 dose in the first thousand years.

16 CHAIRMAN RYAN: Risk-significant
17 radionuclides.

18 MEMBER WEINER: Okay. Risk-significant.
19 That's better. Thank you.

20 CHAIRMAN RYAN: Because high-activity
21 radionuclide is one of those --

22 MEMBER WEINER: Yes, it a word I don't
23 like either.

24 CHAIRMAN RYAN: -- rad safe buzzwords that
25 means nothing.

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1 MEMBER WEINER: Yes. And we -- and as a
2 matter of fact, we scrubbed it.

3 CHAIRMAN RYAN: That's like the word
4 "nuclear" and "radionucleide."

5 MEMBER WEINER: Right. Mike, I want --

6 CHAIRMAN RYAN: They don't exist.

7 MEMBER WEINER: -- I want to assure you
8 that we scrubbed it from the rest.

9 CHAIRMAN RYAN: Please do.

10 MEMBER WEINER: Risk-informed, risk-
11 significant.

12 MEMBER HINZE: Actually, there are several
13 other places where it just grates on me.

14 MEMBER WEINER: Yes.

15 MEMBER HINZE: And that's --

16 CHAIRMAN RYAN: I hear you. Well, I'll
17 find --

18 MEMBER WEINER: Yes, I can scrub that.

19 That's -- risk-significant is a very good --

20 CHAIRMAN RYAN: I have to do this with the
21 journal every day, so it's --

22 MEMBER WEINER: Yes.

23 CHAIRMAN RYAN: -- get these little
24 twitches if I see it.

25 MEMBER WEINER: Yes, that's --

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1 CHAIRMAN RYAN: Occasionally, everybody
2 puts an E in radionuclide in the middle, which is fun.
3 Anyway, move us along.

4 Okay. You're going to read the letter
5 or --

6 MEMBER HINZE: Yes. The letter really
7 consists of a paragraph saying we're sending it to
8 you, and then there are the observations. So the
9 paragraph --

10 CHAIRMAN RYAN: The observations are
11 identical from the summary.

12 MEMBER HINZE: Exactly.

13 CHAIRMAN RYAN: Okay.

14 MEMBER HINZE: Yes. Nothing is different.

15 CHAIRMAN RYAN: All right. Let me ask a
16 dumb question, and this is maybe procedural, do we
17 need to repeat them?

18 MEMBER HINZE: Repeat what?

19 CHAIRMAN RYAN: Do we need to repeat these
20 in the letter if they're in the report?

21 MR. GILLESPIE: No.

22 CHAIRMAN RYAN: So just a transmittal
23 letter I think does the job.

24 MR. GILLESPIE: Yes, because the Committee
25 is voting on both the report and the transmittal

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1 letter and the enclosures.

2 CHAIRMAN RYAN: Right. Okay. Fair
3 enough.

4 MR. GILLESPIE: So that's all approved by
5 the Committee.

6 CHAIRMAN RYAN: Just trying to keep it
7 simple for you, Bill. That's fine. All right. So
8 we'll shorten it just to the transmittal, here is --

9 MR. GILLESPIE: Yes, because otherwise
10 you're going to get it up there and they're going to
11 say, okay, I've read the first three pages, why am I
12 reading the first three pages over again?

13 CHAIRMAN RYAN: Yes, right. Okay.

14 MEMBER HINZE: Well, the paragraph reads,
15 "The Advisory Committee on Nuclear Waste and Materials
16 (the Committee), is pleased to forward as an
17 attachment to this letter the report Igneous Activity
18 at Yucca Mountain: Technical Basis for Decision
19 Making.

20 "This report was prepared by the Committee
21 at the request of the Commission SRM, 'to provide the
22 Commission with an analysis of the current state of
23 knowledge regarding igneous activity which the
24 Commission can use as a technical basis for its
25 decision making.' The report presents a summary and

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1 evaluation of the range of current technical views on
2 the nature, likelihood, and potential consequences of
3 future igneous activity at the proposed repository."

4 And then, "Consideration" --

5 CHAIRMAN RYAN: Let me offer a suggestion.
6 Allen, maybe you could help with a little followup or
7 a closing paragraph to talk about future activities
8 or, you know, additional requests. Ah, you've already
9 got it there.

10 VICE CHAIRMAN CROFF: I know what to do.

11 CHAIRMAN RYAN: But I think that's a good
12 place to raise your questions and put a placemaker in
13 there for our future --

14 VICE CHAIRMAN CROFF: Yes, sir. We're
15 going to be investigating specific -- you know,
16 looking at the specific issues, and we'll be providing
17 followup to --

18 CHAIRMAN RYAN: Whatever you guys want to
19 put in --

20 MEMBER HINZE: Are you suggesting that at
21 the end of the first paragraph or at the end of the
22 letter?

23 CHAIRMAN RYAN: They're the same.

24 MEMBER WEINER: They're the same.

25 CHAIRMAN RYAN: Yes, end of the letter.

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1 This is --

2 VICE CHAIRMAN CROFF: They just took all
3 the observations out.

4 MEMBER HINZE: I was trying to follow
5 this. That's fine with me.

6 MR. GILLESPIE: Mike, would you make the
7 observations an enclosure to the letter?

8 CHAIRMAN RYAN: What observations?

9 MR. GILLESPIE: This list.

10 CHAIRMAN RYAN: No. I'm saying this is
11 already in the report. Take it out of the letter.

12 VICE CHAIRMAN CROFF: This is how the
13 report starts out.

14 MR. GILLESPIE: Fine.

15 CHAIRMAN RYAN: This is all duplicated in
16 the report, so it's gone. That helps put a placemark
17 for your concern, which I appreciate, but that's the
18 way to do it.

19 MEMBER HINZE: Allen?

20 MR. FLACK: Yes. Usually, you think of it
21 in the context of why, what, how, what. Why the
22 report was done is certainly covered here. And when
23 I think what was done -- I don't know if you want to
24 put something in there on that, and then, how would
25 the results be used by the Commission? But that's --

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1 CHAIRMAN RYAN: We can look at the letter
2 one last time and we'll get it wrapped up.

3 Now, if I understood your request, you are
4 going to give us a hard copy and a CD?

5 MEMBER HINZE: I'm going to defer to Neil
6 at this point.

7 CHAIRMAN RYAN: Today, before everybody
8 leaves?

9 MR. COLEMAN: You'll have a CD and a hard
10 copy. Unfortunately, it won't be a color copy, but
11 that's not critical for --

12 CHAIRMAN RYAN: Not critical. And we're
13 going to give you any corrections, markups, or
14 whatever, by next -- a week from Monday. No later.

15 MEMBER HINZE: No later. Anything comes
16 in later, forget it.

17 CHAIRMAN RYAN: Let me again thank the
18 staff, and please extend my thanks to Lawrence. I
19 know you guys have put in a lot of time and hours
20 working, you know, with everybody on the whole team.
21 And I hope we've at least accomplished our goal of
22 getting everybody's range of views down in a
23 reasonable way, and thanks so much for your time and
24 effort.

25 MR. COLEMAN: May I ask the staff one

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1 thing? We've gotten comments from a number of folks
2 on the table that we had handed out at the last
3 meeting. And I just wondered if you folks had any
4 input for that table.

5 MR. TRAPP: I provided some input to Bill.

6 CHAIRMAN RYAN: Yes, on that. Okay. And,
7 again, you have today's draft. If there's anything
8 that strikes you, let us know. Thanks.

9 MEMBER HINZE: Is there any reason why we
10 can't let them have a copy of this -- this table?

11 MR. GILLESPIE: No. Actually, it's part
12 of the public record, and anything given out -- it's
13 on the transcript, it's fine.

