

BLUE RIBBON COMMISSION ON AMERICA'S
NUCLEAR FUTURE

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MEETING

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TUESDAY,
SEPTEMBER 21, 2010

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The Commission convened at 8:30 a.m. in
Ballrooms A, B and C of the Washington
Marriott at 1221 22nd Street, Northwest,
Washington, DC, Lee Hamilton and Brent
Scowcroft, Co-Chairs, presiding.

MEMBERS PRESENT:

LEE HAMILTON, Chair
BRENT SCOWCROFT, Chair
MARK H. AYERS
VICKY A. BAILEY
ALBERT CARNESALE

PETE V. DOMENICI
SUSAN EISENHOWER
ALLISON MacFARLANE
ERNIE MONIZ
JOHN ROWE
PHIL SHARP

ALSO PRESENT:

TIM FRAZIER, Designated Federal Official

ANDREW KADAK, MIT

CHARLES FORSBERG, MIT

VIC REIS, US DOE

CHARLES McCOMBIE, Arius Association

JIM TIMBIE, US Department of State

FRANK von HIPPEL, Princeton University

STEVEN MILLER, Harvard University

BOB O'CONNOR, National Science Foundation

WES CRAGG, York University

TOM COTTON, Consultant to the Commission, for

Alvaro Rodriguez Beceiro, ENRESA

CLAUDIO PESCATORE, OECD Nuclear Energy Agency

CHUCK POWERS, Vanderbilt University and the

Consortium for Risk Evaluation with

Stakeholder Participation

DAVID LEROY, former US Nuclear Waste

Negotiator

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

8:31 a.m.

MR. FRAZIER: Okay, we're going to go ahead and get started.

First of all, I'd like to welcome you all to the open full Commission meeting of the Blue Ribbon Commission on America's Nuclear Future. My name is Tim Frazier. I am the designated federal officer for the Commission. And with that, as soon as -- are you ready, Congressman?

CHAIR HAMILTON: Yes.

MR. FRAZIER: I turn it over to Congressman Hamilton.

CHAIR HAMILTON: Thank you, Tim. Good morning. Thank you all for coming.

The purpose of this meeting of the Blue Ribbon Commission on America's Nuclear Future is to explore four broad areas. First, nuclear waste program governance; second, international perspectives on and the implications of U.S. decisions regarding the

1 back end of the nuclear fuel cycle; third, the
2 ethical and societal foundations for nuclear
3 waste management; and fourth, perspectives on
4 the facility-siting process, including public
5 and community engagement. You'll hear today
6 and tomorrow from an impressive collection of
7 experts who can help us work through these
8 issues.

9 As always, we recognize there are
10 others who care deeply about the issues we
11 will hear about these next two days. We
12 encourage anyone with an interest in our work
13 to submit written input to the Commission now
14 or at any point in the process. Your comments
15 will be posted on the Commission website and
16 will be made available to the full Commission.

17 We remind our invited speakers
18 this morning and this afternoon that they are
19 to keep their formal presentations to 15
20 minutes or less. We appreciate the time and
21 effort the speakers have put into their
22 presentations. We do look forward to hearing

1 what they have to say.

2 After tomorrow's discussion of
3 waste program governance, we will discuss the
4 Commission's planned meeting schedule for the
5 next four months and open the floor to matters
6 the Commissioners wish to discuss.

7 At the end of tomorrow's session,
8 we will hear from any member of the audience
9 who wishes to speak. We've allowed for an
10 extended public comment period at the end of
11 tomorrow's meeting in light of the significant
12 number of people who've commented at past
13 meetings of the full Commission.

14 A sign-up sheet for the public
15 comment period will be available tomorrow
16 morning starting at 8:00 a.m., closing at
17 11:00 a.m. Of course, the amount of time
18 allotted to each speaker will depend on the
19 number of people who wish to speak.

20 With that, I want to give the
21 Commissioners any opportunity for any
22 statement or comment they wish to make before

1 we hear from our first speaker.

2 Are there any comments from the
3 Commissioners?

4 (No response.)

5 CHAIR HAMILTON: If not, we will
6 proceed.

7 Before we hear from our invited
8 speakers, and in an effort to both inform the
9 Commission and ensure transparency, we've
10 asked Commissioner Moniz to give the
11 Commission an overview of the recently
12 released MIT report on the future of the
13 nuclear fuel cycle.

14 He is joined by his colleagues,
15 Dr. Charles Forsberg and Andy Kadak.
16 Commissioners Sharp, Lash, Meserve, and Rowe
17 served on the Advisory Committee for the
18 report, so they are undoubtedly familiar with
19 the results. However, as the report makes
20 clear, the Advisory Committee members provided
21 advice and perspective to the MIT study group
22 but were not asked to endorse the report,

1 findings or recommendations.

2 We take this opportunity for the
3 rest of the Commission and for those observing
4 our work to better understand the MIT study's
5 methodology, assumptions and conclusions. We
6 appreciate the willingness of Drs. Moniz,
7 Forsberg, and Kadak to join us today. We look
8 forward to their comments.

9 Dr. Moniz, you may begin.

10 MEMBER MONIZ: Thank you, Mr.
11 Chairman. We're pleased to have this
12 opportunity, and I will reinforce your message
13 that the Advisory Group does not endorse the
14 recommendations, at least as a group.
15 Hopefully, as individuals, many of them
16 endorse many of the recommendations. I would
17 just say that, as well, that, that pertains to
18 the sponsors who almost more assuredly do not
19 endorse all of the findings and
20 recommendations as a group.

21 (Laughter.)

22 MEMBER MONIZ: Is there a clicker?

1 Oh, here we are.

2 Just to give you an idea, this is
3 the study group. The only point I will make
4 here is that, without going through it, is
5 that we've put together a multidisciplinary
6 group, certainly people in the nuclear
7 engineering business, but scientists,
8 economists, political science, and this is the
9 characteristic of all of our future-of
10 studies, which this is the fourth in the
11 series in the series, covering nuclear power,
12 coal -- natural gas previously -- and solar
13 energy and the grid in the next couple of
14 years.

15 In all cases, what we are doing is
16 trying to provide technically grounded
17 analysis and recommendations for how these
18 particular energy sources may be marketplace-
19 competitive, looking forward particularly in
20 the context of a carbon-constrained world. As
21 I already said, we have a distinguished
22 advisory group. I should say this advisory

1 group was formed two and a half years ago or
2 so, well before this Commission, at least, was
3 assembled.

4 Next, as I said, we have a set of
5 sponsors. EPRI was the lead sponsor with
6 contributions from, as you can see, Idaho, NEI
7 and others.

8 So, why did we revisit nuclear
9 following our initial 2003 report? Basically,
10 a lot has changed. Certainly, nuclear power
11 is seeing accelerated deployment globally --
12 not the United States, at least not yet. On
13 the other hand, there have also been major
14 changes in the United States, certainly the
15 whole Yucca Mountain issue, issues of recycle.
16 We thought it was timely three years ago to
17 revisit this question with a stronger focus on
18 fuel cycle issues compared to our earlier
19 report.

20 What we will do very briefly is
21 run through this, so there's some time for
22 questions, as I will give a very high-level

1 run-through kind of narrative of overarching
2 points, and then my colleagues will reinforce
3 and go a bit deeper into three of the critical
4 issues that underpin this set of conclusions;
5 namely, the question of uranium resources,
6 issues around long-term storage and then some
7 issues around fuel cycle choices and waste
8 management. So, four high-level messages:

9 First, for the next several
10 decades in the United States, the once-through
11 fuel cycle using light water reactors is and
12 remains the preferred economic option.
13 Underpinning this are several issues, but this
14 includes, as you will hear, what we believe is
15 a completely adequate uranium resource base
16 for a long time, and the fact that the science
17 underpinning geological isolation remains
18 sound.

19 Resource extension and waste
20 management benefits of limited recycle, like
21 the MOX processes pursued today, are minimal
22 and we also have a context that, even if one

1 preferred a different fuel cycle, it takes a
2 long time in this business to make a
3 transition. LWRs will be a workhorse for a
4 long time and things like total transuranic
5 inventories or uranium needs in a growth
6 scenario are not materially different in this
7 century for any of the fuel, core fuel cycle
8 choices.

9 Second, we believe planning for
10 long-term managed storage, or interim storage
11 with a planning horizon of a century should be
12 integral for fuel cycle design. Design is
13 italicized because we mean design of the fuel
14 cycle has to incorporate long-term storage as
15 integral to that process.

16 Among other things, this
17 preserves, and we should preserve, options for
18 future choices in disposal, reprocessing
19 and/or recycle. A reason for that is that
20 today there are major uncertainties that we
21 cannot resolve that will influence informed
22 choices in the future.

1 Some of these are, if you like,
2 societal, such as we don't know the future
3 trajectory of nuclear power, let's say in the
4 United States, which would have a profound
5 influence on the optimum choice of a fuel
6 cycle, nonproliferation norms, but also
7 technical issues, as we will go into more
8 detail. The technology pathway even, let's
9 say, for closed fuel cycles, is not clear. We
10 would argue that we do not know today whether
11 an optimum choice will treat spent nuclear
12 fuel as a resource or a waste.

13 We do feel that moving spent
14 nuclear fuel from shutdown reactors is
15 something that should commence as soon as
16 possible, as this Commission has heard already
17 in many ways, and not for reasons of economics
18 or safety but for reasons of how one puts
19 together a fuel cycle with built-in, very
20 long-term managed storage. We feel that
21 moving to centralized managed storage is
22 preferable.

1 A key technical point which
2 underpins policy in an important way -- it's
3 really an amplification of comments already
4 made -- is that, the idea that has been kind
5 of floating around for a long time that we
6 need high conversion ratio, an idea really in
7 many ways driven way back when by the idea
8 that uranium resources were constrained. High
9 conversion ratio is not, at least not
10 obviously, the choice. Indeed, we find that
11 lower conversion ratios, like one or one plus
12 epsilon, are sustainable and, in fact,
13 attractive.

14 The key point that this opens up
15 in the policy sphere is that with relaxing
16 that conversion ratio requirement gives you
17 many, many more technology pathways,
18 including, for example, starting up fast
19 reactors with LEU, which bears directly on
20 this question: is spent nuclear fuel a waste
21 or a resource.

22 Finally, in terms of these first

1 four messages, in terms of waste management
2 and geological disposal, well, geological
3 disposal, first of all, is simply needed for
4 any choice and we should get on with
5 developing the geological disposal options
6 with a transparent and public process.

7 A point that we emphasize is that
8 we need to go to a new level of integrating
9 waste management with fuel cycle design. It's
10 not good enough just to ask what goes back
11 into a reactor in the closed fuel cycle; it's
12 what goes into the waste streams. In fact,
13 the waste streams in many ways dominate the
14 costs of going forward, not to mention
15 determine the possibility of various pathways.
16 In that context, we need a new waste
17 management kind of classification system, one
18 that is not, for example, based upon a source
19 of the waste but on its content and the risks
20 posed by different waste streams.

21 In this context, we developed a
22 set of criteria, the last five sub-bullets

1 there, in terms of what one would like to see
2 in an effective waste management organization.
3 Our observation is that these are, none of
4 them, zero of them are recognizable in the US
5 program to date, and that leads us to
6 recommend a quasi-government waste management
7 organization. If and only if it, in fact, is
8 imbued with these authorities -- it will make
9 no sense to create a quasi-government waste
10 organization that has no more authorities than
11 our program has had up to date.

12 Finally, in this overview, let me
13 just make a couple of points on
14 nonproliferation, which is clearly a very
15 important issue, principally an institutional
16 question with some influence, of course, from
17 technologies. We believe that some version of
18 fuel leasing, and we'll go into this more in
19 the full report, for a fixed term is the right
20 approach. But the real message we want to
21 leave here is that, until we resolve a waste
22 management strategy, we are constrained in our

1 national security options because, frankly, we
2 can't get into fuel leasing without a waste
3 management plan.

4 Finally, on R&D or RD&D, we
5 believe that the DOE 2010 Roadmap that we
6 heard about in one of our meetings is a good
7 start. It's a positive shift of the
8 priorities in the program, for example, in
9 having a strong program around improvements of
10 LWR technology. It kind of makes sense. LWRs
11 are going to be a workhorse; why don't we do
12 some research on improving them?

13 I will say, and we have an
14 interest in this, in the sense that also a few
15 months ago we became partners, not the lead
16 but partners, in the innovation hub created at
17 Oak Ridge for advanced simulation for light
18 water reactor improvements. That's an
19 example, I think, bringing new tools to a
20 high-priority problem.

21 When all is said and done, we
22 recommend about a billion dollars a year, but

1 recognizing that about a third of that, we
2 would argue, is needed to make a significant
3 dent, at least, over a decade in rebuilding --
4 or one might say building -- an adequate
5 research infrastructure to pursue these
6 issues. In time, not immediately, additional
7 funds would be required for appropriate
8 demonstrations, but we believe right now, it's
9 more a focus on exploring alternatives and
10 establishing the infrastructure needed to do
11 the research.

12 So that's a very high level run-
13 through and, Mr. Chairman, I'd suggest that
14 maybe we can go on to discuss and drill down
15 on three of these key issues and then come
16 back to questions if that's acceptable.

17 Thank you.

18 Andy?

19 DR. KADAK: Good morning. I hope
20 the next slide comes up on spent fuel storage.

21 Oh, I'm sorry. I click it? Same
22 presentation, yes. Thank you.

1 My role is going to be to discuss
2 the role of spent fuel storage. Clearly, in
3 looking at our options, this is obviously not
4 a choice; it's the reality for the future of
5 spent fuel at light water reactors.

6 One of the findings that we had
7 was that the time of storage helps in the
8 repository largely because of lower heat
9 loads. As many of you know, the design
10 constraint of Yucca Mountain is, in fact,
11 heat, and the longer we store, the easier it
12 becomes to site such a facility. There is a
13 long transition time, as Ernie has already
14 mentioned, and this interim storage period
15 allows us the time to decide on what is the
16 appropriate fuel cycle for the future.

17 So we're looking at planning for
18 at least, as Ernie said, a hundred years or
19 so. It should be part of the integral waste
20 management design. And this chart basically
21 identifies one of the reasons for making this
22 finding a recommendation, which is the decay

1 heat of the spent fuel helps us in design of
2 a repository.

3 In fact, if you look at the Yucca
4 Mountain history, they took about 30 years to
5 store. They had aging pads outside to allow
6 the spent fuel to decay even further. After
7 even closure or filling up the repository,
8 there was a period of 50, perhaps a hundred,
9 years of ventilation. So as we can see,
10 interim storage is a good thing from that
11 perspective.

12 Ernie also mentioned that there
13 was a transition time of about 40 to 50 years,
14 and this chart basically shows that if we
15 assume fast reactors start on the red line at
16 around 2040 or so, it will take quite a while
17 before it makes a dent in terms of replacing
18 the light water capacity or adding to the
19 light water capacity. And you'll see from
20 this chart, even we assume, at a 2-1/2 percent
21 growth rate, a substantial increase in LWRs in
22 the future with a fast reactor program,

1 aggressive fast reactor program.

2 Now there's much discussed about
3 how important spent fuel from light water
4 reactors is as an energy resource, and it, in
5 fact, does become a Strategic Petroleum
6 Reserve-equivalent if we want to utilize it.
7 And Ernie's point was we need to understand
8 what the real value of that utilization is,
9 and we now have some years to figure out
10 whether it's worth going through an
11 intermediate step of reprocessing for MOX
12 recycle or even using the plutonium in the
13 spent fuel for fast reactor startups.

14 As you also heard him say, it's
15 probably better to start fast reactors earlier
16 with enriched uranium instead of plutonium
17 from light water reactors. In fact, one of
18 the issues was that, what is the cheapest
19 alternative moving forward. As you know,
20 plutonium recycling is not inexpensive, and it
21 adds additional burdens of the waste streams.

22 So a finding that we have is that

1 the burden for spent fuel storage is, is
2 relatively small at operating plants. The
3 marginal cost of at-reactor storage is quite
4 small but it does increase considerably when
5 you have a decommissioned plant. Having been
6 president of Yankee Atomic, I can say that
7 that is a real number every year.

8 So, for decommissioning sites, we
9 would highly recommend moving this spent fuel
10 from the decommissioned sites to some interim
11 storage facility if only to demonstrate that
12 we can do this and to begin the path forward
13 of getting fuel moving in the country.

14 So we're looking to a
15 recommendation that says we should go to more
16 centralized storage starting with
17 decommissioning sites because I think starting
18 a first movement of spent fuel is going to be
19 a tricky and, let's say, controversial
20 process.

