

BLUE RIBBON COMMISSION ON AMERICA'S
NUCLEAR FUTURE

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MEETING

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DAY 1

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THURSDAY,
MARCH 25, 2010

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The Commission convened at 11:00 a.m. in the Ballroom of the Willard Intercontinental Hotel, located at 1401 Pennsylvania Avenue, Northwest, Washington, D.C., Lee Hamilton and Brent Scowcroft, Co-Chairs, presiding.

MEMBERS PRESENT:

THE HONORABLE LEE HAMILTON, Co-Chair
GENERAL BRENT SCOWCROFT, Co-Chair
THE HONORABLE PETE DOMENICI
THE HONORABLE PHIL SHARP
MR MARK H. AYERS
THE HONORABLE VICKY BAILEY
DR ALBERT CARNESALE

MS SUSAN EISENHOWER
MR JONATHAN LASH
DR ALLISON MacFARLANE
DR RICHARD A. MESERVE
MR JOHN ROWE
DR PER F. PETERSON

ALSO PRESENT:

TIM FRAZIER, Designated Federal Official

STEVEN CHU, US Secretary of Energy

MARK HOLT, Congressional Research Office

MATTHEW CROZAT, Office of Nuclear Energy

FRANK MARCINOWSKI, Office of

Environmental Management

JOHN MCKENZIE, Office of Naval Reactors

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

11:00 a.m.

MR. FRAZIER: Thank you. My name is Tim Frazier. I'm the Designated Federal Officer for the Blue Ribbon Commission on America's Nuclear Future. I'd like to welcome you all today for the first public meeting.

What we're going to do, the Secretary of Energy is going to come and make some comments. He's running a little behind. So we're going to go into opening comments from the Commission Members until the Secretary arrives, starting with General Scowcroft.

Let me make a statement for the Commission Members. You have to press and hold the button to speak, and then let go and it will turn the mic back off.

General?

CHAIR SCOWCROFT: Thank you, Tim.

First, I'd like to welcome all of the Members of the Commission, and thank you

1 very deeply for your volunteering your time
2 and your expertise to what is not only one of
3 the most important problems facing the United
4 States but a critically difficult problem to
5 solve.

6 I believe that if our country is to
7 continue to progress in terms of adequate
8 energy, dealing with the environmental issues,
9 nuclear energy has to be a vital part of that.
10 As a part of that, we have to figure out what
11 we do with the residue from nuclear activities
12 in a safe and responsible way. And that's
13 what we're about. That problem has vexed us
14 for decades now. And that's what we have set
15 ourselves to do.

16 It will be a challenging job. The
17 field is wide. We need to know not only the
18 technical aspects but the public opinion
19 aspects of it. And I just want to welcome all
20 of you and say it's going to be tough. But
21 thanks for joining us.

22 CHAIR HAMILTON: Okay. I think by

1 way of instruction, I might say to the
2 Commissioners that in order to speak from
3 these microphones, you have to press down the
4 button in front of you. A red light will
5 appear, and you keep it on. You have to keep
6 pressing it while you speak.

7 I want to reiterate, of course,
8 what a great pleasure it is for me to work
9 with General Scowcroft. General Scowcroft is
10 in any measure one of the great public
11 servants of our generation, perhaps any
12 generation. And his contributions to the
13 betterment of the country are well known to
14 all of us. And Brent, it's a very high
15 privilege for me to work with you on this
16 Commission.

17 The assignment that we have is a
18 daunting task. Pete Domenici and Phil Sharp
19 and I can remember debating this issue 20, 30,
20 maybe 40 years ago in the United States
21 Congress. Indeed I think since the beginning
22 of the Manhattan Project, which was as I

1 recall back in the 1940s, the management of
2 waste has never been satisfactorily resolved.
3 And as a nation, we have really struggled with
4 this issue. The President and the Secretary
5 of Energy have challenged us to conduct a
6 comprehensive review of the policies for
7 managing the fuel cycle, and to recommend new
8 plans. We accept that challenge.

9 We will investigate a very wide
10 range of issues, including as the charter sets
11 forth, fuel-cycle technologies, options for
12 safe storage of used nuclear fuel, options for
13 permanent waste disposal, and arrangements for
14 the management of used nuclear fuel and
15 nuclear waste. We'll also make
16 recommendations on the Nuclear Waste Fund and
17 the fees that are currently being charged to
18 nuclear energy rate-payers.

19 Brent Scowcroft and I are
20 extremely pleased and fortunate to be joined
21 by an extraordinary group of Commissioners who
22 have been selected, I might say, with an

1 enormous amount of care. They have a
2 remarkable degree of expertise on this
3 subject. And I, more importantly the
4 Secretary and the President and General
5 Scowcroft, are deeply grateful to each of the
6 Commissioners for their willingness to step
7 forward here and to accept this challenge. I
8 have every confidence that we will succeed
9 because of the quality of the Commissioners
10 that we have.

11 Likewise, I think it's impressive
12 that we have a good many people from the
13 public sector present. It is a sure sign, I
14 think, of the seriousness and the interest in
15 the work that this Commission is addressing.
16 We welcome the participation, and we deeply
17 appreciate the participation of the public.

18 The issue that we confront is
19 hardly the exclusive purview of this
20 Commission, or for that matter the Department
21 of Energy. Nuclear energy and its future has
22 an impact as the General has suggested for all

1 Americans and for generations yet to come.

2 We're very grateful to Secretary
3 Chu. We're very grateful to the Department of
4 Energy and their remarkable colleagues that he
5 has assembled for providing the necessary
6 financial and administrative support that this
7 Commission needs. We've already benefitted
8 from that support as was obvious this morning.

9 But having said that, I think it's
10 important to note that this is an independent
11 Commission. It is independent by law, and it
12 will be independent in fact.

13 We will listen carefully to the
14 advice and the counsel that is extended to us
15 by the Department of Energy, certainly by
16 many, many other public sources. But at the
17 end of the day, the report, the analysis, the
18 conclusions, the recommendations will be ours
19 and ours alone.

20 We are due to submit a draft
21 report to the Secretary of Energy 18 months
22 after January 29 of this year. And we are due

1 to provide a final report two years after that
2 date which was the date the Presidential
3 Memorandum called for the establishment of the
4 Commission. General Scowcroft and I, as we've
5 already discussed with the Commission, want to
6 meet our goals on an even shorter timetable,
7 if that is possible.

8 So we look forward to the
9 challenge ahead. We will approach our work
10 with great seriousness. We have been told
11 again and again by a variety of people that
12 the stakes are high here for the country.

13 I thank all of you for joining us
14 today, and we will open up the platform for
15 just a moment for any further comments from
16 the Commission Members. General, you may have
17 an additional comment while we wait for
18 Secretary Chu.

19 CHAIR SCOWCROFT: I would just
20 like to add while we wait for the Secretary
21 what an honor it is for me to work with my Co-
22 Chairman Lee Hamilton. He and I have

1 encountered each other over a great many
2 years. He's a Democrat. I'm a Republican.
3 He's from the legislative branch. I'm from
4 the executive branch. But we've always
5 surmounted those differences and I think had
6 a very fruitful relationship. And I am
7 confident that difficult though this problem
8 is that we or the outstanding representatives
9 that we have as Members of the Commission can
10 deal with this problem in a manner worthy of
11 the American people.

12 Now I know that Senator Domenici
13 wanted to comment. He had to excuse himself
14 for a moment.

15 Is there anyone else who would
16 like to comment?

17 HON. MR. DOMENICI: Mr. Chairman,
18 did you call on me?

19 CHAIR SCOWCROFT: I called on you.
20 And you rose to the occasion.

21 HON. MR. DOMENICI: I'm very
22 sorry, everyone. You have to hold it while

1 you talk?

2 CHAIR SCOWCROFT: Yes.

3 HON. MR. DOMENICI: Oh, boy. This
4 is really modern.

5 (LAUGHTER.)

6 HON. MR. DOMENICI: We can really
7 solve these technical problems.

8 (LAUGHTER.)

9 HON. MR. DOMENICI: Well, first I
10 want to say I was in the Senate for 36 years.
11 I just left a year and three months ago. I
12 think some of you know I left not voluntarily
13 and they didn't throw me out. I left because
14 I wasn't well. Turns out I was a little more
15 well than the doctor thought. So I'm still
16 around, and enjoying it.

17 And I want to say for starters
18 that there are a lot of commissions here in
19 the nation's capitol. And they get a lot of
20 coverage and they do a lot of work. And it's
21 been my observation that they also and in
22 great quantities find themselves and their

1 reports in the wastebasket. And it's been an
2 employment for some people and a good time for
3 others and work for others. But nothing got
4 done.

5 I'm firmly convinced that we don't
6 have that kind of Commission. We don't have
7 that kind of Chairman. We're not going to
8 work for a year, a year and a half to have a
9 report to throw it in the basket. From what
10 I can tell, there's a genuine understanding
11 that we have signed on for a real job -- a job
12 that means we're going to help the United
13 States decide on what to do about nuclear
14 power in the future.

15 I just want to remind everyone
16 today there are 57 nuclear power plants under
17 construction in the world. And there is one
18 in the United States, and it's sort of a half
19 a one. We have one that's received a loan
20 guarantee and everybody's very excited about
21 that.

22 But the truth of the matter is we

1 are far behind because we don't want to make
2 a decision on what we do with the used fuel.
3 And I believe we made a big mistake when we
4 decided not to go on with reprocessing.
5 Whenever that was and under which President,
6 it doesn't matter. It happened. We did that
7 because we said the world will stop if we
8 stop. We stopped, they did not. That's what
9 happened.

10 So today, there was a time when
11 our country was the unquestioned leader. But
12 most of the world's new reactors are built
13 overseas, non-U.S. companies. Today it is
14 possible for a country to order a Korean
15 reactor, purchase uranium from Kazakhstan,
16 have the uranium enriched and fabricated in
17 Europe, and never once be dependent upon
18 support from the United States or subject to
19 U.S. non-proliferation programs.

20 It's obvious if we are going to be
21 successful we have a different rule here at
22 home, and we will have some impact in the

1 world with reference to the issues I have just
2 raised. I am hopeful, however, from what I
3 can tell, we have a real chance to do that.

4 Now I want to close by saying that
5 I have observed one permanent repository for
6 nuclear waste. And people don't even know it
7 exists. But the United States does have one.
8 It's in Carlsbad, New Mexico.

9 It's in the salt domes there.
10 They have not moved for 40 million years. And
11 2100 feet under the ground in that salt, there
12 are thousands of tons of transuranic waste,
13 long-life, low radiation dose in that. It is
14 as safe as anything that you could ever do.
15 Not one accident in ten years of operation
16 either in transportation or in the evolution
17 of the mine underground.

18 I cite that to you for two
19 reasons. One, I think we ought to see it as
20 a team, and see that we can do something
21 positive that is difficult, and we can get the
22 citizens to understand and ultimately be for

1 something like that. And secondly, we would
2 have an opportunity to see something that
3 really works.

4 So I took too long. But I thought
5 maybe and since the Secretary wasn't here that
6 I could abuse you with a few of my ancient
7 remarks -- remarks of an ancient mariner.

8 I would say that we are moving
9 ahead in America. But much is dependent upon
10 what we recommend to the President of the
11 United States and the Congress of the United
12 States after we exercise our due diligence.

13 Thank you, Mr. Chairman, for
14 letting me speak a moment, and for letting me
15 be here at your side. Thank you, Brent.

16 CHAIR SCOWCROFT: Thank you very
17 much, Senator Domenici.

18 Mr. Secretary, the two Co-Chairs
19 have made introductory comments. And we
20 welcome you to the podium.

21 SECRETARY CHU: So I apologize for
22 being a little late.

1 The first thing I want to say is
2 how much I appreciate the willingness of this
3 very distinguished committee to do this work,
4 particularly General Scowcroft, Congressman
5 Hamilton, for being willing to take on the Co-
6 Chairs, but the entire committee. It's a very
7 distinguished committee. And it's very
8 important work.

9 So let me just convey some
10 thoughts about the formal charge before you.
11 You have the President's letter to me and also
12 the charge. And let me just talk about some
13 of those things.

14 We're in a different place than we
15 were some 25 years ago. I think 25 years ago,
16 we were not anticipating a renaissance of
17 nuclear technology in the United States and
18 the world. Twenty-five years ago, the
19 constraints -- the legal constraints -- were
20 different than they are today based on a
21 Supreme Court ruling.

22 And right now, I think it's fair

1 to say there's not only a possibility but
2 perhaps even a likelihood that we will be
3 restarting the nuclear industry in the U.S.
4 And not a likelihood, but a certainty around
5 the world that that will be increasing. So in
6 many respects, what you do in your committee
7 will in large part have the attention of the
8 world as well.

9 In looking towards how do we deal
10 with the back-end fuel cycle, I ask you to
11 look deeply at all the things that we know now
12 today and we'll know in the coming decades.
13 And that would and should inform you of
14 plotting a strategy forward.

15 Let me give you a small technical
16 example. Today if you look at the energy
17 content of the uranium we dig out of the
18 ground and how much of it we actually use to
19 generate electricity, it's less than one
20 percent. I do know that with modest designs
21 in talking with some of the people in the
22 community -- the scientists doing these

1 simulations -- that with even modest designs
2 with current light-water reactors and fuels,
3 you could possibly double that or even
4 increase that by more. But if going to more
5 radical things you can increase that by a
6 factor of ten, 20, 30, with a single cycle, so
7 let's say we increase it by a factor of ten.
8 That's ten times less waste for the same
9 amount of electricity.

10 We in the Department of Energy
11 will be looking at research and how to reduce
12 waste even further. But by potentially
13 closing the fuel cycle, we don't now know if
14 this is going to be commercially viable --
15 things of that nature. We are going to be
16 doing research in that area.

17 And so, the people in the
18 Department of Energy you can use as an asset
19 as well as the wider scientific community as
20 to what people are thinking about and talking
21 about. And that again should feed into your
22 plans and recommendations of what you would

1 recommend to me, the President and the
2 Congress on the back-end of the fuel cycle.
3 And in so doing, that would also influence
4 some of the issues regarding what we are going
5 to do about storage -- storage in the coming
6 decades and storage over longer periods of
7 time -- and final disposition.

8 And so those are all questions
9 before you. I just want to emphasize a few
10 more things that this is not a siting
11 commission. It is not to pick spots in the
12 United States for repositories. It is to look
13 at all the science and technology and all the
14 other things that would influence how we deal
15 with the back-end of the fuel cycle.

16 I'm just trying to think if
17 there's anything else.

18 Let me stop now and ask the
19 Commission whether you have any questions that
20 clarifies both the charge that you've
21 received, the letter from the President and
22 the charge you've received from me. I just

1 wanted to throw that open for a few minutes.

2 CHAIR HAMILTON: Mr. Secretary, I
3 think all of us recognize that it was your
4 vision which brought about the Commission.
5 And we're grateful to you as General Scowcroft
6 and I have both said prior to your arrival for
7 giving us the opportunity to serve the
8 country.

9 One of the comments that came up
10 in our discussion earlier today was that the
11 title, Blue Ribbon Commission on America's
12 Nuclear Future, is very, very broad. And
13 there's been an enormous amount of emphasis at
14 the same time on the more specific problem of
15 what do you do with nuclear waste. Maybe you
16 can help us understand our mandate a little
17 more clearly with respect to that.

18 To what extent do we focus on this
19 very broad question of America's nuclear
20 future, and to what extent on the more
21 specific question of nuclear waste?

22 SECRETARY CHU: You have to have

1 some reasonable projections. Again, it
2 doesn't have to be cast in concrete because
3 quite frankly, one can't really tell what
4 technologies will be available to us 50 and
5 100 years from today. And so that also weighs
6 in your decisions on what to do -- or even 150
7 years from today. But you want to step back
8 and take a wide look at it.

9 The focus is definitely on the
10 back-end of the fuel cycle. But if you
11 consider again where we are today, where we
12 are now in a once-through cycle where if we
13 continue let's say at even 20 percent
14 production of electricity by nuclear power
15 that would create huge demands on
16 repositories.

17 And in designing a strategy for
18 the back-end of the fuel cycle, one also has
19 to say okay, how do we set up things so as the
20 technology progresses we can look at it. For
21 example, quite frankly, the Department of
22 Energy will be committed to looking at ways of

1 greatly reducing the amount.

2 There's spent fuel. And then
3 eventually there will be fuel where there will
4 be no economic value, and you don't want to
5 have the access to it anymore and you just
6 want a final disposition of that material.
7 And so, in understanding that there are going
8 to be these categories, one will have to make
9 reasonable conjectures as to how technology
10 will be developing.

11 The NRC has made it very clear
12 that dry-cask storage above ground could be
13 safe for decades. And indeed, Chairman Jaczko
14 has made remarks saying in terms of above-
15 ground storage whether it's going to be 50,
16 100, 200, 300 years. So let's take the low
17 end as a minimum. We have 50 years to develop
18 things. We probably have more. And so, part
19 of your recommendations will say -- you'll ask
20 what is the strategy and how to deal with this
21 knowing that we will be in a different place
22 another 25 years from now than we were 25

1 years ago. And we'll be in even a different
2 place 50 years from today.

3 So does that help?

4 CHAIR HAMILTON: Yes. That is
5 very helpful. Any other questions?

6 CHAIR SCOWCROFT: Mr. Secretary,
7 you made two very interesting comments among
8 your many. One was about possibly closing the
9 fuel-cycle. Another was that we use less than
10 one percent of the energy value of the uranium
11 that we mine.

12 Now, our major task as you said is
13 the back-end of the fuel cycle. But what you
14 do with the front-end of the fuel cycle has a
15 lot to do as you have just said on the back-
16 end. I just wonder how comprehensively you
17 want us to look at the whole thing.

18 SECRETARY CHU: Well, again you're
19 going to have for example the world
20 researchers are looking at whether it's going
21 to be commercially viable, safe to develop a
22 generation of fast neutron reactors that can

1 burn down the waste -- long-lived actinide
2 waste -- that gives you this million-year
3 issue, as well as attract more of the energy
4 content out of the uranium we use.

5 While we do not have, it's safe to
6 say no one is claiming that we are ready to
7 put shovels in the ground and to start
8 building these fast spectrum neutron reactors.
9 Your committee should be looking at these
10 possibilities because if you can reduce the
11 lifetime of the waste by factors of hundreds
12 to thousands, if you can reduce the amount of
13 the waste by factors of tens to hundreds, that
14 also can change things. And what you do in
15 the interim is then an open question.

16 So these are all questions for
17 you. You're very smart people. I don't want
18 to tip any weight anywhere on what you do.
19 And so it's to the extent that you decide.
20 And you can form subcommittees to give you
21 detailed scientific input as to these
22 questions. And then that will then effect

1 what you're here for and to make
2 recommendations to me, to Congress, the
3 President, on what to do with the back-end of
4 the fuel cycle.

5 But I think it's safe to say
6 unless you step back and look at it all, if
7 you just focus on just a tiny portion, we
8 probably will not get to the wisest path.

9 CHAIR SCOWCROFT: Thank you.

10 HON. MR. DOMENICI: Mr. Secretary,
11 it is good to see you again. Good to have you
12 with us. I understand you're on a tight
13 schedule.

14 There is much discussion in the
15 news about Yucca Mountain and its future. So
16 to be clear for everyone, you gave us a
17 charter. But you also gave us certain
18 instructions regarding Yucca Mountain. Could
19 you tell us so the record will be clear and
20 the public will understand, is it correct that
21 we do not have Yucca Mountain within our
22 jurisdiction? It is not to be considered as

1 part of our study approach to the future of
2 nuclear power for America?

3 SECRETARY CHU: It is correct to
4 say that we are going to look to the future
5 and we're going to look to see what we can do
6 going forward. And so what I don't want the
7 committee to be going is just spending time
8 and saying by looking at past history was
9 Yucca Mountain a good decision or a bad
10 decision and whether it can be used as a
11 future repository.

12 MS. EISENHOWER: Mr. Secretary, in
13 the charter that was --

14 SECRETARY CHU: Can I just
15 interrupt?

16 So looking to the future, we want
17 to go forward. And so again your
18 recommendations of all future repositories
19 just have to fold in -- interim storage,
20 temporary storage, permanent disposal -- all
21 those things. It's a generic. This is not a
22 siting commission. And so it's mostly that.

1 It's not a siting commission.

2 MS. EISENHOWER: Yes. Mr.
3 Secretary, in the charter that was distributed
4 to us, the word "options" relate to many
5 things with regard to the back-end of the fuel
6 cycle. To what extent do you expect this
7 Commission to view these options going forward
8 in the context of cost and political
9 feasibility?

10 SECRETARY CHU: I think if, for
11 example, right now if you take a snapshot
12 today in time, the cost and feasibility of
13 some of the things we just were speaking about
14 like full recycling or things are not there
15 yet it's safe to say. But I'm mostly asking
16 you to look towards the future -- 25, 50 years
17 from today, 75 years from today. And so
18 things will change.

19 And so again, it's an assessment
20 and where there's guarantee of what will be
21 economically viable and safe. We also want to
22 develop nuclear technology in a way that is

1 definitely proliferation-resistant. And so
2 there are no guarantees on what will happen.
3 And then you have to fold that into your
4 assessment.

5 CHAIR HAMILTON: My understanding
6 is the Secretary has to leave.

7 Dick, you have a question.
8 Commissioner Meserve?

9 DR. MESERVE: Mr. Secretary, I
10 have a much more mundane question than the
11 ones you've been tackling.

12 And I understand from the charge
13 that the intent is that we focus attention on
14 used nuclear fuel. But there is also
15 reference to disposal of other materials
16 derived from the operation of commercial
17 reactors.

18 There are many categories of low-
19 level waste for which at the moment there is
20 no disposal process. And I'm curious whether
21 low-level waste is intended to be within the
22 scope of our deliberations or not.

1 SECRETARY CHU: Yes. That was an
2 easy one. As far as I know yes, that it's
3 back in.

4 But I mean, we also have -- it's
5 not on the nuclear civilian side -- we also
6 have an issue with the military side.

7 The Department of Energy has
8 responsibilities and legal mandates and we
9 fully intend to keep those. And so this
10 committee is also here to give us advice on
11 all those responsibilities that we have and
12 will try to adhere to as best we can.

13 CHAIR HAMILTON: Those of us
14 accustomed to sitting in Congressional
15 hearings appreciate these direct responses,
16 don't we, Mr. Secretary?

17 (LAUGHTER.)

18 CHAIR HAMILTON: I'm getting the
19 signal here from your folks that it's time for
20 you to go on. Let me thank you very, very
21 much for stopping by and giving us the
22 opportunity to serve on the Commission.

1 Thank you, Mr. Secretary.

2 SECRETARY CHU: Thank you.

3 And again, let me thank the
4 committee once again for be willing to do
5 this. It's very time consuming.

6 The eyes of the world will be upon
7 you. But you're a terrific committee. And
8 so, if there's any way we can assist in the
9 information and things of that nature, but
10 you're the people who are going to be making
11 these recommendation. Thank you.

12 CHAIR HAMILTON: Now I think under
13 the agenda we have a few minutes to have
14 discussion among the Members of the
15 Commission. And I know that General Scowcroft
16 and I would appreciate any input from the
17 Commission with regard to how we might
18 proceed, what kind of hearings we should have,
19 how frequently, what witnesses -- anything you
20 want to comment on with regard to the
21 processes of the Commission.