14 MR. RUBENSTONE: So we can take these to
15 go.

16 CHAIRMAN RYAN: That just has a cross-
17 through on my high activity one.

18 MR. RUBENSTONE: Well, we would have
19 caught that anyway once it got --

20 MEMBER WEINER: I really thought I had
21 caught all of those.

22 CHAIRMAN RYAN: All right?

23 MEMBER HINZE: All right. Fine.

24 CHAIRMAN RYAN: Sorry. Yes, sir. Please.

25 MR. McCOLLUM: Rob McCollum, Nuclear

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1 Energy Institute. I'm asking this on behalf of EPRI
2 that's not here today. If this is part of the public
3 record, and you're welcoming additional input from
4 staff, I know EPRI's views are reflected in this
5 latest version. Is it possible to get a -- this
6 latest version to them and give them an opportunity to
7 look at it?

8 CHAIRMAN RYAN: Certainly, the materials
9 we have talked about today are part of the public
10 record.

11 MR. GILLESPIE: Yes. Anything that we
12 give out we just attach to the transcript, and so
13 there's no legalities. It's up to the Committee.
14 Anything they want to give out is --

15 CHAIRMAN RYAN: It will be part of the
16 transcript package, so they can get it.

17 MR. McCOLLUM: Right.

18 CHAIRMAN RYAN: If you want to offer
19 comment, that's fine.

20 MR. McCOLLUM: I'm thinking of the
21 logistics of having them get comments to you back by
22 Monday. Is there -- can I have --

23 CHAIRMAN RYAN: Neil?

24 PARTICIPANT: It's a week from Monday.

25 MR. McCOLLUM: A week from Monday, I'm

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1 sorry.

2 CHAIRMAN RYAN: Is there a clean copy of
3 this little package that we just read from?

4 MR. COLEMAN: I don't know what all has
5 been given out, because I'm --

6 CHAIRMAN RYAN: What you just handed me.

7 MEMBER HINZE: Let me give you this copy.

8 MR. McCOLLUM: Thank you, for the record.

9 CHAIRMAN RYAN: Anything else?

10 (No response.)

11 Why don't we take a break until our
12 appointed hour of 10:30 for an update on West Valley.
13 We'll adjourn until 10:30.

14 (Whereupon, the proceedings in the
15 foregoing matter went off the record at
16 10:04 a.m. and went back on the record at
17 10:32 a.m.)

18 CHAIRMAN RYAN: Okay. We'll reconvene,
19 please.

20 The next item on our agenda is an update
21 on West Valley, the draft environmental impact
22 statement. I'll turn the meeting over to our
23 cognizant member, Dr. Clarke.

24 MEMBER CLARKE: Thank you, Dr. Ryan. I
25 understand there are several folks on the bridge line.

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1 Could you identify yourselves for the record, please?

2 MR. PICHULO: This is NYSERDA. This is
3 Paul Pichulo.

4 MS. GERWITZ: Colleen Gerwitz.

5 MR. BEMBIA: And Paul Bembia.

6 MEMBER CLARKE: Okay. Thank you. And
7 then, I'd like to ask you to hit mute, and then we'll
8 proceed with the presentation.

9 PARTICIPANT: There's more.

10 MR. BOWER: From DOE West Valley, Brian
11 Bower.

12 MEMBER CLARKE: Thank you.

13 MR. RICE: The New York State DEC from
14 Albany, Tim Rice, Lynn Winterberger, and John Zeh.
15 And Barbara Youngberg will be here with us shortly as
16 well.

17 MEMBER CLARKE: Okay. Very good. Okay.
18 So please mute your end, and at this point we will
19 have a briefing on consideration of new
20 decommissioning alternative at the West Valley
21 demonstration project.

22 This presentation will be given by Dr.
23 Keith McConnell, who is Deputy Director for
24 Decommissioning and Uranium Recovery Licensing
25 Directorate in the Office of Federal and State

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1 Materials and Environmental Management Programs. He
2 will be supported by Chad Glenn, who is the West
3 Valley Project Manager in the same office.

4 We appreciate this update. Keith, it's
5 all yours.

6 DR. McCONNELL: Okay. Thank you.

7 Chad and I are here this morning to
8 provide you with a status update on the
9 decommissioning activities at the West Valley
10 demonstration project.

11 Specifically, we want to talk to you about
12 activities that are underway in the core team process,
13 and the core team process is basically a new effort
14 that has been recently undertaken at the site in an
15 effort to move forward in terms of developing an draft
16 environmental impact statement for the decommissioning
17 of the site.

18 One of the outcomes from the core team
19 process to date has been the development of a new
20 decommissioning alternative. That decommissioning
21 alternative right now is still under discussion in the
22 core team, but if the trend continues it could play a
23 significant role in the development of the draft
24 environmental impact statement, so we think it's
25 important to come to you all and bring you up to speak

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1 on that alternative.

2 So if we could move to slide 2.

3 Again, the purpose of our presentation
4 this morning is to provide you an update on the
5 decommissioning activities in the recent past, at
6 least the planning for those decommissioning
7 activities at the West Valley site. And we'll do that
8 in the context of the core team and the core team
9 process.

10 We have five elements to the presentation.
11 First, the core team process is new to me, and I
12 believe it's relatively new to the NRC. And it may be
13 new to you all, although some of you may have
14 experience from other activities. But what we intend
15 to do is provide a little bit of background on the
16 core team process, what it is, why it's being
17 implemented at the West Valley site.

18 We'll then go on and discuss in a little
19 bit more detail the new alternative that the core team
20 has come up with, and we term that the "delayed
21 closure alternative." In conjunction with that, you
22 should know that there are actions that can and may be
23 taken in the interim to mitigate the existing
24 contamination at the site.

25 These actions would be taken before the

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1 major decommissioning activities envisioned under the
2 new delayed closure alternative would be taken. And
3 so they are basically considered interim activities,
4 but the end of these interim activities would be
5 considered the start of the delayed closure
6 decommissioning activities. So we need to define what
7 the starting point for this new alternative is.

8 We'll then move on and discuss the path
9 forward in terms of activities that will occur in the
10 near term and with respect to the core team, and also
11 describe at least one activity where the NRC has
12 specific action to take. And this may be some area
13 where -- an area where you may have some significant
14 role I think in helping us move forward.

15 And then, finally, we'll discuss the
16 schedule, both in terms of what their core team
17 intends to do and the development of the draft
18 environmental impact statement, and at that time we
19 can discuss areas where the Committee might want to
20 become more fully engaged in the process.

21 So if we can move to slide 3.

22 It's my understanding that most, if not
23 all, of you have been to the West Valley site, so this
24 is just a refresher. It's an aerial photograph of the
25 West Valley site. North is down for the bottom right

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1 of the photograph, down in this -- going in this
2 direction.

3 And just some points of reference as we go
4 through the discussion of the delayed alternatives
5 that might help. If you look on the south plateau,
6 down here, you can see the -- if I can work it -- the
7 state-licensed disposal area, which is not on the
8 project premises but is just adjacent to it. It's
9 covered by a geomembrane right now.

10 Just to the west of it is the NRC-licensed
11 disposal area, and you can see it's not covered. It's
12 basically open ground at this point. South of it is
13 the building housing the low-level waste material in
14 the drum -- the drum cell building.

15 If we move north across Irving Brook, this
16 little drainage here under the north plateau -- and
17 you all may recall this. This is the area of the
18 process building and the vitrification facility. Just
19 to the north of it is the high-level waste tank farm,
20 right in this area. And the lagoons, where the
21 effluents from the process building were released, are
22 right in here.

23 And for those of you who are familiar with
24 the strontium-90 groundwater plume, it emanates from
25 beneath the process building and trends east-northeast

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1 towards Franks Creek, which is right down in this
2 tree-lined area here. the boundary of the DOE part of
3 the West Valley site basically runs along this road
4 here.