21 Now, this recommendation comes
22 with the assumption that you can, in fact,

1 site an interim storage facility without an
2 exit strategy, the exit strategy being a
3 repository or some other facility to take it.
4 As we've seen in this country, there have been
5 many attempts at that, and tomorrow you'll
6 hear from David Leroy about unsuccessful
7 efforts in this regard. So, my sense is it's
8 easy to say and probably hard to do.

9 Now, in terms of storage options,
10 obviously we have several, and storage in a
11 repository is technically sound. One of the
12 recommendations that we looked at, and I will
13 address it later on this afternoon, is using
14 the repository as a storage site, underground
15 storage site, and if, in fact, we decide not
16 to go to a recycle strategy using LWRs, it
17 becomes a disposal site. So you would design
18 for disposal, license for storage, with fully
19 retrievable systems.

20 So the last recommendation or, and
21 another recommendation, is even though we have
22 confidence that we can store spent fuel at

1 reactor sites or interim storage facilities
2 for a hundred years, that does not fully
3 answer the question about what happens when
4 you have to move this spent fuel. There are
5 degradation mechanisms at work, even though
6 the spent fuel is stored in helium, inert
7 environments, degradation mechanisms continue.
8 No one has yet integrated the storage with
9 transportation for, for the safety of the
10 transport and ultimate handling, once you get
11 it either to a reprocessing plant or the final
12 repository or storage facility.

13 So, we're recommending an R&D
14 program to validate the assumption that you
15 can store and then transport for long periods
16 of time.

17 So that would be my presentation.
18 So thank you. Charles?

19 DR. FORSBERG: I'm going to
20 continue with addressing -- drill down to two
21 particular areas. That is the uranium and
22 systems analysis models that we conducted.

1 Our finding is there's no shortage of uranium
2 that might constrain nuclear commitments for
3 most of this century, but this is so central
4 to our recommendations that we encourage
5 additional -- develop R&D to confirm that
6 conclusion. We have strong confidence in it,
7 but it's central on this and thus, appropriate
8 effort should be made to confirm that.

9 A couple of observations on
10 uranium cost assessments. Uranium is about
11 two to four percent of the cost of nuclear
12 electricity. We evaluated the cost of uranium
13 mining versus cumulative worldwide production
14 looking at uranium resources versus ore
15 grades, economics of scale and technology,
16 learning over time. Our best estimate is that
17 a 50% increase in uranium cost; that is, a
18 one- to two-percent increase in electricity
19 cost would occur if -- there are two
20 conditions -- nuclear power grows by a factor
21 of 10 worldwide and we assume each of those
22 plants operates for a full century; in other

1 words, small cost impacts for a very large
2 nuclear power growth.

3 I'm going to show one particular
4 slide that I think is indicative of where
5 we're coming from. This happens to be a slide
6 of the prices of 25 metals over the last
7 century -- copper, nickel, zinc, cobalt and so
8 forth. Over that period of time, the demand
9 for these various metals went up by a factor
10 of 10 to 1,000, and what you observe on an
11 inflation-adjusted basis is that the price of
12 these various metals did not change in a
13 century. Thus, the question is, if all the
14 other metals have this trend, why should
15 uranium be different.

16 I'd like to turn to the second
17 subject. We did a dynamic simulation of the
18 nuclear energy system, and the objective was
19 to examine the implications of reasonable
20 ranges of nuclear energy assumptions and
21 growth rates in the US on various nuclear fuel
22 cycle options. It's an advanced tool, where

1 you put in different assumptions and you see
2 what the results are.

3 Key item -- we modeled multiple
4 fuel cycles. We looked at different growth
5 rates, one, 2.5%, and 4%, and we looked at a
6 variety of fuel cycle options. We looked at
7 a light water reactor with a once-through fuel
8 cycle, a light water reactor with the recycle
9 of the LWR spent fuel into the light water
10 reactor, and a light water reactor -- spent-
11 fuel transuranic materials, mostly plutonium,
12 to fast reactors.

13 Then we looked at a fast reactors
14 with a conversion ratio of 0.75. That is,
15 actinide-burning of the plutonium. We looked
16 at the conversion ratio of 1, where we make
17 fuel as fast as we consume it, and we looked
18 at a conversion ratio of 1.23, the traditional
19 fuel cycle option where you make fuel faster
20 than you consume it in a fast reactor.

21 Now, I'm not going to, I'm going
22 to show you a couple of slides that follow

1 this, but what is noteworthy is we looked at
2 a whole variety of options, and the results
3 sort of came out independent of the fuel
4 cycle. That's the surprising thing that most
5 people are not aware of.

6 This one shows the installed
7 capacity for all of those five fuel cycles
8 with a 2.5% growth rate. In all the options,
9 you end up with a lot of light water reactors.
10 This shows the total transuranics in these
11 five systems -- very different assumptions --
12 and what you find out is there's a 30-, 40%
13 difference in the amount of transuranics in
14 the system whether you have a once-through
15 fuel cycle or a fast-reactor fuel cycle --
16 relatively insensitive to the amount of the
17 fissile -- insensitive to the assumptions on
18 the fuel cycle.

19 We looked at the total
20 transuranics in one of these systems, an LWR
21 spent nuclear fuel fast reactor system. What
22 you find out in these fast reactor scenarios

1 is the total plutonium or the total fissile
2 material is about the same as with other fuel
3 cycles; it's just, the location varies. You
4 have more of the plutonium in the reactor
5 core, less in the repository.

6 We looked at the cumulative demand
7 of uranium for the medium case, a whole bunch
8 of fuel cycles. Total uranium demand? Well,
9 gee, for 2050, there's almost no difference in
10 all these different scenarios. And even by
11 2100 for the middle growth scenario, you see
12 there's like a 30% difference in uranium
13 demand. In other words, you could have lots
14 of different fuel cycles, and some of the main
15 measurements stay very similar, which is in
16 some sense rather surprising.

17 This brought us to the question
18 after we looked at all this, looked and
19 realized there wasn't much difference between
20 these various cases, we said maybe we should
21 rethink the fuel cycle assumptions and ask
22 what our options are because it turns out many

1 of the results are independent of the option.
2 We asked the key question of, what if we
3 started fast reactors with enriched uranium,
4 low enriched uranium, less than 20%, rather
5 than plutonium.

6 Now, historically, fast reactors
7 have been started on high enriched uranium,
8 but recent work at MIT and elsewhere indicates
9 that we should be able to start them on low
10 enriched uranium. Now, if you start fast
11 reactors on low enriched uranium, what it
12 means is that your fast reactor long-term fuel
13 cycle is totally decoupled from the light
14 water reactor spent fuel and the light water
15 reactor fuel cycle. You have two cycles and
16 they're independent of each other. There's no
17 connection, and LWR spent fuel becomes a
18 waste.

19 We took a look at things like
20 uranium requirements. This happens to show
21 the once-through fuel cycle. This shows
22 various fuel cycles where we start with low

1 enriched uranium and fast reactors, and the
2 funny thing is, is the total uranium
3 consumption for the whole system goes down.
4 The report goes into the complicated details
5 of why but the more you look at this idea of
6 starting up on low enriched uranium, the more
7 potentially attractive it is.

8 But it has a couple of other
9 implications, and of course, a couple of
10 implications from all these. First is the
11 transition times are very long. Second, any
12 of the scenarios, the LWRs are dominant.
13 Third, recycle has a surprisingly small impact
14 on actual uranium. Fourth, recycle does not
15 lead to applicable large reductions in
16 transuranic waste. Fifth, from a technical
17 perspective, there is little difference in the
18 outcomes of a fast reactor with a conversion
19 ratio of 1 versus 1.23.

20 Well, why is that relevant? The
21 historical assumption is we need a high
22 conversion ratio. That's why we chose a

1 sodium-cooled fast reactor. If you take that
2 assumption away and you say a conversion ratio
3 1 is fine, instead of having one reactor
4 option, you have many reactor options for a
5 sustainable long-term fuel cycle. The bottom
6 line is one doesn't know which one of these
7 options is the preferred option. Important in
8 that context of course is that some of these
9 new options may have superior characteristics
10 compared to the traditional options.

11 So, the results of our analysis:
12 lots of fuel cycles, but the outcomes in terms
13 of transuranic are about the same, but by
14 slight changes in some of the assumptions, we
15 open up a much wider options space that we
16 think needs to be investigated before you go
17 forward on long-term sustainable reactors.

18 That leads for our recommendation.
19 Integrated system studies and experiments with
20 innovative reactor and fuel cycle options
21 should be undertaken in the next several years
22 to determine the viable technical options,

1 define time lines when decisions need to be
2 made and select a limited set of options for
3 the path forward.

4 Thank you very much.

5 MEMBER MONIZ: So, Mr. Chairman,
6 I'd like to say that we kind of raced through
7 this perhaps, but we did want to leave enough
8 time for questions.

9 CHAIR HAMILTON: Okay, we thank
10 you for your presentations.

11 We'll open it up to the
12 Commissioners for questions.

13 Pete, go ahead. Are there
14 questions? Allison.

15 MEMBER McFARLANE: Great. Thanks
16 very much, you guys. I appreciated that. I
17 did see a preview the other day.

18 So, a couple of questions. So
19 first, that one of your first conclusions,
20 Ernie, was that you said that we should be
21 planning our fuel designs, fuel cycle designs,
22 for, sort of on the century scale. What's the

1 historical basis for that? Has anything been
2 designed thinking this century out and then
3 actually there's really been a follow-through
4 that's been measurable?

5 MEMBER MONIZ: Well, Gothic
6 cathedrals took many centuries to build. Of
7 course, the flaw in that argument is that
8 you've got a place in heaven no matter which
9 piece you did, which is not the case with
10 waste management, I'm afraid.

11 But, look, obviously, anything we
12 do that requires a commitment for a long time
13 line, we understand is difficult. That
14 doesn't change the fact that we need to get
15 launched in this direction. We want to
16 emphasize that what we said is that the
17 planning horizon should be for a century.
18 That fits the time scales needed.

19 As Andy noted, it's not that
20 different from the implicit time scale we had
21 anyway for, let's say, Yucca Mountain. It is
22 not different materially from the planning

1 horizons in other international spent fuel
2 programs in terms of the need for storage,
3 whether it's through ventilation or some other
4 approach. But we do emphasize it's a planning
5 horizon, and clearly, if at some point in that
6 period one decides that one should proceed
7 with disposal or one should proceed with
8 partitioning the fuel for any purpose --
9 resource extension, waste management, both --
10 the option is there.

11 In fact, I would turn the question
12 around and say that, from the beginning in
13 this business, the value of maintaining
14 options has been strangely discounted in
15 contrast to any other business that I know of
16 that assigns great financial value to being
17 able to maintain options at a low cost, which,
18 which is the case here. So I think all of
19 these things come into our feeling that that's
20 kind of the right time scale.

21 We also, on the other side by the
22 way, pressing your point maybe even harder, as

1 Andy noted, we feel that -- I'll add a word
2 that Andy didn't say that was on his slide --
3 is that we argue that the RD&D program around
4 long-term storage is not only for validation
5 but for potential extension even longer time
6 periods in terms of maintaining the options.

7 MEMBER McFARLANE: Okay.

8 So can I ask a few more questions?

9 CHAIR HAMILTON: Sure. Go right
10 ahead.

11 MEMBER McFARLANE: All right. One
12 has to do about this billion-dollar-per-year
13 RD&D program, and how much of that do you
14 imagine going to actual understanding disposal
15 relative to demonstration facilities, et
16 cetera? Well, that's one question. Go ahead.

17 MEMBER MONIZ: Well, first of all,
18 there's -- maybe, Charles, if you want to
19 answer this as well -- there is a table on
20 page 16 of the summary report that gives a
21 rough breakout of what we anticipate.

22 Let me first say that, along the

1 lines of what we said earlier, that, of the
2 \$650-ish million that we recommend for RD&D --
3 it's really R&D because major large-scale
4 demonstrations, we are arguing, is something
5 that we should not be entertaining at the
6 moment -- those will be defined through the
7 program over the next years. But we say about
8 \$150 million should be around LWR improvements
9 -- I want to make sure that we're still
10 aligned with those, with those important
11 priorities -- and then another \$100 million
12 around spent nuclear fuel and high-level waste
13 management.

14 Part of that is that dry cask
15 research but other disposal concepts, other
16 enhanced waste and engineered barrier forms,
17 are all areas where we have had, shall we say,
18 an extremely limited program.

19 MEMBER McFARLANE: Yes, that's
20 true.

21 MEMBER MONIZ: And we need to make
22 it a strong program.

1 MEMBER McFARLANE: Yes, okay.

2 Finally, I know when you guys
3 talked on Thursday at CSIS, Mujid Kazimi
4 talked about his systems analysis and he said
5 that when you guys did your analysis, you
6 assumed that uranium would be recycled along
7 with plutonium. I wondered why and I wondered
8 how that affected the outcome of your analysis
9 because nobody really does that. It's not
10 very cost-effective and it implies a whole
11 extra infrastructure.

12 DR. FORSBERG: It reduces uranium
13 demand by about 10 percent. But you're right;
14 economically, it's not currently a competitive
15 option, although it's done on a small scale,
16 mostly a demo scale, in Europe at the time.

17 MEMBER MONIZ: Also in Japan, they
18 have, they have used the uranium from the
19 French --

20 MEMBER McFARLANE: Yes, but this
21 is all very, very small scale, and nobody
22 wants to dirty their centrifuges. You know,

1 send it somewhere else, blah, blah, blah.

2 MEMBER MONIZ: Yes, but I think,
3 Allison, I think the real point is that that's
4 not the big driver. The big drivers are
5 choices around plutonium and minor actinides,
6 and again, not only what goes into the reactor
7 but what goes into waste streams, which is, I
8 think, a really important point that needs
9 emphasis.

10 Also, maybe it's worth just
11 emphasizing that the issue of the LWR role and
12 the long transition times, in the standard,
13 plutonium-initiated fast reactor economy, of
14 course, comes because LWRs are a really
15 inefficient generator of plutonium.
16 Basically, in the growth scenario, you've got
17 to keep building LWRs fast enough to keep
18 feeding the fast reactors --

19 MEMBER McFARLANE: Beast.

20 MEMBER MONIZ: Beast; is that what
21 you said? Yes.

22 Secondly, your huge uranium

1 commitment comes because once you build the
2 LWR to feed the fast reactor, you'd better
3 operate it for 60 years to get your investment
4 back and you've got to keep feeding it uranium
5 all the time. So that is a major part of the
6 dynamics in that cycle.

7 Now, the irony is -- and Andy said
8 a little bit about this. Was it Andy or
9 Charles? I forget which; it was Charles,
10 excuse me -- is that if you do go to this, if
11 you relax the conversion ratio, you go to the
12 uranium feeding, on the one hand, you use less
13 uranium because you're not requiring all those
14 LWRs. You decouple from the constraints on
15 building fast reactors, ironically, so you
16 could transition faster from light water
17 reactors.

18 But then, and it's an issue that,
19 actually, Tom Cochran is here, raised last
20 week is that, of course, the attractiveness of
21 that will depend upon whether or not you can
22 get fast reactors to be cheap enough.

1 MEMBER McFARLANE: Well, that's,
2 that's what --

3 MEMBER MONIZ: And so, it's --

4 MEMBER McFARLANE: That's really
5 the fundamental question, the economics of any
6 of this.

7 MEMBER MONIZ: Absolutely. So
8 there's lots of open questions, which then
9 goes back and reinforces -- well, since we're
10 going to the in this once-through light water
11 reactor fuel cycle for a while, why don't we
12 start using the time strategically and begin
13 to answer these questions?

14 CHAIR HAMILTON: All right, I have
15 four, three others, John and then Al and then
16 Vicky.

17 MEMBER ROWE: Two questions, Mr.
18 Chairman, the first to Dr. Moniz.

19 You talked about the importance of
20 a quasi-government special-purpose
21 organization to manage this process and
22 suggested that, unless it had very

1 comprehensive authorities, it wouldn't make
2 much difference.

3 As I understood your chart, what
4 you were saying is you think such a federal
5 corporation, for lack of a better phrase,
6 should manage everything from coordinating a
7 new scientific review process to controlling
8 the use of the waste disposal funds and
9 ultimately operating an interim storage
10 facility and the ultimate repository.