22 As I've indicated previously to

1 you, we've only hired two people with regard
2 to the staff at this point. We anticipate
3 that we'll be hiring a few more. But we
4 really don't know how large a Commission staff
5 we're going to need.

6 But the floor is kind of open at
7 this point for general discussions or comments
8 or remarks by Members of the Commission.

9 DR. MESERVE: I wasn't intending
10 to launch forward with an opening statement,
11 but let me offer my perspective on the context
12 within which I think we should proceed with
13 our work.

14 It is I think apparent to all of
15 us on the Commission that we need to define a
16 strategy to deal with used fuel, that there's
17 a compelling obligation because as material is
18 accumulated, it needs to be handled. But I
19 think it's also important to recognize -- and
20 I'm picking up on a point that the Secretary
21 made -- that this is not a crisis. We have a
22 situation today in which we can safely and

1 securely store these materials for many
2 decades, and that we don't have to have a
3 public concern that this material is somehow
4 severely at risk over a period as we think
5 about how we proceed.

6 Secondly, I think I would add that
7 -- and this is something which the Commission
8 will have to reach its own conclusion -- but
9 that there are a number of studies including
10 some from the National Academy of Sciences
11 that have found that deep geologic disposal is
12 sufficient to isolate these materials for the
13 long term. That's not to say that any
14 particular site is necessarily good for that.
15 Obviously, not every site is going to be
16 appropriate. And I'm not making a comment
17 about any site. It's just that it is within
18 the technical capability of the country to
19 find an appropriate site that will be able to
20 handle these wastes for the long term.

21 So there is a solution that is
22 available if it were necessary. And beyond

1 that fact, as the Secretary also emphasized,
2 there may be some other approaches that he
3 mentioned -- reprocessing, recycling -- that
4 could provide a way that would make the
5 problem of waste disposal different and
6 easier. If that doesn't pan out to be the
7 case, we still have a solution that is
8 available which is deep geologic disposal.

9 So I mention all this to say that
10 this is a problem we need to solve. It is a
11 solvable problem. And there is no crisis and
12 urgency in having an answer today or tomorrow
13 that is we're ready to implement. What I
14 think as I've understood the Secretary, we
15 want to launch on a path that will take us to
16 the stage of appropriate resolution of these
17 matters.

18 Now there are some who might argue
19 that while you haven't found a way to deal
20 with the spent-fuel and therefore we ought to
21 start shutting down reactors or we ought not
22 to build reactors. I disagree with that point

1 of view. I disagree with that point of view
2 for the reason that the fact that we're
3 producing an increment more of spent-fuel does
4 not change the character of the problem. The
5 solution that is we have to solve the problem
6 dealing with used fuel one way or another. We
7 can solve it. And the fact that there's an
8 increment of used-fuel that is produced
9 doesn't change the nature of the problems. So
10 the solution is one that we will have to find.
11 But it doesn't mean that our immediate path
12 should be that we turn away for that reason
13 from nuclear power.

14 So I think that is for me a
15 context of which we're approaching a very
16 important problem. But it is one that is not
17 at a crisis in which a thoughtful, measured
18 approach is appropriate.

19 CHAIR HAMILTON: Thank you, Dick.

20 All right. Jonathan, and then
21 Allison.

22 MR. LASH: A brief comment from a

1 somewhat different starting point that Dick's.

2 Most of the people around this
3 table genuinely qualify as what we were
4 described as in our appointment papers --
5 experts. But among that group, I don't
6 include myself. This has not been an issue
7 that's occupied most of professional life. I
8 run an environmental think tank.

9 If there is one reason that
10 compelled me to agree to participate in this
11 process, it is the vision that we're making a
12 set of decisions that are potentially
13 enormously important in a larger consideration
14 set of considerations -- how we move into a
15 carbon-constrained world. John and I have
16 spent a great deal of time discussing that.

17 I hope that as the Commission
18 moves forward and as we answer the Secretary's
19 request that we understand what we're doing in
20 a broader context that we spend some time
21 talking about that context -- what we expect
22 of this industry, how we'll produce the energy

1 that's necessary for the country to operate
2 faced with increasing carbon constraints, and
3 how we do that within the context of our
4 desire to lead the world in restraining
5 nuclear proliferation.

6 Thank you.

7 CHAIR HAMILTON: Thank you very
8 much, Jonathan.

9 Allison?

10 HON. MS. BAILEY: Thank you, Mr.
11 Chairman.

12 I just want to respond a little
13 and maybe enhance a little Commissioner
14 Meserve's comments. I agree that there's no
15 urgency to move forward tomorrow with a
16 solution to the problem of spent nuclear fuel.
17 There may be a case to be made for those
18 reactors that have fully decommissioned to
19 move their fuel somewhere to some central
20 site. I think that is something that we
21 should consider.

22 But I would like to make very

1 clear from the outset that no matter what kind
2 of management option we consider, whether it
3 is a direct disposal or whether we are
4 considering even a fully closed cycle, we need
5 some kind of geologic repository. We cannot
6 escape that fact.

7 It doesn't have to be a mined
8 repository. It could be a borehole. And we
9 should be open to that as well. But we cannot
10 escape that fact. And we will have to deal
11 with that.

12 And then if we do consider other
13 options besides direct disposal, we need to
14 keep in mind that we're not just dealing with
15 high-level nuclear waste, that there are
16 numerous waste streams that we have to account
17 for, not only in terms of the technical
18 aspects, but in terms of as Commissioner
19 Eisenhower pointed out, the political and
20 economic aspects.

21 So, just want to be clear with
22 that.

1 CHAIR HAMILTON: Thank you,
2 Allison.

3 Vicky?

4 HON. MS. BAILEY: Thank you, Mr.
5 Chairman.

6 I guess, in also taking off a
7 point from Commissioner Meserve, there may not
8 be a scientific crisis. And I too am not an
9 expert on the science of these issues. But to
10 the extent there is a crisis of confidence, I
11 think there exists.

12 If we agree that nuclear power
13 should continue to be a viable part of the
14 supply portfolio in this country, our
15 inability to address this issue is an
16 impediment in my mind. If we want to grow
17 domestically vendors who will construct
18 nuclear plants, if we want students to enroll
19 in nuclear specialties, I think this is an
20 issue that if we are serious about the growth
21 of nuclear power that we have to address.

22 As a former state and federal

1 regulatory, we often found ourselves on the
2 front lines of decisionmaking. And as state
3 commissions make resource decisions and commit
4 ratepayers to meet the supply needs in their
5 state, and as the industry makes resource
6 commitments and financial commitments, they
7 need confidence that there is a direction in
8 place for managing the end of the nuclear fuel
9 cycle, one that gives clarity and one that
10 gives certainty.

11 This is how I believe we show that
12 we are serious about promoting the growth of
13 nuclear power in this country. And I want my
14 participation -- I hope my participation on
15 this Commission puts some building blocks in
16 place so that we can do that and build that
17 confidence.

18 CHAIR HAMILTON: Thank you, Vicky.

19 Al?

20 DR. CARNESALE: Thank you, Mr.

21 Chairman.

22 I just want to point out, there

1 were two related issues, but they're not the
2 same. One is the one that we generally talk
3 about which is what are we going to do with
4 the radioactive waste in the fuel cycle. And
5 the other is issues associated with
6 reprocessing. These are -- they overlap
7 substantially, but they're not the same. For
8 nuclear power to be viable, it's got to be
9 safe, it's got to be economic, it's got to be
10 acceptable to the public -- all three of
11 those.

12 Much of the debate we've been
13 having in recent years and the concerns of
14 people has been about radioactive waste. And
15 generally, much of that argument would be the
16 people do not consider whether it's to be
17 reprocessed or not. And then reprocessing
18 which does have a bearing on radioactive waste
19 also has many other implications -- economic,
20 safety, proliferation and the like.

21 And while it is essential for us
22 to consider both of those issues, I believe

1 it's also important for us not to conflate
2 them. The latter -- proliferation -- has a
3 substantial international dimension. So this
4 committee, while our advice is on what the
5 United States should do, is very much in an
6 international context as it relates to
7 proliferation and other matters as well.

8 CHAIR HAMILTON: Thank you, Al.

9 Per?

10 MR. PETERSON: I am Professor and
11 Chair of Nuclear Engineering at the University
12 of California at Berkeley, and therefore have
13 been deeply involved in many of the elements
14 of the technology and questions both on the
15 civil side as well as on nonproliferation and
16 arms control side of the issues that we face
17 here on this Commission. I think it's
18 important to note that a lot of things --
19 important things -- have changed over the last
20 25 years, and that we have an obligation to
21 identify those changes and to clearly report
22 them in our report because we are in a

1 different position now -- much different --
2 from where we were back then.

3 I would note that our current
4 Nuclear Waste Policy Act has not proven to
5 have the level of flexibility to adapt well to
6 these changes, not just in technology, but
7 also substantial changes in our security
8 environment, and in nonproliferation, the
9 Nuclear Waste Policy Act was developed back in
10 the midst of the Cold War. And so for this
11 reason, I think we have an obligation to look
12 at approaches that would have a greater degree
13 of long-term flexibility and responsiveness so
14 that we can adapt to additional changes we
15 know that will happen.

16 Another thing that I think that is
17 important is to emphasize that we also face
18 the need to perform environmental remediation
19 at defense sites which were involved in the
20 efforts to develop nuclear weapons. And this
21 is an obligation that the government carries
22 and that needs to be taken seriously as a part

1 of the Commission's work in addition to the
2 questions associated with energy.

3 And finally, I think that we want
4 to make sure that we advocate for a policy
5 framework such that we have high assurance
6 that future actions in terms of the deployment
7 technology will meet the highest standards for
8 safety, security and nonproliferation, and
9 again to have a sufficiently flexible policy
10 framework that indeed we can evolve and adapt
11 as new challenges come before us. And I
12 believe that that can be done because of
13 things that we have learned about how to
14 regulate this technology over the last 25
15 years that have actually resulted in
16 impressive improvement by all empirical
17 measures in the safety of operation of nuclear
18 reactors.

19 So I think that this is a very
20 good time for us to revisit the set of
21 questions. And I appreciate the opportunity
22 to do so.

1 HON. MR. DOMENICI: Professor,
2 would you yield for a moment?

3 I just wanted to say for the
4 record, your great cerebral qualities probably
5 have a lot to do with genetics. But I want to
6 lay claim to the fact that you were born in
7 New Mexico.

8 (LAUGHTER.)

9 HON. MR. DOMENICI: And I think it
10 had something to do with that marvelous
11 climate and sunshine that you got in your
12 early childhood.

13 MR. PETERSON: It's a bit of an
14 accident that I was born in Las Cruces, New
15 Mexico. I grew up in Nevada.

16 (LAUGHTER.)

17 MR. PETERSON: But I have to say
18 that my father and my family get the primary
19 credit for how I grew up and what my values
20 are.

21 HON. MR. DOMENICI: We're going to
22 have display Las Cruces' claim. They're very

1 happy.

2 (LAUGHTER.)

3 CHAIR HAMILTON: Okay. John?

4 MR. ROWE: Thank you, Mr.

5 Chairman.

6 As the Commission Members know --
7 but not all the public present may -- my
8 company owns and operates 17 of the nation's
9 103 or so nuclear power reactors. So it will
10 come as no surprise that I agree with General
11 Scowcroft and Senator Domenici that nuclear
12 power must play a significant role in the
13 future if we are to deal with the nation's
14 twin goals of more secure energy and cleaner
15 energy. And especially I agree with
16 Commissioner Lash's point about the need to
17 have a lower carbon energy fleet.

18 It may come as more of a surprise
19 given our role in the nuclear industry however
20 that we are not among the nation's leaders in
21 developing a new nuclear facility. And while
22 there are many reasons for that, one of them

1 is that this nation has not yet come up with
2 a credible approach to dealing with spent
3 nuclear fuel.

4 Like Commissioner Meserve, I know
5 this is not an immediate crisis. But I do
6 feel it is a major impediment to the
7 development of new nuclear sites. And while
8 we don't have to do anything quickly to keep
9 the public safe, we do have to do something
10 decisive to have public credibility.

11 I tell my nuclear team it's the
12 cocktail party test. It's a matter of when
13 you can look your neighbor in the eye and say
14 we know what will happen to the spent fuel and
15 do it without flinching. And it's terribly
16 important. We need this technology, but we
17 need an approach to the nuclear waste problem
18 that is real.

19 For many of us when our children
20 or grandchildren were small, we read them a
21 book called The Velveteen Rabbit in which a
22 stuffed rabbit wishes to become real and

1 becomes so by being beaten and infected.

2 Well, our nuclear policies have been beaten
3 often enough. But in the area of spent fuel
4 disposal, they have not yet become real
5 enough. And the challenge for this Commission
6 is to do something that we can look at each
7 other in the eye and say this is real, and
8 then go out and look at our neighbors and say
9 this is real.

10 CHAIR HAMILTON: Thank you very
11 much, John.

12 Are there further comments from
13 any of the Commissioners? Phil?

14 HON. MR. SHARP: Mr. Chairman, I
15 certainly won't review why this is so
16 important and critical. The Secretary's done
17 that and several of our Commissioners have
18 done that. But I think we all feel that very
19 heavily.

20 I think there are two broad ways
21 in which we're going to make a contribution.
22 And I think many of us are intent on making

1 it. And one is the way in which we deliberate
2 because part of what we hope to do as we have
3 to educate ourselves, even though many have
4 rich experience in this field, it's an
5 opportunity for public discourse of the first
6 order in this country, and there can be no
7 doubt in this society today how critical that
8 need is, and it's very critical on this issue
9 to have serious conversations about serious
10 issues.

11 The second is of course what
12 several of our Commissioners are driving for
13 that we must drive for actionable
14 recommendations. That is not just
15 recommendations about what's good for the next
16 century without being specific. It means
17 things that decisionmakers can actually make
18 decisions about and not dumping in their laps
19 45 potential options that they might take.
20 That doesn't really help. Many of us here
21 have been on the decisionmaking end of some of
22 these issues.

1 So I think that's what we want to
2 drive for, and I think we'll be most effective
3 if we sort of serve these two goals of
4 heightening the deliberation in America and
5 also coming forth with actionable
6 recommendations.

7 CHAIR HAMILTON: Thank you, Phil.

8 Further comments? Yes, Mark?

9 MR. AYERS: Thank you, Mr. Co-
10 Chairman.

11 It's very evident that our nation
12 must have a diverse energy portfolio that
13 includes hydro, wind, solar, geothermal, coal,
14 oil and gas and certainly nuclear. We cannot
15 meet this nation's energy needs without
16 nuclear generation. And we all know that it's
17 a carbon-free generation.

18 I agree with everyone else. There
19 certainly is no crisis at this point. But
20 there is an urgency to allay the concerns of
21 the world. And as Dr. Chu stated, I think the
22 world will be looking to the United States to

1 thoughtfully adopt a responsible approach
2 toward waste management. And with that
3 charge, I know that everyone on this
4 Commission is ready to do that very
5 thoughtfully and as expeditiously as we can.

6 HON. MR. DOMENICI: Mr. Chairman,
7 I -- Co-Chairman, I want to just comment for
8 a moment and extend an invitation.

9 Commissioner MacFarlane, you
10 mentioned we need a repository -- geological
11 repository. And I want to say everyone -- I
12 just touched on it -- but in New Mexico in
13 some very extensive salt -- salt domes --
14 there exists a permanent repository for
15 transuranic military waste. Now it's not high
16 level because it's just defined to be
17 transuranic. And that's what we put in there.
18 You don't put high level but you put
19 transuranic. It is a kind of radiated
20 excesses -- gloves and everything like that.

21 It is 2100 feet under the ground
22 in salt. It's existed for ten full years

1 without a single accident. It has its own
2 trucks who travel the highways day-in and day-
3 out. Not a single accident in ten years. And
4 I think if we are going to conduct field
5 hearings or trips, I think we ought to go see
6 it because I think it would give Members who
7 wonder whether what we talk about is really
8 doable, it would give them a real opportunity
9 to see that reality.

10 I also wanted to say there's
11 another aspect and that we've touched on it.
12 And that is what do the people think about
13 what we're talking about. Are they for it,
14 against it? Are they -- well, you will find
15 in that community and the surrounding areas an
16 informed citizenry. They will question you as
17 hard as anybody else. You tell them something
18 about nuclear, you'd better know what you're
19 talking about because city counselors,
20 commissioners -- everybody knows. They're
21 smart. They are in favor of what is going on.
22 I think that's also part of what is being

1 discussed. And Commissioner, you alluded to
2 it too. We need to make sure that the public
3 -- what we come up with -- the public believes
4 is safe and are participants in talking about
5 it as it evolves.

6 And so, I extend that, and place
7 it in the record because I know of no other
8 way to do it. And I might not see you for a
9 month or so, Co-Chairman, and I don't want to
10 forget to put this request to you today.

11 CHAIR HAMILTON: That's very
12 helpful indeed. All of the comments by the
13 Commissioners have been very helpful this
14 morning.

15 Are there any further?

16 MR. PETERSON: I would add just
17 one related comment which is to emphasize
18 regardless of future approach on geologic
19 repositories, gaining experience at smaller
20 scale through activities such as have been
21 conducted at WIPP I think is a vital element
22 of scaling up to address the larger problems.

1 And in fact, if you look at the nuclear
2 industry from the perspective of the operation
3 of reactors, the most important thing that has
4 changed over the last 20 years that has
5 resulted in dramatic improvement in the
6 reliability of those operations and reductions
7 and forced outage rates is the proactive
8 application of corrective action programs
9 where you identify problems at a minor scale
10 and then systematically and effectively
11 address them so that they disappear. And the
12 effects of that are quite evident.

13 The current policy that we have
14 actually calls for a massive effort to move a
15 lot of stuff very rapidly. And that's not a
16 way to build up a base of experience that
17 gives you confidence that it can be done well
18 and safely. So indeed, I think that this type
19 of experience is very important and in forming
20 an approach forward on the set of questions we
21 have to work on.

22 CHAIR HAMILTON: Thank you, Per.

1 We have Vicky, and the Allison.

2 Vicky?

3 HON. MS. BAILEY: Thank you. One
4 of the things I meant to add to my comment is
5 actually a question as a nonscientific
6 individual.

7 As we look at storage --
8 maintaining storage -- and this is scientific
9 from the standpoint of Commissioner Meserve --
10 if we look at this as being able to maintain
11 where it is now in the storage facilities and
12 at the different sites, but I guess in my
13 thinking they were not necessarily designed to
14 be maintained longer I guess maybe than 30 or
15 40 years. But this possibly might mean we
16 would maintain them even longer.

17 So one of the things that would be
18 helpful for me in looking at this is the
19 ability to maintain them. Were they
20 constructed? That was not the initial intent.
21 But do we really have the scientific ability,
22 reliability and safety and environmental

1 issues? Obviously if a utility --
2 Commissioner Rowe can address this -- is
3 running out of room at a certain facility,
4 obviously there's the ability to build dry-
5 cask storage -- that kind of thing. But I
6 just need to understand the option of
7 maintaining it, where it is if we do nothing
8 and just leave it there, what are we looking
9 at.

10 CHAIR HAMILTON: Thank you, Vicky.

11 And Allison?

12 DR. MacFARLANE: Thanks. I just
13 want to go back to comments made by
14 Commissioners Domenici and Peterson.

15 I think we do have to spend a
16 little bit of time understanding the lessons
17 learned from the failed nuclear waste process
18 in the United States so far. And I think we
19 will find that a significant portion of the
20 failure has been due to it's been on political
21 grounds. And I think we would be well served
22 by looking at where that's working. And where

1 that's working is Sweden and Finland. And I
2 think we may be well served by visiting there.

3 The localities where the Swedish
4 waste site is going to be developed, the
5 municipality has an over 80 percent approval
6 rating for the repository there. There's a
7 lot that we can learn from them. So I'd just
8 like to throw that out.

9 CHAIR HAMILTON: Dick?

10 DR. MESERVE: Thank you. Let me
11 respond a little bit to some of the comments
12 that have been made.

13 I hope that my statement that
14 we're not in a crisis was not understood to
15 mean that this is not a problem that we need
16 to deal with now. We need to define a path
17 forward. If that path happens to involve
18 several decades of work but is a credible path
19 that is optimal, that is something that we can
20 deal with.

21 But I fully agree with several of
22 the comments that we need a repository

1 certainly and we need to make progress on
2 having a credible and believable route forward
3 for all the reasons that Vicky and John and
4 others have mentioned. And I certainly didn't
5 intent to suggest anything different.

6 With regard to the storage
7 question, I know that the NRC licenses these
8 dry-fuel casks -- I believe it's for 40 years
9 -- with the prospect of them being renewed.

10 And I think that is something that we
11 certainly ought to look to and examine as the
12 back-up for the duration of time as has been
13 indicated by the Secretary that the Chairman
14 at a recent conference talked about storage
15 being perhaps satisfactory for considerably
16 longer than a century. Of course, if you
17 needed to re-pack the materials, you could.

18 So in any event, I fully agree
19 that if storage ends up being part of the
20 responses, I believe it's going to be we need
21 to satisfy ourselves with regard to how long
22 we reliably can deal with that. And as

1 Allison has indicated, there are going to be
2 some issues with decommissioned plants which
3 would like to get the fuel off the sites. And
4 I didn't make any comment about where the
5 storage should take place.

6 I would like to reinforce as a
7 final point an issue that Dr. Carnesale
8 mentioned in passing. And that is that you
9 can't look at any one piece in isolation. And
10 all the pieces have to be looked at in light
11 of a large number of factors.

12 If we're going to consider
13 anything that has to do with nuclear
14 technology, first you have to certainly
15 evaluate and be satisfied as to safety,
16 security, nonproliferation, economics,
17 extension and availability of fuel and
18 probably five other factors. And they all
19 interplay with each other. They all need to
20 be considered. And beyond that, what you do
21 with the waste and think about with regard to
22 the waste needs to be factored into your

1 consideration about how the whole system has
2 to work together, that you need a production
3 of fuel, reactors all need to work in
4 synchrony with each other in a total system.

5 And so this is a very complicated
6 problem that we're embarked on. It involves
7 many factors that in defining an optimal path
8 is important and going to be challenging.

9 CHAIR HAMILTON: Mark, and then
10 Susan.

11 MR. AYERS: Yes. Very briefly.

12 Our broader mission is also to
13 contemplate America's nuclear future. And in
14 doing that, I think that we really have to
15 look very closely at where our reactors are
16 manufactured, where our fuel comes from and
17 recognize that we must get away from foreign
18 reliance on our reactors, our components, on
19 our fuel and clearly make this a domestic
20 project.

21 CHAIR HAMILTON: Thank you, Mark.

22 And Susan?

1 MS. EISENHOWER: Well, I think
2 many very important points have been made.
3 I'd just like to reiterate I think the value
4 of this Commission meeting at various places
5 throughout the country because this has become
6 a very, very contentious issue. And while we
7 have some running room technically, we don't
8 have a lot of running room with respect to
9 garnering and sustaining public confidence.

10 But I'd like to add not only to
11 the idea of best practices and seeing how
12 small our operations can scale up, but I'd
13 like to associate myself with Commissioner
14 MacFarlane's comments about the international
15 community. I know many of us have been aware
16 of the fact that the international community
17 is deeply interested in the outcome of the
18 results that will be advanced by this
19 Commission. And I think just as it's
20 important that we demonstrate to the American
21 public that we're aware of their views and we
22 understand the significance and the impact

1 that our deliberations will have, I think the
2 international community needs to be addressed
3 in the same way. The issue of
4 nonproliferation and other things is an
5 international issue.