5 MEMBER CLARKE: Excuse me, Keith. There's
6 also a cesium prong. I think that's the --

7 MR. GLENN: Yes.

8 MEMBER CLARKE: -- reference that you're
9 using. Is that --

10 MR. GLENN: Yes. The cesium prong -- let
11 me see if I can -- actually begins -- the cesium prong
12 is the result of an aerial release from the stack back
13 in the late '60s, I believe, and that is off in this
14 direction here. It goes off this photo right here.

15 MEMBER CLARKE: Thank you.

16 DR. McCONNELL: We can move on to slide 4.

17 And, again, this starts the background in
18 terms of what the -- what the core team process is.
19 And I hope I'm not going over too much old ground that
20 you all are aware of, but it does provide some
21 background to what's going on up at the West Valley
22 site now.

23 The core team process is a formalized
24 consensus-based process to examine technical issues.
25 In this case, it's to examine the technical issues

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1 related to the development of the environmental impact
2 statement for decommissioning at the West Valley site.
3 Involved agencies worked together to reach an
4 agreement on those technical issues.

5 The decisionmakers from the agencies
6 comprise the core team. I'm the NRC representative on
7 the core team, supported by Chad, along with other
8 technical staff from the NRC, as well as the Center
9 for Nuclear Waste Regulatory Analyses.

10 One key part being on the core team is
11 that our participation does not change our role or
12 responsibilities. So in terms of our consultative
13 role under the West Valley Demonstration Policy Act to
14 DOE, our role in that regard does not change. Neither
15 does our role in terms of a regulatory role when the
16 technical specifications are reinstated and the New
17 York State Energy Research and Development Authority
18 takes control of the site. Our relationship with our
19 licensee does not change based on our participation on
20 this core team.

21 Moving on, slide 5, why the core team and
22 why at the West Valley site. The core team provides
23 a mechanism for the effective and timely resolution of
24 difficult issues, and I think -- I'm sure you're aware
25 that there are a number of complex technical issues --

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1 erosion at the site being one -- that have largely
2 stalemated the progress towards development of a draft
3 environmental impact statement for decommissioning.

4 The core team process emphasizes clear
5 communication. It's basically face to face across the
6 table between the agencies for two days at a time, and
7 so we have a lot of opportunity to understand the
8 various agencies' positions, get clarity on those
9 positions, and work towards some resolution of the
10 technical issues.

11 Although the core team process is new to
12 me, I understand it has been used successfully in the
13 past by the Environmental Protection Agency, the
14 Department of Energy, and New York State. And just in
15 my cursory search, I understand it's used in the
16 Federal Facilities Agreement Program, such as some
17 CERCLA actions taking place at the Savannah River site
18 and the Paducah gaseous diffusion site.

19 And I also understand, in talking with
20 some of the New York State representatives, that it
21 has also been implemented at Brookhaven National Lab
22 in some of the remediation activities up there.

23 Moving on to slide 6, core team process
24 was conceived -- although it's not a new concept, it
25 was conceived for the West Valley site at a June 2006

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1 regulatory roundtable. NRC initiated that roundtable.
2 It was actually Larry Camper, the Division Director's
3 idea, with the support from the other agencies.

4 And the concept of having the roundtable
5 was to find a path forward to overcome the hurdles
6 that had been prohibiting movement on developing a
7 draft decommissioning environmental impact statement.
8 The core team process was recommended for use here by
9 the Department of Energy.

10 All the agencies represented at the
11 roundtable conditionally supported the core team's
12 use, but there were outstanding issues identified by
13 several of the agencies that would need to be
14 addressed before they would fully participate in the
15 core team process.

16 And I think that will be a theme, as we go
17 through the rest of the presentation, you'll hear more
18 of in terms of there being these residual issues
19 between the Department and some of the other agencies
20 that need to be addressed before full participation in
21 the core team is possible.

22 We move on to slide number 7.

23 The invitees to the core team were the co-
24 leads and the cooperating agencies in the development
25 of an environmental impact statement. This includes,

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1 of course, DOE West Valley, the New York State
2 Department of Health, NRC, EPA, the New York State
3 Department of Environmental Conservation, and the New
4 York State Energy Research and Development Authority.

5 Our first meeting was in November of 2006
6 in Buffalo. Disagreements, again, as I mentioned
7 earlier between DOE and NYSERDA and EPA -- so that's
8 DOE and NYSERDA and DOE and EPA prohibited full
9 participation by EPA and NYSERDA at this meeting.
10 Although all invitees except EPA did attend it,
11 NYSERDA only attended as an observer to that first
12 meeting in November.

13 Continuing with the background, in
14 December -- this is viewgraph 8. In December of 2006,
15 some of the issues that existed between the Department
16 and the State of New York crystallized in the form of
17 a lawsuit filed by the State of New York against DOE.
18 As I understand it -- and I'm not an attorney -- the
19 suit sought to clarify the responsibility for cleanup
20 of various parts of the site, and also sought monetary
21 damages for alleged harm done to the state's natural
22 resources at the site.

23 Because of the suit, NYSERDA decided not
24 to participate until the issues that were raised in
25 this suit were addressed. However, the Department of

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1 Environmental Conservation and the Department of
2 Health did continue to participate in the core team
3 process.

4 Core team meetings were held in December,
5 January, February, and March, and I would note that
6 significant progress was made in those meetings. In
7 fact, the development of the delayed closure
8 alternative was the outcome of those meetings that we
9 held in those four months.

10 Delayed closure alternative, as it
11 implies, basically recognizes that cleanup can
12 continue and can progress in parts of the West Valley
13 site. But decisions on some of the final end state
14 for some parts of the site would be delayed.

15 Because we felt I think as a group in the
16 core team that this was a significant development and
17 offered the opportunity for progress to be made in the
18 decommissioning of the facility, the core team at the
19 time felt it was important to bring the agencies back
20 together, the senior managers of the agencies back
21 together, at an interagency roundtable.

22 That meeting was held in March, all
23 parties participated, and basically all agencies
24 agreed at that meeting that this delayed closure
25 alternative did offer promise for progress, and it was

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1 a potential solution for I guess moving the whole
2 program forward.

3 At that time, EPA and NYSERDA tentatively
4 agreed to again participate in the core team. But,
5 again, there were outstanding issues that needed to be
6 addressed for full participation. Right now, NYSERDA
7 is a full participant, but the Environmental
8 Protection Agency is still waiting to work with DOE on
9 a couple of issues before it comes back to the core
10 team process.

11 That's basically the background, and I'd
12 now like to just provide some detail on the delayed
13 closure alternative. But before I do that, I'd just
14 like to note that I'm not speaking for the core team
15 here. I'm the NRC representative on the core team and
16 speaking as an NRC employee at this point. And we
17 have other core team members on the line, and they can
18 comment and question after I get done.

19 Basically, the delayed closure alternative
20 as developed by the core team recognizes that there is
21 a lack of disposition pathways for the vitrified high-
22 level waste and the greater than Class C waste that
23 existed at the site, and realizes that there may be
24 benefit in delaying certain decommissioning actions
25 until such time as the disposition pathways exist.

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1 An example of this would be the high-level
2 waste tank farm. There could be benefit to delaying
3 final action on the final disposition for the high-
4 level waste tank farm. If you recognize that there is
5 no disposition path for the greater than Class C
6 waste, it would be removed from that facility.

7 You could envision advances in technology
8 coming into play, allowing for a greater cleanup of
9 those tanks or other mechanisms that would further
10 advance the remediation of particular parts of the
11 facility. So what are the elements of the delayed
12 closure alternative? Basically, they would mean the
13 removal of the main processing plant and all of the
14 ancillary facilities.