11 Were you, in fact, suggesting
12 something that comprehensive?

13 MEMBER MONIZ: Well, I'll ask
14 Charles to supplement the answer, or Andy.
15 But, first of all, we are -- the task would be
16 managing spent fuel and high-level waste, not
17 everything about the back end of the fuel
18 cycle but managing spent nuclear fuel through
19 high-level waste, to do so effectively,
20 however, having the ability to be involved in
21 a broader set of decisions.

22 For example, we don't think it's

1 very sensible for some combination of, let's
2 say, government and private sector to be
3 making fundamental decisions about fuel cycles
4 and what waste streams are created without
5 having the person responsible for managing the
6 waste streams in that argument. We would
7 argue today that there's really kind of a
8 decoupling.

9 So, it's about managing spent
10 nuclear fuel, high-level waste, storage,
11 disposal. To do so, you need continuity. You
12 need to have control of the funds, need to be
13 able to talk about what gets shipped when for
14 storage and/or disposal, et cetera. So we
15 listed the characteristics, as we said, none
16 of which seem to have been imbued in
17 organizations up to this time.

18 MEMBER ROWE: But you would
19 include the coordination of the basic review
20 process for deciding the standards and
21 characteristics of an ultimate repository
22 within that organization's authority?

1 MEMBER MONIZ: It could not -- I
2 mean, it would not determine various
3 regulation specifications, which are the
4 government role between NRC and EPA, but would
5 and should be deeply engaged in those
6 discussions.

7 MEMBER ROWE: My second question
8 goes to the issue on the economics of
9 reprocessing. Your point is very clear on the
10 economics and the uranium-supply issue. But
11 some of us have thought that the importance of
12 reprocessing came ultimately from minimizing
13 the amount of waste that requires permanent
14 storage.

15 As I listened to your charts,
16 Charles, you -- it kind of suggests that
17 reprocessing doesn't have a big effect on that
18 amount in the next century either.

19 DR. FORSBERG: Reprocessing
20 doesn't have a major affect. Also, one needs
21 to recognize that volume in particular has no
22 implications on repository design. Heat load

1 can have, but not volume. So whether you have
2 high volumes or low volumes is irrelevant to
3 the discussion of reprocessing and
4 repositories.

5 MEMBER MONIZ: Could I, could I
6 just add a few comments to that, Chairman?
7 The -- clearly, as we showed, in this growth
8 scenario, total transuranic inventories, as
9 Charles showed, are not very different. Now,
10 clearly, as he said, they are in very
11 different places and if you carry on to
12 infinity, then there can be a very large
13 difference in your waste-management challenge.

14 On the other hand, a 2-1/2% growth
15 rate to infinity is not a logical scenario as
16 this would violate a law of physics eventually
17 and eventually is measured in, perhaps in a
18 century kind of a timescale. So, for example
19 -- but if the trajectory kind of levels off;
20 nuclear power stops. It's replaced by solar.
21 Then you still have to handle all of that as
22 waste.

1 So, once again, things like the
2 nuclear power trajectory, et cetera -- great
3 unknowns down the road -- will completely
4 alter the decision space and the policy space
5 that one has.

6 We also point out in the full
7 report that, while issues like volume are not
8 exactly a compelling criterion for a
9 geological repository, one could imagine
10 different strategies. Maybe one partitions
11 light water reactor spent fuel for the
12 purposes of waste management by extracting a
13 very, very small package of minor actinides,
14 and as I described last week, and given MIT's
15 fetish with deep boreholes, one decides that -

16 -

17 (Laughter.)

18 MEMBER MONIZ: -- that is a very
19 appropriate place to put very small packages,
20 et cetera.

21 So it's, again, I just think we
22 have been so blindered in our option

1 decisions, ironically, with no logical
2 pressure -- technically speaking; I don't mean
3 politically but technically -- that we need to
4 have a whole different strategic mindset in
5 terms of how we, how we go forward.

6 CHAIR HAMILTON: I want to remind
7 Commissioners, this phase of our program
8 concludes at 9:30. We have four seeking to
9 ask questions in this order: Al, Vicky,
10 Susan, and Pete.

11 Al?

12 MEMBER CARNESALE: I, too, have
13 two questions. Let me put them both out
14 there, and you can decide.

15 One, I'd like a follow up on the
16 recycle question. Clearly, the result you
17 have is consistent with the result that some
18 others have had; namely, not an appreciable
19 change in uranium demand and not an
20 appreciable changing transuranic waste, but it
21 differs widely from some others' claims.

22 I'd like to know what you

1 attribute the difference to? What is it they
2 were assuming or not assuming, or whatever it
3 might be, that's different than the
4 calculations that leads them to a different --
5 because they, too, have done an analysis.
6 It's not simply them. What is it that's
7 different?

8 My other question relates to the
9 notion that nonproliferation is an
10 institutional problem. Perhaps, maybe, you
11 meant in the context of the nuclear fuel
12 cycle, I presume.

13 But anyway, if you could expand
14 upon, you could expand upon those two things.

15 DR. FORSBERG: Well, I, I can't
16 speak to what other people's analyses are, but
17 the central observation that I make is people
18 have not really looked at the fuel cycles for
19 about 30 years. So, when we came back over
20 the last three years and looked at these with
21 some very new tools that did not exist in the
22 past, we came to these conclusions.

1 But the emphasis I would, again --
2 again -- is that because technology has
3 changed and because we have tools that we did
4 not have a decade ago, we now have an
5 understanding of all these very complicated
6 system dynamics that you can't do on a simple
7 spreadsheet, and that's what's leading to
8 these different, different conclusions than
9 people have seen in the past.

10 A lot of things have changed in 30
11 years, and that's what this reflects.

12 DR. KADAK: Let me add to why
13 people come to different conclusions. I think
14 in listening to people advocate, say,
15 reprocessing is a MOX fuel cycle, there's a
16 belief that there's, this energy stored in the
17 fuel needs to be harnessed regardless of the
18 economics. Okay? People haven't really --
19 and the arguments they make about using
20 reprocessing as a waste management strategy,
21 it's a different philosophy.

22 In our study, we didn't kind of

1 focus on reprocessing as a waste -- or MOX --
2 as a waste management strategy. We basically
3 said, well, let's, why go through this effort,
4 short-term MOX recycle, and why not jump to
5 what you really want to be at, which is a fast
6 reactor fuel cycle? Because that is the long-
7 term sustainable nuclear future.

8 So I, I think it's where you come
9 from and what your expectations are, relative
10 to what the fuel cycle alternatives are, that
11 drives the differences.

12 MR. FRAZIER: Okay, Vicky --
13 excuse me. I didn't want to cut anyone off in
14 response.

15 Vicky.

16 DR. KADAK: There, there was a
17 second question.

18 MEMBER CARNESALE: I asked the
19 second question about nonproliferation.

20 MEMBER MONIZ: Just one correction
21 there is it's as close to recycle, as we
22 emphasize, could be on a thermal reactor, not

1 necessarily a fast reactor.

2 On the proliferation, Al, yes, let
3 me first -- you're absolutely right. We
4 should have made it very clear, we are talking
5 about proliferation as it could be driven by
6 the civilian nuclear fuel cycle. Okay, so
7 we're not talking about proliferation in the
8 broadest sense, North Korea or other, other
9 issues.

10 In that context, our view is that,
11 again, instead of, well, technology could have
12 some influence, our view is that the
13 overarching mechanisms are, in the end,
14 institutional. As an example of a technology
15 influence would be the option of, if you're
16 going to a closed fuel cycle of starting with
17 low enriched uranium for the initial core,
18 would lower your enrichment requirements.
19 But, A, 70 years into the future, and B, it's
20 like everything else, a 20- or 30-percent
21 effect and not a material effect.

22 Going to the uranium, fed, as

1 another example of that particular choice is
2 that -- which may be more material -- is it
3 would eliminate the need for a reprocessing
4 infrastructure for light water reactor fuel.
5 You might have a more distributed
6 pyroprocessing approach, for example, as we
7 saw Idaho. Okay?

8 So there are technology
9 influences, but we don't find them to be, in
10 any case, magic solutions.

11 CHAIR HAMILTON: Okay, Vicky.

12 MEMBER BAILEY: Actually, my
13 question has been asked several times, but I
14 would just make a comment.

15 Ernie, in your slides, and -- you
16 know, you said that the once-through fuel
17 cycle is the preferred option, and I thought
18 "preferred" was an interesting choice of
19 words. I'm always interested in, when I get
20 studies like this, what possibly has been left
21 on the cutting room floor.

22 You obviously had members of

1 industry and others in your participants and
2 in your advisory group, so I thought was
3 interesting -- you know, this is an MIT study.
4 Obviously, it carries a lot of weight, so I
5 expect to have cutting-edge recommendations,
6 and we're looking at the future here.

7 So I was just interested in your
8 choice of words. Obviously, Commissioner Rowe
9 may not go to his commission and recommend a
10 fast reactor. He's not going to recommend
11 anything, according to him.

12 (Laughter.)

13 MEMBER BAILEY: But obviously,
14 there are economic issues there.

15 But I'd just like to know, maybe,
16 some of the other various opinion that might,
17 might have been talked about amongst the other
18 members.

19 DR. KADAK: The word "preferred"
20 was debated hotly. Why do we "prefer" as
21 opposed to "think" the LWRs were going to be
22 the future? My view is there are other

1 technologies that are out there, but the time
2 period is the real issue.

3 It's pretty clear that in the --
4 I'm a fast, I'm a thermal reactor guy, but I
5 think gas reactors might be, have a role in
6 the future. So when he said "preferred", I
7 said, well, are you sure you want to use that
8 word?

9 So, I think by saying "preferred",
10 we avoid or at least kind of neglect other
11 options that are on the table that could
12 provide energy for us, and some of them were
13 already listed -- molten salt-cooled, for
14 example, and some of these new small modular
15 reactors that people are proposing now to
16 address the huge capital cost for LWRs.

17 So, yes, that was the discussion,
18 but everybody sort of concurred, let's use
19 "preferred" for now.

20 MEMBER MONIZ: Also, I think the
21 important point, Vicky, is that the word
22 "preferred" is attached to several things.

1 First of all, "next several decades," it
2 doesn't say "for the next several centuries".
3 Number two, it was first to once-through, for
4 example, using -- I mean, a gas reactor is
5 still going to be a once-through fuel cycle.

6 There are realities of the time to
7 licensing any new reactor, let alone any more
8 complicated fuel cycles. I think the most
9 important part of that, in my view and I think
10 the group's view as a whole, is that certainly
11 for the next several decades, once-through
12 fuel cycle in the context of a planning
13 horizon for long-term managed storage is the
14 preferred option.

15 Another part of third of sub
16 bullet, which -- I'm sure everyone remembers
17 the exact order of the slides --

18 (Laughter.)

19 MEMBER MONIZ: Was that, the
20 benefits of doing something different.

21 Certainly, in the United States,
22 with no sunk costs, let's say, in going to the

1 MOX fuel cycle, we just don't see them. So
2 the preferred option becomes fairly clear.

3 I'm going to say I get a little
4 more inside -- and I think my colleagues can
5 comment on that. When the group started, I do
6 not believe that there was a consensus that
7 there was a starting position on everybody's
8 part, that that was the place we would end up.
9 So I think it was, it was a real conclusion of
10 our discussions.

11 CHAIR HAMILTON: Susan?

12 MEMBER EISENHOWER: Thank you very
13 much for an interesting presentation. I think
14 my question may or may not have been answered;
15 I'm not sure. But I'd like to make a larger
16 observation, then to sort of bring it back to
17 this presentation.

18 I'm generally concerned that the
19 testimony we're hearing is sort of operating
20 at cross purposes because I'm not clear on
21 what problem we're trying to solve. Are we
22 trying to solve this issue of economics, and

1 if so, under what market assumptions, whether
2 climate change is part of that assumption? Or
3 are we trying to solve the problem of waste
4 management reduction? Or are we trying to
5 solve a nonproliferation question? Or are we
6 trying to solve the question of energy
7 maximization? Obviously, we're trying to
8 solve all these problems in some way, but
9 we've got to have a hierarchy for this
10 because, otherwise, all the presentations come
11 in with a different set of assumptions.

12 So I would ask you, what was the
13 principal problem you were trying to solve
14 when you undertook this study? Was it to
15 provide more energy for the future, to manage
16 the national security issues, waste reduction,
17 or finding an economic system for nuclear
18 energy going forward?

19 DR. FORSBERG: It, it was to
20 create, have a viable option to address things
21 like climate change, which implies nuclear
22 energy on a very, very large scale, starting

1 at hundreds of reactors and going up to
2 thousands. So --

3 MEMBER EISENHOWER: Okay. So, in
4 other words, climate change was, was the
5 principal --

6 DR. FORSBERG: Yes.

7 MEMBER EISENHOWER: -- problem you
8 were trying to solve.

9 DR. FORSBERG: Yes, to have a
10 credible option to make a significant
11 difference.

12 MEMBER EISENHOWER: Yes. Thank
13 you.

14 MEMBER MONIZ: Let me add to that,
15 Susan, that our entire set of studies, the
16 future-of series, have a fundamental question
17 behind it, not the only question. But a
18 fundamental question is, in the end, based
19 upon a technical, technically grounded
20 analysis, what are the steps recommended for
21 the relatively near term that would enable
22 technology X to be competitive in a future

1 carbon-constrained marketplace? That's in
2 some sense how we choose the topics -- nuclear
3 now twice; coal, of course with carbon
4 capturing and sequestration; we're doing
5 solar; we just did natural gas as carbon
6 light, et cetera.

7 But it's not the only question we
8 are looking at. But in this case, the
9 question is, ultimately, what steps do we
10 recommend in the near term to enable nuclear,
11 in this case, fuel cycle development for
12 potential -- not predicted and not necessarily
13 wished -- but for a potential growth of
14 nuclear power on a scale material for
15 addressing climate change?

16 Now, of course, at the same time,
17 it's also for supply of energy, et cetera, but
18 that is kind of, that's the mind set that we
19 are coming from. So, in that context,
20 statements about what we should do for waste
21 management organization in the near term,
22 statements about building in the planning

1 horizon on storage --

2 MEMBER EISENHOWER: Right.

3 MEMBER MONIZ: Statements about
4 focusing on LWRs -- that's the game in town
5 for the next several decades; statements about
6 the need to develop waste management in order
7 to have flexibility in the national security
8 nonproliferation arena, statements about how
9 to structure an R&D program -- in the end,
10 these are all about decisions to take now but
11 with the enabling of that bigger, bigger
12 picture.

13 MEMBER EISENHOWER: May I just say
14 that I really, really appreciate the answer to
15 that question. I think we should almost
16 require everybody who's making a presentation
17 to tell us principally what their findings,
18 which problem, which of these many problems,
19 their presentations are trying to solve
20 because I suspect that we're mixing apples and
21 oranges, and at the end of the day, this
22 Commission's going to have to decide what

1 principal problem we're trying to solve when
2 we issue our recommendation.

3 Thank you very much, Dr. Moniz.

4 CHAIR HAMILTON: Thank you, Susan.

5 We have time for only one more
6 questioner. Pete?

7 MEMBER MONIZ: Uh-oh, it's going
8 to be like a Senate hearing again.

9 (Laughter.)

10 MEMBER DOMENICI: I'm not too with
11 it today, so I beg your pardon.

12 First, I know I have only one
13 question, but it's just an observation. It is
14 correct, is it not, that you have recommended
15 that the government explore ways and means to
16 reduce the time and cost of licensing new
17 technologies using a risk-based technology
18 neutral licensing framework?

19 I read that, but I want to leave
20 that, set aside for the moment, an answer, if
21 you, if you tell me. This seems to apply to
22 new technology. What about the existing ones?

1 Is the process too slow or not, or is that not
2 something that you've concerned yourself
3 about, the process of licensing?

4 So my basic question is, with the
5 time lines that you've developed and the
6 uranium resources that you've put into
7 perspective, do you see a scenario where some
8 volume of spent fuel from light water reactors
9 will be directly disposed of in a repository
10 while, even while some volumes might be
11 reserved for potential future reuse by us?

12 What I'm seeing is, and I wonder
13 if we have the evidence, that this Commission
14 could conclude that we already know enough to
15 say that there is more than plenty of purse
16 time through waste, that humankind doesn't
17 need it all, even reprocessing or not, and
18 some significant portion of it could be
19 destined for a repository, a permanent
20 repository, that we might recommend be done.

21 If we did that and cared for
22 making sure that we reserved some -- it didn't

1 all go that way, but we reserved a quantity --
2 that we know it's adequate for further use.
3 Could you discuss that? That seems to me to
4 be something that stood out to me as I talked
5 to people. Certainly, I came to this
6 Commission not thinking of that, and I should
7 have.