6 And I was certainly aware of the
7 fact -- I've read it in foreign newspapers --
8 that the policies of some of these other
9 countries will be affected by what is decided
10 through this Commission. So I think we should
11 view actually getting outside of Washington as
12 a really positive thing.

13 CHAIR HAMILTON: Thank you, Susan.
14 Any further comments? Phil?

15 HON. MR. SHARP: Mr. Chairman, not
16 an area of my expertise, but if you and
17 General Scowcroft and Susan Eisenhower and
18 others here see these international impacts,
19 and my impression is the question is not only
20 the example that we set may or may not affect
21 others, but it is what role the United States
22 ought to take in the international

1 deliberations over the security and
2 supervision of power plants around the world
3 and what is the international regime -- the
4 IAEA and the various elements. I don't know
5 how far we'd want to go with that, but I think
6 we have to recognize that choices that we make
7 may well be advice to the United States
8 President and State Department about certain
9 policy elements that ought to be part of the
10 American agenda. I'm not recommending that.
11 I just suggest we think about that.

12 CHAIR HAMILTON: Thank you, Phil.
13 Further comments?

14 May we begin this morning by
15 saying that the challenge is daunting and I
16 think the comments of the Commissioners would
17 reinforce that all the way. They've really
18 been extremely thoughtful comments. And I
19 know Brent and I are most grateful to you for
20 starting us off on the right foot.

21 We're going to adjourn at this
22 point for lunch. The Commissioners will meet

1 in the Fillmore Room.

2 I just want to say that the real
3 substantive part of the Commission's work
4 where we begin to learn a lot will begin this
5 afternoon. Basically we'll be focused on how
6 we got where we are, discussion of the Nuclear
7 Waste Policy Act and other matters, and then
8 we will be looking specifically at the
9 magnitude of the waste problem both civilian
10 and military.

11 So we'll have a very stimulating
12 afternoon. Until 1:30, we are adjourned.

13 (Whereupon, at 12:09 p.m., off the
14 record until 1:28 p.m.)

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1 A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

2 1:28 p.m.

3 MR. FRAZIER: If I could have your
4 attention, please. According to my watch,
5 it's 1:30. Congressman Hamilton likes to run
6 things on time, so we are going to get started
7 again for the afternoon session.

8 Should make just a comment about
9 this afternoon's session is that it's going to
10 be essentially where we are, how we got to
11 where we are, the magnitude of spent nuclear
12 fuel and defense high-level waste issues, as
13 well as some projections. Then we're going to
14 talk about the EM fuel. So it should be a
15 data-filled afternoon.

16 So General Scowcroft?

17 CHAIR SCOWCROFT: Thank you, Tim.

18 Before we get started with the
19 where are we and how did we get here, I'd like
20 to make one comment about tomorrow's schedule.

21 It's come to our attention that
22 there are a significant number of people who

1 would like to deliver oral statements to the
2 Commission. As the agenda shows tomorrow, we
3 had included 15 minutes for public statements
4 as called for in the Department's implementing
5 procedures. But there's no way we can
6 accommodate anywhere near all the people who
7 want to speak within the 15-minute window.

8 In light of that, we plan to allow
9 one hour tomorrow for oral statements which
10 each one of which we will restrict to three
11 minutes. And that will be an absolute
12 restriction.

13 We also would like to comment that
14 those who wish to make an oral statement to
15 the Commission might consider instead
16 submitting written testimony which will be
17 included in the record just like an oral
18 statement. This can be done by the Commission
19 website which is being established now and
20 will be up and running in early April. Or it
21 can be emailed to Tim Frazier of the
22 Department of Energy.

1 Please also keep in mind that we
2 plan to conduct a series of public meetings
3 during the course of our deliberations. So
4 this is not by any means the only opportunity
5 for you to make a statement if we are unable
6 to accommodate your oral statement today.

7 And finally, I just want to note
8 that the Commission will not be responding to
9 these oral statements, and that we will have
10 a brief media availability after we adjourn
11 tomorrow.

12 And with that, let us start on the
13 afternoon's discussions beginning with how we
14 got here. And to explain that to us, we have
15 Mark Holt who is with the Congressional
16 Research Service as a Policy Analyst
17 specializing in nuclear energy which he has
18 done since 1988. He was head of Research
19 Service Energy and Mineral Section in the
20 Resources Science and Industry Division from
21 1997 to 2008. He has numerous articles
22 dealing with advanced nuclear power, fuel

1 cycle, nuclear energy policy and waste
2 disposal.

3 Before joining Congressional
4 Research Service, he covered energy issues for
5 four and a half years with the Environmental
6 and Energy Study Conference, a bipartisan,
7 bicameral Congressional caucus. He was a
8 reporter for Washington-based publications
9 from 1980 to 1983.

10 Mr. Holt graduated from the
11 University of Maryland/College Park in 1980
12 with a B.S. in journalism.

13 Mark, the floor is yours.

14 MR. HOLT: Thank you, General
15 Scowcroft, Members of the Commission. Thank
16 you very much for inviting me here today to
17 provide this brief overview called How We Got
18 Here that's essentially an overview of the
19 history of nuclear waste policy. And I think
20 you will find the history -- those of you who
21 are not already very familiar with it -- very
22 instructive and hopefully useful for your

1 deliberations.

2 I just briefly want to say a
3 couple of words about my office, the
4 Congressional Research Service. We're an
5 organization within the Library of Congress
6 that provides objective, timely and
7 confidential information and analysis
8 specifically for Congress.

9 And the point I want to emphasize
10 is the CRS does not advocate policy. We do
11 not take any positions on any policy regarding
12 any of the public issues. And of course, in
13 the area of nuclear waste policy which is
14 highly, highly contentious, this can be
15 sometimes a very challenging undertaking to
16 make a presentation that does not appear to
17 advocate any policy. There are fundamental
18 disagreements among the policy analysts and
19 interest groups throughout the nation about
20 even the basic facts regarding nuclear power
21 and nuclear waste, even interpretations of
22 history and even the very terminology that one

1 uses can sometimes be problematic.

2 So that said, I will do my best to
3 present an unbiased overview of the relevant
4 information throughout history that should be
5 useful for this Commission.

6 So the things we'll talk about, as
7 I was requested, we'll go back to the
8 beginning really of nuclear waste with
9 historical background, highlighting key waste
10 studies along the way that may be useful to
11 the Commission to look at, and of course move
12 into more of the modern era, the Nuclear Waste
13 Policy Act, the debate over the Act, how it
14 was implemented. And then I will discuss at
15 the end current inventories of nuclear waste.
16 I will have a few points about that.

17 The format of this session I am
18 told is to be as interactive and informal as
19 possible. So it's really to the extent that
20 any points that I bring up may raise comments,
21 questions, insights from the Commission, or
22 just engender some discussion within the

1 Commission, that is encouraged. So please
2 feel free to break in at any point.

3 Especially given the Members of
4 the Commission, we're talking about nuclear
5 waste history. We have so many Members of the
6 Commission who were major players and actors
7 in this history. I'm sure that they'll be
8 many insights that the Commissioners
9 themselves may want to raise as I go along.
10 And I certainly encourage that, that the time
11 is built into the session to allow for that.

12 My expertise is as a policy
13 analyst covering the nuclear waste/nuclear
14 energy issues for almost my entire career
15 starting in 1985. So I did have the
16 opportunity to closely observe the
17 implementation of the Nuclear Waste Policy
18 Act. Although I wasn't there for the actual
19 debate, I do rely on colleagues at CRS who
20 were there for the earlier decades, and of
21 course on the vast resources of the Library of
22 Congress which have been very useful in

1 providing all of the source documents that we
2 didn't necessarily have right at our
3 fingertips. And I can recommend certainly
4 many interesting books.

5 I did want to mention a very
6 recent book by J. Samuel Walker, the NRC --
7 Nuclear Regulatory Commission historian was
8 very useful for the early history. That's the
9 most recent. There are a lot of good books on
10 nuclear waste history that are interesting and
11 informative.

12 So let's start with the early
13 history.

14 Going back to the Manhattan
15 Project in World War II which of course
16 produced the first nuclear weapons. And I'm
17 going to talk mostly about high-level waste.
18 Of course all types of waste were produced in
19 these huge industrial operations. But the way
20 the high-level waste is produced in nuclear
21 weapons production is that uranium fuel is put
22 into a nuclear reactor. The uranium splits in

1 the fission process releasing neutrons that
2 turn some of the uranium into plutonium. The
3 split pieces of uranium and some of the
4 plutonium becomes intensely radioactive during
5 the process. And of course to make the
6 weapon, you then have to extract the
7 plutonium. That's done by dissolving the
8 spent fuel and acid and separating the
9 plutonium chemically. And that was done at
10 the Hanford site in Washington State starting
11 in World War II. And that process did produce
12 the Nagasaki bomb.

13 The high-level waste resulting
14 from that separation -- that's basically the
15 waste product -- is intensely radioactive.
16 That's called reprocessing when the spent fuel
17 is taken out and dissolved. And of course,
18 from the very first there was a need to do
19 something with the large amounts of that
20 waste. And that was put in underground steel
21 tanks that were created for that purpose
22 underground to shield workers and any other

1 humans from the intense radiation from the
2 waste. And there was additional waste, of
3 course, at other locations. Later, naval
4 reactor spent fuel was reprocessed at Idaho
5 and then eventually at Savannah River as well.

6 So the first planning for what to
7 do with this waste that was being stored in
8 tanks, it was recognized from the very
9 beginning that this was not a permanent
10 solution. The pictures here show what the
11 tanks look like. These are tanks under
12 construction. These are actually replacement
13 tanks much later in the '70s and '80s after
14 the original tanks began to leak. These are
15 double-shell tanks. But this shows what they
16 look like underground. They're huge and of
17 course covered with dirt.

18 But from the very early on,
19 national security was the top priority.
20 Certainly during World War II, there was a
21 crash program to produce the weapons for World
22 War II, and then the Cold War after that. So

1 in general, waste management was not the top
2 priority of the Atomic Energy Commission.
3 Even though they recognized that they had a
4 problem, the underground tanks were expected
5 to be sufficient until a long-term solution
6 could be found.

7 But after World War II and
8 throughout the '40s, the Atomic Energy
9 Commission did continue looking at the waste
10 problem and did finally issue a report in 1949
11 that was the result of some of the public
12 controversy that had arisen over the waste
13 produced by these very large industrial
14 operations producing radioactive materials for
15 the first time. And this 1949 report is very
16 interesting because it's worded very, very
17 carefully and cautiously. It was a report
18 meant to be disseminated to the public, which
19 it was, recognizing that there is a potential
20 problem and that the waste management
21 undertaken by the AEC could be better, but
22 that the practices that were being undertaken

1 were considered safe for the public and for
2 the environment. So that was the message from
3 this report.

4 One interesting quote was that
5 "better means of isolating, concentrating,
6 immobilizing and controlling wastes will
7 ultimately be required." So it's recognizing
8 that things that had been done so far were not
9 the permanent solution.

10 So that's defense waste. And of
11 course, there was no commercial industry yet
12 at that point.

13 So the Atomic Energy Act of 1954
14 created a legal framework for the creation of
15 a commercial nuclear industry in the United
16 States. Before that, all nuclear materials
17 were controlled by the Atomic Energy
18 Commission. So this envisioned that there
19 would be at some point some commercial waste
20 to deal with as well.

21 Commercial spent fuel, just like
22 the defense spent fuel, was expected to be

1 reprocessed to extract the plutonium, which
2 was believed would be needed to create the
3 ultimate commercialization of nuclear power
4 which was expected to be fast-breeder reactors
5 which required plutonium. There was not
6 expected to be enough uranium to fuel a large
7 fleet of such reactors. So therefore, that
8 would create the similar high-level liquid
9 waste as the defense waste. The volume of the
10 commercial high-level waste even at that time
11 was expected to be much greater than the
12 defense waste by 2000, which did turn out to
13 be an accurate prediction.

14 And these commercial reactors were
15 expected to be designed for reprocessing.
16 That meant that the spent fuel taken out of
17 the reactors once we could no longer
18 efficiently sustain a nuclear chain reaction
19 would be stored temporarily in water, actually
20 water pools that are literally designed as
21 part of the reactor building, until perhaps
22 for a few years before it would be taken away

1 to be reprocessed. It would not stay at the
2 reactor sites. That was the vision.

3 So that brings us to one of the
4 key studies I was mentioning -- the famous
5 1957 National Academy of Sciences Waste
6 Disposal Study, essentially trying to answer
7 the question what can be done with all of this
8 waste that is expected to be produced by not
9 only the defense activities but by the new
10 commercial industry that was just then
11 starting up. The very first commercial
12 reactor at Shippingport was just starting up.

13 So the key finding is the first
14 bullet point. "The Committee is convinced
15 that radioactive waste can be disposed of
16 safely in a variety of ways at a large number
17 of sites in the United States." That was a
18 very important finding. It set the scene for
19 really nuclear waste policy since was that
20 yes, this can be done. The scientists have
21 agreed that it is possible. Keeping in mind,
22 as I said, the caveat that about everything

1 that I say can be disagreed with by some.

2 They found that salt deposits
3 appeared to be the most promising method for
4 disposal, and there was a large chapter of the
5 report which is available -- I think it's
6 actually online -- describing the salt
7 deposits and how that might be done.

8 Interestingly, their reactor waste
9 was expected to be liquid at that time for
10 both transportation and disposal. But the
11 Academy did point out that solidification
12 would be advantageous. Certainly in the case
13 of transporting for long distances, they noted
14 that because this liquid waste could be hard
15 to transport that reprocessing facilities and
16 maybe even reactors could be affected as far
17 as what locations they might be at, that the
18 availability of underground formations may be
19 important for locating some of these types of
20 facilities.

21 This is from the salt chapter.

22 And you'll see the cover of the report which

1 we actually have. And that's what it looks
2 like. The salt chapter did show this map of
3 the salt deposits throughout the country,
4 which certainly set the scene for some later
5 activities.

6 So with that report in hand, AEC
7 set about looking for potential repository
8 sites. And the focus was on salt formations.
9 And actual experiments were conducted in salt
10 mines and with solids and liquids to see how
11 salt would react with these various types of
12 potential waste.

13 And AEC started to explore
14 solidification methods, thinking that that
15 might be a better way to deal with the waste.
16 And actually deep injection as envisioned by
17 the '57 report was considered at various tank
18 sites, the fact that maybe the waste could
19 just be injected in the ground into deep
20 formations right at the reprocessing sites.
21 And in fact, the first commercial reprocessing
22 plant did open up during this period in 1996

1 in West Valley, New York producing the first
2 commercial liquid high-level waste.

3 So after all these searches, the
4 AEC finally appeared to have found a suitable
5 site in Lyons, Kansas in 1970. AEC announced
6 that it would investigate an abandoned salt
7 mine in Lyons for a disposal demonstration
8 project, and that there plans today seem
9 somewhat optimistic that it would take six
10 months to investigate the site to see whether
11 it was suitable. And the plan was that low-
12 level plutonium waste -- that's the
13 transuranic waste that Senator Domenici
14 mentioned earlier -- could begin disposal at
15 the site in 1974. And high-level waste --
16 that's the intensely radioactive tank waste --
17 could begin by 1975.

18 However, the site ran into
19 problems immediately. There was very strong
20 opposition throughout the state. Congressman
21 Joe Skubitz of Kansas was leading the
22 opposition in Congress. And he had an

1 interesting comment that has been repeated in
2 many forms throughout history in the future
3 from this. "The federal government cannot
4 compel a sovereign state to do itself and its
5 citizen possible irreparable injury if its
6 officials refused to be stampeded." And in
7 fact, they did refuse.

8 And it very quickly became clear
9 that there were serious problems with the
10 Lyons site. It was very close to another salt
11 mine, for instance -- and especially
12 considering that they were still thinking of
13 liquid waste -- the many oil and gas wells,
14 many not mapped. Some of these gas wells had
15 struck pressurized brine which shot out to the
16 surface which was alarming. There was a lot
17 of undocumented solution mining. That's just
18 injecting water underground to bring out the
19 solution of salt and water. So they didn't
20 even know where these places were. And the
21 Kansas State Geologist had a comment. "The
22 Lyons site is a bit like a piece of Swiss

1 cheese." And that was what finally pretty
2 much removed the site from consideration. And
3 AEC formally issued a statement in 1974 that
4 that site was no longer under consideration.

5 And here's another salt site about
6 the same time in '74 that we've heard a little
7 bit about already. This is a picture of the
8 actual operating -- a diagram of the actual
9 operating repository today.

10 But in 1974, another salt site in
11 Carlsbad, New Mexico was selected for
12 exploratory work, actually volunteered by the
13 local population that was economic distress
14 because of the shutdown of potash mining in
15 the area. And so they invited AEC to come in
16 and look at their site.

17 And the initial plan was for high-
18 level waste and defense transuranic waste much
19 like the Lyons site. But after a great deal
20 of back and forth and much history which the
21 Commission may want to look into as a separate
22 topic because this is a very interesting story

1 of how the WIPP site came to be. So the high-
2 level waste was dropped is the bottom line.
3 And President Carter actually proposed
4 abandoning the site altogether. But Congress
5 in the end had authorized the site for defense
6 waste only in 1979. And then only 20 years
7 later, the first waste was shipped. So that
8 was a pretty rapid progress in the world of
9 nuclear waste.

10 There is still local support for
11 today. We still get occasional messages,
12 letters, meetings with Carlsbad people who
13 would like to expand the mission of WIPP. But
14 my understanding is that the State of New
15 Mexico and the Congressional delegation would
16 still strongly oppose an expansion of the WIPP
17 mission at this time. But that issue is out
18 there.

19 And again, feel free to interrupt
20 me at any time if you'd like to comment on any
21 of these things.

22 HON. MR. SHARP: Excuse me. You

1 say to expand it. Is the argument to expand
2 it to high-level waste? Is that what you're
3 saying?

4 MR. HOLT: Correct. And some of
5 the I guess the DOE contractors in the area,
6 I know they've written magazine articles and
7 things that do a technical analysis of why the
8 site could technically be a good site. So
9 there is significant interest at least in the
10 local people. And as you will see as we go
11 along, that is a common pattern that the local
12 people tend to support some of these waste
13 sites, but the states as a whole do not.
14 That's certainly what happened in the case of
15 WIPP.

16 So in 1974, the AEC in its last
17 year of existence issued a draft environmental
18 statement. It was not called an environmental
19 impact statement. It was just a draft
20 environmental statement on developing
21 permanent repositories and storage sites.

22 The reason for this was after the

1 abandonment of the Lyons site, there was some
2 criticism that AEC was backing away from a
3 permanent solution. So this report
4 specifically said that AEC denies complete
5 reliance on perpetual storage in manmade
6 surface structures, and in fact was
7 anticipating a geologic disposal pilot plan.
8 And it said the AEC would continue to evaluate
9 geologic formations at conventional depths.
10 That's a standard, mined geologic repository
11 as we think of today.

12 Liquid waste would be solidified.
13 They were no longer thinking of disposing of
14 liquid waste for transportation storage and
15 disposal. And they actually named some sites.
16 The Hanford site, the Idaho Reactor Test Site
17 where they're doing reprocessing of naval
18 reactor spent fuel, and the Nevada Test Site
19 were named as surface-storage candidates at
20 that time. We're not talking about
21 repositories for them.

22 The same statement looked at some

1 of the unconventional repository ideas that
2 had been brought up. And these ideas
3 continued to be studied repeatedly, some much
4 more intensively with international efforts
5 than others, some not much study. But they
6 usually are brought up for completeness, I
7 think.

8 So they looked at polar icesheets,
9 seabed disposal which had a major
10 international program, very deep boreholes and
11 walls which are still I think considered an
12 interesting option. Melting in lava was not
13 looked at much. Outer space did get a fair
14 amount of study. and in fact we still do see
15 proposals for various methods of that. But
16 all of them were found not viable at that
17 time.

18 So AEC and now it's newest
19 successor agency, the Energy Research and
20 Development Administration which took on both
21 the AEC mission and a larger variety of energy
22 technologies, continued the site search in the

1 1970s. The bedded salt sites like Lyons and
2 WIPP were looked at. Salina Basin in Lake
3 Erie in lower Michigan got a pretty negative
4 local response, so that was dropped. But the
5 others continued -- Paradox Basin in Utah,
6 Permian Base in Texas, the salt domes which
7 are salt that wells up from lower beds of salt
8 in Mississippi and Louisiana, the basalt at
9 Hanford, Welded Tuff at Yucca Mountain, and
10 the projection or expectation -- I wouldn't
11 even call it a projection -- that was
12 mentioned in a 1976 ERDA technical report
13 which is a very detailed report -- that they
14 were expecting a repository demonstration by
15 1985 at that time.

16 MR. PETERSON: Mark? A quick
17 note. I think you've missed the crystalline
18 salt. We did have an office of crystalline
19 rock repository development as well. You'll
20 mention that?

21 MR. HOLT: Right. That will show
22 up later. This is not my personal

1 recollection but my research indicated that
2 that project started in 1979. Does that sound
3 about right? There was a specific --

4 MR. PETERSON: And then ended in
5 '82.

6 MR. HOLT: Yes. But you're right.
7 This was not I guess specifically -- well,
8 this is a little bit later -- a little bit
9 later, but important.

10 HON. MR. DOMENICI: Sir?

11 MR. HOLT: Yes.

12 HON. MR. DOMENICI: Can you just
13 in simple but specific terms quantify those
14 salt deposits? Is that a lot of room of very
15 stable salt that America owns there?

16 MR. HOLT: Right. I think I have
17 yet another slide on salt. But yes, they're
18 huge areas. They cover multi-state areas.
19 And they're very thick.

20 The salt domes are a little more
21 focused because the bedded salt is like the
22 beds of ancient seas.

1 And I think I'm going to defer to
2 geologists at some point here. But the salt
3 domes then are extruded from these beds up
4 into weak spots higher up. So they're
5 actually closer to the surface. But they're
6 also huge masses of salt also.

7 Do we have any comment from the
8 geology front on the salt?

9 DR. MacFARLANE: No. That's
10 right.

11 MR. HOLT: Okay. So yes. But
12 they are important and big.

13 Any other comments or discussion
14 before we move to the next chapter?

15 Okay. So these are the areas that
16 were being investigated at that time. And now
17 we do come to an exciting chapter change --
18 the major policy change in nuclear waste
19 history.

20 The AEC had started what was
21 called the generic environmental statement for
22 mixed oxide fuel. This is for plutonium fuel.

1 And this started in 1973. This is the use of
2 plutonium fuel as I mentioned earlier which
3 was expected to be used in commercial
4 reactors. Not in fast reactors, but this case
5 it was for using mixed oxide so-called fuel in
6 conventional light-water reactors which are
7 the regular reactors that we have today. And
8 it's done in some places throughout the world.
9 It's essentially replacing the fissile
10 component of uranium -- the U-235 with
11 plutonium -- and making fuel that can be used
12 by conventional reactors. So that process
13 began in 1973. Basically that was an
14 environmental impact statement-type process.