15 What that would require would be that the
16 vitrified high-level waste that currently resides in
17 the process building would have to be removed and
18 placed in a low-cost storage elsewhere on the site.
19 Also, in the delayed closure alternative, the tanks
20 would be stabilized, as would be the disposal areas.

21 In addition, potential measures to
22 mitigate the groundwater contamination that exists on
23 the north plateau would be taken. The actions that
24 would be deferred -- again, because in part there is
25 lack of a disposition pathway -- would be that the

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1 high-level waste tank farm, the NRC-licensed disposal
2 area, and the state-licensed disposal area, even
3 though it's not part of the project, the final
4 disposition of those elements of the West Valley site
5 would be delayed.

6 They would be stabilized in place, but
7 there would be nothing done that would preclude a
8 further option in terms of what final disposition
9 would be made.

10 CHAIRMAN RYAN: Keith, just to clarify so
11 folks won't be confused --

12 DR. McCONNELL: Yes.

13 CHAIRMAN RYAN: -- if you were to just
14 tell us about what disposal areas under the "remove
15 main plant and disposal areas," and the defer part,
16 just maybe highlight -- those are different disposal
17 areas, and so forth.

18 DR. McCONNELL: Well, I think it's still
19 the NDA and the EPRI-A. Basically, again, they need
20 to do something, particularly the NDA, in terms of
21 stabilizing the NRC-licensed disposal area, because
22 they have infiltration problems and migration of water
23 into the facility. So they need to do something to
24 those facilities.

25 CHAIRMAN RYAN: So this might not be the

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1 right word, but there is interim measures necessary to
2 put them in a condition for deferred decisionmaking.
3 Is that a fair way to say it?

4 DR. McCONNELL: Right. The term of art
5 that I think we've used is they need to stabilize
6 those facilities.

7 CHAIRMAN RYAN: Okay.

8 DR. McCONNELL: And I would note, again,
9 on this slide for your benefit is that what is in the
10 delayed closure alternative and what is not in the
11 delayed closure alternative is still a matter that's
12 under discussion within the core team.

13 CHAIRMAN RYAN: Fair enough.

14 DR. McCONNELL: Okay. Moving on to
15 slide 10, as I noted earlier, there are activities
16 that can take place before the major decommissioning
17 actions envisioned under the new alternative are
18 implemented. These measures would, as I noted,
19 stabilize the existing facilities and mitigate the
20 spread of existing contamination.

21 Actions under this program would not wait
22 for the development of a decommissioning environmental
23 impact statement. These actions are covered under
24 what DOE calls its enhanced interim end state, and,
25 again, these are the interim actions taken before

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1 delayed closure decommissioning would take place.

2 In that regard, DOE, in cooperation with
3 the State of New York, would move forward now to
4 basically work on the issues like the NDA and place
5 the geomembrane cover on it to inhibit infiltration,
6 also build a slurry wall around parts of it to prevent
7 groundwater from migrating into the facility.

8 The liquid that remains in the high-level
9 waste tanks would be removed, either through drying or
10 some other process, and groundwater contamination on
11 the north plateau would be addressed. In addition,
12 the Department would evaluate options for the
13 relocation of the vitrified high-level waste that
14 exists in the process building to allow future
15 decommissioning of that facility.

16 And, again -- I would note that, again,
17 what's in the interim statement, what's in the delayed
18 closure alternative, is under discussion.

19 The next two viewgraphs -- viewgraphs 11
20 and 12 -- are an attempt to pictorially describe what
21 the enhanced interim end state and what the delayed
22 closure alternative would mean to the site. If you
23 look at the upper left picture, it's basically the
24 current status of the site. Again, you have the
25 state-licensed disposal area, which is off the project

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1 premises, but you can see probably better here the
2 geomembrane cover that exists on it. And if you've
3 been up there, you've seen it.

4 Just to the west, this is the NRC-licensed
5 disposal area, again subject to water infiltration.
6 If you move north onto the north plateau, you've got
7 the process building and the vitrification facility.
8 And right now the high-level waste -- the vitrified
9 high-level waste is stored within the process
10 building.

11 In the high-level waste tank farm, you
12 have liquids remaining in the tanks, and then you have
13 the strontium-90 groundwater plume that extends out
14 from the process building out towards Franks Creek.
15 So under these interim actions, the enhanced interim
16 end state, what would happen would be DOE working with
17 the state would work on -- in placing the geomembrane
18 cover over the NRC-licensed disposal area, as well as
19 developing a slurry wall to prevent groundwater
20 infiltration.

21 In the process building, they would move
22 the vitrified high-level waste out to a separate
23 facility elsewhere on the site. The high-level waste
24 tanks would be dried, and the Department, again,
25 working with the State of New York, would address

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1 issues related to the strontium-90 releases to surface
2 water in seeps that come out of the groundwater plume
3 that emanates from the process building.

4 So that's basically the enhanced interim
5 end state and what it would mean to the site.

6 We move on to viewgraph 12. This compares
7 the enhanced interim end state with what would -- the
8 site would look like after the delayed closure
9 alternative is completed. Again, enhanced interim end
10 state, and this is the result of the delayed closure
11 activities. There would be only four facilities
12 remaining on the site and adjacent to the site -- the
13 state-licensed disposal area, the NRC-licensed
14 disposal area with its geomembrane cover, high-level
15 waste, dry cask storage or some sort of storage
16 facility that would store the vitrified waste, and the
17 high-level waste tank farms.

18 The balance of the site, the lagoons, the
19 strontium-90 plume, and all of the ancillary
20 facilities would be decontaminated and decommissioned.
21 There are various ways you get there, and those are,
22 again, matters under discussion right now.

23 Moving on to viewgraph 13, that's
24 basically the state of affairs in terms of where we
25 are in the core team. We have the concept of what the

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1 delayed closure alternative would be. We understand
2 I guess the direction we're heading, but the devil
3 would be in the details in terms of what's being done
4 under which part of the program and how we're going to
5 get to I guess a final end state.

6 Some of the elements of a path forward
7 include that the agencies as a whole need to agree on
8 a delayed closure as the preferred alternative in the
9 draft environmental statement. There are outstanding
10 issues, as I mentioned, about what's in and what's out
11 of the various parts of this process.

12 The core team needs to continue to meet to
13 address these issues, as well as some of the cross-
14 cutting technical issues, such as erosion or perhaps
15 receptor location in terms of how you calculate a dose
16 for those parts of the site that are being
17 decommissioned to a final end state, or what is
18 expected to be a final end state.

19 And the last item, which probably isn't
20 appropriate to put on this viewgraph, but I included
21 it anyway because it's not a core team activity. It's
22 an NRC activity. The NRC has to come up with a model
23 for what a phased decommissioning program actually
24 looks like.

25 Right now, that's somewhat of a foreign

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1 concept to us, because, you know, in our general
2 thought process you take decommissioning from the
3 starting point to the end point over a relatively
4 short period of time. You don't look at kind of an
5 interim step. So how you calculate dose in terms of
6 those interim steps in the decommissioning process to
7 allow parts of the site to be decommissioned while
8 other parts don't have a final end state is a problem
9 that we're going to have to address over the next few
10 months.

11 And this is one area where, again, I think
12 that the Committee could play a significant role in
13 helping us develop that process and that model.

14 And then, moving on to the last viewgraph,
15 which is the schedule of the core team activities and
16 the development of the environmental impact statement,
17 the draft environmental impact statement, from early
18 March until the end of April the Department of Energy
19 is developing responses to questions that were the
20 result of the interagency roundtable meeting,
21 basically in terms of the schedule and cost of the
22 various decommissioning activities, but also working
23 with NYSERDA and the Environmental Protection Agency
24 to resolve the other interagency issues that have
25 limited the participation of some of the participants

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1 in the core team.