8 But to me, this is the basic
9 simplicity of this, that we're now finding
10 that quantities justify some decisions, and we
11 don't have to wait forever for those
12 quantities to, to develop. We're going to
13 have plenty, if not more than we could ever
14 use, of spent fuel of nuclear energy. So some
15 of that is going to be put away, and we can,
16 we could say that right up front, that America
17 will have a repository, and start that part.

18 Can you talk about that?

19 DR. KADAK: Let me, let me address
20 the technology-neutral framework idea. I
21 think it's a very useful approach to license
22 new technologies that are not traditional in

1 the LWR sphere. The NRC is moving to apply
2 technology-neutral licensing. It's slow, but
3 it's moving. As we now observe in the LWR
4 industry, NRC is moving more to a risk-
5 informed licensing strategy, so that's all
6 good news.

7 Let me just, let me just introduce
8 the second answer, the answer to your second
9 question. I think I mentioned that one of the
10 options we looked at was, for repository
11 design, make it fully retrievable; meaning, it
12 becomes an underground storage facility. So,
13 if it is found to be useful as a resource,
14 spent fuel, it can be easily removed. The
15 Yucca Mountain design was not done that way.
16 It was pretty much a repository, and even
17 though they say it was retrievable, it really
18 was very difficult to do.

19 So if you design an underground
20 repository as a storage facility able to be
21 reused as needed, that is, in my view at
22 least, the optimum solution.

1 MEMBER DOMENICI: Let me, let me
2 just say, before you leave the mic, Professor,
3 salt and similar, similar things that are out
4 there that we can use lend themselves to a
5 permanent, permanent repository, not
6 necessarily one that you can remove the
7 substance from. I'm not suggesting that we
8 leave waste in salt, where it is not
9 retrievable. We have plenty of information as
10 to how much access we have. Why do we have to
11 make it retrievable?

12 DR. KADAK: Well, I guess, to keep
13 the options open.

14 MEMBER DOMENICI: Well, you could
15 keep the option open by saying, we shall never
16 let the reserve of once-through fuel get below
17 a certain level and go ahead and use the rest
18 for a permanent repository; couldn't you?

19 DR. KADAK: Yes.

20 MEMBER DOMENICI: That, to me -- I
21 wanted to make sure we got that on the record
22 because that seems very practical to me, and

1 it satisfies another group of people, mainly
2 those that might have to have the interim
3 repository in their neighborhood because you
4 can then tell them, here's living proof that
5 everything is not going to come to your area
6 and stay there forever; we're also going to do
7 a permanent repository and start putting once-
8 through fuel in there as long as we have
9 enough left over. I just want to make sure I
10 understood that.

11 DR. KADAK: I would just add to
12 that, Senator, that, first of all, we
13 certainly agree that we should be aggressively
14 developing a geological repository or
15 repositories options.

16 MEMBER DOMENICI: Yes, sir.

17 DR. KADAK: That's very important.

18 Secondly, exercising the
19 repository early on makes a lot of sense. I
20 would add, however, that it's not only the
21 civilian waste. We also have the defense
22 waste. The production complex waste in

1 particular is finite and not growing, and I
2 think we should be getting a little fire under
3 that program to start getting the waste ready
4 for geological disposal. The submarine fleet
5 waste will keep growing, but again, these are
6 modest amounts. We're talking there thousands
7 of times, ultimately, of defense waste. I
8 think that would be a very interesting
9 priority to be moving that into a geological
10 repository.

11 As far as the civilian waste goes,
12 we certainly -- there are many options,
13 including the one that you say. The only
14 caution is that, because we do not know what
15 a possible nuclear-power growth scenario is
16 and we don't know if we are going to use that
17 light water reactor fuel as a resource, if we
18 do, in the traditional fuel cycle, as we saw,
19 we need a lot of, we would need a lot of
20 plutonium to feed those reactors.

21 So, in the end, I think the
22 important point is moving aggressively on a

1 geological repository and exercising it as
2 early as we can.

3 DR. FORSBERG: Two technical
4 observations. One --

5 CHAIR HAMILTON: We can conclude
6 with your observations.

7 DR. FORSBERG: Yes, two technical
8 observations. One, there have been designs of
9 salt repositories with suitability of spent
10 fuel back in the '70s.

11 Second, if economics is a
12 criterion in recycle of spent fuel, I would
13 suspect in the long term that much of the
14 spent fuel will be reprocessed but other spent
15 fuel will be considered uneconomic because of
16 particular technical characteristics. It's
17 just like uranium ore grades: We mine the
18 high ore grades; we don't mine the low ore
19 grades. Spent fuel is in the same context as
20 a resource.

21 CHAIR HAMILTON: Well, our thanks
22 MIT and Drs. Moniz and Forsberg and Kadak for

1 a very, very good opening discussion. We're
2 grateful to you.

3 CHAIR HAMILTON: We'll move now to
4 the next topic for the morning, International
5 Perspectives on and International Implications
6 of U.S. Decisions at the Back End of the Fuel
7 Cycle

8 We'll hear from each speaker for
9 15 minutes and then engage in a panel
10 discussion with all five of the speakers, so
11 we ask the Commissioners to only ask
12 clarifying questions during the presentations,
13 save their other questions for the panel
14 discussion.

15 Our first invited speaker is Dr.
16 Vic Reis, Senior Advisor to the Office of
17 Science within the US Department of Energy.

18 Dr. Reis, you may proceed. Thank
19 you very much for coming.

20 DR. REIS: Thank you. My first
21 thing, well, I was going to tell you I'm not
22 to talk about the subject you asked me. I

1 will talk about what I believe, the total
2 problem that the Commission is looking at.
3 So, I'll give you my advisory thoughts on what
4 that ought to be, and we can discuss the
5 international stuff as part of the panel.

6 I've been in this business --
7 let's see -- for quite some time, starting
8 with stockpile stewardship, the global nuclear
9 energy process, and I'm doing this right now.
10 Dan Ponemon asked me to look about, involve
11 how the high-performance computing could be
12 done here. So I didn't -- let me take, let me
13 take Ms. Eisenhower's advice, starting out
14 with -- first of all, let me say what my
15 assumptions are. Let me make some postulates
16 in terms of what they are, I believe the valid
17 end, then tell you what I think the answer
18 ought to be.

19 First of all, the availability and
20 effective use of electricity is
21 extraordinarily important, both for the US and
22 the rest of the world. Climate change due to

1 carbon dioxide is real. But it's also time-
2 critical. This time-critical part is
3 essential to what I'm, I'll be suggesting.
4 Nuclear power is a primary replacement for
5 coal-burning baseload electricity.
6 Electricity generation in the US will mostly
7 remain in the private sector. The US
8 government's responsibility is for environment
9 safety, national security, and well-being.
10 Those are, if you will, my going-in
11 assumptions.

12 Putting that together, I say the
13 US government will require a rapid growth of
14 affordable, safe, secure nuclear power. Why?
15 That's because we want to reduce those
16 emissions a lot, and as soon as possible. So
17 it's this rate problem, I think, which drives
18 much of what we're doing.

19 At the same time, if we're going
20 to do that, we've got resolved the spent fuel
21 management, and we have to, at least the US,
22 should be a global leader in dealing with

1 nonproliferation. I would recommend -- I'm
2 sure that Jim Timbie will discuss that in some
3 detail.

4 So what can the government
5 actually do about it? Well, of course, the --
6 not necessarily as part of nuclear, but of
7 course, but as I'm sure everybody is aware, is
8 that the cost of carbon emissions has got to
9 be a major play. But within the large nuclear
10 reactors, I'm suggesting that, of course, loan
11 guarantees is probably the only tool the
12 government has available to it.

13 For small light water modular
14 reactors, I'm suggesting the government can
15 help with the design certification, combined
16 operating licenses, and also be a first user
17 of this technology.

18 It could provide sites for dry-
19 cask interim storage and take back used fuel.
20 It could generate a salt repository for
21 commercial waste. We're going to hear more,
22 of course, as we discuss the whole idea of

1 international fuel banks both for supply and
2 take-back, and then of course it can do
3 advanced R&D.

4 So those are the roles that I
5 think the government specifically can do, and
6 what I'll try to show is how you put those
7 things together into an integrated, basically
8 an integrated strategy.

9 So this is the light water
10 reactor, LEU fuel -- both of those things are
11 important, that they're light. They're for
12 small modular reactors. I believe the
13 Commission has seen some of this, so I can go
14 it through very quickly. There are two,
15 potentially at least two, credible designs
16 that are getting ready to be, through, going
17 through the license process.

18 But I think was important for them
19 is, the industrial base to support this, I
20 believe, is for the most part available and
21 can be built up. It builds upon an industrial
22 base which we've done for the US Navy in terms

1 of submarines. I believe that's important.
2 Because they're LEU and because they're light
3 water reactors, then we can move rapidly, I
4 believe, to get them licensed and onboard.

5 The role of the first user is
6 something that I believe that the DOE sites
7 themselves, and then the DOD can in fact be
8 used. The DOD is required by the presidential
9 Executive Order 13514 to reduce their
10 emissions by almost 30 percent by the year
11 2020. If you look across the board, that is
12 a significant, difficult problem, but small
13 modular reactors very possibly could play a
14 serious role in this, and people have looked
15 at that, and the numbers begin to be sensible.

16 There's about a gigawatt of
17 electricity that's used by these systems.
18 Most of the sites are large accelerators,
19 large computers, which use a lot of
20 electricity, and they get their electricity
21 off the grid, which tends to be carbon- or
22 coal-dominated.

1 Okay, so this is, what you do you
2 now do about spent fuel management? Well, of
3 course, the error here is interim storage with
4 dry casks. I point out a very good -- well,
5 it doesn't quite make it onto the screen, but
6 there was a very good study that was done back
7 in 2001 -- some of your commissioners
8 participated in it -- where they said interim
9 storage is a key element of the fuel cycle,
10 regardless of whether they're planned
11 permanent option and for reprocessing and
12 direct disposal. I believe that's correct,
13 but of course, they also say, like we know,
14 that's not enough; it has to be permanent
15 storage.

16 Well, here's one. You know, this
17 is the Waste Isolation Pilot Plant, which has
18 actually been demonstrated at the National
19 Academy way back in 1957. I think that's when
20 I graduated from college -- said salt was
21 preferred, was the preferred option for
22 permanent storage, I think probably the

1 analysis will still show it's the preferred
2 option, and in fact, indeed, we've now
3 demonstrated it.

4 It's got, had -- the WIPP, the
5 Waste Isolation Pilot Plant, has been
6 operating now for 11 years. It primarily uses
7 low, low radiation defense wastes, but
8 nonetheless, it can be used for high. The
9 analysis indicates it can be used for high,
10 highly radioactive waste, and some highly
11 radioactive waste actually goes down there.
12 It's been EPA-certified. It's been analysis
13 to show it's been there for 250 million years,
14 which is a pretty reasonably long time. But
15 in addition, it has strong local support, and
16 we know the cost. I've just indicated that
17 one of your members, Senator Domenici,
18 actually has been there and can describe it,
19 I'm sure, in some detail.

20 What about nonproliferation?

21 Well, of course, assured nuclear fuel services
22 is really the key. There are some very good -

1 - we've been talking about that for some time
2 -- a paper by Carter, Perry, Kramer,
3 Scowcroft; another very good paper by Deutch,
4 Kantor, Ernie Moniz, and Dan Poneman. Of
5 course, more recently in his Prague speech,
6 President Obama has said this whole idea of
7 the international fuel bank is kind of the way
8 to go.

9 Somehow how do I put all these,
10 these things together? Well, you start off by
11 light water reactors, both large and small.
12 Interim storage and salt repository is kind of
13 the key, I think, of making this happen.
14 Again, you go into interim storage. Do we
15 have to deal with, what are the oversea
16 reactors? They're primarily low light water
17 reactors with LEU as well. Of course, you set
18 up a fuel bank and then do the take-back where
19 the take-back goes into the interim storage
20 facility.

21 The other important point, and
22 we'll be talking about that in front in the

1 panel, is that while that's a diplomatic heavy
2 lift, it's also an enormous diplomatic
3 opportunity for getting, if you will, the
4 nations of the world to agree on how that
5 happens. Then, interim storage can eventually
6 either be put into the permanent repository --
7 we're suggesting salt -- or future fast-
8 recycle systems, and of course, what Dr. Moniz
9 and the MIT folks have said. There are a
10 number of options there. I've indicated fast,
11 but in fact, what we're saying is that it
12 could be others as well.

13 Now, I just want to leave with one
14 thing. Of course, what you're dealing with
15 here is not really just where to put this
16 stuff in the ground and whether John Rowe make
17 some more money with Exelon or not. These are
18 really transcendental problems that go back to
19 the beginning of the Cold War.

20 This is Eisenhower's "Atoms for
21 Peace" talk, where he first embeds nuclear
22 power, then describes this situation. I would

1 argue that President Obama has made a very
2 equivalent statement in his Prague speech back
3 in April of 2009.

4 CHAIR HAMILTON: Thank you very
5 much, Dr. Reis.

6 DR. REIS: I almost got you back
7 on time.

8 CHAIR SCOWCROFT: Thank you very
9 much, Vic.

10 I think the advantages of the
11 Small Modular Reactor are obvious, but one of
12 the problems that's apparent that we have to
13 deal with is the "not in my backyard"
14 syndrome. If you proliferate these small
15 reactors around the country, won't you magnify
16 the problems and the objections to nuclear
17 power in general?

18 DR. REIS: Well, that's certainly
19 an issue. The suggestion generally starts off
20 by adding these two nuclear reactor sites that
21 are already available, and as time goes on, I
22 think the obvious place to put them for is the

1 replacement of coal. You know, large coal
2 plants, even moderate coal plants, also have
3 a "not in my backyard" situation. That's one
4 of the reasons, by the way, I'm also
5 suggesting that the Department of Energy and
6 the Department of Defense and the others can
7 act, if you will, as the first mover both in
8 terms of moving that industry along and also
9 providing, also providing sites.

10 I think the data that I've seen
11 said once a nuclear reactor is in an area, the
12 populace becomes big supporters. There's no,
13 there's no pollution, there's no -- we don't
14 have to go through all that now. So I think
15 that certainly is an issue, but I think
16 there's a pathway, there's a pathway to making
17 that happen, and I believe that's where the
18 Department of Energy can play a significant
19 role in making that, in making that happen.

20 CHAIR HAMILTON: Dr. Reis, thank
21 you very much. We'll have you back on a panel
22 here in a few minutes while we go ahead with

1 the other speakers.

2 DR. REIS: All right. Thanks.

3 CHAIR HAMILTON: John, did you
4 have a question?

5 MEMBER ROWE: Yes, just one.

6 Vic, you assume or postulate salt
7 is the preferred medium for, the ultimate
8 repository for waste. Do you think there is
9 a body of research that says that salt is
10 clearly superior in the United States to the
11 other geologic options?

12 DR. REIS: Yes, I do. Yes. I
13 think starting with the National Academy study
14 back in 1957, people have reviewed that said,
15 you know, that still holds true. That doesn't
16 mean there aren't other options as well, but
17 I do believe salt is certainly the preferred.
18 Most importantly, we've been doing it, so we
19 understand what, the costs.

20 In addition to that, there's a
21 very enthusiastic and technically qualified
22 population around that area, so they are

1 anxious to have that, anxious to have that
2 happen.

3 Of course, the radioactive
4 isotopes -- I don't know really whether they
5 came from a defense use or a reactor.

6 So I'm convinced that that's the
7 preferred solution.

8 CHAIR HAMILTON: Dr. Reis, thank
9 you very much.

10 DR. REIS: Okay, sure.

11 CHAIR HAMILTON: We'll look for to
12 seeing you on the panel in a few minutes.

13 The next speaker is Dr. Charles
14 McCombie, Arius Association in Switzerland.
15 He's come a long way to be with us today.

16 We appreciate that much, and you
17 may proceed, sir.

18 DR. McCOMBIE: Thank you very
19 much, Commissioners. Well, I really
20 appreciate the opportunity to put to you my
21 views on how programs, fuel cycle programs and
22 waste management programs in the USA can

1 affect developments in the rest of the world.

2 This is especially important, of course,

3 nowadays when we are expecting a large

4 increase in global nuclear power, and it will

5 probably expand very strongly, as you see

6 indicated here.

7 If it does, it's in the interests

8 in all of us to see that any expansion like

9 this -- and this is the purpose of my talk, as

10 the Commissioner Eisenhower said -- is that it

11 must happen safely, securely, and without

12 social unrest. It's the last part that I'm

13 going to come to a couple of times in my talks

14 to you today.