15 It immediately raised tremendous
16 controversy, mainly over nonproliferation, the
17 concern that commercial separation of
18 plutonium -- which of course the original
19 purpose of plutonium was for weapons -- that
20 this could lead to widespread availability of
21 plutonium throughout the world and cause a
22 potential expansion of nuclear weapons

1 technology throughout the world. And the 1974
2 India nuclear test heightened this concern
3 considerably because they in fact did use
4 commercial technology that had been provided
5 by the West, at least commercial reactors. I
6 guess they did their own reprocessing to make
7 plutonium for a nuclear explosion, which they
8 described as a peaceful explosion at the time.
9 But it was very alarming throughout the world.

10 This issue continued to be very
11 contentious until the point -- well, you can
12 see it was right in the middle of the
13 Presidential election. October '76, President
14 Ford announced a deferral of commercial
15 reprocessing at that time. And in fact, it
16 was a campaign issue. Future President Carter
17 had campaigned very strongly on that issue.
18 And once elected, he extended the deferral
19 indefinitely in 1977, making the following --

20 DR. CARNESALE: Excuse me. Can I
21 just for clarification? I'm trying with my
22 own recollection.

1 Was it a deferral of all
2 commercial reprocessing, or was it a deferral
3 of federal funds for reprocessing of
4 commercial fuel?

5 MR. HOLT: Well, it was a little
6 vague. If you read the actual statements,
7 it's not exactly clear what was being done.
8 But it was certainly interpreted as stopping
9 everything.

10 DR. CARNESALE: I think it was
11 actually the latter. But there was no
12 contest. No one in the commercial sphere was
13 interested in spending their own money on it.

14 MR. HOLT: Right. And in fact,
15 the actual GESMO process was really outside of
16 the President's control because that was now
17 being done by the Nuclear Regulatory
18 Commission. But the Nuclear Regulatory
19 Commission after studying the issue and taking
20 note of the Administration's position did
21 terminate the GESMO process on its own. I
22 don't know what kinds of pressures may have

1 been brought to bear. But that's what
2 happened.

3 And so yes, the funding was very
4 important. In fact, interesting -- I can make
5 a sideline I'm not going to mention -- but of
6 course President Reagan did reverse that
7 policy. But there was still no reprocessing
8 because President Reagan also did not think
9 that federal funds should be provided for
10 that. And so it didn't happen.

11 Actually, while President Carter
12 was still in office, I think Congress did
13 continue funding for the Barnwell reprocessing
14 plant. And so it stayed alive until finally
15 the Reagan Administration when it wouldn't
16 provide money, the private sector finally
17 decided there was no future in the near term
18 for that.

19 DR. CARNESALE: The Reagan
20 Administration reversed the deferral but
21 continued not to provide funds.

22 MR. HOLT: Right. Exactly.

1 Although the Reagan Administration did restart
2 the breeder reactor program, which was later
3 killed by Congress.

4 So, as you can sort of get an idea
5 from this conversation, there is a huge amount
6 of history that we're not even going to get
7 much of a chance to touch on. But certainly,
8 any points that I get to that are of interest,
9 let's stop and discuss them. That's certainly
10 no problem.

11 So President Carter's policy was
12 to develop alternative designs for breeder
13 reactors that essentially stopped the breeder
14 program. Focus on nonweapons material fuel
15 cycles could be relevant for today, and
16 initiated a study of spent-fuel storage needs.
17 And as I mentioned, the NRC did terminate
18 GESMO given the policy. So the implications
19 of this change were pretty strong.

20 As I had mentioned, the commercial
21 power plants were designed to hold spent fuel
22 for only a short time before it would be taken

1 away for reprocessing. And some of it had
2 been taken away to the West Valley site in New
3 York that I mentioned, and also to a facility
4 in Morris, Illinois built by GE that did take
5 some spent fuel but never operated as a
6 reprocessing plant.

7 But for the most part, this new
8 policy meant that spent fuel is going to stay
9 at the reactor sites and not be taken to
10 reprocessing plants. So President Carter
11 proposed away-from-reactor storage to
12 alleviate that problem.

13 Another issue arose that was
14 suddenly a change in what was going to go into
15 these repositories. There was no longer going
16 to be high-level waste which is defined as
17 reprocessing waste. But instead it would be
18 actual spent fuel which is unprocessed spent
19 fuel. And the reason that's significant
20 mainly is because the spent fuel have much
21 higher amounts of long-lived material, mainly
22 plutonium, which was supposed to be extracted

1 in reprocessing, at least the vast majority of
2 it, so that the high-level waste would not
3 have so much long-lived material, that the
4 fission products that I mentioned earlier.
5 The splitting products of the uranium and
6 plutonium which create most of the
7 radioactivity are actually much shorter-lived
8 in general. And it's really a different
9 technical problem of how to dispose of them.

10 So that caused some issues. And
11 as a result, President Carter created the
12 Interagency Review Group to look at spent-fuel
13 policy as it was affected by the change in
14 reprocessing policy. So that's another group
15 that may be of interest to the Commission --
16 how that operated and what it resulted in. It
17 was, of course, not an independent group. It
18 was an interagency group. It was made up of
19 heads of various agencies. So it's not
20 exactly analogous. In fact, the report was
21 greatly rewritten. And those are all
22 available. You can see what was done.

1 Actually in the end, the final report did not
2 have a lot of what was discussed earlier as
3 the actionable items really. If you look at
4 the whole thing, it's hard to find actual
5 recommendations. But there were a few.

6 And Carter policy which was
7 announced in 1980 did have a few points. One,
8 which a repository site should be chosen from
9 several qualified alternatives, and also, the
10 State Planning Council was established that
11 made further recommendations largely about how
12 this selection of the repositories should be
13 dealt with by the states -- what kind of
14 control states should have over the repository
15 process and that type of thing.

16 So that brings us to the Nuclear
17 Waste Policy Act.

18 Yes?

19 HON. MR. DOMENICI: Wasn't that
20 passed by statute? You mentioned that as
21 Carter policy. Wasn't that statute law where
22 you mentioned what was happening to the

1 country? When you mentioned Carter policy,
2 wasn't that statutory?

3 MR. HOLT: The Carter policy? Was
4 it statutory?

5 HON. MR. DOMENICI: Wasn't that
6 passed into law?

7 MR. HOLT: It was an input into
8 the Nuclear Waste Policy Act debate. And in
9 fact, at that point from the historical record
10 evidently not a major input because at that
11 point other things were happening. And of
12 course, the Administration changed in the
13 middle of the debate also.

14 But obviously, some of these ideas
15 did end up being in the Act. But Carter's
16 policy was not enacted.

17 So, the Nuclear Waste Policy Act
18 grew out of this. As I mentioned the change
19 in reprocessing policy, it was seen at the
20 time that there was potential storage crisis
21 at reactor sites and that Congress would have
22 to act to deal with that. And of course, that

1 was the away-from-reactor storage. I guess
2 you could say that away-from-reactor storage
3 did end up in the monitored retrievable
4 storage concept later.

5 And then of course, the AEC/ERDA
6 and finally now by this time the Department of
7 Energy's difficulties in finding sites was an
8 indication to many that some kind of
9 Congressional mandate was needed specifically
10 to move forward, that this could not be done
11 administratively under the authority of the
12 Atomic Energy Act which is very general
13 authority.

14 And of course, during the debate
15 there were a lot of concerns by the potential
16 host states that had to be addressed which had
17 of course been addressed by the State Planning
18 Council partly. So this debate went on for at
19 least two Congresses, and I think it may have
20 overlapped three -- approximately four years
21 of debate. Late 1982, and then it was
22 actually signed in '83. The Nuclear Waste

1 Policy Act did become law setting in motion
2 the next set of events.

3 So the Nuclear Waste Policy Act
4 set up a search for repository sites. It was
5 really the heart of the Act. And the basic
6 idea was that a technically-driven process or
7 a scientifically authoritative process -- with
8 the emphasis on process -- that would be
9 considered so fair that the state that was
10 ultimately selected would agree that the
11 process had been fair and would accept the
12 site.

13 So a compromise during the Act was
14 that there would be potentially two
15 repositories in different regions of the
16 country so that not one region would take all
17 of the waste. A first repository site was to
18 be chosen from these sites that had been
19 investigated up to that point, which we
20 mentioned. The second repository site was to
21 use a different geologic media. But it was
22 not authorized to actually open that second

1 repository without further Congressional
2 approval. But the site search was required.
3 And that became the crystalline rock
4 repository -- granite.

5 And the first repository was
6 limited to 70,000 metric tons until the second
7 repository was licensed. So that's where the
8 70,000-ton limit comes from.

9 Of course, there were many other
10 provisions. The Office of Civilian
11 Radioactive Waste Management was created
12 within DOE because of the perceived need for
13 an office that would focus specifically on
14 this problem and have no other mission, known
15 as OCRWM. The Department of Energy was
16 required to -- well, authorized -- to sign
17 contracts with utilities to dispose of waste
18 with a deadline of 1998, and return for fees
19 paid by the nuclear utilities -- a fee on
20 nuclear power. And so that was in the form of
21 an enforceable contract, which becomes
22 important later.

1 The monitored retrievable storage
2 site, which is sort of the away-from-reactor
3 storage idea -- a site search was authorized,
4 but not the actual construction in the
5 original Act. And then in case of emergency,
6 a federal interim storage site was authorized
7 basically at some existing site. It wasn't
8 envisioned to be a huge site. But if a
9 nuclear utility really was in danger of
10 shutting down its plants because of a lack of
11 storage space, it could pay extra -- basically
12 pay the costs of this program and get storage
13 at an existing federal site.

14 There were grants for state
15 oversight of the process so that the states
16 that were being examined would have the
17 expertise to know what was happening to them.
18 And the so-called state veto -- the authority
19 for a selected state to disallow a repository
20 in its territory with the option of expedited
21 Congressional procedures to override that
22 veto. It's not really a term. It's an

1 approval resolution to basically disallow the
2 veto.

3 The waste facilities were to be
4 licensed by NRC using Environmental Protection
5 Agency environmental protection standards.

6 And I think we're getting to the
7 part where a lot of people may remember.

8 HON. MR. SHARP: Mark?

9 MR. HOLT: Yes?

10 HON. MR. SHARP: I don't know how
11 useful it is but there are two things in this
12 regard. One was the division of two sites for
13 the country was clearly a major concern
14 especially among westerners that most of the
15 waste was being generated by where most of the
16 reactors were in the east, and they wanted to
17 make sure the pain was equally shared. And so
18 it was a political compromise clearly. But it
19 was based on that concern that everything
20 would be shipped out of the east to the west
21 where there was much more of it.

22 The other thing is that I'm not

1 sure the way you said it whether it's
2 understood. This was called a site
3 characterization process in which it was still
4 recognized none of these places were selected.
5 The goal was to test out scientifically
6 multiple sites in multiple media recognizing
7 that they weren't going to all pass muster, or
8 at least there would be some preference to it.

9 One of the issues we'll get to
10 next is how much characterization it takes,
11 how extensive that is, and how costly that
12 becomes that will trigger parts of what
13 happened in the next decision.

14 MR. HOLT: That is exactly right.
15 That's exactly the types of insights that I'm
16 encouraging here. I mean, this is a rare
17 opportunity to get insights from the actual
18 participants in a talk like this. So I do
19 encourage that.

20 And you're absolutely right. And
21 my understanding is that's correct that the
22 two repositories was viewed as a fundamental

1 compromise in the creation of the Act, which
2 will become important in a few slides from
3 now.

4 HON. MR. SHARP: But there is one
5 enduring proposition in that. And that was
6 almost universal agreement that deep geologic
7 storage was the way to go. At least everybody
8 involved in the decisions on a superficial
9 level thought that was the case.

10 MR. HOLT: Yes. And the Act
11 specifically referred to repositories except
12 in the case of -- I think there was sub-seabed
13 storage even in the original Act authorized,
14 and later continued to be authorized as a
15 possible alternative.

16 But in general, the procedures
17 that were set up were for the location of
18 conventional mined repositories.

19 HON. MR. SHARP: Carry on. But
20 that's a critical concept politically because
21 you had an unusual coalition of some of the
22 environmental critics of nuclear waste along

1 with the industry who at least could agree
2 upon this as the fundamental thing to do. Of
3 course, then everything falls apart later.

4 MR. HOLT: Yes. And so that led
5 to how to implement this law. And so here's
6 how it happened.

7 DOE was required under the Act to
8 select five sites -- five candidate sites --
9 from the ones that were under consideration
10 that were considered potential repositories.
11 Those are the nine sites that I think I
12 previously mentioned, although it's going to
13 come up in another slide here. This does
14 exclude WIPP specifically because that was
15 already named as a defense site.

16 The three sites that were chosen
17 -- the three sites from the five -- were then
18 to be chosen for full characterization.
19 That's intense, site-based studies -- actual
20 drilling, geologic samples and everything
21 else. So all three would be studied and
22 ultimately one would be selected. This is the

1 first repository site -- the one that's being
2 selected from the pre-existing candidate
3 sites.

4 DR. MacFARLANE: And Mark, those
5 three, I think I recall they had to be in
6 different rock types, right?

7 MR. HOLT: I'm not sure. I know
8 that the second repository had to be. That
9 may be true. They were, in fact. Yes, that
10 would be one of the considerations in the
11 ranking.

12 Now in the ranking in the
13 Multiattribute Utility Analysis -- which is
14 just a way of saying looking at all the
15 different criteria and trying to quantify them
16 and give a numerical ranking to them, which
17 was done -- I don't think that was a factor in
18 that. But DOE was very clear in saying the
19 Multiattribute Utility Analysis was not the
20 decision. It was a decision-aiding
21 methodology. It was in fact in the title of
22 it because they didn't want to imply that the

1 results of this analysis were going to be the
2 results, which in fact they weren't.

3 But the ranking was Yucca Mountain
4 was first. And then you'll see the other
5 rankings -- the Richton Dome site, the Deaf
6 Smith County, Davis Canyon and Hanford. That
7 was the order that they came out after all the
8 different criteria were looked at.

9 HON. MR. SHARP: Mark, you left
10 out a very important political development.
11 I doubt that it comes later because I think
12 it's in 1992 right before the election in
13 which the eastern sites are ruled out.

14 MR. HOLT: Yes. Yes.

15 HON. MR. SHARP: Is that coming
16 with your next slide? Okay.

17 MR. HOLT: That's coming. Yes.

18 HON. MR. SHARP: It has major
19 ramifications for what happens.

20 MR. HOLT: Anything political that
21 I leave out, please feel free to comment on.
22 We are reluctant to comment on political

1 motives or anything else like that. But
2 that's certainly open to discussion.

3 HON. MR. SHARP: If I can follow
4 up then, are you not going to address that?
5 Is that what you're saying?

6 MR. HOLT: Yes. When the comment
7 comes up, then we can open.

8 HON. MR. SHARP: I don't want to
9 cast blame or anything.

10 MR. HOLT: I'm reluctant to say
11 too much about why the second repository was
12 canceled. But we will get to that in a second
13 here.

14 HON. MR. SHARP: Okay.

15 MR. HOLT: But we've got another
16 crisis on this slide. But DOE after going
17 through this analysis selected Yucca Mountain,
18 Deaf Smith and Hanford, which of course upset
19 Nevada, the Northwest and Texas, immediately
20 initiating law suits and all other kinds of
21 controversy.

22 And here are the other sites.

1 This is from the Multiattribute Utility
2 Analysis -- a little map -- showing the nine
3 sites and then the five that I mentioned that
4 were selected. And of course the three ended
5 up all being in the west. And actually, two
6 of the nine sites were sort of the east or in
7 the south at least -- three of the sites in
8 the south.

9 HON. MR. SHARP: Mark, but I think
10 you're still missing -- there's something, and
11 I don't recall the events. But there were
12 some northeastern -- at least one or two sites
13 that stimulated intense opposition. And for
14 electoral reasons -- oh, that --

15 MR. HOLT: Yes. That is coming up
16 in two slides. That's very important. Yes.
17 I remember it like yesterday.

18 So the second repository -- this
19 is the other repository that was to be a
20 different type of rock and/or sites that were
21 rejected from the first repository. And
22 that's the crystalline rock program that did

1 -- anyway, the research that I found was begun
2 in 1979 -- a survey of the country to find
3 potential crystalline rock that's basically
4 granite -- formations --

5 DR. MacFARLANE: It doesn't have
6 to be granite.

7 MR. HOLT: It doesn't have to be
8 granite. No. I certainly did not know what
9 crystalline rock was before we started this.

10 DR. MacFARLANE: It could be
11 something called gneiss.

12 MR. HOLT: Okay. Yes. It's the
13 G-N-E-I-S-S gneiss. Right.

14 So a national screening was begun
15 of this type of rock. And DOE after the
16 Nuclear Waste Policy Act was enacted did come
17 up with methodology for narrowing this
18 national survey down -- a very objective-type
19 process. That was the intention. And in
20 1985, issued the methodology and then used the
21 methodology to issue in 1986 the Draft Area
22 Recommendation Report. And this is what sort

1 of caused a lot of consternation, which was
2 interesting because in fact these sites had
3 been publicized by DOE for some time. So it
4 shouldn't have been a huge surprise. But
5 nobody really seemed to be paying attention
6 until this report came out.

7 So there are 12 candidate sites in
8 seven states, mostly in the east and upper
9 midwest, and eight additional candidate areas
10 as shown in this slide. This is from the
11 original report. And this is what people saw.
12 And you can sort of get an indication of what
13 type of reaction this was met with.

14 MR. PETERSON: I think as a point
15 of information, it's useful to note that at
16 this point both Sweden and Finland have
17 successfully sited repositories in crystalline
18 rock. Interestingly, they're right on the
19 coast which allows the repositories to be in
20 the saline water from the ocean where nobody
21 would put a well.

22 So it is interesting. There has

1 been success in this area, but certainly not
2 in the United States.

3 MR. HOLT: Right. I think it was
4 a negative public reaction for the most part.
5 I don't think the scientists were up in arms.
6 But the public was concerned.

7 So as I said, immediately DOE had
8 to go out to the actual locations and have
9 public meetings. Evidently that was not a
10 popular mission among the DOE officials to go
11 to these meetings. And very large crowds,
12 they would stay all night, all kinds of
13 opposition.

14 The host states fought the project
15 and Congressional delegations fought the
16 project. And so this led to what Congressman
17 Sharp has mentioned -- the suspension of the
18 second repository in May 1986 by Energy
19 Secretary Herrington.

20 The reasons given were that there
21 were lower spent fuel projections at that
22 time. In fact, the mid-'80s was sort of a --

1 there were no new plant orders in sight. The
2 expansion of the nuclear power industry was
3 not expected. And in fact, at that time it
4 was considered more likely that plants would
5 shut down prematurely than there would be new
6 plants. Although in actuality, the
7 projections from the plants that existed and
8 the plants that were still coming on line
9 would have exceeded the 70,000 tons. But
10 that's a legal limit, not necessarily a
11 physical limit.

12 And there certainly were rising
13 cost projections for the costs of
14 characterizing all these sites as we will see
15 in coming forward, that characterization
16 process far from costing a few hundred million
17 dollars is certainly far higher than that. So
18 those were the justifications.

19 But at this point, things got very
20 controversial. And certainly anybody with
21 political insight, feel free here.

22 The methodology of ranking the

1 sites for the first repository was certainly
2 attacked since Hanford for example had come in
3 last in the five sites and was chosen as one
4 of the three. The northwest people didn't
5 like that. Of course, the cancellation of the
6 second repository really upset the western
7 states. As I said, they considered that to be
8 a fundamental part of the Act.

9 Meanwhile, Tennessee had been
10 chosen by DOE for the MRS. And another
11 similar pattern was Oak Ridge which is one of
12 DOE's major nuclear sites. But the State of
13 Tennessee as a whole strongly opposed that.

14 And the bottom line was that there
15 were so many states and regions at this point
16 that were concerned about becoming hosts that
17 the program essentially threatened to paralyze
18 it. And really the appropriations process was
19 really almost paralyzed only five years into
20 the Act.

21 Maybe the only good news was that
22 the emergency federal interim storage was not

1 needed after all because dry storage
2 technology was demonstrated successfully in
3 the interim. And so, no reactors had to shut
4 down for lack of spent fuel storage.

5 Here is Congressman Udall's take
6 on what had happened. Of course, he was I
7 believe the actual sponsor of the legislation
8 that ultimately became the Nuclear Waste
9 Policy Act, and he was the Chairman of the
10 Interior Committee.

11 This was his statement on the
12 floor. "We created a principled process for
13 finding the safest, most sensible place to
14 bury these dangerous wastes. Today, just five
15 years later, this great program is in ruins."
16 And he went on to say, "Potential host states
17 no longer trust the technical integrity of the
18 Department of Energy's siting decisions." So
19 that was Congressman Udall's sort of
20 indictment of how the program had been
21 implemented.

22 So because the program basically

1 had no support anymore, that led Congress to
2 act again with the 1987 amendments. And this
3 is definitely not a political consideration I
4 will comment on too much.

5 But the bottom line was that
6 Congress after a great deal of deliberation on
7 how to solve this deadlock did end up actually
8 naming Yucca Mountain as the only repository
9 candidate site. And the way this was supposed
10 to work was that the site characterization
11 would be sequential rather than three at once.
12 So the idea was it'll save a lot of money
13 because it was becoming clear at that time
14 that the characterization was much more
15 expensive than it was thought that it would
16 be. So we'll do one at a time. If the first
17 one isn't accepted, then under the Act
18 Congress would have to name another site. And
19 that is still the law. There is no
20 alternative site.

21 But in fact, I think that the
22 members were fully expecting that Yucca

1 Mountain would have been chosen, and Yucca
2 Mountain was acceptable because it had come
3 out on top in these technical reviews at that
4 time. But of course, there was a large
5 political dynamic in the fact that naming a
6 single site eliminated all the other potential
7 sites from consideration, which presumably
8 would eliminate a lot of the opposition that
9 had stalled the program.

10 And I don't know if there's any
11 comment on that at this time. How was that
12 decision made?

13 HON. MR. SHARP: Exactly.

14 MR. HOLT: Okay. But obviously
15 the State of Nevada did not like it.

16 As an aside, I do recall watching
17 day after day in the Senate Senator Reid who
18 was a junior Senator on the floor opposing
19 this. And of course, he has now risen to much
20 greater power today.

21 The amendments also eliminated the
22 second repository.

1 DR. MacFARLANE: It didn't really
2 eliminate the second repository.

3 MR. HOLT: It caused a study which
4 was done.

5 DR. MacFARLANE: Yes. And the
6 Department of Energy was supposed to report on
7 the need for a second repository by 2010.

8 MR. HOLT: Yes. And they did.
9 Yes, that's a good study. Everybody should
10 take a look at that. It'll be an interesting
11 study anyway. And that's online too, I
12 believe.

13 It's surprising how much of this
14 is online now. Certainly anything related to
15 the Nuclear Waste Policy Act -- a lot of these
16 original documents -- are online.

17 Rescinded the MRS site selection
18 which made Tennessee happy. And did actually
19 authorize an MRS which had not been authorized
20 before. But the catch was that the MRS was
21 tied to the actual operation of the
22 repository.

1 The concern about the MRS had been
2 that once a storage site began operating, that
3 would eliminate all pressure for the
4 repository, and then the MRS site would be
5 stuck with the waste forever. So the law as
6 it now stands is that no waste can be shipped
7 to the MRS site without the -- I think it has
8 to be a construction permit for the
9 repository. And if the repository ever stops
10 operating, all the waste has to be shipped
11 away. And there's also pretty severe limits
12 on the amount that can be put at the MRS.