2 From March to June, the core team will
3 continue to meet to try to resolve some of the issues
4 that I've mentioned, what's in and what's out type of
5 issues. In March, the whole core team did begin the
6 public communication process by meeting with a
7 citizens task force and describing the delayed closure
8 alternative, and there will be more meetings with
9 citizens groups up in New York State as this process
10 continues.

11 The Department and NYSERDA intend to
12 periodically brief the New York State congressional
13 delegation to keep them informed of what's going on at
14 the site and the core team activities.

15 Then, in July through -- or in July of
16 2007, right now we a planned -- a second meeting of
17 the interagency roundtable, and the concept is at that
18 meeting the agencies would determine whether they all
19 could agree that this new delayed closure alternative
20 would be the preferred alternative in the draft
21 environmental impact statement.

22 And this is would be a key milestone in
23 making progress towards the decommissioning of the
24 site. If that meeting comes off being successful,
25 then there is I think cautious optimism that we can

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1 move forward with the EIS and eventual decommissioning
2 of the site.

3 In July through December 2007, the core
4 team would continue to meet to resolve any remaining
5 issues. And assuming all of that is successful, in
6 the January through March 2008 timeframe the
7 Department, working with its co-lead on the EIS --
8 NYSERDA -- would complete the draft environmental
9 impact statement for agency review.

10 And if I could, what I would suggest is
11 possibly three areas where the Committee could play a
12 significant role and become more fully engaged. It
13 would be, one, again, in our efforts -- the staff
14 efforts to develop this model for phased
15 decommissioning. That would be one, and we intend to
16 do that over the next several months.

17 Two, after the core team finishes its
18 activities in the December timeframe, in preparation
19 for the development of the draft EIS, we would hope at
20 that time that most of the technical issues would have
21 been resolved, we would have the technical basis for
22 the resolution, and we could come to the Committee and
23 describe that and get your input or allow you to
24 provide your comments both to us and to the
25 Commission.

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1 And then, after the draft environmental
2 impact statement is published, we would be reviewing
3 it, developing our comments, and we would think that
4 it would be appropriate at that time if we came back
5 to the Committee, got your input, and again allowed
6 you to communicate with the Commission on those
7 matters also.

8 Well, that's basically the briefing I had
9 for you this morning, and Chad and I and the other
10 core team members I'm sure would, you know, like to
11 respond to any questions you might have.

12 MEMBER CLARKE: Keith, thank you. It's
13 very helpful, and it seems to me to be a very positive
14 development, this approach. I have a couple of
15 questions, and then I'd like to turn to the Committee.
16 And I believe you answered one, but -- and also in
17 response to what Dr. Ryan asked you about the disposal
18 areas.

19 You're using the term "stable" and
20 "stabilize" to mean reducing infiltration. But I also
21 -- I think I heard from you that one of the issues
22 that's currently being discussed would be the possible
23 stabilization with respect to erosion as well. Is
24 that --

25 DR. McCONNELL: That would be part of it.

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1 The question is: how far do you take stabilization in
2 terms of engineered barriers for some parts of the
3 site? Certainly, for some parts of the site,
4 engineered barriers would be part of the stabilization
5 process.

6 But what we don't want to preclude is, for
7 those facilities that would remain at the site in the
8 delayed closure alternative, we would want to preclude
9 any end state being taken -- you know, any disposition
10 path for that particular part of the site.

11 MEMBER CLARKE: I understand that you're
12 weighing the merits of that --

13 DR. McCONNELL: Yes.

14 MEMBER CLARKE: -- that now.

15 DR. McCONNELL: Yes.

16 MEMBER CLARKE: And personally, I like the
17 approach of putting the geomembrane on and seeing how
18 it performs over time. There are always concerns
19 about subsidence and other things, and this approach
20 has been taken at Maxie Flats as well, and it seems to
21 have merit.

22 My understanding is the license is in
23 abeyance. What is the status of the license?

24 DR. McCONNELL: Well, the license is still
25 in force. What has been done is that technical

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1 specifications for the license have been put in
2 abeyance. So the net effect is the license is in
3 abeyance, that DOE controls the site.

4 MEMBER CLARKE: Okay. Dr. Ryan, would you
5 like to start?

6 CHAIRMAN RYAN: Sure. Thank you. First
7 of all, it does sound very positive. The core team
8 process certainly involves folks. Kind of a detailed
9 question maybe, but what is a delayed closure? What
10 do you mean "delay"?

11 DR. McCONNELL: Well --

12 CHAIRMAN RYAN: Is that kind of a -- is it
13 10 years, 100 years, something for different parts
14 or --

15 DR. McCONNELL: We haven't defined what
16 the excess years it would be.

17 CHAIRMAN RYAN: Okay.

18 DR. McCONNELL: What we have I guess used
19 as a model is the CERCLA 30-year period for -- I think
20 30-year period for closure -- final closure.

21 CHAIRMAN RYAN: And from what you're
22 saying, I guess you define that in a general way, but
23 not necessarily a specific way.

24 DR. McCONNELL: Yes.

25 CHAIRMAN RYAN: Okay. Well, that's an

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1 interesting working concept. I mean, that's a great
2 way to think about it.

3 The three items you mentioned
4 specifically, Keith, really sound fine to me in terms
5 of our involvement. I mean, I think all of those are
6 appropriate. So if we could work with you and our
7 staff on scheduling those, let's just go ahead, and I
8 think those are all appropriate. So we'll be happy to
9 participate, particularly on those points.

10 DR. McCONNELL: Okay. Good.

11 CHAIRMAN RYAN: If there are any others
12 that develop, that would be worth talking about, too.

13 The other question I had in that regard,
14 is it of any benefit for us to attend any of either
15 your citizen task force engagements or other public
16 citizen group engagements, or even your core team
17 meetings as observers? And you don't have to make a
18 decision about that. You may want to talk about that
19 with your team members. But, you know, we find
20 certainly observing sometimes those discussions
21 enriches our understanding as well, so you might think
22 about that.

23 DR. McCONNELL: Okay.

24 CHAIRMAN RYAN: It was a great
25 presentation. Sounds like a real meaningful step

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1 forward, so thank you.

2 Jim, back to you.

3 MEMBER CLARKE: Okay. Ruth?

4 MEMBER WEINER: Keith, my first question
5 is just a clarification. Could you go back to your
6 slide 12, please? Yes. On the delayed closure, you
7 have underground high-level waste tanks, and on the
8 enhanced interim you have dry high-level waste tanks.
9 Are you intending to leave the heels in the
10 underground waste tanks on the delayed closure? In
11 other words, is that the -- is that a real difference?

12 DR. McCONNELL: The answer is we think
13 it's a real difference in that the liquid, again,
14 would be removed. And you're right, that in the
15 delayed closure alternative the heels would remain.
16 The difference, again, between this and what other
17 alternatives in the environmental impact statement
18 would be that there would be no grout.

19 MEMBER WEINER: Oh, I see.

20 DR. McCONNELL: It would not be grouted
21 under this concept at this time.

22 MEMBER WEINER: Thank you. That's very
23 helpful.

24 My second question is: when did the site
25 stop releasing strontium-90 to the plume? And then,

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1 to the cesium prong, when did that release stop,
2 about?

3 MR. GLENN: We have DOE and NYSERDA on the
4 line, too, but the historical information that I'm
5 aware of was that the strontium was the result of a
6 leak in the late '60s. And I think DOE and NYSERDA,
7 if they want to comment on that and provide any
8 additional information, feel free.