15 So, these goals can only be

16 achieved if the back end is done in a

17 responsible way everywhere in the world. How

18 it's done in other parts of the world is

19 affected, some things positively and sometimes

20 negatively, by how it's done here in the USA.

21 So what I was going to do is look at two

22 issues very quickly, given the time we've got,

1 reprocessing geological disposal -- what's the
2 status today; what's the impact of U.S.
3 policies in my opinion -- and is there a way
4 forward?

5 Reprocessing is big technology, as
6 you know. In Europe, these were the biggest
7 building sites there ever were in Europe as
8 they were being built, so commercial
9 reprocessing's not a small job.

10 If you look at the history of
11 reprocessing without going through it in
12 detail, it's necessary to look at the
13 checkered history of reprocessing in the
14 States. You invented it, and then you
15 decided, or your president at that time, it
16 was not a good idea, and you tried to persuade
17 the rest of the world it was not a good idea
18 with little success; yes?

19 You persuaded people it was not a
20 good idea for economic reasons and other
21 nonproliferation reasons. That persuaded some
22 people. Money talks; yes? Then suddenly out

1 of the blue, of course, you came back, and
2 then we had all of this, and suddenly, it was
3 on the table again. I don't know if you
4 realize how that impacts on people outside the
5 USA. Suddenly the coin's turned, and
6 reprocessing is not just "in", but desirable.

7 So what is the status with
8 reprocessing? First of all, it works well.
9 It works well in some countries. There's
10 nothing wrong with reprocessing, at least in
11 France. In my second home country, the UK,
12 it's got more problems. Of course, we could
13 improve today's reprocessing, the separation
14 efficiency, emissions, the plutonium
15 separation has been mentioned, and economics
16 are currently unfavorable. You can argue
17 whether that's because reprocessing is too
18 expensive and/or uranium is too cheap. We rip
19 stuff out of the ground at pretty cheap rates
20 all over the world today, and I'd like to come
21 back to that in the ethics discussion this
22 afternoon.

1 Of course, the other issues of re-
2 effect, reprocessing, are the resource
3 conservation -- Andy Kadak mentioned that --
4 environmental impacts, which have led to lots
5 of discussion in many countries where
6 reprocessing has been introduced,
7 proliferation concerns, transport concerns,
8 which weren't mentioned. If you ship around,
9 of course, it's a big thing, and back again to
10 the economics.

11 Using my time, I'm going to jump
12 right to what I think, in the reprocessing
13 area, might happen. What should happen?
14 Well, this is actually in line -- these slides
15 were prepared before your MIT report --
16 reprocessing. Concentrate it, and a few
17 countries are going to have full recycle
18 facilities. Build new facilities; don't build
19 nonsensical copies of French facilities now.
20 There's no need for them. Build them when
21 there is a need, and that means when fast
22 reactors are around today, when recycling --

1 I should say, there are a lot of fast reactors
2 -- looks to be a certainty. Then is the time
3 to close the fuel cycle.

4 Of course, you should develop more
5 proliferation-resistant technologies. I agree
6 that it's not the total answer, but it'll
7 certainly help in the answer there. And then
8 you should enhance incentives for other
9 countries to desist from reprocessing. Up
10 until now, it has been done with security of
11 supply -- big talk about this. Security of
12 supply has never been a problem. There's a
13 market there. People are fighting to give you
14 fuel.

15 But where there is a problem is
16 with the back end. It's with the geological
17 disposal, where it possibly costs a billion,
18 to \$4 billion, the cheapest one around. Maybe
19 helping with geologic disposal could be the
20 carrot that would be more likely to persuade
21 countries to desist from reprocessing.

22 Unfortunately, in this area, the

1 US is not showing a good example, and that's
2 the set of slides I'm going to rush through
3 now. In the geological area, the first thing
4 to know is this in the middle here. Every
5 country needs geological disposal. I'm really
6 pleased the MIT study says that, and we
7 believe that. The problem is we don't tell
8 enough people that this is true, and it's not
9 universally accepted. It's accepted in our
10 circles, in the insiders? Well, I'd like to
11 emphasize that point.

12 If you want to solve this waste
13 problem and overcome the resistance to it,
14 there's this nice quotation here, the
15 definition of insanity. I lived through this.
16 In the '70s, it's exactly what we did. In the
17 '70s, we said we can do all this without
18 having a back-end solution. We ignored waste
19 disposal issues. We were confident; we had
20 waste confidence then, without knowing the
21 word would be invented 30, 40 years later. "A
22 repository will be available when we need it."

1 I'm really astonished that people can say that
2 now because it wasn't available when we said
3 we would need it, so why should we believe
4 this the second time around?

5 So, what can we do to make that
6 better? Well, I think we could work on this
7 to get the consensus that geological disposal
8 is feasible and it's safe if it's done the
9 right way at the right place, and we have to
10 change our way of siting these repositories.
11 The whole issue of geologic disposal, of
12 course, you invented that as well back in
13 1957. We've already seen. It was invented
14 not because it's a cheap and nasty "out of
15 sight, out of mind" solution. It was invented
16 because that's the only place that it's known
17 to be safe.

18 I get fed up hearing people
19 saying, we can't tell what people will be
20 doing a thousand years from now, or two. It
21 doesn't matter what they're doing up there a
22 thousand years from now if I'm 500 meters down

1 here, where it's been -- somebody said, 250
2 million years. We don't bring that point
3 through enough.

4 In the geological disposal area,
5 what the US has done well, of course, is lots
6 of the technology, lots of the technology.
7 It's all been positive. But there's been more
8 negative than positive signals. First of all,
9 the government's program is totally non-
10 transparent, I suspect, from inside the
11 country, never mind from outside the country.
12 The siting process is driven, at least in its
13 final stages -- not up until then; it was good
14 -- the final stage when it was pretty clearly
15 political rather than scientific.

16 The staging study that was
17 mentioned, One Step at a Time, which I chaired
18 and where Tom Isaacs did most of the real
19 work, was actually a very good way forward.
20 The DOE sponsored it and then ignored it, and
21 Canada actually took it on board and has had
22 big success with it.

1 The overly expansive and expensive
2 -- it just, it puts fear and terror -- I
3 headed up a small waste program, and when I
4 saw the budgets being done at Yucca Mountain,
5 it struck terror into my soul the whole time,
6 and into the souls of my Finnish friends, my
7 Swedish friends, my French friends even. It's
8 hugely expensive.

9 Other things like engineered
10 barriers, pop-ups -- in the beginning, a paper
11 bag would have done, think, almost a quart.
12 Then suddenly, out of the blue comes in \$8
13 billion titanium drip shield. You know,
14 people are falling over. It's losing
15 credibility for, not just for your program,
16 it's losing credibility for waste disposal in
17 general, which is my real point.

18 The last point, of course, is this
19 dropping the Yucca Mountain without letting
20 the NRC judgment come through is such a very
21 clear mixture of policy and science, of not
22 keeping them separate, that it's sent a bad

1 signal outside the USA as well. So, if you
2 didn't want to hear unpleasant things, you
3 shouldn't have invited me.

4 So how can we go forward? Well,
5 first thing I think is really important: Make
6 clear that Yucca Mountain is a policy choice.
7 That's okay; you can make policy choices like
8 that. In Switzerland, we had a site that
9 everybody thought was good, even the regulator
10 did pronounce it was good. The locals thought
11 it was good and so on. We dropped it because
12 it didn't get public acceptance, and it was a
13 policy decision. We wrote off \$500 million,
14 which for us is a lot of money. But it was a
15 policy decision, and nobody tried to mix the
16 justifications. That seems to me to be one of
17 the most important points here.

18 The second point is that service
19 storage, we all know that it's good and it can
20 last for a long time, but it's a final
21 solution. That's said in the MIT report as
22 well. It's not said strongly enough. You

1 have to keep saying it. It's not a final
2 solution. You won't get your centralized
3 storage unless you have the -- what did
4 somebody say? -- an exit strategy, I think it
5 was described as.

6 Unless we bring that through, then
7 you're endangering the whole of waste
8 management, and through that, the whole of
9 nuclear power, not just in USA, but in all of
10 the countries around the world. So what one
11 should do is they start up this model,
12 adaptively staged, to use "one step at a time"
13 thing, taking into account all of the societal
14 issues.

15 Then lastly, and this is little
16 bit in my own area, of course, support
17 multinational or regional geological disposal
18 and fuel leasing. There, you need take-back
19 from that, of course. Take-back came into the
20 GNEP program, and I've often made the comment
21 when I saw GNEP being presented in the States
22 or outside of the States -- I always thought

1 it was due to a different format of paper.
2 You know, our paper's longer. So the last
3 bullet, which said, "take-back of fuel could
4 come on," when I saw it in the States it never
5 came on.

6 (Laughter.)

7 DR. McCOMBIE: So that's as much
8 as I like to say now.

9 Thank you.

10 CHAIR HAMILTON: Dr. McCombie,
11 thank you very, very much.

12 That concludes the first session
13 this morning. We'll have questions directed
14 to the panel soon after we return. When we
15 return, we will hear from Dr. Timbie. We'll
16 have a 15-minute break.

17 (Whereupon, the above-entitled
18 matter went off the record at 10:05 a.m. and
19 resumed at 10:22 a.m.)

20 MR. FRAZIER: Okay, we're going to
21 resume.

22 Congressman Hamilton?

1 CHAIR HAMILTON: Thank you, Tim.

2 Our next speaker is James Timbie,
3 Senior Advisor to the Under Secretary for Arms
4 Control, United States Department of State.

5 Mr. Timbie, thank you for joining
6 us, and you may proceed.

7 MR. TIMBIE: Okay, thank you for
8 this opportunity to appear before you today.
9 You have an important and a difficult task,
10 and we're happy to help in any way that we
11 can. You should all have a page with bullets
12 on it so that you can follow along.

13 To us, the question is how
14 domestic fuel cycle decisions could affect the
15 worldwide effort to discourage enrichment and
16 reprocessing. You asked the speakers to be
17 explicit in what problem we are addressing,
18 and to us, the problem is the potential spread
19 of enrichment reprocessing, and the question
20 is, how could domestic fuel cycle decisions
21 help?

22 As nuclear energy expands, if

1 enrichment and reprocessing scales up, that
2 would be a major nonproliferation setback.
3 There would be concern about states acquiring
4 the capability to produce nuclear materials
5 for nuclear weapons, and there would be
6 concern about terrorists having access to
7 fissile materials. So the spread of
8 enrichment reprocessing is not going to be
9 constrained by a new international agreement.

10 There's not going to be a treaty,
11 there's not going to be a legal instrument,
12 prohibiting countries that don't now have
13 enrichment reprocessing from gaining that
14 capability. We know from our experience,
15 including our experience in the Nuclear
16 Suppliers Group, that if we drafted such an
17 agreement, probably not a single country would
18 sign up. There is no interest in establishing
19 another division between haves and have-nots
20 based on enrichment and reprocessing.

21 So the way forward is to develop
22 incentives, incentives for countries

1 considering nuclear energy to rely on
2 international markets for nuclear fuel
3 services and not to engage in indigenous
4 enrichment and reprocessing. Our goal is to
5 help shape the options available to for
6 countries, to provide incentives to cooperate,
7 and to influence decisions that they make.

8 We want countries to choose not to
9 enrich, to choose not to reprocess, even
10 though they have a right to do so. So let me
11 first outline what we are, steps that we are
12 now taking to discourage enrichment
13 reprocessing. Then at the end, I'll suggest
14 some ways that U.S. domestic fuel cycle
15 decisions can, can facilitate that activity.

16 On enrichment, the main argument
17 for relying on the international market for
18 nuclear fuel rather than producing it
19 indigenously is that existing international
20 suppliers are far more reliable and far more
21 economical than any indigenous effort could
22 hope to be. But at the margin, one can add

1 fuel banks and other fuel supply assurances to
2 help tip the balance in favor of relying on
3 international suppliers.

4 As a country makes the decision
5 whether to adopt nuclear energy, they also
6 make fuel cycle decisions, and we're
7 attempting to add another argument against
8 enrichment and reprocessing through these fuel
9 supply assurances. We have actively supported
10 the establishment of an enriched uranium
11 reserve at Angarsk in Russia.

12 The United States is producing its
13 own reserve of low-enriched uranium derived
14 from the diluted HEU for the purpose of
15 supporting fuel supply assurances. The United
16 States is leading the effort in Vienna to
17 establish an international fuel bank using
18 \$150 million supplied by NTI, the United
19 States, the EU, and several other donors.

20 These reserves of enriched uranium
21 are designed to support the argument that
22 countries considering nuclear energy don't

1 need indigenous fuel cycle facilities. They
2 can rely on the international market, and if
3 something goes wrong, they have recourses.
4 They can go to the IAEA. They can have access
5 to international supplies of enriched uranium.

6 Now on reprocessing, the main
7 argument against reprocessing is that it's not
8 been economical and it has not significantly
9 reduced waste burden wherever it has been
10 practiced. The separated plutonium piling up
11 around the world because of the imbalance
12 between production and use of plutonium is a
13 major nonproliferation concern.

14 Now if we can add to that
15 argument, that basically economic argument,
16 against reprocessing by helping other
17 countries, particularly newcomers, in spent
18 fuel management, that could be another major
19 incentive to forgo enrichment and
20 reprocessing. I've listed on the handout a
21 variety of ways where we could potentially
22 provide useful assistance in spent fuel

1 management.

2 In the first instance, we and
3 others can assist spent fuel storage for
4 period of time at the reactor sites. As has
5 been mentioned here several times, dry cask
6 storage is something we know how to do, and we
7 could assist, we can assist other countries.

8 Another, a second way we can be
9 helpful on the back end of the fuel cycle is
10 interim retrievable storage for 50 to a
11 hundred years either at reactor sites or at a
12 central facility. These would preserve future
13 options to extract more energy value. It
14 would buy a considerable amount of time -- 50,
15 a hundred years -- and it would be cheaper
16 than a decision now to reprocess with existing
17 technology. Again, this is something we know
18 how to do. This is a way that we could assist
19 others.

20 Moving to things that don't now
21 exist, international storage does not, does
22 not now exist, but the potential benefits

1 would be very high. The problems are
2 formidable. Where would you locate it? Who
3 would be responsible for the material? Who
4 would pay for the costs? What happens after
5 50 to a hundred years? But the potential
6 value of international storage, we believe, is
7 very high because that is one route to
8 allowing or to establishing a fuel leasing
9 scheme where a country could receive fresh
10 fuel, and the supplier could take it back and
11 put it in an international facility. So even
12 though it's not an easy thing to do, we
13 definitely think it's worth pursuing.

14 There's several -- well, spent
15 fuel take-back, just sort of progressing from
16 things we know how to do to things that we
17 don't know how to do, spent fuel take-back
18 also has potentially high value and
19 fermentable problems. Only Russia now takes
20 back spent fuel, and only from Russian-
21 supplied reactors. Now we understand that
22 importing other countries' spent fuel and

1 taking responsibility for it will be
2 difficult, but if suppliers of fresh fuel were
3 in a position to take back spent fuel, that,
4 too, would open up the form of leasing. So we
5 think that, too, is worth pursuing, an idea
6 worth pursuing, even though it's obviously
7 very complex.

8 As several people have mentioned,
9 fuel leasing -- the provision of fresh fuel;
10 taking responsibility for the spent fuel --
11 that would be a very attractive alternative to
12 indigenous, indigenous fuel cycle activities.
13 We think that implementation of fuel leasing -
14 - well, implementation of fuel leasing,
15 attractive as it is, would require some sort
16 of international storage or some sort of take-
17 back arrangement. So those are sort of the
18 prerequisites to establishing a fuel leasing
19 opportunity.

20 Finally, the final way that we can
21 help other countries is that decisions not to
22 pursue reprocessing with existing technology

1 but to store spent fuel for a considerable
2 period of time would be facilitated by the
3 prospect that if there are going to be better
4 options in the future, better choices down the
5 road.

6 So that's the menu of incentives
7 that we are aiming to develop as an attractive
8 alternative to enrichment and reprocessing.
9 The question before us today is how U.S. fuel
10 cycle decisions could help, and we have five
11 suggestions.

12 First is, if the United States
13 decisions, the decisions that you make,
14 validate the safety, reliability and economics
15 of storage of spent fuel for a considerable
16 period of time, initially where the fuel was
17 irradiated, perhaps eventually at a central
18 facility, that could be very useful. That
19 would support the view that there's no rush
20 for countries to make decisions on spent fuel
21 disposition, including unhelpful decisions
22 like reprocessing with existing technology.