13 HON. MR. SHARP: Mark, I just
14 think it's a lesson worth focusing on for a
15 moment. I mean, today one of the issues I'm
16 sure we'll consider is whether we need an MRS
17 or not. And it's clearly forbidden or it
18 can't happen under the law right now.

19 But the thinking at the time was
20 precisely as you say, that how do you keep the
21 pressure up politically and legally to move
22 this nation ahead on the deep geologic thing?

1 And one of the concepts here was that. It had
2 the added political benefit of getting
3 Tennessee off the hook.

4 I believe there's also a provision
5 of law -- and correct me if I'm wrong -- that
6 it could not be located at the Nevada site,
7 which was in theory sort of a gift to Nevada.

8 MR. HOLT: And that becomes
9 important later.

10 HON. MR. SHARP: But the issue is
11 that -- and those of us that have been in the
12 legislative process know how difficult it is
13 to design policy things that force action.
14 You can set deadlines. You can do all kinds
15 of things. But as we can see throughout this,
16 well, almost none of them worked.

17 MR. HOLT: Right. That's
18 definitely been the pattern.

19 And then other provisions in '87
20 that were thought that might help solve the
21 problem, there were benefits packages -- pre-
22 defined benefits packages offered to the host

1 states if they would agree to accept waste
2 repositories.

3 And then a completely different
4 approach proposed by Congressman Udall was the
5 nuclear waste negotiator. An office was
6 established to actually go around and try to
7 find voluntary host sites and just reach any
8 kind of agreement that the negotiator could.
9 So really, just about anything was potentially
10 on the table with the nuclear waste
11 negotiator, and with the catch that whatever
12 was negotiated, the agreements would not be
13 binding until approved by Congress. So there
14 was obviously some ultimate control over what
15 might be offered.

16 And then finally, the Nuclear
17 Waste Technical Review Board was established
18 in response to the criticisms that the DOE
19 technical program no longer had credibility.
20 The idea was to create an independent board
21 that would not be beholding to the Department
22 of Energy and would have technical experts in

1 its own right who could call DOE or basically
2 publicize -- raise an alarm -- if the
3 Department of Energy's technical program was
4 not accurate.

5 I believe Congressman Sharp was
6 the originator of that idea.

7 HON. MR. SHARP: I offered it in
8 the House bill.

9 MR. HOLT: And that Board is still
10 in existence today.

11 HON. MR. DOMENICI: Mr. Chairman,
12 might I ask a clarification question?

13 Sir, could you tell us today what
14 is the policy of the United States regarding
15 reprocessing? And when was an Executive Order
16 issued and when was it done away with and by
17 whom?

18 MR. HOLT: It's a convoluted
19 history.

20 It was not really an Executive
21 Order by President Carter. It was a statement
22 and a National Security Directive which was

1 rescinded by President Reagan. So President
2 Reagan said reprocessing is okay. And that
3 continued under the first President Bush.

4 And then President Clinton issued
5 a statement that we would not reprocess. But
6 there was no Executive Order per se. And then
7 the second President Bush actually made
8 reprocessing an essential part of his nuclear
9 energy policy starting with Vice President
10 Cheney's report in 2001 -- the National Energy
11 Policy Group -- which emphasized reprocessing.

12 And as far as President Obama's
13 position, the only way to I think glean that
14 is from the budget requests which state that
15 a science-based program of research should
16 continue on reprocessing technology. But he
17 did explicitly reverse in his budgets the
18 previous Administration's path toward actually
19 building commercial reprocessing facilities or
20 demonstration facilities. So he backed off
21 from that. But the budget is still about the
22 same as it was. And so it's for fundamental

1 research.

2 So that seems to be where things
3 stand right now.

4 HON. MR. DOMENICI: Thank you very
5 much.

6 CHAIR HAMILTON: Mark, you've got
7 about 25 minutes to go here. So you can judge
8 your time accordingly.

9 MR. HOLT: We'll zoom through the
10 recent history.

11 So how were the 1987 amendments
12 implemented? Immediately there were delays --
13 all kinds of problems on the DOE side with
14 quality control. Nevada was not interested in
15 the benefits and began actually denying
16 permits to DOE to do some of the
17 characterization. And in fact, the Yucca
18 Mountain was found to have trouble meeting
19 EPA's general repository standards, which
20 could have been a serious problem.

21 As a result, the Energy Policy Act
22 of 1992 included provisions specifically

1 requiring EPA to issue new standards just for
2 Yucca Mountain based on a National Academy of
3 Sciences' study. And that has been done.

4 Language was offered originally to
5 get at the State permit problem. But I think
6 the State sort of backed off a little bit, and
7 that was dropped from the final bill.

8 This is an example of Nevada's
9 ongoing opposition. This was in a monthly
10 newsletter from the State Project Office that
11 would generally criticize the program. It's
12 just an example of how Nevada was not
13 interested in the benefits.

14 The nuclear waste negotiator got
15 started, and as I mentioned was authorized to
16 offer pretty much anything, and in fact became
17 an important part of the program because it
18 was becoming clear by the early 1990s that DOE
19 was not going to be able to meet the 1998
20 deadline that's in the contracts.

21 And I know that people within DOE
22 at the time were thinking that that might be

1 the best chance for finding -- they weren't
2 planning to open a repository by 1998 -- but
3 they thought they might be able to find a
4 volunteer site for a storage facility that
5 could begin receiving waste. And that's all
6 that was required by the deadline to receive
7 the waste by 1998.

8 And so that went forward. DOE
9 offered grants. And some localities were
10 interested in meeting with the negotiator.
11 But in every case, state governments blocked
12 it.

13 In the case of Indian tribes, they
14 were outside of state control. They could not
15 be blocked. And some of these projects did
16 seem to be moving forward. But the state
17 delegations then stopped the funding for those
18 projects at that time. So that program pretty
19 much ended.

20 However, what grew out of that was
21 one site that one Indian tribe in Utah did
22 move forward with on its own outside of this

1 process because under law, anybody can apply
2 for a waste storage site to the NRC. And so
3 they did. This is the PFS -- Private Fuel
4 Storage Venture -- which did get an NRC
5 license but was ultimately blocked when the
6 Interior Department denied some permits for
7 it. So that has not opened.

8 MS. EISENHOWER: I just would like
9 to go back to this for a second.

10 You said there's sort of a trend
11 that localities tend to be interested and
12 their state governments tend to resist.

13 MR. HOLT: That's been the
14 pattern.

15 MS. EISENHOWER: Could you say
16 something about the dynamics of that?

17 MR. HOLT: A lot of people have
18 looked at that and commented on it and why is
19 that the case, and I guess generally thought
20 that the localities have the most benefits
21 economically from these projects even though
22 they also bear the most risk presumably. But

1 the state as a whole often apparently does not
2 consider the benefits to outweigh the risk.
3 And so the pattern has been in repeated cases
4 the states as a whole oppose the sites.

5 HON. MR. SHARP: I think the added
6 issue always comes up in the debate over
7 transportation. To get the stuff to the local
8 area, it has to go through other communities
9 and things like that. There are multiple
10 interests that people raise, but that's
11 certainly one of them.

12 HON. MR. DOMENICI: If I might
13 say, all of these were raised in the innocence
14 of Waste Isolation Pilot Project. The federal
15 government funded highway expansions, highway
16 extensions, highway widenings because these
17 trucks had to go through cities that had two-
18 lane highways. But all of that was worked out
19 once the community decided that it was a good
20 project. Then the Department and the cities
21 worked most of these out very well.

22 I believe the next time the United

1 States is involved in this that the Waste
2 Isolation Pilot Project will be a living
3 example of how it should be done. And I
4 surmise there will be more than one if the
5 economy of the United States remains as flat
6 as I presume it will for the next ten years --
7 excuse me -- 15, I think. But that's just my
8 pessimism.

9 But anyway, I think cities are
10 going to want something like an underground
11 storage facility that is safe, sound and
12 brings in many good jobs. I think there's a
13 different attitude out there. Right now
14 there's similar projects that ten years ago
15 would have been opposed that localities are
16 asking for from the Department of Energy.

17 HON. MR. SHARP: If I could, I
18 think it's worth recognizing the importance of
19 this Senator's leadership in making all of
20 this happen. Because all the kind of
21 negotiation, all the kind of controversy, all
22 the problems that arose that had to be

1 resolved, he was certainly in the forefront of
2 trying to find a solution to. And it requires
3 that kind of persistence and that kind of
4 leadership to be successful. Since we don't
5 always on television see as many examples of
6 that today, this I think is worth recognizing.

7 MR. LASH: I don't know if this is
8 a question to you or the former legislators.

9 You mentioned that the
10 proliferation issue came to the forefront with
11 the Indian nuclear test. And I'm interested
12 to what extent these debates in Congress over
13 the Nuclear Waste Policy Act were influenced
14 by the episodes at West Valley and at Hanford
15 and so forth and public perceptions of whether
16 the federal government was capable of managing
17 waste.

18 HON. MR. SHARP: I don't think
19 there's any question those were part of the
20 issues of whether -- I mean, there always was
21 an issue it was always being too politically
22 driven and not enough scientifically driven,

1 even though you can see there was a great
2 effort to try to base it on science.

3 Nonetheless, there were political decisions
4 that were made along the way.

5 And this skepticism is one of the
6 reasons we tried the Nuclear Waste Technical
7 Board was to give an outlet for citizens,
8 states and anybody else to raise scientific
9 questions because the people on that Board are
10 -- well, they're selected. I think they're
11 appointed by the Secretary of Energy. But
12 they are actually nominated by the National
13 Academy of Sciences. But that wasn't
14 sufficient to resolve that issue.

15 When you use the word
16 proliferation though, usually we're talking
17 about obviously in the international arena.
18 This is actually seen as a solution in part to
19 proliferation to get decisions on this.

20 MR. LASH: No, what I was saying
21 is that we mentioned that the proliferation
22 perceptions were affected by an outside event.

1 And I just was surprised that Hanford and West
2 Valley hadn't come up.

3 HON. MR. SHARP: Well, all these
4 things usually in debates get raised on every
5 issue from running a rail car through to
6 everything else. There's a lot of mythology,
7 and there's a lot of error in that discussion
8 which I hope partly we will in our report try
9 to describe as accurately with historical data
10 as we can, are the consequences of some of
11 these questions or some of them I think should
12 not be in controversy. There are legitimate
13 uncertainties and legitimate questions. But
14 sorting that out could be a useful thing that
15 we do in this process.

16 MR. PETERSON: I'd agree with
17 that. I'd also point out that our
18 proliferation concerns have evolved
19 substantially over this period of time. The
20 threats that we face today are much different
21 because of evolution and technology and
22 dispersion of technology. And we have not had

1 adequate flexibility to address these emerging
2 threats under the existing policy. And that's
3 a real serious defect.

4 MR. HOLT: Yes, that's definitely
5 I agree an undercurrent of the debate.

6 This is just a New York Times
7 article showing the reaction that the nuclear
8 waste negotiator got. "Hired to negotiate,
9 but shunned by all" was sort of the reaction.

10 So since the nuclear waste
11 negotiator did not work, this led to some
12 proposals in the 1990s really after the '94
13 elections. In three successive Congresses,
14 there were efforts to change the law so that
15 nuclear waste could be shipped to Yucca
16 Mountain in advance of the repository. That
17 reached its high-water mark actually after the
18 deadline had passed.

19 And the Congress did pass a bill
20 to speed up Yucca Mountain licensing and allow
21 early shipments to Yucca Mountain. But that
22 was vetoed by President Clinton. And that

1 veto was sustained really by only one or two
2 votes in the Senate. So it came very close.

3 And in recent years, there have
4 been a lot of proposals especially in
5 appropriations bills to create federal storage
6 sites to try to solve the problem. And those
7 have not been enacted.

8 The Secretary of Energy -- now
9 we're getting very recent history -- did issue
10 the site suitability determination in 2002
11 finally after many years. And this triggered
12 all these immediate actions that President
13 Bush -- and these are all under the Act --
14 President Bush recommended the site to
15 Congress. Nevada Governor Guinn issued the
16 state veto or state's approval. And then
17 Congress overwhelmingly passed approval
18 legislation to override the veto allowing the
19 application to go forward. And it was, in
20 fact, after much more delay submitted in June
21 2008.

22 And now of course we bring it up

1 to the present -- March 2010 -- or the Obama
2 Administration has requested to withdraw the
3 application.

4 HON. MR. SHARP: Pardon me for
5 cutting in, but there is one other issue. And
6 you naturally focused on-site selection. And
7 that's the critical, really hard thing.

8 But there is the question of
9 financing. And that was a part of these
10 legislative proposals was how to deal with
11 what is in the law. The Nuclear Waste Fund
12 collects a fee on every nuclear kilowatt and
13 goes into a fund. But it's not off budget.
14 And so there's a whole set of issues that I'm
15 sure we're going to get an opportunity to
16 examine. It's what I think is one of the
17 things Commissioner Bailey was referring to
18 about the state utility regulatory commissions
19 have become intense on this issue, not to
20 mention a whole host of other concerns, but
21 what happens to that money that is building
22 up.

1 MR. HOLT: Yes. That was
2 considered to be one of the problems that DOE
3 was having with their budget constraints.
4 They were able to spend much less than was
5 being collected because it is subject to
6 appropriations.

7 So as a brief summary of these
8 siting approaches that were looked at that
9 might be of interest -- the administrative
10 process, pre-Nuclear Waste Policy Act, DOE
11 selection of the MRS site administratively,
12 the site ranking process for the first
13 repository, the screening process for the
14 second repository, benefits agreements for
15 host states, negotiations for voluntary sites,
16 and then the actual Congressional designation
17 of a site -- a candidate site -- and this had
18 multiple votes and subsequent votes in support
19 starting with the '87 designation, the 1992
20 Energy Policy Act, the Congressional votes
21 that were vetoed for Yucca Mountain storage,
22 and then of course the 2002 approval

1 legislation. But despite all of that, as we
2 know, none of these approaches has yet proved
3 successful.

4 For future policy, what does that
5 mean? All these approaches, it doesn't
6 necessarily mean it's hopeless. But perhaps
7 promising approaches can be developed or
8 combinations of approaches that were not
9 previously tried or perhaps previous
10 approaches that can be determined why the
11 previous approaches didn't work and be
12 modified so that they might work.

13 And of course, as has been
14 mentioned several times today, identifying
15 changed circumstances. This has been a long
16 period of time. Technology, knowledge,
17 political environment, other things may have
18 changed that may lead to better results. So
19 hopefully, there is a potential here.

20 I've been asked to present where
21 are we now as far as the amount of spent fuel.
22 This is data I believe from an Energy

1 Information Administration survey that is
2 compiled by a contractor to the Nuclear Energy
3 Institute, the ACI Nuclear Energy Solutions.
4 We actually did this one year.

5 EIA does not compile this data
6 very often. The last time they did it was
7 2002. And we actually took their raw data
8 which was in a really complicated format and
9 made a real nice chart out of it. But that's
10 from 2002. And they said a new one is coming
11 out this year. But these are charts from the
12 industry from that data.

13 As you can see, the total right
14 now in metric tons -- 62,683. That's getting
15 pretty close to the Yucca Mountain limit. The
16 number of dry casks that are out there are
17 growing all the time. This is showing the
18 breakdown between the pool storage which is
19 pretty much fixed, and then the independent
20 dry storage which is growing all the time.

21 DR. CARNESALE: To what does
22 independent refer here?

1 MR. HOLT: It's not connected to
2 the reactor building, as opposed to --

3 DR. CARNESALE: Physically
4 connected.

5 MR. HOLT: Right. As a pool
6 that's actually part of the reactor buildings,
7 literally attached to the reactor inside the
8 building. And this is outside the reactor.
9 So it's mostly dry storage. The Morris,
10 Illinois site I mentioned is really the main
11 wet one. It means we can't say it's all dry
12 storage.

13 Here it's state-by-state. You can
14 see that Illinois has the most. And it shows
15 the breakdown of wet and independent storage,
16 as I said mostly dry. Pennsylvania has quite
17 a bit. And you can just see there are lot of
18 states that have this waste being stored.

19 And it was also mentioned that the
20 shutdown sites are a potential problem. And
21 here are the shutdown sites where they're
22 located -- how much is in wet storage.

1 Illinois wet storage is mostly Zion actually
2 still in wet storage according to the
3 statistics and the Morris site mostly in dry
4 storage. And the issue regarding this, about
5 2,000 to 2,400 tons per year is discharged.
6 It varies depending on the reactor cycles.
7 And of course, the need for dry storage is
8 increasing as the reactor pools are filled up.

9 And the problem with the shutdown
10 sites is that there's nothing else there
11 typically except for the pools. And
12 therefore, all the infrastructure and
13 everything else is ascribed solely for the
14 pools. In other words, if not for the pools,
15 they could take out the security and all the
16 other measures that have to be taken to deal
17 with radioactive materials. So it's a very
18 high marginal cost. That total is right now
19 3,000 metric tons in storage. It's 11 sites
20 in nine states.

21 MR. PETERSON: Could you comment
22 on the DOE's current legal obligations in

1 terms of prioritizing which materials it would
2 take first? It doesn't match with what's in
3 shutdown --

4 MR. HOLT: Yes. Right now, it's
5 done by age. And there is a study -- another
6 study -- that DOE did on these sites and its
7 ability to take the material. And they talk
8 a little bit about that.

9 I don't think there's a statutory
10 requirement for DOE to do it by age. But I
11 think that's in the contracts. So that might
12 be part of the problem. And of course, the
13 other problem is they don't have any place to
14 put it. So there's two issues there.

15 Long-term issues -- because of the
16 waste building up under storage, these
17 contracts are enforceable and they are being
18 enforced in the Court of Federal Claims. And
19 DOE is paying judgments for failing to meet
20 the 1988 deadline.

21 There are sort of two scenarios
22 for the breach of a contract. Right now,

1 partial breach means that DOE still considers
2 the contracts valid and still plans to take
3 the waste under the contracts, but they just
4 haven't done it on time. And so as a result,
5 DOE is paying the marginal costs that the
6 utilities are incurring for the ones who have
7 reached settlements under these court actions
8 or have actually gotten judgments.

9 And the estimate is that if no
10 repository or no storage site opens up, that's
11 ultimately going to be about \$500 million per
12 year. That's pretty much the industry's
13 storage costs each year indefinitely. And
14 that comes automatically out of the judgment
15 fund. That's not an appropriation. That's
16 just paid automatically.

17 A full breach has been hinted at
18 potentially which would mean basically that
19 DOE no longer even plans to implement the
20 contract at all -- ever. And the potential
21 has been raised in that case that the federal
22 government would have to return all the

1 utilities' payments plus interest which is
2 about \$30 billion right now. I don't think
3 we've fully legally analyzed that scenario at
4 this point.

5 The indefinite on-site storage
6 also potentially -- as discussed earlier -- is
7 an impediment to new reactors. NRC is
8 required under its policy to have what they
9 call waste confidence that waste from a new
10 reactor could be adequately dealt with in a
11 timely manner before a license will be issued.
12 And that was due to some court cases in the
13 '70s and '80s.

14 The Nuclear Waste Policy Act does
15 require waste contracts to be in effect for a
16 new reactor to be licensed. And that was the
17 subject of some recent controversy that DOE
18 has in fact signed some of these contracts for
19 the new reactors even though repository plans
20 have been canceled. And of course, concerns
21 about public opinion.

22 DOE also may face environmental

1 cleanup penalties for their defense waste.
2 And then of course, there's long-term storage
3 risks talked about quite a bit today. Long
4 term generally in this case meaning probably
5 more than 100 years seems to be sort of our
6 general consensus, although not really a
7 technical analysis yet. That is being studied
8 that 100 years should be considered fairly
9 secure but indefinite periods. But longer
10 than that have been at least discussed in some
11 of the DOE environmental documents as well.
12 It might be a very long-time scenario.

13 CHAIR HAMILTON: Mark, do I
14 understand that the federal government has the
15 responsibility for all storage fees and
16 environmental cleanup as well?

17 MR. HOLT: The commercial waste is
18 paid for under the contracts in which the fee
19 on nuclear power production is collected. The
20 defense waste is really under environmental
21 enforcement actions.

22 The waste being stored at defense

1 sites, Congress has made those sites subject
2 to environmental regulation. That is state
3 environmental regulation. So the states and
4 these existing tank wastes and a lot of other
5 wastes are out of compliance usually with RCRA
6 -- Resource Conservation and Recovery Act.
7 And so there are enforcement actions there
8 that could be taken if the states feel that
9 the waste is not being dealt with adequately.

10 HON. MR. SHARP: Mr. Chairman, I
11 thought you were asking a little different
12 question. I mean, that's part of it.

13 But there are two different funds
14 that every reactor has to contribute to --
15 every private reactor. One is the Nuclear
16 Waste Fund which goes specifically and is
17 being utilized now on Yucca Mountain.

18 The other is their own
19 decommissioning fund. And they have to get a
20 certain level. So that's all coming off of
21 the costs of nuclear reactors today. And
22 there's always an argument over whether those

1 funds are adequate. And the NRC supervises
2 that. But those are the private funds.

3 So it's supposed to be the
4 environmental cleanup of the plant itself when
5 it's closed down. It's supposed to be taken
6 care of by the decommissioning fund.

7 The waste though, I think part of
8 the key issue is another one of the things
9 that we did -- which doesn't look so hot now
10 -- was to say in 1998, this is another trigger
11 on the federal government to push it to get
12 it. It had to take legal title. And now that
13 liability is coming home to roost.

14 Again, it was designed to try to
15 push this whole process to get complete --

16 CHAIR HAMILTON: What is the
17 federal government paying now per year for
18 storage costs and environmental cleanup?
19 What's in the budget for that?

20 MR. HOLT: Well, this final slide
21 sort of illustrates how that works.

22 What is the federal government

1 paying for the commercial reactor storage
2 costs? Is that the question? How is the
3 government paying for --

4 CHAIR HAMILTON: I'm just trying
5 to figure out how much the federal government
6 is paying on storage and environmental
7 cleanup. How much is this costing the
8 taxpayer?

9 MR. HOLT: Well, for the defense
10 waste, you're right. That is of course DOE's
11 responsibility. And that's in the
12 environmental management budget. And that is
13 I think approximately \$6 billion a year. But
14 it's not just for the high-level waste. It's
15 for all of the cleanup and all the waste
16 management at DOE. So it is very expensive.

17 CHAIR HAMILTON: What's the total
18 cost?

19 MR. HOLT: Something like \$6
20 billion. I haven't looked at the request.

21 CHAIR HAMILTON: How much? Six
22 billion?

1 MR. HOLT: That would be the
2 entire Department of Energy environmental
3 management budget. And that's for cleaning up
4 all of the old waste and managing the defense
5 tank wastes that I talked about. A lot of it
6 is for environmental restoration of previous
7 contamination. So it's obviously very, very
8 expensive -- decommissioning of old Cold War
9 facilities and that type of thing.

10 This is the cost for the
11 commercial reactors that DOE under the
12 contracts has to pay the commercial reactors'
13 extra storage costs for failing to take away
14 the waste from the reactor sites. And that is
15 not per year as much. That's the \$500 million
16 a year I was talking about.

17 This is a scenario that DOE came
18 up with if waste had begun being taken by
19 2017. That blue line shows that they would
20 continue paying liabilities until 2046. The
21 2020 line, which was the most recent Yucca
22 Mountain schedule, shows that they would have

1 to pay liabilities until 2056. If there is no
2 repository then, those lines go away and at
3 some point, they just pay indefinitely under
4 the current contracts. So that is how that
5 works.