9 MR. BEMBIA: Chad, this is Paul Bembia.
10 There was a significant leak from the process building
11 in the '60s in regard to, you know, being a potential
12 source for the plume. There is also some other
13 information that we've been looking at more recently
14 that I guess suggests that there could very well be
15 other leaks and sources for contamination on the north
16 plateau as well.

17 There is about 11,000 feet of underground
18 process lines beneath and around the process building,
19 and there are records that some of those lines leaked
20 somewhere, capped off because of leaks and others were
21 repaired. So there are potentially several sources of
22 contamination around the process building.

23 MEMBER WEINER: Do you know yet what your
24 delayed closure plans are for those buried pipes? Do
25 you have any --

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1 DR. McCONNELL: Well, under the delayed
2 closure, the process building, which would have been
3 here, would have been decommissioned, as would be the
4 material beneath it, so the pipes and lines that lead
5 from the process building would be part of the
6 decommissioning of that facility under the delayed
7 closure alternative.

8 MEMBER WEINER: So there would be no
9 possibility of future additions to that plume, and
10 that would be part of the delayed closure.

11 DR. McCONNELL: One of the reasons to get
12 to the process building and get it done is to get to
13 the source of some of the contamination, the
14 groundwater contamination, although, as we've been
15 told, in terms of the strontium-90, the vast majority
16 of the strontium-90 is already outside the boundary of
17 the process building and into the plume itself.

18 MEMBER WEINER: But there wouldn't be any
19 additions to the plume.

20 DR. McCONNELL: That's my understanding,
21 yes.

22 MEMBER WEINER: Okay. That was my point.
23 Finally, as those of us who have visited the site know
24 that there is continuing erosion of that slope that
25 leads down into the creek. I mean, you can see -- you

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1 can almost see the erosion there. Is that going to
2 give you a problem with delayed closure?

3 DR. McCONNELL: No. I think in relation
4 to Dr. Clarke's comment, I think the concept is that
5 there would be some engineered barriers added to the
6 site that would mitigate, at least in the short term,
7 any erosional effects.

8 MEMBER CLARKE: You wouldn't have to cover
9 the whole thing. You could do a partial cover and I
10 think stabilize that one side.

11 MEMBER WEINER: And that would stabilize
12 that slope going down to the creek?

13 DR. McCONNELL: That would be the goal
14 would be to put riprap or something in there to
15 stabilize that part of the creek.

16 MEMBER WEINER: Okay. Thank you.

17 MEMBER CLARKE: Thanks, Ruth.

18 Allen?

19 VICE CHAIRMAN CROFF: Yes. You mentioned
20 drying out the high-level waste tanks and that the
21 heel would remain. What else will be in the tanks
22 besides the -- I view the heel as sort of solid
23 material deposited on the bottom and some of the
24 hardware in there. Is there anything else in those
25 tanks?

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1 DR. McCONNELL: Well, there's a bathtub
2 ring where a lot of the transuranic material is
3 basically -- well, for lack of a better term -- welded
4 to the side of the tank and, in fact, is I guess some
5 of the higher concentrations of the transuranic, and
6 the greater than Class C waste is in that bathtub
7 ring.

8 VICE CHAIRMAN CROFF: I thought I
9 remembered when we were on the tour some mention of
10 some cesium I'll call them columns. Does that ring
11 any bells?

12 DR. McCONNELL: Brian, do you want to
13 comment on that?

14 MS. GERWITZ: Yes, they're in there. AD-1
15 is where that treatment system -- the columns were
16 suspended in that tank, so, yes, there are four loaded
17 columns suspended in AD-1.

18 MR. GLENN: That was Colleen Gerwitz,
19 right?

20 MS. GERWITZ: Correct.

21 VICE CHAIRMAN CROFF: And those would stay
22 in the tank during this interim phase, is that --

23 DR. McCONNELL: I don't know that we've
24 gone that far, but I think that's --

25 MR. BEMBIA: Yes, that's subject to

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1 further core team discussion.

2 DR. McCONNELL: Yes. That's Brian Bower
3 speaking for DOE.

4 VICE CHAIRMAN CROFF: Okay. Second, on
5 the previous slide there was the strontium I guess
6 I'll call it a plume or strontium migration, and it
7 says, "Address it." How were you going to go about
8 addressing that? Have you got any ideas?

9 DR. McCONNELL: Well, that's -- right now,
10 the Department of Energy and the New York State Energy
11 Research and Development Authority are involved in
12 discussions about what that exactly would mean,
13 whether it means pump and treat, whether it means
14 other types of mitigative measures, that's another
15 part of this negotiation process that's ongoing. And
16 we're involved in terms of Chad is involved in those
17 negotiations.

18 VICE CHAIRMAN CROFF: And the source of
19 the strontium is underneath the process building, as
20 I remember it. Is that correct?

21 DR. McCONNELL: That was the original
22 source. Most of it is now moved out from with --

23 VICE CHAIRMAN CROFF: Okay.

24 DR. McCONNELL: -- outside the process
25 building.

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1 VICE CHAIRMAN CROFF: Okay. Thanks.

2 MS. GERWITZ: Just for clarification,
3 DOE's senior management has indicated that those
4 discussions in terms of how to deal with the
5 strontium-90 plume are actually part of the core team
6 agenda, so I think we'll see those coming up in this
7 context more, Allen, in some of the questions in terms
8 of the details being discussed at these meetings.
9 So --

10 VICE CHAIRMAN CROFF: Okay.

11 DR. McCONNELL: That was Colleen Gerwitz
12 from NYSERDA again.

13 VICE CHAIRMAN CROFF: Okay. Thanks.

14 MEMBER CLARKE: Before I turn to Professor
15 Hinze, speaking of the strontium plume, is there any
16 further characterization going on? I think we were in
17 West Valley almost two years ago, and it was not clear
18 to us at the time whether that plume had been
19 sufficiently characterized to evaluate any of the
20 mitigation alternatives that you might be considering.
21 Is that a fair question? Is that still going on?

22 DR. McCONNELL: I think if Brian Bower is
23 there, we'll let Brian -- Brian, are you there? No?

24 MR. BOWER: I am here. I'm sorry. I'm
25 calling in from my cell phone, and I was missing the

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1 mute button. There are currently some questions with
2 regard to hazardous constituents in the plume. There
3 was a sampling analysis plan prepared for doing some
4 additional sampling of the plume for hazardous
5 constituents, and that plan is being reviewed right
6 now.

7 With regard to additional characterization
8 for rad, I'm not aware that there was a concern, but
9 I can go back and see if we have documentation for
10 further characterization for rad constituents.

11 MEMBER CLARKE: Brian, my question was
12 motivated not so much from what's in the plume, but do
13 we know where the plume is? I mean, have we
14 sufficiently characterized the boundaries of it?

15 DR. McCONNELL: Brian?

16 MR. BOWER: I'm trying to recall from
17 memory. I'll have to get back to you on that. I
18 don't recall from memory what the concerns were with
19 regard to characterization of the power extent of the
20 plume.

21 MEMBER CLARKE: Okay, that's fine. Thank
22 you.

23 Dr. Hinze?

24 DR. McCONNELL: If I could, one point on
25 the --

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1 MS. WINTERBERGER: Keith? I'm sorry.
2 This is Lynn.

3 MEMBER CLARKE: Okay. Lynn?

4 MS. WINTERBERGER: I thought I might be
5 able to add to the previous question that was just
6 asked. In regards to Brian's statement that hazardous
7 -- that sampling analysis plan is currently under
8 review, the New York State Department of Environmental
9 Conservation has the regulator at the sites reviewing
10 that plan, and we had asked for extensive sampling in
11 that plan to help actually characterize wreck or
12 contamination as well as the extent of the plume.