1 Second is, if the United States
2 fuel cycle decisions validate a policy of
3 deferring decisions on spent fuel disposition
4 and keeping option open with retrievable
5 storage, that would support our advocacy of
6 similar approaches in other countries. We
7 could lead by example.

8 Third, exports of nuclear fuel and
9 exports of enriched uranium, they strengthen
10 international markets, and that's a positive
11 benefit as we are encouraging countries to
12 rely on international markets. But in
13 addition, they provide the United States with
14 consent rights on further processing. So we
15 think exports of, enriched uranium exports of
16 fuel are something to be encouraged.

17 Imports of fuel and enrichment
18 also have the benefit that they show that the
19 United States is prepared to rely on
20 international markets for a significant
21 fraction of its nuclear fuel. So a situation
22 where we export a portion, a considerable

1 portion, of the enriched uranium in the fuel
2 that we produce and import a portion, a major
3 portion, of the enriched uranium and fuel that
4 we use has benefits both ways.

5 Okay, fourth -- and again, we
6 understand this is difficult -- but
7 establishing a path forward on domestic spent
8 fuel is clearly a prerequisite for
9 consideration of the question of take-back of
10 spent fuel into the United States. So we look
11 forward to the establishment of the domestic
12 framework for spent fuel management that would
13 allow consideration of the question of take-
14 back of foreign spent fuel.

15 Finally, a strong research and
16 development program would support the argument
17 that countries should forgo reprocessing and
18 store spent fuel for a period of time until
19 more attractive options become available.

20 So, we think U.S. spent fuel
21 policy could make a significant contribution
22 to nonproliferation. We could establish a

1 path forward on spent fuel management that not
2 only resolved that question for ourselves and
3 established a good example for others but
4 would put us in a position to help others in
5 the back end of the fuel cycle.

6 So that's the way we look at this
7 question, and thanks for the opportunity to
8 share with you.

9 CHAIR HAMILTON: Thank you very
10 much, Mr. Timbie. We appreciate your
11 anticipation.

12 Any immediate questions for him?

13 (No response.)

14 CHAIR HAMILTON: If not, we'll
15 look forward seeing you on the panel in a few
16 minutes.

17 Our next speaker will be Dr. Frank
18 von Hippel, Co-Director of the Program on
19 Science and Global Security at Princeton
20 University.

21 Dr. von Hippel, we're very pleased
22 to have you, and you may proceed, sir.

1 DR. von HIPPEL: Thank you very
2 much, Chairman. I, I submitted a prepared
3 statement that I hope you all have. It goes
4 a little bit further than what I'll have time
5 to talk about, and it also provides a lot of
6 references, especially to material that has
7 been produced on the subject by the
8 International Panel on Fissile Materials,
9 which I co-chair.

10 I should note, also, that we are,
11 the next annual publication of the
12 International Panel on Fissile Material, the
13 Global Fissile Material Report, will focus on
14 spent fuel management internationally, and you
15 know, I'd be, I'd welcome an opportunity to
16 come back to talk to you about that in the
17 spring.

18 Okay, I'm going to talk about the
19 history of US spent fuel reprocessing policy.
20 We started by promoting reprocessing and
21 promoting plutonium breeder reactors. In
22 fact, during the 1960s, Glenn Seaborg, who was

1 the Chairman of the Atomic Energy Commission,
2 promoted what he called the "plutonium economy
3 of the future". That came to a screeching
4 halt after 1974 when India, one of the
5 countries that we encouraged to reprocess,
6 used the first plutonium, and it separated for
7 what it called a peaceful nuclear explosion.

8 The Ford administration
9 reconsidered it, the idea of encouraging
10 reprocessing, and in fact, when, at that time,
11 France had contracts with South Korea and
12 Pakistan, and Germany with Brazil, for
13 exporting reprocessing plants, and Henry
14 Kissinger and others worked very hard to get
15 those contracts canceled, and ultimately they
16 were. We learned later that all those
17 countries at the time had nuclear weapons
18 programs.

19 In 1977, President Carter canceled
20 the licensing of a US reprocessing plant which
21 had been largely constructed in South
22 Carolina, stating that, from our own

1 experience, we have concluded that a viable
2 and economic nuclear power program can be
3 sustained without reprocessing and recycling.
4 I think you heard that again from the MIT
5 study this morning.

6 In 1981, President Reagan lifted
7 that ban on domestic reprocessing, but at that
8 point, the US utilities preferred the option
9 of giving their spent fuel over to the
10 government for mil per kilowatt-hour, having
11 learned that reprocessing was much more
12 expensive than they had been originally led to
13 believe. Then the US breeder program was
14 ultimately, breeder demonstration program, was
15 ultimately killed by Congress in 1983 after
16 there had been a 500-percent cost increase
17 before, really, construction began.

18 So this shows the history in the
19 OECD countries of the budgets for developing
20 the fast neutron plutonium breeder reactors,
21 which were the core of the R&D development
22 efforts by the OECD countries from the 1960s

1 to the 1980s.

2 You can see that -- well, overall,
3 including India, Russia in pre-1960, and also
4 France, which didn't report its R&D, a very
5 large R&D program, as breeder R&D, it was
6 about a \$100 billion spent. So my one
7 reservation on the MIT study's recommendations
8 is, having spent \$100 billion on these
9 reactors, I'd really like to know what we
10 would be doing with additional R&D funds
11 before I committed those.

12 The legacy of the breeder reactor
13 development program is small in terms of
14 reactors. There, there is one operating
15 demonstration breeder reactor in Russia.
16 There's, there's a couple under construction,
17 one in Russia and one in India. There's a
18 large legacy of plutonium, which was separated
19 in the expectation that breeder reactors would
20 need start-up plutonium for their fuel.

21 As the MIT study pointed out, you
22 don't need start-up, even if someday these

1 reactors were to materialize. You wouldn't
2 need to prepare for that by separating huge
3 amounts of plutonium. We do have 250 tons of
4 separated plutonium, as much separated
5 plutonium as was separated during the Cold War
6 by the Soviet Union and the United States have
7 accumulated. In some cases, for example, the
8 UK, they haven't figured out what to do with
9 it, you know, now that there are no fast
10 reactors.

11 Now, the history of reprocessing
12 is -- well, where we are with regard to
13 reprocessing -- now this is all the 30
14 countries that have operating reactors today.
15 Some of them have never reprocessed, including
16 the US. The majority of that capacity is the
17 US capacity.

18 Some of them -- all, a number of
19 weapons states plus Japan reprocess, on that
20 side.

21 One country in that column, the
22 Netherlands, sends the fuel from its small

1 reactor, single reactor, to France to be
2 reprocessed.

3 In the middle, we have countries
4 which were customers of France, UK and Russia
5 for reprocessing services. But they haven't
6 renewed the contracts. The reason is that
7 there was an advantage. I mean, most
8 countries have problems with spent fuel,
9 political problems with spent fuel management.
10 So there was an advantage to send spent fuel
11 out of the country to get it reprocessed. But
12 the contracts with France and the UK specified
13 that the high-level waste from reprocessing,
14 the fission products, transuranics solidified
15 in glass, would come back to the customer
16 country.

17 So, after this sort of brief
18 period of respite, the customer countries were
19 faced by the same problem as they had
20 originally. They now had to figure out where
21 to put this high-level waste. They also -- it
22 was costing about 10 times as much to get it

1 reprocessed abroad as it would cost to have
2 interim storage domestically. So all but
3 Japan decided to go for interim storage.

4 Japan decided to go for a domestic
5 reprocessing plant. They couldn't solve their
6 interim storage problem without committing a
7 huge amount of money to the second poorest
8 prefecture in Japan, more than \$10 billion and
9 a \$20 billion reprocessing plant and then \$2
10 billion a year operating cost for 40 years.

11 MEMBER DOMENICI: Mr. Chair, can I
12 ask him a clarifying question?

13 CHAIR HAMILTON: Certainly. Pete?

14 MEMBER DOMENICI: I want to ask
15 you --

16 DR. von HIPPEL: Yeah?

17 MEMBER DOMENICI: -- just a simple
18 question. When you use the word
19 "reprocessing", what do you mean?

20 DR. von HIPPEL: I mean dissolving
21 spent fuel and separating the plutonium or the
22 plutonium and mixture of transuranics from the

1 long-lived fission products.

2 MEMBER DOMENICI: Is it synonymous
3 with breeder reactors?

4 DR. von HIPPEL: It was originally
5 justified for breeder reactors. It's, today,
6 it's in the absence of breeder reactors. In
7 France, and as planned in Japan or just
8 starting in Japan, it's being, the plutonium
9 is being recycled in the reactors from which
10 it came.

11 MEMBER DOMENICI: When you say
12 France has reprocessing --

13 DR. von HIPPEL: Yes.

14 MEMBER DOMENICI: -- do they?

15 DR. von HIPPEL: Yes. Yes, they
16 do. They reprocess.

17 MEMBER DOMENICI: What, what
18 percent are they getting out of the one-time
19 through as they, as they reprocess it? What
20 are they leaving and what are they getting
21 out?

22 DR. von HIPPEL: They're getting

1 out maybe 99 percent of the plutonium and
2 recycling it, and they also are beginning to
3 recycle the reprocessed uranium.

4 MEMBER DOMENICI: Thank you.

5 DR. von HIPPEL: Sure.

6 So things are not working out so
7 well in Japan, however. Their reprocessing
8 plant is 13 years behind, and they have, they
9 are starting de facto to have to deal with
10 their spent fuel problems with interim
11 storage, which, which originally they thought
12 they couldn't do.

13 So why did the US nonproliferation
14 policy succeed? I think Jim Timbie basically
15 encapsulated what has been most of the time US
16 policy. We don't reprocess; you don't need to
17 either. That has been effective. It's --
18 yes? Pardon?

19 MR. FRAZIER: Turn your mic on,
20 Ernie.

21 DR. von HIPPEL: Yeah? Say it
22 again; I'm sorry.

1 MEMBER MONIZ: Just to clarify,
2 did you mean "not succeed" in the top?

3 DR. von HIPPEL: "Why did US" --
4 no, it did succeed.

5 MEMBER MONIZ: It did succeed,
6 okay.

7 DR. von HIPPEL: It did succeed,
8 yes. It's sometimes described as a failure
9 because some countries still reprocess. But
10 in fact, no new countries have reprocessed
11 since we, since our policy was initiated. A
12 number of countries which were reprocessing,
13 had reprocessing pilot plants, abandoned
14 reprocessing, and countries which were trying
15 to acquire reprocessing plants didn't.

16 Now, if you divide up, look at
17 these 30 states which have nuclear power
18 plants, this was facilitated by the fact that
19 a large fraction of them were aligned with
20 either the Soviet Union or with the US. Very
21 few were sort of more loosely coupled to the
22 nonproliferation regime that the US and the

1 Soviet Union were cooperating on. Those
2 three, Argentina, Brazil, and South Africa,
3 all developed, all launched nuclear weapons
4 programs. Only South Africa's went to the
5 end.

6 But if you look forward, the stars
7 aren't necessarily aligned so well with us.
8 You see, this is the Nuclear Energy Agency's
9 choice of the next 25, including one weapon
10 state, so 24 non-weapons states which would,
11 which are expected to acquire nuclear power
12 plants. They are not so coupled, tightly
13 coupled with reinforcing arrangements to the
14 nonproliferation regime. So I would, I would
15 answer my question, we shouldn't risk ending
16 our opposition to national reprocessing
17 plants.

18 So, in summary, I think the US has
19 done rather well by not reprocessing. Our
20 nuclear utilities have been able to save about
21 \$100 billion that they would have otherwise
22 spent. The influence of our example has

1 helped limit the spread of reprocessing,
2 reinforced by these fortuitous, the fortuitous
3 fact of who was acquiring nuclear power. Only
4 one non-weapons state reprocesses today.

5 Finally, I'd just observe that
6 reprocessing has been advocated in the last
7 decade or so as a way to facilitate, make
8 repositories more acceptable. But if you look
9 at the success of countries who have been
10 trying to site repositories, you find that the
11 countries which are furthest along, Sweden and
12 Finland, do not reprocess, while countries
13 which do reprocess and have been trying to
14 site repositories have not been so successful,
15 even though the plutonium has been, has been
16 separated out of the waste that they would
17 propose to bury.

18 So that's my statement. Thank
19 you.

20 CHAIR HAMILTON: Dr. von Hippel,
21 thank you very much. We look forward to
22 seeing you on the panel, unless there are

1 clarifying questions for him.

2 (No response.)

3 CHAIR HAMILTON: -- I gather not.

4 We will see you shortly.

5 The final speaker in this portion
6 of the program will be Dr. Steven Miller.

7 He's the Director of the International
8 Security Program at Harvard's Belfer Center.

9 Doctor Miller, thank you for
10 coming, and you may proceed, sir.

11 DR. MILLER: Thank you very much.
12 It's an honor to have an opportunity to share
13 some thoughts with this Commission. I was
14 asked to make some comments putting the
15 domestic issues that you have under
16 consideration in a wider international
17 context. Coming at the end of a string of
18 very accomplished and knowledgeable speakers,
19 much of which I thought I might say has been
20 said, and I'll try to refrain from repeating
21 the detailed suggestions they've already
22 gotten.

1 I thought, as I was listening to
2 Frank von Hippel and Jim Timbie, that I might
3 be able to structure my remarks as a framework
4 for thinking about why it is so important to
5 pursue the kinds of angles that they were
6 advocating.

7 For Commissioner Eisenhower, I
8 come at this from a nonproliferation point of
9 view, and so the issue I'm trying to come at
10 in a roundabout way is, what are the late
11 implications of our domestic nuclear policy
12 choices for the global nonproliferation regime
13 and effort?

14 So what is the global nuclear
15 context for America's domestic nuclear
16 decision making? In the current environment,
17 there are two notable developments, both of
18 which have been alluded to earlier. One is
19 that we're seeing in some places a substantial
20 expansion of nuclear power, that is the
21 growth, rapid growth, in places that already
22 have nuclear power.

1 A large fraction of this globally
2 is accounted by four countries: China, India,
3 Russia, and South Korea. Interestingly, all
4 four of these either reprocess or have a
5 strong interest in reprocessing. About half
6 of the growth is, in fact, found in China,
7 which presently has 23 reactors under
8 construction. So that's one piece of the
9 puzzle, and so we're going to end up in a
10 world where there's quite a few more nuclear
11 reactors, at least until older ones start
12 being phased out, because in some countries
13 there has been a very significant choice to
14 accelerate the growth of nuclear power.

15 But there's a second factor, which
16 again has been touched on by some of my
17 predecessors, which has to do with the spread
18 of nuclear power. Charles McCombie, in one of
19 his slides, used the number 61 as the number
20 of states that you can find in the Power
21 Reactor Information System database of the
22 IAEA, states that have approached the IAEA and

1 expressed an interest in exploring the nuclear
2 power option for themselves.

3 I think it was implicit in some of
4 what Frank von Hippel was saying, that on
5 average, these 61 states are less stable, less
6 democratic, more corrupt, less blessed with
7 bureaucratic and regulatory experience and
8 capacity, often reside in much more dangerous
9 neighborhoods. So the idea that we're going
10 to have nuclear technology spreading much more
11 widely across the planet and much more
12 significantly outside what you might call the
13 OECD zone means that the kinds of risks and
14 worries that we try to contain as we seek to
15 harvest the benefits of nuclear power, they
16 press themselves upon us even more urgently.

17 I've been fortunate to be a part
18 of a project at the American Academy of Arts
19 and Sciences called the Global Nuclear Future,
20 which is an effort to look at the perceptions
21 and implications of this expansion and spread
22 of nuclear power. One of the things to point

1 out and perhaps highlight is that among these
2 five dozen or so states that have an interest
3 in nuclear power, some are perfectly content
4 to be compliant with established norms and to
5 be deferential to our preferences for the kind
6 of nuclear world that we'd like to live in.

7 However, there are a significant
8 number of exceptions, of states that do not
9 fully share our views of the NPT, do not fully
10 share our views of the preferred nuclear
11 order, and under the NPT system, they have the
12 right to pursue options that will make us
13 nervous. Those are the kinds of options that
14 I think Jim Timbie's incentives are designed
15 to woo them away from.