6 DR. MacFARLANE: Can you clarify
7 the Nuclear Waste Fund issues and where that
8 money is?

9 MR. HOLT: The Nuclear Waste Fund
10 is like any other dedicated fund -- like the
11 Social Security fund. It's held in usually I
12 think Treasury securities. It's a fund in the
13 Treasury dedicated for this purpose, but it
14 can't be spent without Congressional
15 appropriation. So it's not a revolving fund
16 where the money goes out and DOE can spend it
17 as it sees fit. But theoretically, it's
18 really in effect like an authorization because
19 the money really isn't available unless it's
20 appropriated.

21 MR. ROWE: How big is it now? \$23
22 billion?

1 MR. HOLT: It's something like
2 that.

3 DR. MacFARLANE: But does it
4 exist?

5 MR. HOLT: Well, it exists as in
6 any other fund.

7 (LAUGHTER.)

8 HON. MR. DOMENICI: It exists just
9 like your Social Security trust fund.

10 MR. HOLT: Yes. If you go to the
11 Treasury Department, they could tell you what
12 securities are held in this fund. So that's
13 how it works. But all the other funds are
14 similar.

15 The only thing that pays for the
16 program -- because Yucca Mountain is also
17 supposed to take defense waste -- has been a
18 defense appropriation, which actually in many
19 recent years has been greater than the Nuclear
20 Waste Fund appropriation that also pays. So
21 some general revenues are also used to pay for
22 the program, or have been up until now.

1 MR. ROWE: The Committee might
2 wish to delve into these funding issues a
3 little more deeply because like everything
4 else, there's a layer under the last layer.

5 In this case, you have all this
6 pending litigation generally to the effect
7 that the U.S. government owes people money for
8 breach of contract, but it's not all settled
9 or final.

10 In the case of my company, we were
11 able about three years ago to enter into a
12 settlement. But it just might be interesting
13 to have somebody who can trace all of this
14 through to answer Commissioner MacFarlane's
15 question and some of these others in a little
16 more detail than we can do here today.

17 CHAIR HAMILTON: I think that's a
18 good suggestion. We'll see that we do it.

19 Mark, we're right at the end. I
20 don't want to shut any Commissioner off, but
21 you've given us a marvelous history here.
22 We're deeply appreciative of it as well as the

1 charts you've furnished to us.

2 Are there any further questions?

3 (No audible response.)

4 CHAIR HAMILTON: Thank you very
5 much.

6 MR. HOLT: Yes. Thank you.

7 CHAIR SCOWCROFT: We'll break now
8 and reconvene at 3:15.

9 (Whereupon, at 3:00 p.m., off the
10 record until 3:14 p.m.)

11 MR. FRAZIER: We're going to give
12 the Commissioners just a few minutes to get
13 back in and get settled. Then we're going to
14 start right away.

15 General Scowcroft?

16 CHAIR SCOWCROFT: Thank you., Tim.

17 Having left at the history of this
18 issue, we're now going to take a very brief
19 look at projections for the future. And to do
20 that, we have Matt Crozat from the Department
21 of Energy. Matt is a Program Analyst in the
22 Office of Nuclear Energy.

1 Since joining the Department of
2 Energy in 2006, Matthew has performed systems
3 analyses to examine current and proposed
4 policies for managing nuclear fuel cycle with
5 regards to economics, nonproliferation and
6 waste management. He currently serves as Co-
7 Chair of the Working Party on Nuclear
8 Economics of the Organization for Economic
9 Cooperation and Development's Nuclear Energy
10 Agency.

11 Welcome.

12 MR. CROZAT: Thank you. It's a
13 pleasure.

14 Okay. My name is Matthew Crozat
15 in the Office of Nuclear Energy. And it's my
16 honor to be here to help talk about the
17 scenarios for nuclear energy growth.

18 If Mark Holt's presentation gave
19 us a sense of how we got to where we are
20 today, I want to pick up a theme from
21 Secretary Chu's comments earlier which is
22 looking towards the future and where we might

1 go. And to that end, with these scenarios I
2 want to focus not just on how future nuclear
3 deployment might play out but also what the
4 implications are for used fuel management.

5 Now I don't often tend to offer
6 forecasts or predictions of how nuclear plants
7 are going to be deployed in the U.S. going
8 forward, but I do want to provide a range of
9 possible scenarios to capture some of the
10 uncertainties that frankly make forecasts so
11 perilous for the forecasters. And in this
12 presentation, I'm going to focus on the 2050
13 time horizon.

14 In my ideal sense, I would have
15 started something much sooner at 2030. But
16 one of the things that comes up pretty quickly
17 is that it takes quite a bit of time for even
18 large-scale changes in the nuclear fleet to
19 translate into appreciable changes in the
20 inventories of nuclear fuel.

21 Of course, one way to deal with
22 these time lags would be to carry projections

1 well into the future like perhaps to the end
2 of the century. But this is where I get quite
3 a bit nervous about trying to preclude or
4 estimate what new technologies might come
5 forward, both in terms of fuel cycle
6 technologies and reactor types. So what I'm
7 going to try to do is focus on this 2050 time
8 range, and at the same time try to give a
9 sense of how post-2050 deployments might play
10 out and what implications those might have.

11 Now, I can certainly create
12 detailed, complicated projections, and I've
13 been known to do so on occasion. But I think
14 the purpose is here of trying to quantify what
15 the range of possibilities look like. I think
16 we can do this in a pretty straightforward
17 manner with three relatively simple scenarios.

18 The first one I want to pick up on
19 is a low-growth scenario. And actually when
20 I say low growth, I actually mean no growth in
21 nuclear electricity in this case. All the
22 growth I'm talking about here is just going to

1 use fuel inventories.

2 In this case, I want to think
3 about a situation in which the current reactor
4 fleet until the current licenses expire, as in
5 like where the expiration dates were as of say
6 Sunday morning when I last checked. I don't
7 want to assume any further license renewals,
8 and I don't want to assume any new bills from
9 this point forward -- the minimum case of what
10 I think we can expect going forward.

11 Now in a medium-build case, I want
12 to think about something a little bit broader.
13 First is to have a scenario in which the
14 current fleet, each of the reactors receive
15 one 20-year license renewal so that they all
16 operate for exactly 60 years. Additionally,
17 new reactors are built to maintain a 20-year,
18 20 percent marketshare going forward to 2050.

19 And finally a high-growth case in
20 which the nuclear share expands to 50 percent
21 of the marketshare by the middle of the
22 century.

1 Now before looking at these cases,
2 I want to highlight a couple of key
3 assumptions that are going to drive the
4 analysis. First of all, I'm going to assume
5 that the overall electricity demand in the
6 U.S. grows about one percent per year through
7 the middle of the century. And that's right
8 in line with what the EIA's latest projection
9 is. Their latest annual energy outlook
10 reference case shows one percent growth
11 through 2035. I simply extrapolated it a
12 little bit further.

13 Another key assumption I've made
14 so far is that all of the reactors I'm looking
15 at going forward look an awful lot like the
16 ones being considered for the current
17 marketplace -- large, light-water reactors.
18 Now, in doing this, it's mostly for
19 simplification. I don't want to look past the
20 possibilities for smaller reactors. It's a
21 case that we're quite interested in. It's
22 possible to look at these reactors as smaller

1 reactors if you'd like without changing any of
2 the conclusions.

3 And the final assumption is that
4 the fuel cycles that we're looking at going
5 forward look again kind of like today's with
6 relatively high burn-offs by historical
7 standards, but no assumptions beyond what's
8 basically the current state of the art.

9 Okay. With the scene setting
10 complete, let me move forward to actually
11 walking through some of these scenarios.

12 So first of all, here's the low-
13 growth scenario. In this chart, what I'm
14 plotting, it's billions of kilowatt hours of
15 nuclear energy production. It started out at
16 about 800 billion kilowatt hours which is
17 about where we are today, and slowly declines
18 over the course of the next 40 years. That's
19 about equivalent to about 90 gigawatt years
20 for that unit.

21 At the same time for these same
22 reactor fleets, I've estimated the used-fuel

1 generation. And what we see is even in this
2 case where nuclear declines over the course of
3 the half century, the used-fuel inventories
4 grow from about 63,000 metric tons to almost
5 100,000.

6 Now let me be clear about this
7 scenario. This is a case in which we are
8 phasing out of nuclear electricity. The first
9 retirement here happens in 2013, and by 2049,
10 the last current fleet is presumed to go off
11 line. This is the low-end case we're trying
12 to talk about here.

13 Let's look at the medium case. In
14 the medium case, I made two changes to the
15 baseline. The first is I had the remainder of
16 the reactor fleet that had not received
17 license renewals go on for an extra 20 years.
18 That purple band in the upper left-hand side
19 is the electricity production that comes from
20 those assumed units. That's about a 40
21 percent increase over that base blue that we
22 started with in the lower case. We also see

1 in the bottom right how much additional used
2 fuel is generated -- about 16,000 metric tons
3 from that.

4 Now I'm also building new reactors
5 in this story. It's actually about three of
6 these large reactors per year from about 2025
7 through 2050. By the end of the 2050 range,
8 about all the nuclear electricity is coming
9 from these new advanced light-water reactors.

10 What also can be seen here too in
11 the bottom right-hand chart is the used fuel.
12 In total, about 150,000 metric tons have been
13 produced by 2050. And the vast majority of
14 that is coming still from the current fleet.
15 In spite of this big expansion of nuclear
16 power -- it's a mild expansion of nuclear
17 power -- the used fuel from the current fleet
18 is actually what's dominating the system so
19 far.

20 And I'll take this one more step
21 further.

22 So in the hydro scenario, this is

1 actually the same place as before. I've just
2 said to smush down the scale here -- the same,
3 especially with the current fleet and license
4 extensions. But now I've got a much more
5 significant build of nuclear power. This is
6 about three trillion kilowatt hours, so about
7 a three-and-a-half fold increase over where we
8 are today to the nuclear output in 2050. That
9 looks something like 260 of these large
10 reactors. It would require building about
11 nine of them per year from about 2020 on out.

12 Again, I imagine the scales are
13 hard to see. But in the bottom right, we're
14 looking at over 200,000 metric tons of used
15 fuel produced by the end of 2050, with about
16 half of that coming from this new large fleet
17 of advanced light-water reactors.

18 So now we take these scenarios and
19 tie them together for a second just to help
20 you see what they look like on the same scale.

21 I think the first thing that comes
22 together from my mind at looking at this is

1 the disparity in the way the scenarios are
2 depicted between looking at the energy
3 production and the used-fuel generation rates.
4 And of course this is because electricity
5 production here is a rate. It's an annual
6 amount of electricity produced whereas in the
7 bottom right, I'm looking at cumulative
8 effects. What that tells is it takes a long
9 time to see how decisions made about reactor
10 builds in the middle of the time frame here
11 actually translate into large-scale effects on
12 the used-fuel inventories.

13 That implies that by looking just
14 at the 2050 time horizon for used fuel, I'm
15 only getting a partial picture of what's
16 happening here. So let me try to fill that a
17 little bit.

18 CHAIR HAMILTON: Brad, which of
19 these three scenarios is most likely?

20 (LAUGHTER.)

21 MR. CROZAT: It's difficult to
22 say.

1 (LAUGHTER.)

2 MR. CROZAT: I think a lot of it
3 depends not just on the uncertainties we're
4 seeing today on the cost of the reactors, but
5 also a lot to do with what kind of policies
6 we're going to see.

7 I will tell you that the EIA tries
8 to capture the cost calculations. And what
9 they've seen is if there's no carbon policy
10 through climate policy in effect, there's not
11 a reason to expect an awful lot of nuclear
12 deployment over the next 30, 25 years.

13 CHAIR HAMILTON: If you've got a
14 group of nuclear experts in the room, would
15 they split all over the place on these
16 scenarios, or would they agree on one?

17 MR. CROZAT: I suppose we could do
18 a show of hands.

19 (LAUGHTER.)

20 MR. CROZAT: I would think you'd
21 probably see a pretty broad range. And I
22 would guess you would probably find more in

1 the middle as a plausible story. But again,
2 that's a guess. And we could certainly try to
3 expand the range of expertise to ask this kind
4 of question.

5 And part of the reason I'm trying
6 to show --

7 CHAIR HAMILTON: Does the
8 Department of Energy take a position with
9 regard to these three scenarios?

10 MR. CROZAT: I think we're trying
11 to prepare for all of them. Large because --
12 I'll speak for myself -- I would very much
13 love to see a broad expansion of nuclear
14 power. I think that is a key element of how
15 we'll see these climate concerns mitigated.

16 But from our perspective, we need
17 to be able to consider all of these
18 possibilities because we can't control how
19 we're going to move forward. These are going
20 to be decisions made by people like John Rowe
21 and commercial industry, and how the Congress
22 tries to encourage those decisions along the

1 way.

2 DR. CARNESALE: Just so we're not
3 to answer your questions and you've got a
4 bunch of nuclear experts in the room and ask
5 them the question, the first thing they'd ask
6 you is will there be a price on carbon. That
7 would be the first thing, and what would be
8 the new incentives for nuclear energy over
9 other sources. And if you told them there's
10 going to be no price on carbon and no penalty
11 for burning very cheap coal or other sources,
12 they'd say well, don't talk to me. Talk to
13 somebody else. I can't do it for you.

14 MR. ROWE: I strongly agree with
15 that.

16 And I would just point out another
17 thing that I think most folks in my industry
18 would bet on something nearer the central line
19 rather than the red line. And yet if we could
20 attain something near the red line given that
21 the power sector is responsible for about 40
22 percent of the nation's carbon emissions, that

1 red line would cut that contribution in half.

2 MR. PETERSON: I think another
3 important point is while it's a reasonable
4 assumption for the purpose, assuming that
5 there won't be evolution of the technology is
6 unlikely to be correct. In fact, if you go
7 back 25 years, the rate at which reactors
8 produce spent fuel has dropped enormously as
9 the fuel designs have improved. And there's
10 absolutely no reason to expect, particularly
11 with proper incentives, that we couldn't
12 achieve substantial further reductions in the
13 rate of generation of spent fuel per unit of
14 useful energy that you derive.

15 So particularly on the high end
16 where you're looking at building a substantial
17 number of new reactors, the technology will
18 change substantively during that period of
19 time.

20 CHAIR HAMILTON: When you folks
21 talk about incentives, what are you talking
22 about? Government subsidies?

1 MR. PETERSON: Well, actually I'd
2 say for example, currently the Nuclear Waste
3 Fund fee is paid based on the amount of
4 electricity you generate, not the amount of
5 waste you generate. And it's like if you
6 don't charge for carbon, you're not going to
7 see reductions occur. If you don't charge for
8 the amount of waste that you make, you're not
9 going to have the same set of incentives to
10 reduce the amount that you make.

11 These reductions that have
12 occurred occurred for other reasons just
13 through improved fuel design, besides the fact
14 that there's a benefit from reducing waste.
15 And it's a matter of what you charge -- what
16 you pay for.

17 CHAIR HAMILTON: How is the charge
18 set? In the market?

19 DR. MacFARLANE: It's one mil per
20 kilowatt hour.

21 CHAIR HAMILTON: What?

22 DR. MacFARLANE: It's one mil per

1 kilowatt hour that ratepayers pay.

2 CHAIR HAMILTON: That's the
3 market?

4 DR. MacFARLANE: That's a fee. If
5 you receive your electricity from a nuclear
6 power plant, or even part of it, you will pay
7 one mil per kilowatt hour in your bill.

8 CHAIR HAMILTON: Who sets it?

9 DR. MacFARLANE: You set it. It's
10 in the law. It's in the Nuclear Waste Policy
11 Act.

12 CHAIR HAMILTON: It's government
13 set?

14 DR. MacFARLANE: Yes. Now one
15 point of clarification, all this talk about
16 amount of waste and amount of waste being
17 decreased, that is not necessarily the
18 relevant unit of measure when you're talking
19 about a repository. Heat and composition, in
20 particular, long-lived isotopes, those are the
21 significant units of measure. So let's not
22 get wrapped up with volume here.

1 MR. PETERSON: I agree. The way
2 that you measure the amount of waste is
3 actually a complex question. It's not as
4 complex as figuring out how much carbon you've
5 emitted when you get into the details. But
6 it's not a trivial thing. And it's not just
7 the mass of material.

8 But by all measures, there have
9 still been I think substantive reductions in
10 the amount of waste -- the rate at which waste
11 is generated in reactors.

12 MR. ROWE: Chairman Hamilton, to
13 your question, there are several ways to get
14 at the nuclear issue. The one that I
15 personally think has the most intellectual
16 integrity is the cap-and-trade or the carbon
17 tax which prices carbon and greenhouse effects
18 into the marketplace. But there is
19 substantial thought on the Hill these days
20 that such a policy may not come to pass, and
21 instead we may try to deal with greenhouse-
22 type problems by as one member put it to me

1 subsidizing our favorite technologies. And
2 then we promise to oink as loudly as the
3 others racing for the trough.

4 MR. CROZAT: Let me just come back
5 to this. I have to say that I think just
6 about every one of these points is already
7 made in the last side.

8 The point I wanted to make here is
9 that by looking at just 2050 for used-fuel
10 generation rates, I'm missing part of the
11 picture.

12 If I'm rebuilding nuclear power
13 plants throughout the next 40 years, I expect
14 those to run for the better part of the rest
15 of the century. And therefore, beyond 2050,
16 which is where these used fuel inventory
17 levels are, I would expect to see from those
18 very plants no more production just by running
19 them out through their natural lives, which
20 I'd assume to be 60 years here.

21 So let me make some final
22 observations. I know I've already gone over.

1 What I'm trying to point to here
2 to your observation as well is that there is
3 a range of possibilities, and it is very
4 difficult to sit here in 2010 and understand
5 which world we're going to end up in. I think
6 some of us have preferences, but I think
7 trying to actually project where we're going
8 to be is a very difficult task.

9 Even the low-growth scenario,
10 we're talking something on the order of
11 100,000 metric tons which I think if nothing
12 else, just moving beyond the 60- to 70,000-ton
13 is a reminder of where we're going. And with
14 any sizeable expansion of nuclear power, we're
15 looking at 250,000 metric tons in my moderate
16 case to 500,000-plus in the high-growth case.
17 And much of that inventory is going to be
18 generated after the middle of the century.

19 So decisions made in the next two
20 decades are going to be ones that are going to
21 persist for a while. And a useful management
22 system that's going to capture this is going

1 to need to be persistent as well in how it
2 deals with these changes.

3 CHAIR HAMILTON: Any further
4 questions for Matt here?

5 (No audible response.)

6 CHAIR HAMILTON: Matt, thank you
7 very, very much. We appreciate your
8 contribution. It's helpful to the Commission.

9 We'll call Frank Marcinowski
10 forward. Is he here?

11 MR. MARCINOWSKI: Yes, sir.

12 CHAIR HAMILTON: Okay. Frank has
13 more than 20 years experience with the federal
14 government. He joined DOE in 2004. Serves as
15 Deputy Assistant Secretary for Regulatory and
16 Technical Support for the Department's
17 Environmental Management Program. Serves as
18 the Program's Acting Chief Technical Officer.

19 The focus of his work is to
20 develop policy and support implementation of
21 waste and materials disposition activities and
22 provide leadership on the entire suite of

1 regulatory issues. He was Director prior to
2 his current position of the U.S. EPA's
3 Radiation Protection Division. And he has a
4 Bachelor's Degree in radiologic technology
5 from Thomas Jefferson University, and a
6 Master's of Science Degree in radiologic
7 health from the University of Michigan.

8 And Frank, we're delighted to have
9 you. You're going to cover two topics here --
10 magnitude of defense high-level waste and
11 other spent nuclear fuel.

12 Thank you for joining us. You may
13 proceed.

14 MR. MARCINOWSKI: Thank you. And
15 good afternoon.

16 And yes, I'm going to cover two
17 topics. And I'm going to talk about -- well,
18 actually the majority of the waste that the
19 Department manages with regard to spent fuel
20 and the high-level waste. And this is going
21 to cover about 95-plus percent of what the
22 Department is responsible for. This is

1 excluding the Navy waste that you'll be
2 hearing about later today. And there's a
3 small quantity of spent fuel that's being
4 managed out of other programs, primarily the
5 science program at Oak Ridge that amounts to
6 a very small quantity of fuel.

7 Now, there are some differences
8 that I'll point out as we go along between the
9 spent fuel that we're managing in that we have
10 quite a number of different types of the fuel
11 that we're managing. Some of it is actually
12 commercial fuel that the Department has
13 decided to take on for a variety of reasons.
14 And there's a percentage of it that's also
15 damaged fuel. We'll get into it. We've got
16 the Three Mile Island fuel that we're managing
17 right now. We've got other commercial fuels,
18 and fuels that are damaged are going to be
19 difficult to justify for other purposes other
20 than what the current plans are.

21 So the outline of my presentation
22 is broken into two categories. I'm going to

1 first talk about the spent fuel and all the
2 varieties of spent fuel that we're managing;
3 talking about the inventory, what's important
4 too is the state commitments. I know it was
5 touched on briefly a little earlier as well,
6 but we have various state commitments that are
7 directly relevant to the work that we do with
8 this type of material. What the current
9 status is of our sites in the summary, and do
10 the same thing on the high-level waste side as
11 well.

12 And then I'm going to talk about
13 another small category of waste that was
14 potentially intended to be disposed of at the
15 Yucca Mountain site but currently does not
16 have a disposal path, just so that you're
17 aware that it's another issue that we are
18 dealing with as well.

19 Right here, this map gives you a
20 pictorial of where the spent fuel is at our
21 various sites across the country, the
22 quantities at each of those particular

1 locations.

2 And as I mentioned, there's a
3 variety of different types of fuel that we're
4 currently managing. We've categorized it into
5 34 different categories and for a variety of
6 reasons. Some of it was from experimental
7 reactors for R&D purposes, production
8 reactors. But there's a programmatic
9 environmental impact statement that actually
10 goes through the specific qualifications that
11 placed each of those waste --

12 MR. LASH: Can I interrupt you for
13 one moment with a question about this?

14 MR. MARCINOWSKI: Absolutely.
15 Yes.

16 MR. LASH: Chairman Hamilton asked
17 earlier about the annual DOE budget for
18 cleanup and was given the figure \$6 billion a
19 year, I think. And noticing your title and
20 while the map is up here, could you give us
21 some rough idea where that money is spent
22 among these sites and what it's spent for?

1 Not a detailed response, but you seem like the
2 most informed person we're going to hear from
3 on that.

4 MR. MARCINOWSKI: Well, I could
5 actually provide you later the actual annual
6 distribution among the various sites.

7 As far as for this type of
8 activity though -- the management of the spent
9 fuel and the high-level waste activities --
10 you're right, the annual budget for the
11 Environmental Management Program is about \$5.8
12 to \$6 billion per year.

13 Of that, approximately a third of
14 that goes toward management of the high-level
15 waste and the spent fuel, probably more so on
16 the high-level waste side in fact, but
17 definitely more so on the high-level waste
18 side because we've got on the order of 230
19 underground storage tanks that we're managing
20 right now that have liquid waste in them that
21 needs to be somehow treated and put into a
22 form that's suitable for disposal. So that's

1 the rough order of magnitude of what we're
2 dealing with here. It's approximately on the
3 order of \$2 billion a year that goes towards
4 these particular efforts.