13 MEMBER CLARKE: Thank you.

14 MR. GLENN: That was Lynn Winterberger
15 from the New York State Department of Environmental
16 Conservation.

17 DR. McCONNELL: And I'd just also add
18 that, you know, through our regional office we do
19 monitor DOE's activities in relation to all activities
20 at the site, but in particular the strontium-90 plume.
21 And there are publicly available monitoring reports
22 from our regional office.

23 Sorry to interrupt.

24 MEMBER HINZE: Keith, just a couple of
25 questions. Regarding the core team process, what I've

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1 heard here is that the core team determines what and
2 kind of when. Do they also determine how? And what
3 kind of commitment -- when one joins this core team
4 process, what kind of a commitment is there to
5 implement the decisions of the core team?

6 DR. McCONNELL: Well, in terms of what, I
7 think to a certain extent we do, because we drive the
8 concept, so the what is discussed. But to this point,
9 we have I think been taking more of a higher plane in
10 our discussions, but I think if we get into the cross-
11 cutting technical issues the what or the how --

12 MEMBER HINZE: How.

13 DR. McCONNELL: How?

14 MEMBER HINZE: It's a what, when, and how,
15 right.

16 DR. McCONNELL: Yes, I think the how would
17 also become involved in the discussion, as well as the
18 what. But, again, there are these ongoing
19 negotiations on things like how we would mitigate the
20 plume, which is, again, the how, which are -- although
21 they are part of the core team process, a lot of the
22 negotiation is being undertaken on the outside of the
23 core team, between various parties.

24 MEMBER HINZE: A second question about the
25 core team process. Is there -- you have mentioned the

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1 citizen task force in New York. Are they observers?
2 Are these meetings open to the public? How does that
3 operate?

4 DR. McCONNELL: The core team process,
5 because it's the co-leads and the cooperating agencies
6 on the environmental impact statement, are closed
7 meetings. But Brian Bower and the core team have
8 talked to the -- and NYSERDA have talked to the
9 citizens task force, and I think there is now a
10 recognition that if we intend to move forward we need
11 to bring the public more into this process.

12 And I think you'll see more of that, but,
13 you know, in terms of the meetings themselves, the
14 meetings themselves are closed, because they are
15 basically between agencies that are working on the
16 environmental impact statement.

17 MEMBER HINZE: There have been decisions
18 made about the timing of the whats, if you will. I'm
19 wondering, what criteria were used by the core team in
20 arriving at their decisions? How much have you done,
21 first, and what should be left, and so forth?

22 DR. McCONNELL: Well, it basically I think
23 relates to some of the priorities that some of the
24 agencies have. I think one of the priorities I think
25 in all of the agencies' minds is the strontium plume.

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1 I mean, it's a visible sign of contamination. The
2 further it moves, the more land it contaminates, and
3 in the end it could potentially increase the cost of
4 any decommissioning alternative to that feature. So,
5 obviously, something like that is a high priority.

6 Also, the existing NRC-licensed disposal
7 area, which doesn't have a geomembrane on top and
8 which is subject to infiltration and potential offsite
9 excursion of -- not offsite, but at a facility,
10 excursions of material, radioactive material, is
11 another priority. So that's where, particularly in
12 the enhanced interim end state, some of the priorities
13 came from, is that there are these highly visible,
14 highly significant concerns for some parts of the site
15 that I think all parties agree need to be addressed.

16 MEMBER HINZE: Is any consideration being
17 given to the possibility that mitigation be made more
18 difficult by delaying certain hows or whats?

19 DR. McCONNELL: I don't know that we've
20 considered that it would be more difficult, but it
21 could be more complex in the sense that, again -- and
22 I'm thinking parochially here -- in terms of phased
23 decommissioning plan, that's a concept that is
24 difficult to comprehend when you have to -- when the
25 West Valley -- the Commission's West Valley policy

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1 statement says that the doses need to be integrated
2 across the entire site.

3 When you think about that, if you have
4 parts of the site that are not being closed per se,
5 and not being -- don't have a final end state, how do
6 you then integrate the dose for these other areas
7 across the entire site, as specified?

8 MEMBER HINZE: Some of these questions
9 really are very germane to the first thing that you
10 mentioned, where the -- where we might be of some
11 assistance.

12 DR. McCONNELL: Yes.

13 MEMBER HINZE: And that is -- and how to
14 develop procedures within the Commission for the
15 phased approach.

16 DR. McCONNELL: Yes.

17 MEMBER HINZE: Just a detail -- I won't
18 get into the plume, which interests me a great deal,
19 but erosion interests me, too, very much, and we've
20 heard about -- we've heard in the DOE's draft EIS that
21 they had a model for landscape evolution, and the NRC
22 had their own landscape evolution model.

23 The results of these models are very
24 important in terms of the timing of the events and the
25 concern about delaying them. What is the status in

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1 terms of landscape evolution modeling? And are there
2 new models that were going to be incorporated into the
3 draft EIS that's underway?

4 DR. McCONNELL: Improvements have been
5 made to the models. Whether and how much of those
6 advancements is included in doing a draft
7 environmental impact statement is, again, a matter
8 that's under discussion within the core team.

9 I think -- I don't mean to -- to not
10 respond to your question, but I think as we get
11 further into the process we'll be able to better
12 respond to your question.

13 MEMBER HINZE: I understand. Thank you
14 very much.

15 MEMBER CLARKE: Thank you, Bill.

16 I know we have one question from the
17 staff. I'd like to turn to Mike and let him ask it,
18 but then I would like to open it up to the folks on
19 the bridge, so we can hear from them as well.

20 Mike, go ahead.

21 MR. LEE: Sure. This question goes to
22 comments that had been raised by Dr. Clarke and Dr.
23 Hinze. What's the status of the maturity of the PA
24 model? I mean, there has been reference made to the
25 landscape evolution model, but it seems that you need

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1 -- is there a good working performance assessment
2 model that's in place right now that's helping in some
3 of this decisionmaking, or at least some scoping of
4 alternatives?

5 I know that that model has been under
6 development for a number of years, both independently
7 by the staff as well as by DOE and its contractors.

8 DR. McCONNELL: Yes. Speaking as an NRC
9 employee and not a core team member, certainly David
10 Esh, who I think has briefed the Committee in the past
11 on our efforts to develop the PA model, there have
12 been improvements in his development of models for
13 these features, such as erosion.

14 The Department of Energy has also
15 undertaken efforts to improve their models of erosion
16 and groundwater flow, which is another important
17 aspect of this site.

18 So I guess what I would offer you is
19 perhaps in the future, if you wanted another briefing
20 on where we stand, as far as NRC stands, we would
21 offer that we'd, you know, ask Dave Esh to come down
22 and talk to you all.

23 CHAIRMAN RYAN: It would be helpful, too,
24 to kind of broaden that a bit and not just talk about
25 the NRC model, but how is performance assessment

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1 modeling really guiding and helping your
2 decisionmaking, and so forth.

3 MR. LEE: That's kind of the key in my --

4 DR. McCONNELL: Okay.

5 CHAIRMAN RYAN: I think in the context of
6 what you're talking about today, Keith, with the core
7 team and how you're developing your approaches, that
8 modeling certainly would have a role.

9 DR. McCONNELL: Even in a delayed closure
10 alternative --

11 CHAIRMAN RYAN: Absolutely, yes.

12 DR. McCONNELL: -- the performance
13 assessment is going to be key.

14 CHAIRMAN RYAN: And probably more
15 critically and to what's delayed and how you delay it
16 and --

17 DR. McCONNELL: Yes.

18 CHAIRMAN RYAN: -- how long.

19 DR. McCONNELL: Yes.

20 MR. LEE: That's kind of the motivation
21 behind my question is that the PA model seems -- you
22 need to have some kind of decision -- a framework on
23 which you can base some decisions, risk-based
24 framework.