16 I just flagged for your attention
17 the fact that not only are we seeing changes
18 on the demand side for nuclear power, but also
19 we're seeing some changes on the supply side
20 as well. The illustration here that I think
21 is quite vivid is the most recent large
22 nuclear export deal in which the Korean

1 Electric Power Company succeeded in winning a
2 \$40 billion, 20-year contract with Abu Dhabi.

3 So, if we think that the nuclear
4 past largely consisted of the French exporting
5 to the Finns, the nuclear future may look much
6 more like the Koreans exporting to Abu Dhabi,
7 the Chinese exporting to Pakistan. If you
8 follow the nuclear trade magazines, you'll
9 have noticed that the Koreans have followed up
10 their Abu Dhabi deal with discussions with Sri
11 Lanka, with Jordan, with Bangladesh, where it
12 appears they're losing out to the Russians.

13 But it isn't going to be the same
14 limited circle of customers and the same tiny
15 band of suppliers as in the past, and this
16 means that we may have more competition, less
17 American ability to impose some discipline on
18 this market, and all of those, I think, have
19 implications for how we manage the
20 nonproliferation system going forward.

21 So just to conclude this portion
22 of my remarks, what I would say is that we're

1 edging into a different nuclear world, one in
2 which there are more players and more
3 technology spread more widely around the
4 planet.

5 Now this is not going to happen
6 rapidly and some of this isn't going to happen
7 at all and some of these 60-plus states that
8 have an interest in nuclear power will never
9 achieve nuclear power and many of them are
10 decades away from having any meaningful
11 operational nuclear capability. So why does
12 this matter now, and why should it matter to
13 our decision making now? I would say there
14 are two answers to this.

15 One is that a number of important
16 states out there in the developing world --
17 Saudi Arabia, Malaysia, Indonesia -- are in
18 the process right now of exploring their
19 options, defining the frame for their future
20 nuclear policies and making choices for the
21 future. So, even though the manifestations of
22 their choices may not hit us in an operational

1 sense until 20 or 30 years down the road, the
2 perceptions and choices they make today can
3 heavily influence what world it is that we
4 live in.

5 The second point is that some
6 states are beyond just framing options. Some
7 states are making decisions today that are
8 going to shape the nuclear world that we live
9 in 20 or 30 years from now. Abu Dhabi has
10 made a decision to have four nuclear reactors.
11 Abu Dhabi has already completed its vendor
12 selection process. Abu Dhabi has in place its
13 regulatory framework. Abu Dhabi has already
14 hired a general contractor for its nuclear
15 power plant. Abu Dhabi already has a fixed
16 and firm construction time table. With the
17 Jordanians, they have made a decision to have
18 a nuclear reactor. The Egyptians have made a
19 decision to have four nuclear reactors. And
20 so on. So decisions are being made out there
21 that will very strongly shape the future
22 nuclear order that we live in.

1 Well, why does this for American
2 domestic nuclear decision making? I would
3 offer three quick points in my waning two or
4 three minutes here. First, what we choose to
5 do -- and I think this is very much in the
6 spirit of Jim Timbie's point about incentives
7 -- what we choose to do affects how others
8 perceive their choices, what they perceive to
9 be desirable, acceptable, legitimate,
10 economically viable, and tolerable within the
11 existing rules of the game.

12 Secondly, there is a kind of, what
13 I would call a double standard problem. Not
14 everywhere but in many significant places
15 among these aspiring nuclear states, what one
16 finds is a considerable degree of frustration
17 and resistance with what I would call the "do
18 as I say, not as I do" approach to
19 nonproliferation. If we do it, others are
20 likely to do it; it's as simple as that. Our
21 ability to be persuasive in asking others to
22 avoid certain choices is, I think, very much

1 undercut if we don't factor in that our
2 behavior casts a big shadow on how they think
3 about things.

4 Then the third point is there
5 exists within the NPT regime -- and I think
6 you saw some of this in May at the NPT Review
7 Conference -- there exists what I call a
8 coalition of the disaffected, people who are
9 not with the drill as we see it, who react
10 skeptically and often with hostility to our
11 preferred normative interpretations of the NPT
12 regime.

13 So what one finds is that there
14 are key opinion-leader states within the
15 developing world, the Egypts, the Indonesias,
16 the Mexicos and so on, who, each has their
17 varying national positions. But on average,
18 what you can find is significant, articulate,
19 and hard-working groups of souls out there who
20 oppose the establishment of the additional
21 protocol as a condition of supply;

22 Who resist the idea of

1 international fuel banks as a compromise on
2 their sovereign rights; who look skeptically
3 on export controls and view the strengthening
4 of them as contrary to our Article 4;

5 Who argue that the Nuclear
6 Suppliers Group was never in view when they
7 signed up to the NPT, and constitutes a
8 violation of what they see as the deal;

9 Who resist the strengthening of
10 Article 10 so there's not such an easy exit
11 route for potential cheaters; and

12 Who resist or reject restraints on
13 the spread of international nuclear fuel cycle
14 capabilities.

15 Not every state feels equally
16 passionately about these issues and some care
17 a lot more than others and some are much more
18 active than others, but every one of the
19 positions that I just described was contained
20 in the working paper that the Non-Aligned
21 Movement submitted to the 2010 NPT review
22 conference. This is 118 states and 18

1 observers. That is to say, roughly two-thirds
2 of the members of the NPT system, signatories
3 on the NPT, have lined up with positions that
4 are exactly contrary to our preferences.

5 These are the kinds of political ties that I
6 think we have to work against in building
7 incentives that will shape the nuclear order
8 in the way that we hope for it to be shaped.

9 So let me conclude by drawing
10 attention to some old work that I think has
11 very current relevance. Thirty five years
12 ago, the legendary nuclear strategist Albert
13 Wohlstetter ran a big project which was called
14 "Life in the Nuclear-Armed Crowd", and the
15 punch line is, I think, betrayed by the title.
16 They, they had the thought that life in the
17 nuclear-armed crowd probably won't be all that
18 appealing.

19 As part of that project, he wrote
20 a quite influential article called "Spreading
21 the Bomb Without Quite Breaking the Rules"
22 because everything we're talking about is

1 permitted by the NPT system, so we can spread
2 a lot of implicit nuclear weapons capability
3 while staying within the rules on the inside
4 of the boundary of permissible.

5 Wohlstetter argued in this famous
6 piece that the international implications of
7 our domestic political decisions, our domestic
8 nuclear policy decisions, were those that
9 posed the highest costs to our national
10 interests properly understood. He argued
11 quite stridently that this reality was not
12 properly taken into account in our
13 policymaking at that moment. What he ended up
14 doing was arguing that it's not enough to
15 advocate the world that we want to live in; we
16 have to illustrate it. The way we illustrate
17 it is with the behavior we display in our own
18 country, the choices that we make.

19 So I would conclude by saying that
20 if you think nuclear proliferation represents
21 a first-order threat to the long-term security
22 interests of the United States, then this

1 consideration has to play a very large role in
2 all of our calculations about the choices we
3 make here at home.

4 Thank you very much.

5 CHAIR HAMILTON: Thank you very
6 much, Dr. Miller.

7 I think we'll ask all of the five
8 preceding presenters to come to the table
9 here, and we'll begin the panel discussions.

10 We'll open it up now for questions
11 from commissioners. I want to say to the
12 members of the panel that we've had a very
13 thought-provoking series of presentations.
14 We're deeply grateful to each one of you, and
15 we will proceed with questions.

16 Are there questions from
17 commissioners? Brent?

18 CHAIR SCOWCROFT: Yes, I'd like to
19 ask the panel, following all of your
20 presentations here, which were fascinating, it
21 seems to me that one of the ways that we can
22 rectify the situation we're in now is to try

1 to, in a way, internationalize the fuel cycle
2 as much as possible, and that is, to make
3 enriched uranium, low-enriched uranium for
4 reactors available at prices that nobody can
5 match by doing it nationally; to guarantee a
6 supply as long as the IAEA certifies it so we
7 can't deny it based on our national
8 preferences for countries; and to take back
9 the spent fuel after it's over.

10 It seems to me that would minimize
11 incentives for others and for the 108 non-
12 aligned countries, whatever you call them, to
13 do it. What are your thoughts on that?

14 DR. REIS: Yeah, I would agree
15 with that.

16 DR. von HIPPEL: I guess the key
17 part of that is the take-back --

18 CHAIR SCOWCROFT: Right.

19 DR. von HIPPEL: -- of the spent
20 fuel and, because that is a big issue. But of
21 course, it's a big issue; it would be a big
22 issue here. If the Blue Ribbon Commission can

1 figure out how to achieve that, it certainly
2 would have lived up to its name.

3 DR. McCOMBIE: Yeah, I'd just like
4 to reinforce that. Take-back is the big
5 issue.

6 If I can add something that's a
7 little bit in my own area, there is one
8 alternative to take-back that can help, and
9 that is if small countries are helped to do it
10 together so that it doesn't have to go back to
11 the producer. But if small countries are
12 helped to do it together, then they also have
13 an exit strategy, to use the words that we
14 used earlier.

15 One important thing -- I work in
16 this area a lot, so I know -- is that large
17 countries, not the US but large countries in
18 Europe, have actively at some stages worked
19 against that. They've actively pushed a
20 pseudo-ethic that every country has to take
21 care of its own waste by disposing of it in
22 its own territory. I call that a pseudo-ethic

1 because it doesn't apply across the board
2 elsewhere.

3 Some more positive support from
4 the US and the other large nuclear countries
5 to help that particular option, which we call
6 a shared option, as opposed to a take-back
7 option could also be valuable.

8 MR. TIMBIE: Yeah, I, I would say
9 that what you just described is an excellent
10 long-term aspiration. I would also point out
11 that many countries are going to be making
12 decisions on a time scale, short compared to
13 the realization of your aspiration.
14 Therefore, we ought to spend a lot of time and
15 put a lot of our effort into strengthening
16 existing international markets as we move
17 toward the longer-term aspiration.

18 DR. MILLER: I think yours is a
19 very coherent approach, and I would just add
20 in addition to points that have already been
21 made, that there is some resistance to buy
22 into internationalization schemes for the

1 front end of the fuel cycle on the part of the
2 hard cases that probably matter most because
3 they view the nuclear marketplace as very
4 heavily politicized.

5 There's always a fear that if you
6 get yourself crosswise with Washington, it
7 doesn't matter if the IAEA has this stuff
8 because Washington really pulls the strings.
9 Iran certainly feels that way, but also many
10 in the Egyptian nuclear league and so on.
11 There are lots of folks out there who look at
12 the way the system currently works and say
13 it's very difficult to imagine how you're
14 going to provide fuel assurances that have
15 sufficient guarantees that the people who are
16 really on the other side of the divide in
17 terms of friendliness with the United States
18 will be confident in putting their fuel future
19 in the hands of that system.

20 CHAIR HAMILTON: The Chair has
21 three Commissioners who want to ask questions:
22 Allison, then Pete, then Ernie -- and then

1 Susan's four, and then Al -- we have five.

2 Allison?

3 MEMBER McFARLANE: Okay, great.

4 Thanks, I really appreciate all your great
5 presentations, and I just want to go further
6 with this discussion about take-back.

7 I think the issue on the front end
8 you're all, as many of you pointed out, the
9 fuel bank issue which the US really seems to
10 be pushing, it's not, according to Charles,
11 it's not much of a problem, fuel supply. But
12 the take-back issue is the real key here, and
13 so I want to explore a little bit more about
14 whether this is at all possible, or whether
15 we're just going to be really wasting our time
16 with a solution that really isn't workable.

17 So, I want to understand how to,
18 how you guys think it could work in the US,
19 some concrete suggestions. Is this being
20 discussed elsewhere? And what are the
21 options? If it is being discussed elsewhere,
22 how is it being implemented?

1 DR. von HIPPEL: I guess we'll go
2 down the line.

3 (Laughter.)

4 CHAIR HAMILTON: Let's not be too
5 polite here.

6 (Laughter.)

7 MEMBER McFARLANE: Is it that hard
8 a question? Maybe we shouldn't even deal with
9 it.

10 MR. TIMBIE: Of course, it is a
11 hard question. You sort of posit take-back as
12 the only medium-term solution. As I pointed
13 out, long-term storage and international
14 storage is also a feasible way to implement a
15 fuel leasing scheme, which we think provides
16 the maximum incentive to forgo enrichment
17 reprocessing.

18 So I wouldn't say that take-back
19 is the only solution --

20 MEMBER McFARLANE: Yeah, but --

21 MR. TIMBIE: -- but it is -- I
22 mean, many people talked about leading by

1 example. You know, if, as a result of your
2 decisions or your recommendations, policies
3 are formulated where we have a well-defined
4 path forward for disposition of US spent fuel,
5 that then opens up the question, first of all,
6 if this path could be replicated by others,
7 but also whether the path that's designed for
8 the United States could also be used for
9 foreign spent fuel.

10 We take back, now, the --

11 MEMBER McFARLANE: Um-hmm.

12 MR. TIMBIE: -- spent HEU from
13 research reactors. That's on a very small
14 scale and so forth, but it does show that it
15 can be done once one has a means for dealing
16 with one's own problem. So then use that, or
17 at least consider using that, to deal with
18 spent fuel of others.

19 MEMBER McFARLANE: No, I agree
20 that, I think take-back is very attractive and
21 the idea of international long-term storage is
22 great. But I think it, it basically reflects

1 the fact that the US has no solution itself,
2 and it's just sort of a mirror reflection of
3 what our own policy is, or lack thereof.

4 So, I'd like to think about what
5 our policies could or should be, so I want to
6 explore, I want to understand more about what
7 some of the details could be with a take-back
8 option.

9 DR. McCOMBIE: Yeah, well, I think
10 we all agree, it's a really difficult option.
11 For those that don't know, of course, it was
12 mentioned that Russia does it for its own
13 fuel. One of the drivers that might lead to
14 it happening, of course, is purely commercial.
15 If Russia sells enough reactors, then the
16 French are going to start thinking about it
17 then more strongly, especially if France does
18 implement its own national repository in 2025,
19 which it would like to. So there could be
20 commercial drivers, in fact, that would lead
21 in that direction.

22 The other aspect, of course, is a

1 level of trust. Russia did take back in the
2 past. I think Frank mentioned it. The
3 Finnish fuel went to Russia. But it didn't
4 have a long-term guarantee, the same as the
5 UK, so they all got their fingers burned.
6 They, they introduced nuclear power on the
7 expectation they wouldn't have to deal with
8 spent nuclear fuel, and then suddenly the
9 take-back became conditional at very high
10 prices. So that's when the Finns, for
11 example, decided, we can't do this; it's not
12 predictable.

13 So I think somebody mentioned
14 take-back with a 10-year time horizon or
15 something. It's too short. You know, you
16 want to have confidence if there's take-back
17 that it's going to last a longer time.

18 DR. von HIPPEL: To add that -- I
19 know you've had many discussions before, but
20 I just wanted to say that I think the US
21 debate over spent fuels is highly irrational
22 and that if you have, in my view, a rational

1 hierarchy of concerns about nuclear power,
2 about the external effects of nuclear power
3 would be nuclear proliferation, a nuclear
4 weapons connection, nuclear safety, and then
5 at the bottom of the list would be radioactive
6 waste, the hazard from radioactive waste.

7 But the "not in my backyard"
8 concerns about spent fuel have really
9 imperiled, I think, the nonproliferation
10 objective. So I think hopefully one of your
11 tasks is to try to make the process more
12 rational, I mean reflecting a real objective
13 set of dangers that we're facing.

14 CHAIR HAMILTON: Okay. Pete --

15 MEMBER DOMENICI: Could I ask him
16 to clarify something?

17 CHAIR HAMILTON: -- Pete, you're
18 next.

19 MEMBER DOMENICI: The last speaker
20 -- would you clarify, what was your last --
21 the end of your statement, what was it at the
22 end?

1 DR. von HIPPEL: That, that the --
2 objectively spent fuel 500 meters underground,
3 or even kilometers underground, does not
4 represent a hazard on the scale of the spread
5 of nuclear weapons.

6 MEMBER DOMENICI: Oh.

7 I wanted to ask you all a
8 question. One of you said that the old-
9 fashioned saying that people would like to,
10 for us to do what we say instead of saying and
11 not doing -- I don't know which one said that,
12 but I'm going to borrow the phrase for minute
13 and say to you, the United States, pursuant to
14 your suggestions, would be out there pounding
15 on its chest talking about wanting to do
16 things for other countries when we don't know
17 how to do it for ourselves, and we haven't
18 decided how to do it.

19 It would appear to me, and you'd,
20 I'd like you to answer this, that the best way
21 for us to get involved in a meaningful way in
22 the nonproliferation aspects of international

1 markets would be for us to have our own policy
2 with reference to the disposition of the waste
3 and the nonproliferation activities that we
4 would be part of. Am I correct in that
5 thinking or not?