5 If you want a more specific
6 breakdown, we can certainly provide that.

7 MR. LASH: And how much goes for
8 cleanup?

9 MR. MARCINOWSKI: Well, some would
10 argue that the high-level waste is part of our
11 cleanup as well. But then toward the other
12 aspects of our cleanup, some of what that
13 funding is actually for is just for what we
14 call men-safe activities. That's turning on
15 the lights, making sure that all the buildings
16 are properly maintained and kept in a safe
17 configuration, the materials are properly
18 managed and then the remainder of that goes
19 towards the actual cleanup of the soils, the
20 groundwater, et cetera.

21 I'd have to get back to you with
22 the precise breakdown on that, but we can

1 certainly do that. Sure.

2 So that's the distribution of what
3 we've got across the country and where it's
4 located right now. We estimated that we're
5 going to have about 3500 of what we call DOE
6 standardized canisters which is what we've
7 assumed would be the form that would be used
8 for disposal of this spent fuel.

9 Just to touch on the other
10 domestic sites, I think I mentioned Oak Ridge,
11 and I'll talk a little bit later about a
12 program where we retrieve fuel from
13 universities across the country as well. And
14 that's captured in the other domestic sites.

15 The type of waste that we have.
16 We've got the waste for the defense purposes,
17 from production reactors, R&D activities,
18 government R&D activities. And then on the
19 defense side, it's a smaller quantity of waste
20 but comes from a wider variety of sources. I
21 mentioned the Three Mile Island core debris,
22 commercial power demonstration projects at

1 those three sites -- Shippingport, Peach
2 Bottom and Fort St. Vrain where we had an
3 agreement that the government would be
4 responsible for the waste from those
5 facilities, the domestic research reactors
6 program I touched on as well. And then
7 there's the farm research reactor program that
8 the Department operates as part of our
9 nonproliferation efforts.

10 Some of the state commitments that
11 are directly relevant to the spent fuel and
12 the disposition of the spent fuel. The Idaho
13 Settlement Agreement, or more often referred
14 to as Batt agreement after Governor Batt,
15 requires that the spent fuel that's currently
16 at the Idaho National Lab be in dry storage by
17 December of 2023. We're well on our way to
18 fulfilling that commitment. But then the
19 follow-on commitment is that it would be out
20 of Idaho by January of 2035. And so that's a
21 key milestone that's something we're well
22 aware of. And the penalty - there's a number

1 of other provisions within the Idaho
2 Settlement Agreement -- and should we fail to
3 uphold any of those commitments, then Idaho
4 can require us to suspend any shipments into
5 Idaho for storage of that and also impose on
6 us a fine of \$60,000 a day for each day we're
7 in violation.

8 We also have a commitment to the
9 State of Colorado regarding the Fort St. Vrain
10 fuel. And while we have some of the Fort St.
11 Vrain fuel in the Idaho facility, because of
12 some legal disagreements between the
13 Department and the State of Idaho, we're not
14 able to move all of that fuel to Colorado.
15 And so we have a separate agreement with the
16 State of Colorado that we would remove all of
17 that fuel from that state by the same date in
18 2035.

19 MR. PETERSON: Frank, a quick
20 question.

21 Idaho also has high-level waste
22 remaining from former reprocessing of naval

1 spent fuel, if I remember. Is that high-level
2 waste also covered under the settlement
3 agreement, or is it free to sit there forever
4 with no penalty?

5 MR. MARCINOWSKI: No. There is
6 agreement on the high-level waste. And I'll
7 talk a little bit about that when I talk about
8 the high-level waste portion of it. But the
9 high-level waste is meant to be processed and
10 what we call road-ready -- ready to be shipped
11 out of state by that 2035 date with the same
12 penalties.

13 Getting a little more site-
14 specific right now -- Hanford, right now all
15 the spent fuel that we have in Hanford is
16 currently in dry storage. A large portion of
17 it is in multi-canister overpacks which is
18 what you would see in the right side of the
19 screen there where the gentlemen are lowering
20 that into the floor right there. And at the
21 appropriate time, we're also going to need to
22 package this in a configuration that's

1 suitable for disposal and shipping to it.

2 The waste that we have at Hanford
3 accounts for 87 percent of the waste we manage
4 by weight. And the majority of that comes
5 from the end reactor -- the production reactor
6 -- we had at the site. And so besides the
7 multi-canister overpacks, we have other
8 storage configurations on site that you see in
9 the picture there just for the safe storage of
10 the spent fuel until a disposition path is
11 identified.

12 MR. ROWE: Excuse me. The fact
13 that you've made all of the SNF in a dry form
14 doesn't imply that you've removed all the
15 other different forms of contaminated liquids
16 from the old tanks, does it?

17 MR. MARCINOWSKI: No, sir. We
18 have not. And the old tanks, I'll talk a
19 little bit more in detail as we go on. I'm
20 just focusing on the spent-fuel aspects at the
21 Hanford site for now.

22 Out at the Idaho National Lab, as

1 I mentioned, this site probably has the most
2 diverse inventory of spent fuel of all of the
3 sites. And it has most of the commercial
4 waste that the Department's commercial spent
5 fuel department has accepted. We are in the
6 process of moving all the spent fuel from wet
7 storage into dry storage to meet that 2023
8 commitment to the State of Idaho, and we
9 expect to have that process completed well
10 before that 2023 date.

11 There's also some fuel that
12 requires processing as I'm treating it before
13 it is considered to be suitable for
14 disposition. And we're currently in the
15 process of doing that. We expect that to be
16 completed in the next couple of years.

17 And Idaho is one of the two sites
18 that receives our Foreign Research Reactor
19 fuel that we retrieve from other countries.
20 The other site is Savannah River.

21 And there's a rationale behind
22 which fuel is sent to Idaho and which is sent

1 to Savannah River. The aluminum-clad fuel, we
2 actually have capabilities at our Savannah
3 River site to reprocess aluminum-clad fuel
4 should we desire. So the fuel that's
5 retrieved that has an aluminum cladding on it
6 goes to the Savannah River site. That which
7 does not goes to our Idaho facility.

8 Some of the commercial fuel that
9 we have requires NRC licensing. And so we
10 also have some facilities that are NRC
11 licensed as well.

12 CHAIR HAMILTON: Frank, do we
13 receive spent nuclear fuel from other
14 countries?

15 MR. MARCINOWSKI: That's correct,
16 sir.

17 CHAIR HAMILTON: And are we paid
18 for storing that?

19 MR. MARCINOWSKI: Well, it
20 depends. This is research reactor fuel that
21 we're retrieving. So it's just a research
22 reactor fuel that's being retrieved.

1 DR. MESERVE: It is the case that
2 a lot of it is fuel with highly-enriched
3 uranium, isn't that correct?

4 MR. MARCINOWSKI: That's correct.

5 DR. MESERVE: Which is why we're
6 retrieving it.

7 MR. MARCINOWSKI: That's right.

8 DR. MESERVE: It's a proliferation
9 risk.

10 MR. MARCINOWSKI: That's right.
11 Exactly right. That's what that program was
12 intended to retrieve -- the high enriched
13 uranium so that the reactors can be switched
14 over to a low enriched uranium fuel.

15 CHAIR HAMILTON: Who bears the
16 cost of that?

17 MR. PETERSON: As a matter of
18 nonproliferation basis.

19 CHAIR HAMILTON: Nonproliferation.

20 MR. PETERSON: The other thing is
21 I think the total mass --

22 CHAIR HAMILTON: What is the cost?

1 MR. MARCINOWSKI: For the
2 countries that are economically capable of
3 paying us for the retrieval and the storage of
4 that, then we do get reimbursed for those
5 activities. For those countries that are less
6 economically able to do that, then we would
7 bear that cost. And the exact figure that we
8 spend on that on an annual basis, I would need
9 to get back to you.

10 The amount that we retrieve in a
11 year, it's not a great deal. But it is a
12 program that was highly supported by the other
13 foreign countries who didn't have the
14 capability of storing and maintaining this
15 material. So it is a service we provide. But
16 certainly that's another budget cost that we
17 can provide to you as well.

18 HON. MR. SHARP: There's a big
19 distinction here between this ongoing research
20 program that's been going on for years --
21 right -- and the retrieval and the larger
22 question of what agreements we made with

1 Russia in the post-Soviet Union era, right?

2 MR. MARCINOWSKI: Oh, yes. Yes.

3 HON. MR. SHARP: I mean there you
4 get at a whole other round and larger
5 quantities and bigger issues.

6 MR. MARCINOWSKI: This is separate
7 from that. This had been a program that had
8 been in place since I believe '99. I'm
9 talking about the Foreign Research Reactor
10 Retrieval Program. It was originally set up
11 for a ten-year span to end in 2009. Because
12 of the continued nonproliferation concerns,
13 the program was extended to 2019. And so our
14 current plan on operating that program is
15 through 2019.

16 The Fort St. Vrain was a
17 commercial advanced reactor concept program
18 that the Department entered into a cooperative
19 agreement with at the time with General
20 Atomic. And this was back in '65. And the
21 agreement was that we, the government, would
22 accept the fuel for storage and eventual

1 disposal. And this occurred throughout the
2 1980s until about '89 when the facility
3 experienced some operational difficulties.
4 They had to cease operations. And so some of
5 the fuel is in the State of Idaho at our Idaho
6 National Lab. Some of it remains in Colorado
7 at the facility pictured here which is still
8 under NRC license. DOE is the owner of that
9 NRC license. And I mentioned the agreement
10 that by 2035 it's to be out of the State of
11 Colorado.

12 The Savannah River site --
13 actually all of our spent fuel at Savannah
14 River is currently in wet storage. As I
15 mentioned, we do have the capability of
16 reprocessing some spent fuel at the Savannah
17 River site in H Canyon which is a chemical
18 separations facility.

19 DR. MacFARLANE: And have you done
20 that?

21 MR. MARCINOWSKI: Have we done
22 that in the past?

1 DR. MacFARLANE: Have you done
2 that since 1994 say?

3 MR. MARCINOWSKI: I'm sorry?

4 DR. MacFARLANE: Have you done it
5 since 1994?

6 MR. MARCINOWSKI: Since 1994? I
7 couldn't tell you when the last date was
8 offhand.

9 DR. MacFARLANE: Have you done it
10 since 2000?

11 MR. MARCINOWSKI: I would have to
12 get back to you on the specific dates of when
13 the operations occurred. It is an operating
14 chemical separations facility.

15 So these disposal alternatives for
16 aluminum-clad fuel as I mentioned are under
17 consideration. As I mentioned, it can
18 reprocess the aluminum-clad fuel. We have not
19 made a decision about whether we're going to
20 do that or not. That would involve exchanges
21 of fuel between Savannah River and the Idaho
22 facility. We've not decided whether or not

1 we're going to pursue that. But as I
2 mentioned, this is also another site that also
3 accepts the foreign research reactor fuel and
4 some of the domestic research reactor fuel.

5 Well, we already talked a bit
6 about the foreign and domestic research
7 reactor programs. So far we've collected
8 fuels from 29 countries actually as of this
9 month.

10 I mentioned the separation between
11 aluminum- and nonaluminum-clad fuel. And the
12 program is going to continue until 2019. As
13 far as the domestic program, there is no
14 specific date for the completion of that
15 program.

16 And this chart here just
17 summarizes everything we just talked about as
18 far as which sites and what type, whether it's
19 defense or nondefense is being stored at each
20 of those sites. We've got just under 2500
21 metric tons across all of those facilities.
22 They're going to continue to remain in safe

1 storage, and that the current facilities where
2 it's being stored can maintain it in that
3 configuration for many decades.

4 Moving onto the high-level waste,
5 and this shows the geographic dispersement of
6 our high-level waste and where it's currently
7 located. Again, this was a byproduct of our
8 weapons program.

9 And we have compliance agreements
10 with regard to the high-level waste as well.
11 They're somewhat different than what we have
12 for the spent fuel in that I mentioned in
13 Idaho, it's to be out of a certain state by a
14 certain period of time. We have agreements
15 out in Washington State where it's more about
16 the agreements that we have is the time frame
17 for when we would retrieve the liquid waste
18 from the tanks and when we would process that
19 waste. And likewise at Savannah River, it's
20 when we would retrieve the material from those
21 tanks and when we would close the liquid waste
22 tanks out at those sites.

1 West Valley. There's no longer
2 operations out at West Valley. There hadn't
3 been for quite a long time. But when the West
4 Valley Demonstration Act was passed, the
5 Department had the responsibility for
6 vitrifying the material that was commercially
7 generated at the site. We've got 275 high-
8 level waste canisters that are currently in
9 storage out at that site. So right now,
10 they're in storage and waiting for a
11 disposition path.

12 And overall, when all the
13 operations -- the high-level waste operations
14 -- are completed, we're going to have on the
15 order of 20,000 or 21,000 high-level waste
16 canisters. And just to give you an idea of
17 what one of these canisters is, they are
18 currently stainless steel canisters. They're
19 about ten feet tall, two feet in diameter.
20 And they're filled with a boro-silicate glass
21 that is embedded with the high-level waste
22 that's currently in the tanks that's separated

1 out of the tanks. And so it's a very robust
2 waste form that it's being placed into.

3 And that's the current plan for
4 how all of this high-level waste would
5 eventually be in that particular form -- most
6 of it. There's some waste at Idaho that I'll
7 get to when we get to the site-specific
8 information that's actually being placed into
9 a slightly different configuration.

10 HON. MR. DOMENICI: Sir?

11 MR. MARCINOWSKI: Yes.

12 HON. MR. DOMENICI: You just
13 described those tanks with the glass in it,
14 and you said they're robust.

15 MR. MARCINOWSKI: Yes.

16 HON. MR. DOMENICI: Does that mean
17 that they are ready for permanent disposal
18 someplace?

19 MR. MARCINOWSKI: Yes. For the
20 waste that's already produced, they're in the
21 configuration that is prepared for disposal.

22 HON. MR. DOMENICI: So that's

1 high-level military waste but is not from a
2 reactor?

3 MR. MARCINOWSKI: It's not from a
4 commercial reactor. Yes.

5 On the Savannah River site, the
6 canisters we just talked about, we've got just
7 under 3,000 of those canisters right now that
8 are currently in storage at the site. These
9 are those ten-foot tall, stainless steel boro-
10 silicate glass canisters that are currently
11 stored waiting for a disposition path.

12 We've got two storage buildings
13 right now that are available for this. One is
14 essentially full. We've got a second that
15 we're in the process of placing the waste in
16 storage. And we've got a third one that's
17 planned for the eventual storage of this.

18 We produce about 200 of these
19 canisters a year. And we've got some facility
20 at the Savannah River site that's planned to
21 come online. It's called the Salt Waste
22 Processing Facility. It's going to accelerate

1 some of that processing.

2 But we've got remaining at this
3 particular site about 31 million gallons of
4 liquid waste to be treated through these
5 processes and eventually placed into these.
6 It's going to be separated into it's low-level
7 fraction and the high-level fraction. The
8 high-level fraction will go into the disposal
9 canisters that I mentioned. And eventually
10 all these tanks would have to be closed to the
11 satisfaction of the state regulators. And
12 that's our intent to do that.

13 DR. MacFARLANE: Can I ask some
14 questions here?

15 MR. MARCINOWSKI: You bet.

16 DR. MacFARLANE: So this 31
17 million gallons that remain, that's just the
18 sludge? Or how are you calculating this?
19 Because in the 1990s or early 2000s, DOE
20 reclassified some of its high-level waste to
21 be waste incidental to reprocessing. It
22 renamed it so it didn't have to deal with it

1 under the Nuclear Waste Policy Act. How are
2 you talking about that? How are you dealing
3 with that?

4 MR. MARCINOWSKI: Yes. Again, the
5 31 million gallons is liquid waste. I didn't
6 say that it was high-level waste. It's liquid
7 waste that's then separated into its low-
8 activity fraction and the high-activity
9 fraction. The high-level waste out of the
10 liquid waste -- that 31 million -- would then
11 go through eventually what's called the
12 Defense Waste Processing Facility which takes
13 the high-level waste and places it into the
14 boro-silicate glass configuration for
15 disposal. The low-activity fraction then goes
16 through a separation process at the Savannah
17 River site for which there was a waste
18 determination. That's how that waste is
19 disposed of.

20 DR. MacFARLANE: This is the stuff
21 that goes into the ground?

22 MR. MARCINOWSKI: It goes into

1 vaults that are at the Savannah River site
2 right now as low-level waste.

3 DR. MacFARLANE: And what about
4 the heel of the waste that you can't get rid
5 of or it's too difficult to get rid of?

6 MR. MARCINOWSKI: Sure. Again we
7 remove as much of the waste as we can
8 technologically do.

9 There's a statute that's called
10 Section 3116 of the Ronald Reagan National
11 Defense Authorization Act of 2005 that
12 provides a process whereby we can ahead and
13 close tanks. Now that process includes
14 removing as much of the waste from the tank
15 including the heel that we can technologically
16 remove. Then we have to go through an
17 exercise to demonstrate that what remains
18 within that tank meets the NRC's
19 classification as low-level waste.

20 And there's a consultation process
21 that we go through with the NRC whereby they
22 review the information -- the analyses that we

1 conduct. It's an open public process that it
2 goes through. And we've actually followed
3 this process for the tank farm out at Idaho,
4 and have successfully closed 11 tanks out at
5 the Idaho site using that particular process.

6 We have not yet gone through that
7 process at Savannah River. We intend to in
8 the next couple of years to pursue that
9 process to proceed with closure of tanks out
10 at the Savannah River site.

11 Moving on to Idaho, there are
12 three particular waste streams that fall into
13 the high-level waste category. We have
14 calcine waste that's actually in a storage
15 configuration at the site that's called bin
16 sets. They're concrete structures that
17 actually have a storage life that is on the
18 order of 400 or 500 years right now. So it's
19 in a very safe storage configuration at
20 present.

21 The agreements that I mentioned
22 earlier -- the Settlement Agreement -- is

1 requiring us to have this waste road-ready as
2 I mentioned by 2035. The decision was made
3 that we would use a process called hot
4 isostatic pressing whereby this -- this is a
5 granulous solid, but through heat and pressure
6 this would actually be made into a ceramic-
7 type material which is some argue more robust
8 than the boro-silicate glass configuration.
9 But then that would be in a disposal-ready
10 package once we complete that process.

11 Likewise, sodium bearing waste is
12 another waste stream that we have out there.
13 We anticipate that that's going to create
14 another 590 or 600 canisters of that waste.
15 And then there's going to be some waste
16 through the processing of the sodium-bonded
17 fuel that will need to be disposed of as high-
18 level waste as well.

19 Hanford. Again, we've got a
20 similar situation with the liquid tanks out at
21 the Hanford site. We've got more tanks out
22 there. We've got 177 tanks, 53 million

1 gallons of liquid waste. There's a project
2 underway called the Waste Treatment Plant out
3 at the facility whose intended purpose is to
4 process all of this particular waste.

5 We're going to be producing once
6 that plant is operational. This is going to
7 be in the 2020, 2021, 2022 time frame when
8 we're going to be operating and producing.
9 The plan is right now about 400 canisters a
10 year.

11 And there are commitments that we
12 have with the state as well in the State of
13 Washington in order to clean the tanks out, to
14 remove the waste from the tanks, to close the
15 tanks and to process this waste. It's in a
16 tri-party agreement that we have with the
17 State of Washington and the Environmental
18 Protection Agency. And although there's no
19 particular regulatory commitment with regard
20 to removing it from the State of Washington,
21 the agreements that we have right now are on
22 the removal of the waste from the tanks and

1 the processing of the waste.

2 And then we have some cesium and
3 strontium capsules that are high-level waste
4 as well. This is cesium-strontium that we
5 removed from the tanks to remove the heat load
6 from the tanks where the waste is currently
7 being stored. And so we've got these capsules
8 that we have a need to dispose of as well, and
9 they're currently in safe storage at the site
10 as well.

11 West Valley. I think I mentioned
12 that as well. We've got the 275 canisters
13 currently being stored on that site near
14 Buffalo, New York waiting for a disposition
15 path for that.

16 So the path forward. Right now
17 for all of this material that I just spoke of
18 is to immobilize/vitrify the tank waste both
19 at Savannah River and Hanford. That's the 177
20 tanks at Hanford and 51 tanks out at Savannah
21 River.

22 Idaho National Lab. We talked

1 about the treatment of the waste out there.

2 And through all of this, we continue to
3 improve our treatment methodologies to reduce
4 the cost and schedules for the treatment of
5 this particular waste. We're talking about
6 right now decades of waste processing at these
7 facilities in order to deal with the nearly 90
8 million gallons of waste at both of those
9 sites.

10 And throughout all this, we are
11 going to continue to store those high-level
12 waste canisters on site. We think the current
13 configurations are designed for 100-year
14 storage. And we were hoping that we don't
15 need to utilize them for all that time, and
16 that we can have a storage location identified
17 well beforehand.

18 I think I touched on this -- the
19 Idaho Settlement Agreement -- and its relation
20 to the high-level waste efforts that we have.
21 And I mentioned, ready-for-transport out of
22 the state -- what I called road-ready.

1 And just a couple of things to
2 note. And I've talked a few times about the
3 state commitments. We have gotten recent
4 inquiries about concerns about the storage of
5 the waste and whether it's going to be stored
6 on site indefinitely. The various federal
7 facility agreements and settlement agreements
8 I've already touched on.

9 And throughout however long we
10 need to maintain the waste, there's
11 discussions that we're going to have to have
12 about how we're going to continue to store the
13 waste on site until a suitable disposal
14 facility is identified.

15 And then again, here's a chart
16 which summarizes the various sites and where
17 the waste is currently being stored, and the
18 projections in terms of how many waste
19 packages we would have at the end of all the
20 processing, which is approximately 22,000 of
21 those high-level waste canisters.

22 Just briefly about another waste

1 category that currently does not have a
2 disposition path. The repository at Yucca
3 Mountain was identified as a potential
4 disposal path for this material. But greater
5 than Class C waste is actually a definition of
6 waste that's defined by the Nuclear Regulatory
7 Commission. And this is a low-level waste
8 that's of greater activity than their Class C
9 low-level waste. And this primarily consists
10 of activated metals from decommissioned
11 nuclear plants. Some sealed sources fall into
12 this category as well.

13 And then there's nondefense
14 transuranic waste that currently does not have
15 a disposition path as well. We currently
16 estimate that there's about 1100 cubic meters
17 of this. But over time, the estimate is about
18 12,000 cubic meters that needs to be disposed
19 of. It's a smaller quantity -- much smaller
20 quantity than I previously talked about in
21 terms of the high-level waste or the spent
22 fuel. But it's something that DOE has a

1 statutory responsibility to identify a
2 disposal path.

3 The Energy Policy Act of 2005 gave
4 that responsibility, or actually the Low-Level
5 Waste Policy Act gave us the responsibility.
6 The Energy Policy Act gave us some more
7 specific directions and required a schedule
8 for us to do this. We've got an environmental
9 impact statement which identifies alternatives
10 for its disposition. That's going to proceed.
11 But I just wanted to raise that to the
12 Commission as a waste form that may require
13 something more than shallow land burial which
14 currently does not have a disposition path.

15 HON. MR. DOMENICI: Sir, is that
16 same kind of waste that is currently
17 transuranic waste going into WIPP? Is it the
18 same but one's civilian, one's defense?