25 MEMBER CLARKE: Okay. Derek, you had a

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1 quick question? And then, let me go to the bridge.

2 MR. WIDMAYER: Okay. Yes, hi, this is
3 Derek Widmayer from the ACNW staff. The delayed
4 closure end state includes high-level waste canister,
5 dry cask storage. So that sort of implies that there
6 is a further, further end state where this particular
7 waste is going to be moved to the repository. Is that
8 correct?

9 DR. McCONNELL: Yes. At some point there
10 is an assumption that there would be a repository and
11 that material would be moved offsite.

12 MR. WIDMAYER: Okay. I guess that makes
13 a follow-on question, then. Is the core team
14 considering -- did the core team consider moving high-
15 level waste containers to some other site, and then
16 that moves this more towards an actual final closure
17 end state as opposed to storing the canisters there?

18 DR. McCONNELL: I think the simple answer
19 to that question is, no, we didn't consider that as an
20 alternative, probably due to the complexities of doing
21 that.

22 MR. WIDMAYER: Okay.

23 DR. McCONNELL: I mean, it is vitrified
24 high-level waste, so it seemed the easiest answer
25 would be to just move it to a storage facility onsite,

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1 it's under DOE control now, and it would remain under
2 DOE control during this interim period. So --

3 MR. WIDMAYER: Okay. I understand why you
4 say it's easier, but it's making your -- the model
5 that you're talking about, as far as doing a phased
6 decommissioning, more difficult. You're going to have
7 seemingly several steps of some sort of partial
8 closure and --

9 MR. RICE: Keith?

10 DR. McCONNELL: Yes.

11 MR. RICE: This is Tim Rice from the DEC.
12 Just to add a little bit on that, the potential for
13 moving that vitrified waste offsite had been looked at
14 in the past, and at one point they thought they had an
15 agreement with Savannah River. That agreement fell
16 through, and it doesn't look like there's any
17 practical way to move it to another DOE facility at
18 this time. At least that's the last status that I'm
19 aware of.

20 MR. BOWER: This is Brian. Also, the EIS
21 -- it was prepared for high-level waste eventually
22 going to Yucca Mountain. The decision that was made
23 by the Department of Energy at that time was that the
24 high-level waste would be stored at the site until the
25 repository was available.

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1 MR. WIDMAYER: Okay. Thanks.

2 MEMBER CLARKE: Okay. Any comments from
3 other folks on the bridge?

4 MR. BEMBIA: This is Paul Bembia from
5 NYSERDA. I had the opportunity to brief the ACNW when
6 you were here on the site about NYSERDA's concerns
7 with the performance assessment modeling. And I also
8 had the opportunity to take I think many of you out
9 and walk the site and actually see the erosion.

10 And I just wanted to say that in regard to
11 the performance assessment modeling we feel that there
12 has really been little progress in terms of resolving
13 our concerns about the long-term PA model for this
14 site. We still have considerable concerns with the
15 approach to erosion modeling, to the receptor
16 locations, and the assumptions that are being used for
17 engineered barriers over very long periods of time.

18 There is one place that I think there has
19 been some progress, and that is on the -- that DOE and
20 their contractors have agreed to move forward with the
21 development of a 3-D groundwater model, so we think
22 that's a significant step forward. But we've not had
23 the opportunity to review any of that -- the
24 groundwater modeling work -- in any detail yet.

25 But in regard to the other issues --

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1 erosion, receptors, and engineered barriers -- we
2 still have many of the same concerns as when you were
3 here.

4 MEMBER CLARKE: Okay. Thank you, Paul.

5 Mike?

6 CHAIRMAN RYAN: Paul, I'd like to ask a
7 followup question. Will the new groundwater modeling
8 be more probabilistic or include uncertainty analysis?
9 That seemed to be a point that we learned from our
10 visit is that the -- DOE's modeling was pretty
11 deterministic.

12 MR. BEMBIA: Mike, my sense is that they
13 are still planning on using a deterministic -- the
14 overall approach to the PA is a deterministic
15 approach. I think SAIC is looking at, you know, some
16 opportunities to do some probabilistic work on the
17 groundwater modeling, but to what extent I really
18 don't know at this point.

19 CHAIRMAN RYAN: Okay. Thank you.

20 MEMBER CLARKE: Any other comments from
21 the bridge?

22 (No response.)

23 Any from the staff? Committee?

24 MR. WIDMAYER: I've got one more, Jim,
25 just a comment. As far as the model for the phased

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1 decommissioning, I think as far as decommissioning
2 reactors they have a model that you can remove some
3 stuff from a site without having the license
4 termination plan approved, so there is potentially a
5 model to follow there. I know it's not analogous,
6 but --

7 DR. McCONNELL: Okay.

8 MEMBER CLARKE: I think there certainly
9 are some cases out there -- they may not be NRC sites,
10 but there are cases where a phased approach has been
11 taken. And the one thing you want to be careful about
12 is that you don't do anything in Phase 1 that
13 complicates things for Phase 2. So, you know, ideally
14 you take an integrated approach, but this certainly
15 seems to have merit. It seems like a very positive
16 development to me anyway.

17 If there are no more --

18 MR. FLACK: Well, let me just ask a
19 process question, if I --

20 MEMBER CLARKE: Sure.

21 MR. FLACK: This is John Flack, ACNW
22 staff. With respect to the model, you said you'd come
23 back to the Committee in a few months with this. Now,
24 as far as the process, do you develop a draft model
25 and bring it to the core team, or how does that work?

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1 Or you work with the core team to develop this draft
2 model for the --

3 DR. McCONNELL: Again, I probably
4 shouldn't have included it on that slide, because
5 development of a model for the phased decommissioning
6 and what we would see as a review plan for phased
7 decommissioning would be outside the core team
8 process.

9 MR. FLACK: It is purely NRC.

10 DR. McCONNELL: Right.

11 MR. FLACK: And then, you would bring that
12 draft to the Committee, and the Committee can comment
13 on it, and then you would go and finalize it.

14 DR. McCONNELL: Right.

15 MR. FLACK: And then, you would bring it
16 to the core team and say, this is how it -- what we
17 envision the decommissioned plan will look like is
18 that --

19 DR. McCONNELL: Well, more likely we would
20 interface with the Department of Energy and the New
21 York State Energy Research and Development Authority,
22 who would be the main beneficiaries of our phased
23 decommissioning.

24 MR. FLACK: Right. Okay. And you
25 envision that is going to happen sometime within the

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1 next six months or something like that? Or do you
2 have a --

3 DR. McCONNELL: Well, let me look at the
4 guy who is --

5 (Laughter.)

6 -- actually going to do the work, and his
7 branch chief back there.

8 CHAIRMAN RYAN: Round numbers are okay.

9 (Laughter.)

10 MR. GLENN: Yes. Six months sounds just
11 right.

12 CHAIRMAN RYAN: Okay.

13 MR. WIDMAYER: It was three earlier in the
14 presentation.

15 MEMBER CLARKE: Okay. Well, Keith and
16 Chad, thank you very much. It's been very
17 informative.

18 Folks that called in, thanks for calling
19 in and participating in the discussion.

20 Dr. Ryan, back to you.

21 CHAIRMAN RYAN: Let me add my thanks to
22 those folks on the bridge line.

23 At this point, this concludes this
24 presentation -- pardon me, my voice has about given
25 out -- and we are scheduled for a lunch break from

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1 11:30 to 1:00 p.m. And the Committee will reconvene
2 shortly to just discuss some final business matters at
3 1:00 p.m., and we'll conclude our record here for the
4 day.

5 (Whereupon, at 11:32 a.m., the
6 proceedings in the foregoing matter went
7 off the record.)
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