19 MR. MARCINOWSKI: That's correct,
20 sir. Yes. At least one of the categories is.
21 Yes.

22 HON. MR. SHARP: Does WIPP cover

1 the materials that are regulated under the
2 Low-Level Waste Act?

3 MR. MARCINOWSKI: I'm sorry. Does
4 who?

5 HON. MR. SHARP: Could WIPP
6 receive the materials that are covered under
7 the Low-Level Waste Act?

8 MR. MARCINOWSKI: No.

9 HON. MR. SHARP: So that's a whole
10 other regime that frankly isn't functioning
11 either.

12 MR. MARCINOWSKI: They just work
13 under the WIPP Land Withdrawal Act. That's
14 the defense transuranic waste is the only kind
15 of waste that goes into the WIPP facility.

16 HON. MR. SHARP: I mean, apart
17 from the legal question, I'm asking the
18 technical question as to whether that could
19 receive materials under the Low-Level Waste
20 Policy Act -- the materials that are regulated
21 under the Low-Level Waste Policy Act --
22 technically?

1 MR. MARCINOWSKI: Well, materials
2 under the Low-Level Waste Policy Act are
3 generally of lower radioactivity. And so, I'm
4 not aware of any specific analysis that looks
5 at that. But just judging from the category
6 of material --

7 MR. PETERSON: I think that
8 certainly it was not designed or licensed for
9 that purpose. And it would be a substantive
10 change technically to change the mission of
11 that repository. But certainly it was not
12 designed or licensed to do anything besides
13 what its current mission is.

14 MR. MARCINOWSKI: That's correct.

15 HON. MR. SHARP: I don't know
16 whether we're going to deal with it, but a
17 potentially major function is where are we
18 going to put all this stuff because that plan
19 of action is not working either. And if I
20 understand correctly, most states have not
21 done what is expected under the Act.

22 MR. MARCINOWSKI: Yes. The Waste

1 Isolation Pilot Plant and its transuranic
2 mission is working very well. And that's a
3 mission that's serving the Department's
4 cleanup efforts extremely well. And it's a
5 complicated regulatory structure for that
6 facility right now. And it's something that
7 is necessary for the program's efforts to
8 continue to make progress on our cleanup.

9 So as far as the high-level waste
10 and spent fuel, our goal is to stabilize the
11 high-level waste and store it on site, and the
12 plan is to have everything in a safe
13 configuration to store that as such. We don't
14 expect any near-term impacts with regard to
15 completing that. Our storage facilities are
16 designed for 50-plus years depending on what
17 the current need is.

18 Right now, we're going to continue
19 to improve the methods that we use to process
20 the high-level waste to retrieve it from the
21 tanks to process it into a robust waste form,
22 and we need to be mindful of the compliance

1 issues that we have with the effected states
2 where this waste is currently being located
3 and the spent fuel is being stored. And we're
4 in constant communications with the states in
5 that regard.

6 And I think with that, that's the
7 end of my intended remarks. I'd be certainly
8 glad to answer any questions.

9 CHAIR HAMILTON: Are there any
10 questions for Frank? Vicky?

11 HON. MS. BAILEY: Just a quick
12 one. The facility -- the WIPP facility -- who
13 owns that? Who makes the decisions as to what
14 goes in there?

15 MR. MARCINOWSKI: Well, the
16 decision was made statutorily. So there's a
17 piece of legislation that tells us what kind
18 of waste can go in there.

19 There's a regulatory system with
20 the State of New Mexico and the Environmental
21 Protection Agency that ensures that we comply
22 with their regulations and the letter of the

1 law.

2 HON. MS. BAILEY: And so who runs
3 that? Who owns that facility?

4 MR. MARCINOWSKI: Well, as far as
5 owning it, the Department owns the facility.

6 HON. MS. BAILEY: The Department
7 of Energy?

8 MR. MARCINOWSKI: That's correct.

9 HON. MR. DOMENICI: The Department
10 of Energy is working for the Defense
11 Department in this case. This is defense
12 waste. There's no civilian waste in this
13 facility. It's all defense.

14 MR. MARCINOWSKI: That's correct.

15 HON. MS. BAILEY: The Department
16 of Energy could possibly make a decision to do
17 something different there, or no? Help me.

18 HON. MR. DOMENICI: No, they
19 can't. They would have to change the statute
20 law of the land. Very difficult. It could be
21 done if you had a plan, but there's no plan
22 yet.

1 MR. MARCINOWSKI: That's correct.

2 CHAIR HAMILTON: Susan?

3 MS. EISENHOWER: What percentage
4 of defense transuranic waste goes into WIPP
5 right now as opposed --

6 MR. MARCINOWSKI: What percentage?

7 MS. EISENHOWER: Yes.

8 MR. MARCINOWSKI: Well, anything
9 that qualifies as defense transuranic waste is
10 scheduled to be disposed of at the WIPP
11 facility.

12 MS. EISENHOWER: That's not my
13 question. What percentage is there now --
14 just out of curiosity?

15 MR. MARCINOWSKI: Out of all of
16 it? Approximately one third of the
17 transuranic waste is probably already disposed
18 of at the site.

19 MR. PETERSON: And when will WIPP
20 cease operations and close up then? Is that
21 like 20 years or so?

22 MR. MARCINOWSKI: Right now, we're

1 currently planning on 2030 as the planned end
2 date at present.

3 CHAIR HAMILTON: Okay.

4 HON. MR. DOMENICI: Mr. Chairman?

5 CHAIR HAMILTON: Pete, go ahead.

6 HON. MR. DOMENICI: I'm sorry to
7 burden you. But I want to ask you something,
8 sir.

9 I have a Nuclear Energy Fuel Cycle
10 Primer. Have you ever seen this? Can you see
11 it from there?

12 MR. MARCINOWSKI: Yes.

13 HON. MR. DOMENICI: Anyway, it's
14 the Department of Energy primer. And I'll
15 show it to the Chairman and I'm going to ask
16 that you provide him with sufficient copies to
17 give to all the members. It's a 30-minute
18 read on understanding the fuel cycle. And
19 it's pretty good.

20 But it has a statement in it that
21 is particularly informative with reference --
22 and I'm going to try to distinguish for the

1 Commission -- two kinds of waste. We're
2 talking about waste we're going to reprocess,
3 and that there's a lot of energy still in it.
4 And most of that comes from reactors where
5 part of the fuel rod was used and most of the
6 energy was left. And we're wondering what to
7 do with that.

8 And today you've talked to us
9 about another kind of waste. It's high-level,
10 some of it. But it's not from a reactor.
11 It's from Hanford left over from the defense
12 work there. And it's liquified. It's all
13 kinds of different things. But it's high-
14 level. But you're not going to turn it into
15 energy, right?

16 MR. MARCINOWSKI: Yes.

17 HON. MR. DOMENICI: Now, wait just
18 a minute. I just want to get it in.

19 You're not going to turn that into
20 energy -- that Hanford high-level waste?
21 You're going to vitrify it and store it,
22 right?

1 MR. MARCINOWSKI: The product that
2 it's being manufactured into this glass
3 cylinder, it's meant for thousands and
4 thousands of years of robust storage and
5 disposal.

6 HON. MR. DOMENICI: That's what I
7 just asked you.

8 MR. MARCINOWSKI: It's not meant
9 as a package that can eventually be retrieved
10 from.

11 HON. MR. DOMENICI: That's what I
12 just said. It's vitrified and then stored.

13 MR. MARCINOWSKI: That's correct.

14 HON. MR. DOMENICI: Okay. Now let
15 me tell you what this primer says.

16 After all of this, it says, "If we
17 were to take all of the nuclear waste produced
18 to date in the United States" -- that's not
19 talking about waste from reactors -- okay --
20 "and stack it side by side, end to end, it
21 would cover an area the size of a football
22 field to a depth of about ten feet. The

1 amount would increase to an estimated 119,000
2 metric tons by 2035." That's about a 25
3 percent increase.

4 But what I'm saying is the whole
5 thing is a football field that's the depth of
6 ten feet. So everything we're talking about
7 in terms of spent fuel rods, reprocess, don't
8 reprocess, store, don't store, leave it where
9 it is and make that an interim storage -- all
10 of it is a football field full of it. It's
11 ten feet deep.

12 Now that's a truism, more or less.
13 Well, you can't have a truism more or less.
14 It's a truism.

15 (LAUGHTER.)

16 HON. MR. DOMENICI: It's the truth
17 more or less. Truth more or less.

18 Now having said that, let me ask
19 you this. How much of this high-level waste
20 that we have in barrels and you described as
21 being vitrified, ready for very long storage
22 when we find out how we're going to store it,

1 how much of it do we have in some way compared
2 to this football field that I talked about?
3 If you don't know, can you find out? I think
4 it would help us to have a quantity that we
5 have in mind. Do you happen to know?

6 MR. MARCINOWSKI: Well, right now
7 in storage we have about 3,000 of these
8 canisters that I mentioned were ten feet high
9 and two foot in diameter. So I'm sure we can
10 equate that to something such as the football
11 field analogy.

12 HON. MR. DOMENICI: Okay. I would
13 like that. If nobody else would, you could
14 give it to me. But I think the Chairman would
15 ask that you distribute that to everybody.
16 It's sort of a good talking piece.

17 And I had just one last one for
18 you. Do you happen to know how much waste and
19 what waste was scheduled to go into Yucca?
20 How much waste and what kind of waste was
21 going to go to Yucca but is going somewhere
22 else now?

1 MR. MARCINOWSKI: Well, under the
2 legislation, there was to be 7,000 metric tons
3 of that repository space was allocated for
4 defense purposes. So it had a capacity of 70.
5 We got ten percent of the capacity for the
6 Department's materials.

7 HON. MR. DOMENICI: What was the
8 rest of it going into Yucca? Where would it
9 come from? You get 70, you get ten percent.
10 Where would the rest come from?

11 MR. MARCINOWSKI: Well, the rest
12 of it's commercial fuel.

13 HON. MR. DOMENICI: Commercial
14 fuel is supposed to go there.

15 So it's going to be retrieval fuel
16 rods, is that correct?

17 MR. MARCINOWSKI: I believe so.
18 But I'm not the expert on the Yucca Mountain.

19 HON. MR. DOMENICI: Well, you're
20 the expert on high level. I don't mean to put
21 you behind the eight ball. I wouldn't ask you
22 if I didn't think you knew.

1 MR. MARCINOWSKI: Sure, sure.

2 Yes, it could have been retrievable. Right.

3 HON. MR. DOMENICI: All right.

4 CHAIR HAMILTON: Okay. Any

5 further questions for Frank?

6 MR. PETERSON: I'd just like to

7 add one additional point on the point about

8 all of that material fitting on a football

9 field.

10 I think it's useful to note that

11 if you'd made the equivalent amount of

12 electricity using coal, you'd have had to burn

13 five billion tons of coal instead of having

14 one football field. It's five billion tons.

15 CHAIR HAMILTON: Okay. Per, thank

16 you very much.

17 Frank, thank you very much.

18 You've given us an excellent presentation for

19 an hour, and we thank you.

20 Our final person speaking about

21 Navy spent nuclear fuel is John McKenzie,

22 Director for Regulatory Affairs, Naval Nuclear

1 Propulsion Program. He's responsible for
2 matters involving safety and environmental
3 regulation on a national, state, local level
4 that may affect the Naval nuclear propulsion
5 program.

6 Holds a B.S. in nuclear
7 engineering from Rensselaer Polytechnic
8 Institute, veteran of the naval service.

9 John, we're delighted to have you
10 here. Thank you for waiting. You're the
11 cleanup hitter here for the day. You're the
12 last man. You have one half hour. And you
13 may proceed.

14 MR. MCKENZIE: Thank you, Mr.
15 Chairman. I'll keep you on time.

16 It's a pleasure to be here this
17 afternoon. Good afternoon.

18 Like Mr. Holt before me, I'll
19 encourage you to interrupt me with questions
20 if you have questions as we go along.

21 Like Mr. Holt before me, I'm going
22 to spend one slide on my program because it is

1 unique in the federal government. We're a
2 joint organization of the Department of Navy
3 and the Department of Energy. And we have a
4 focused and simple mission. It's to provide
5 the nation with the capability to use nuclear
6 power to propel warships safely and reliably
7 through the water.

8 Our responsibilities and
9 authorities associated with executing that
10 mission are rather broad. And that's
11 consistent with our history of having taken a
12 concept, developed the capability, and then
13 responsibly managing and providing oversight
14 of that capability through its entire
15 lifetime.

16 When Admiral Rickover -- then
17 Captain Rickover -- stood up the program in
18 1948, it really was little more than an idea.
19 Seven years later, the Nautilus went to sea.
20 In that seven years, he created an industrial
21 base and a new technology; developed new
22 materials; developed a quality assurance

1 system for nuclear products that didn't exist
2 before; developed a training and qualification
3 system for operators; designed, built and
4 operated a prototype reactor in Idaho; and
5 designed, built and delivered the Nautilus.

6 Since 1955 when the Nautilus went
7 to sea, we've developed over 30 different core
8 designs, we've sent to sea well over 200
9 nuclear-powered warships. Those designs and
10 our organization have evolved somewhat as the
11 threats have evolved and as the technology has
12 evolved. But the basic way that we approach
13 and execute our work is basically the same as
14 what Admiral Rickover set out for us when he
15 stood up the program.

16 When he retired after 34 years as
17 the Director, both the President and the
18 Congress took action to sustain the
19 principles, practices and structures that he
20 had put in place. The current Director of the
21 program is Admiral Kirkland Donald. He's the
22 fifth Director in the program's 62-year

1 history.

2 This is a diagram of the scope of
3 our activities. I'll just say a few words
4 about those that are pertinent to this
5 afternoon's discussion.

6 The first is a nuclear-powered
7 fleet: 53 attack submarines, 14 ballistic
8 missile submarines, four guided-missile
9 submarines, 11 aircraft carriers. Those 82
10 warships represent over 45 percent of the
11 nation's major combatants.

12 In addition to the reactors on
13 those warships, we operate prototype and
14 training reactors at two sites -- one outside
15 of Charleston, South Carolina and the other
16 outside of Saratoga, New York.

17 There are six shipyards that
18 construct and maintain the nuclear propulsion
19 plants on the warships. Four of those
20 shipyards handle spent nuclear fuel -- the
21 Portsmouth Naval Shipyard in Kittery, Maine;
22 Norfolk Naval Shipyard in Norfolk, Virginia;

1 Northrup Grumman Newport News in Newport News,
2 Virginia; and Puget Sound Naval Shipyard in
3 Bremerton, Washington.

4 All spent fuel from the shipboard
5 and the prototype and training reactors is
6 shipped to the Naval Reactors Facility. The
7 Naval Reactors Facility is on the Idaho
8 National Laboratory in southeastern Idaho.

9 The design requirements for naval
10 fuel are unique. Day in and day out, sailors
11 live and work within tens of feet of operating
12 reactors. Those reactors have to operate
13 reliably and safely in a wartime environment.
14 That results in fuel designs which are
15 substantially different from the fuel designs
16 that you see in a commercial reactor. Those
17 designs are rugged, exceptionally compact and
18 very effective at retaining fission products
19 within the fuel matrix.

20 As a measure of the effectiveness
21 of the fuel design, the average radiation
22 exposure for a sailor assigned to a nuclear-

1 powered warship is less than the average
2 radiation exposure received by a member of the
3 public from background or medical testing.

4 I mentioned that all of our fuel
5 is shipped to Naval Reactors Facility in
6 Idaho. Those shipments are done by rail. The
7 top photograph is a picture of the shipping
8 container that we use. The wall of that
9 container is 14-inch thick stainless steel.
10 It weighs 350,000 pounds. Though we're not
11 required to do so, we take that container
12 design to the NRC and get an NRC certificate
13 of compliance.

14 Since the late 1950s, we've
15 shipped over 800 containers to Idaho. Today
16 in a typical year, we'll ship eight
17 containers, all by rail.

18 When the containers arrive in
19 Idaho, the fuel is taken from the container
20 and unloaded into a water pool in the expended
21 core facility. The picture on the left shows
22 that unloading area within the facility.

1 All spent fuel is examined to
2 compare actual performance to predicted
3 performance. That technical feedback --
4 actual to predicted -- allows us to improve
5 our designs and our models. The importance of
6 that feedback is reflected in the improvements
7 we've been able to make in the lifetime of
8 naval fuel.

9 When the Nautilus went to sea, her
10 fuel lasted two years. For the attack
11 submarines that we build today, the fuel that
12 we put in those submarines lasts the entire
13 life of the ship -- about 33 years.

14 The inventory of naval spent
15 nuclear fuel is about 25 metric tons. It's
16 stored in the water pool here at the expended
17 core facility and a comparable water pool at
18 the Idaho Nuclear Technology and Engineering
19 Center, also located on the Idaho National
20 Laboratory. That center used to be called the
21 Idaho Chemical Processing Plant.

22 Today we're in the process of

1 consolidating all of that spent fuel back at
2 the Naval Reactors Facility and placing it
3 into dry storage. The picture on the right
4 shows you the area in the facility where we
5 load the fuel into dry storage canisters.

6 That loading is done in such a
7 manner that once the fuel is sealed inside the
8 canister, we can place it in a shipping
9 container and ship it by rail across the
10 country without any further handling or re-
11 packaging of the spent fuel.

12 The bottom photograph shows our
13 dry storage area, and the concrete overpacks
14 that we place the loaded and sealed dry
15 storage canisters in. Today we have 28
16 canisters loaded.

17 Dr. MacFarlane mentioned that
18 there are various ways to measure the quantity
19 of fuel that you have to deal with and how it
20 relates. I've prepared two slides on that
21 which are measures that I can discuss in an
22 open meeting.

1 The first is metric tons of heavy
2 metal. As was mentioned earlier, 70,000
3 metric tons is the statutory limit for the
4 repository. President Reagan decided in 1985
5 that there would not be a separate repository
6 for defense waste, that defense waste and
7 commercial waste would use the same
8 repository. And as Mr. Marcinowski mentioned,
9 that split was 90/10 -- 90 percent for
10 commercial, 10 percent for defense.

11 Of the 7,000 metric tons set aside
12 for defense waste, the allocation for naval
13 spent nuclear fuel is 65 metric tons. That
14 allocation is sufficient for the spent fuel we
15 expected to have on hand and have generated
16 through 2035.

17 Because naval fuel uses highly
18 enriched uranium, you can't put as much heavy
19 metal into a single disposal canister as you
20 can with a commercial canister. So if you
21 count canisters, this is what the picture
22 looks like. Again, based on the analyses that

1 we did to support the repository licensing, we
2 anticipated we would have on the order of 400
3 canisters of naval fuel out of an expected
4 repository inventory of about 11,000
5 canisters.

6 Mr. Marcinowski mentioned the
7 Idaho agreement and consent order. The
8 agreement and consent order resolved
9 litigation between the State of Idaho and the
10 federal government regarding the management of
11 spent fuel and transuranic waste on the Idaho
12 National Laboratory.

13 In the late '80s and early '90s,
14 Idaho became concerned based on certain events
15 that they were going to become the de facto
16 long-term repository -- permanent repository
17 -- for spent nuclear fuel and transuranic
18 waste. In 1992, they filed suit against the
19 federal government alleging that DOE had
20 violated the National Environmental Policy Act
21 in its plans and programs for management of
22 spent nuclear fuel.

1 In response to that law suit, DOE
2 prepared an EIS -- again, this is the same EIS
3 that Frank referred to -- which looked
4 comprehensively at how spent fuel would be
5 managed across the DOE complex. The EIS was
6 completed in 1995. And the Settlement
7 Agreement captured the terms and the
8 conditions that the parties felt necessary to
9 fully resolve the matter between them. The
10 federal district court, which had jurisdiction
11 for the law suit, entered that agreement as a
12 consent order and decree, and retains
13 jurisdiction for compliance with the terms of
14 the agreement.

15 With regard to the Navy and naval
16 spent fuel, the commitments in the agreement
17 on naval spent fuel are identified as
18 commitments of the Navy. And they're
19 summarized in the center of the viewgraph.

20 Notable there is the same one that
21 Mr. Marcinowski pointed out -- the requirement
22 that all spent fuel be removed from Idaho by

1 2035. That created some ambiguity for us
2 regarding the future of the Naval Reactors
3 Facility and its mission to continue to
4 conduct research and development for us to
5 continue to improve fuel designs. We went
6 back and resolved that ambiguity with Idaho
7 and negotiated an addendum to the agreement in
8 2008. That addendum allows us to continue to
9 have a small in-process quantity of naval
10 spent fuel at the Naval Reactors Facility.

11 In the event that the Navy fails
12 to comply with the commitments set out in its
13 agreement, we're also subject to the \$60,000
14 per day fine that Mr. Marcinowski identified.
15 But perhaps more importantly, we're also
16 subject to the requirements to suspend further
17 shipments of spent fuel into Idaho. A
18 suspension of further shipments into Idaho
19 would interrupt our ability to service
20 nuclear-powered warships with potential
21 impacts to the fleet.

22 Consequently, your work to define

1 a potential alternate path for defense waste
2 is particularly important to us, and we're
3 prepared to give you any technical support
4 that you need to further that work. And in
5 addition I'd be pleased to arrange a briefing
6 for you on classified aspects of naval fuel
7 and our management of naval spent fuel if it
8 would be helpful.

9 That's the end of my prepared
10 remarks.

11 CHAIR HAMILTON: Thank you very
12 much.

13 Allison?

14 DR. MacFARLANE: That was great.
15 Can you go back to slide five?

16 MR. McKENZIE: I'll try.
17 Everybody just went forward here.

18 DR. MacFARLANE: Great technology.
19 Okay.

20 So just help me understand some
21 stuff here. So you said that that transport
22 cask there was by my calculations 156 metric

1 tons, right?

2 MR. McKENZIE: The weight of the
3 cask is 350,000 pounds.

4 DR. MacFARLANE: Which is 156, or
5 let's say 150 metric tons. Okay?

6 MR. McKENZIE: Okay.

7 DR. MacFARLANE: And you said your
8 total current inventory of naval spent fuel is
9 25 metric tons.

10 MR. McKENZIE: Twenty-five tons.
11 That's correct.

12 DR. MacFARLANE: So why is that so
13 big?

14 MR. McKENZIE: To ensure that the
15 cargo is safely protected as it moves across
16 the country. That's the weight of the cask --

17 DR. MacFARLANE: Okay. I know. I
18 know. Is it mostly the weight of the cask, or
19 is a lot of it the spent fuel?

20 And then the second question is
21 how much spent fuel is in those dry casks?
22 What's the weight of those?

1 MR. McKENZIE: It is mostly the
2 weight of the casks. And a typical cask would
3 have about one tenth of a metric ton in it.

4 DR. MacFARLANE: One tenth of a
5 metric ton of spent fuel?

6 MR. McKENZIE: Yes.

7 CHAIR HAMILTON: Other questions?

8 (No audible response.)

9 CHAIR HAMILTON: John, thank you
10 very much. We appreciate your contribution to
11 the Commission.

12 This concludes the work of the
13 Commission for today.

14 Tomorrow morning, 7:45, breakfast
15 for the Members of the Commission. We'll
16 begin the meeting at 8:30. At 11:00 o'clock,
17 we will begin public comment. We will adjourn
18 at 12:00 noon.

19 Thank you very much. We are
20 adjourned.

21 (Whereupon, at 4:41 p.m., the
22 hearing was adjourned.)

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