6 I don't see how any other
7 countries are going to buy into us, and you
8 described between you this whole new group of
9 countries that are getting active, and they're
10 apt to all go elsewhere if the United States
11 of America continues what we're doing. We're
12 all talk and do nothing. Would you address
13 that? If you don't want to, I'll leave my
14 statement stand. I wanted to make it anyway.

15 DR. REIS: Senator Domenici, let,
16 let me respond to that by suggesting that the
17 tools for doing something is really with us.
18 We really understand about interim storage, I
19 think most using dry casks. We understand
20 what that is. I think everybody on the panel,
21 certainly everybody here, would agree to that.
22 As the people from MIT suggested -- and I

1 guess the panel would agree on that -- if we
2 move ahead aggressively with low-enriched
3 uranium or the once-through fuel cycle interim
4 storage, the issue then becomes, it's just
5 interim; where does the US put it?

6 Again, I would suggest that where
7 to put it, we've already demonstrated that at
8 the Waste Isolation Pilot Plant. In other
9 words, the National Academy has some years ago
10 and continues to suggest that's the preferred
11 technical option. There are political
12 obstacles. I would suggest that those
13 political obstacles can indeed be overcome.
14 We understand because we've done it. We
15 haven't just talked about it; we've actually
16 done it --

17 MEMBER DOMENICI: That, that kind
18 of medium could be the permanent one too.

19 DR. REIS: Indeed. I would
20 suggest that is -- again, the technical
21 response is that is indeed the permanent one,
22 so, if you take a combination of interim

1 storage and salt, put them together,
2 recognizing that we are taking back,
3 admittedly at a low level, the HEU.

4 So we've done -- the pieces of
5 everything you have suggested are already
6 being done. They don't happen to be in the
7 right, if you will, political bins
8 necessarily, but technically, we haven't just
9 talked about it. We've actually done all the
10 things to put together a system to make that,
11 to make that happen.

12 CHAIR HAMILTON: Dr. Miller, did
13 you -- your light was on a moment ago.

14 DR. MILLER: Well, I was the one
15 who I think used the phrase in question. But
16 in the famous Wohlstetter article that I
17 alluded to in my remarks, he opens that essay
18 by saying that the incoherence of American
19 nuclear policy has been damaging to our
20 nonproliferation objectives, and I think
21 that's sort of consistent with the point you
22 were trying to make. It's certainly true that

1 if we have failures in our nuclear policies in
2 important areas that cause other states to
3 choose paths we don't like, that again is sort
4 of consistent with the spirit of your
5 question.

6 But I think that you've gotten
7 some specific substantive answers from my
8 colleague.

9 CHAIR HAMILTON: Dr. McCombie?

10 DR. McCOMBIE: I was going to
11 disagree with Vic because it's always good if
12 people disagree on panels, but in fact, he
13 saved himself at the end by pointing out that
14 the interim storage has to be tied to a final
15 solution. It doesn't work unless it is.

16 MEMBER DOMENICI: That's true.

17 DR. McCOMBIE: We shouldn't mince
18 words. We shouldn't deliberately mix
19 everybody, including ourselves, up with that.
20 Unless you have some kind of exit strategy --

21 MEMBER DOMENICI: That's right.
22 Absolutely right.

1 DR. McCOMBIE: -- then you can't
2 do the rest, and you can't do it in the US and
3 you can do it anywhere else.

4 In Switzerland, my second home
5 country, we have a centralized interim storage
6 facility, but the locals who agreed to it have
7 a signed contract that after 25 years, if they
8 don't want it anymore, then the utilities have
9 10 years to get out of there to somewhere.
10 But that can only work if there's enough trust
11 in the system, and I think that level of trust
12 might be harder to get here.

13 CHAIR HAMILTON: Okay, we have --

14 MEMBER DOMENICI: Thank you, Mr.
15 Chairman.

16 CHAIR HAMILTON: -- Ernie and then
17 Susan and then Al. Ernie?

18 MEMBER MONIZ: Actually, a few
19 comments, then a question. First of all, Vic
20 just mentioned the interim storage, and I just
21 wanted to reinforce a point that we made, that
22 while we feel very confident about a century

1 and maybe even longer, the technical basis,
2 factually speaking, is rather thin, and I
3 think that's an important contribution for us
4 to make by carrying out the program to do that
5 RD&D.

6 Charles, you mentioned -- in terms
7 of observations again, you mentioned
8 multibillion-dollar titanium drip shields and
9 the general Rube-Goldberg construction just to
10 say that that reinforces this idea. If you
11 don't do an integrated look at the whole
12 business, you get into terrible problems.

13 I do have a question for you, and
14 that is, why in your list of reprocessing
15 technology issues don't you include things
16 like safety and health? You know, on the
17 scale of large civilian activities, we don't
18 have a whole lot of reprocessing experience.
19 What we do have -- sure, La Hague is on one
20 side; very positive -- but we have lots and
21 lots of other issues that have occurred
22 historically that I think deserve attention.

1 DR. McCOMBIE: Well, I think
2 earlier, early reprocessing was not clean. It
3 was a military operation to start with. It's
4 cleaned up, even in the UK very much so, and
5 it's doable. It's, we'll talk later about
6 ethical issues, but that's an
7 intergenerational issue.

8 It's a lot -- if we're really
9 worried about the nuclear fuel cycle, my idea
10 is we should be looking at the mining and
11 milling part of it and not even at the
12 reprocessing if you look farther down the
13 line. Nothing we do is going to get us away
14 from the mining and milling parts.

15 But these are technologically
16 solvable problems, it seems to me, even in the
17 future.

18 MEMBER MONIZ: Again, I don't
19 disagree with the statements. The fact
20 remains that there are issues, and certainly
21 issues of short-term versus long-term
22 exposures, worker exposures versus public

1 exposures. So I just think we make a mistake
2 in not having this on the table as a major
3 issue, as well, to address.

4 DR. von HIPPEL: Mr. Chairman,
5 could I just make a comment on that? I think
6 you're right. In practice, the way
7 reprocessing has been executed in France and
8 the UK is, actually creates a major danger.
9 Instead of solidifying the high-level waste
10 immediately, they actually accumulate years'
11 worth of liquid high-level waste in tanks, you
12 know, the inventory's about a hundred
13 Chernobyls' worth of cesium 137.

14 Those tanks have to be constantly
15 actively cooled so that they don't boil.
16 They're potential targets of terrorists. In
17 fact, right after 9/11 the French put anti-
18 aircraft missiles around La Hague, the
19 reprocessing plant, because, maybe because of
20 this concern.

21 Now the Japanese are hung up, but
22 in part, because they have refused to go this

1 easy route when they have problems solidifying
2 the high-level waste, of just letting it
3 accumulate in tanks. So, I mean, some people
4 can, they may laugh at the misfortunes of the
5 Japanese, but in fact, part of their problem
6 is, in fact, being responsible in this regard.

7 MEMBER MONIZ: There are also, of
8 course, alternative reprocessing approaches
9 that have very, very different sets of
10 technological solutions, et cetera.

11 Mr. Chairman, I had a set of
12 questions for Mr. Timbie as well, but do you
13 want me to defer those until later, or --

14 MEMBER McFARLANE: My question has
15 been answered.

16 CHAIR HAMILTON: Your question's
17 been answered?

18 MEMBER McFARLANE: Yes.

19 CHAIR HAMILTON: Well, let's go to
20 Al, and then we can come back.

21 MEMBER MONIZ: Great. Al?

22 MEMBER CARNESALE: Thank you, Mr.

1 Chairman.

2 I have two questions. One relates
3 to this dilemma that we hear to some extent,
4 especially when we take into account the MIT
5 study and what you said. First, we see the
6 reaction in this country to the withdrawal of
7 the application for Yucca Mountain, which
8 shows that all those places that have
9 ostensibly interim storage are suddenly very
10 upset that there is not a solution for long-
11 term storage. Whether there really was one or
12 not is irrelevant; right? They are very upset
13 about that, which I think reinforces the point
14 that some of you are making that it's
15 essential that you have some sort of plan for
16 the long term. I want to put that in
17 juxtaposition to, what's most important is
18 keep your options open, which means don't have
19 a firm plan for the long-term.

20 So my question on that one is,
21 help me.

22 (Laughter.)

1 DR. REIS: Have a plan. I mean,
2 options really do have value, but if they're
3 not -- I think we've been talking about these
4 options that have been going on for 50 years.
5 Okay, at some time, people want to say enough
6 talking, enough workshops, enough CSIS, you
7 know, Brookings, et cetera, et cetera. John
8 Rowe's got an issue he's got a deal with;
9 okay?

10 I think the -- so I think it's
11 very important to have a plan. I think we
12 have the elements of a plan. I would
13 certainly concur almost entirely with what my
14 MIT colleagues say. I think that if we get
15 along to, you know, what we're talking about
16 here, I think the elements of that are already
17 there, that the part that is missing is the
18 final, if you will, is the final disposition.

19 Is there a plan? Again, I keep
20 coming back to this because I say we've
21 actually demonstrated that we know how to do
22 that. It may not fit our legal construct, and

1 we still have to do with NIMBY and all those
2 other things, but the pieces of that, the
3 technical perspective, is there. We have a
4 plan, or we have the technical perspective of
5 genuinely getting a plan.

6 I think the options, Al, would be
7 just exactly what Ernie and MIT folks have
8 said. It's, okay, the options are at the end
9 of the century. Now it does make a difference
10 to start doing that. That's why you do a
11 research program. That's why a vigorous
12 research program is necessary.

13 But I think it's really important
14 to move ahead and move ahead rapidly, and I
15 think the reason for that has to do with
16 carbon; okay? If you're, if you don't believe
17 there's a carbon problem, if you don't believe
18 that, then we can wait. But if you really
19 believe -- if you, you know, you can just put
20 the numbers down, and you get a metric ton of,
21 you know, of carbon dioxide for every megawatt
22 year of carbon. That's a lot of carbon you're

1 putting out from a coal plant. If you don't
2 believe that's important, you know, then this
3 is an academic exercise. But if you believe
4 that's important, it's important to move
5 ahead, and options don't help you with moving
6 ahead rapidly.

7 That's my answer.

8 DR. von HIPPEL: I'm glad that you
9 brought this up because I don't really
10 understand which options would be foreclosed
11 by putting spent fuel into a repository. I
12 mean, you could, of course, do that and have
13 it retrievable, fuel retrievable. But even if
14 it weren't retrievable, the amount of energy,
15 the energy potential in that spent fuel is
16 minuscule compared to the energy potential if
17 we do have a large future nuclear energy
18 system in the future spent fuel.

19 So, I think we could, in fact,
20 demonstrate that we know what to do with the
21 existing spent fuel and have all of our
22 options open. You know, two centuries from

1 now, if we decide the world's a different
2 place, we want to have a closed fuel cycle,
3 that option will still be open.

4 DR. McCOMBIE: Yeah, I'm a little
5 bit confused by the question, as well. If I
6 live at a site where I'm collecting spent
7 fuel, that's my whole problem. Nobody's
8 giving me another option. The only other --
9 you've just proven that the other option that
10 was supposed to be out there hasn't worked,
11 namely Yucca Mountain. The only people who
12 are saying there is an option there are the
13 dyed-in-the-wool technical people like we are,
14 or the NRC commissioners, apparently. But
15 that's the whole, that's why people object to
16 having it there, because they think there is
17 no other option.

18 So, following Frank's thing,
19 you've got to show that there is another
20 option. You don't have to build a full-scale
21 repository or something like that, but you
22 have to get a large enough consensus that you

1 can do that, and you know where it's going to
2 go, and then you have an option. But right
3 now, that's exactly what's bothering people at
4 the local sites, that they don't see that
5 there is another option.

6 CHAIR HAMILTON: Okay, we have
7 three Commissioners who have questions. Mark
8 has not asked a question, so we'll go to him
9 next, and he'll be followed by Ernie and
10 Susan.

11 MEMBER AYERS: Thank you very
12 much. I don't know if I have question as much
13 as I do a statement.

14 You know, we're spending a lot of
15 time. One of the gentlemen here said that we
16 have a plan. It's pretty clear to me that the
17 science and technology is sound. There may be
18 some differences, but it does appear to be
19 sound from my perspective, and the discussions
20 are centered on spent fuel, taking it back,
21 repositories, interim storage. It seems as
22 though the policy is in place in the United

1 States for a seemingly nuclear renaissance.

2 The only thing that is not in
3 place are loan guarantees for these first
4 starters. We can, with all the solutions, and
5 I'm very respectful of all the great testimony
6 and professors that we have here, but the real
7 question is, are we going to be sitting here
8 for the next 10 years letting OMB be the ones
9 that stopped any renaissance in this country?
10 That's really troubling to me. That's been an
11 issue for quite some time now, and it's going
12 to continue to be, and it's what's going to
13 interfere with moving forward in the United
14 States with any nuclear renaissance.

15 CHAIR HAMILTON: Okay, thank you,
16 Mark. I don't see too many lights on up there
17 on the panel on this question, but it's really
18 not a question for them, I think, probably.
19 It's a statement. Thank you very much, Mark.

20 Turn to Ernie, then Allison, then
21 Pete.

22 MEMBER MONIZ: Actually following

1 on Mark's point, I just wanted to say that in
2 my first slide, the first bullet, was
3 accelerated implementation of the First Mover
4 Program, and goes back to Vic's point. That
5 is, in the climate context, that is actually
6 being still reinforced. That's the number one
7 issue.

8 Another observation I would make
9 is that in our 2003 -- this goes to the whole
10 take-back issue -- I just want to emphasize a
11 point that we, in 2003 we did a construction
12 of a scenario as to what a terawatt by mid-
13 century might look like in terms of a global
14 distribution. Now, you know, there was
15 judgement involved in there.

16 The only point I want to make in
17 this context is that it was very difficult to
18 find a scenario where you possibly have more
19 than 15 to 20 percent of spent fuel as
20 candidates for this kind of take-back option.
21 So one might say that no matter which pathway
22 one follows, at least for 50 years, we're not

1 talking about a complete -- you know, turning
2 the whole waste management system in the world
3 on its head. It's actually a pretty small
4 increment, and our view was, every country
5 engaged should just do with whatever they do
6 with their own spent fuel with this small
7 increment.

8 But now, to Jim and a couple of
9 questions. One is, your presentation was all
10 about carrots, and have you thought about
11 sticks? Secondly, we've heard various issues
12 of policy incoherence. I need only mention
13 India, UAE, Jordan, Brazil, Japan, to get to
14 the drift of, shall we say, a boutique
15 strategy for each and every country, which I
16 suppose could be viewed by some as an
17 advantage, but it's not viewed by me that way,
18 at least. How are we going to get coherence
19 and any kind of uniformity that would provide
20 us an opportunity for leadership in this
21 field?

22 MR. TIMBIE: Okay, as far as

1 sticks are concerned, I guess the answer to
2 your question is, no, maybe we should think
3 more about sticks. Our entire focus is, as I
4 mentioned in my remarks, looking at
5 incentives, to ways to influence, ways to
6 cooperate and therefore influence decisions to
7 establish options, and as several mentioned,
8 lead by example. So I would say sticks would
9 be an area that might require more attention.

10 As far as coherence is concerned,
11 I mean, we do have a worldwide policy to
12 discourage enrichment and reprocessing. It is
13 implemented on a case-by-case, country-by-
14 country, one-by-one approach. I guess I don't
15 see that as a disadvantage. Countries are
16 different. They're in different situations.
17 They have different resources. They come to
18 this decision from different perspectives. As
19 Frank pointed out, some countries are embedded
20 in a good security situation; others are not.

21 So I guess I don't see it as a
22 disadvantage that, although we do have a

1 worldwide policy of discouraging enrichment,
2 indigenous enrichment, indigenous
3 reprocessing, we do approach each country,
4 sort of, one by one as to what strategy, what
5 set of incentives, what set of cooperation
6 opportunities would best lead to the sorts of
7 decisions that we would like to see.

8 MEMBER MONIZ: Steve used the
9 words -- many of your words keep being revived
10 here -- crosswise with the United States, and
11 I think it would be very hard argued that
12 there is not an impression created that we
13 have very, very different approaches to
14 friends and others, and I don't know if Steve
15 wants to comment on that.

16 CHAIR HAMILTON: Okay, any further
17 comment from the panel?

18 (No response.)

19 CHAIR HAMILTON: If not, we got to
20 Allison, then Pete, and then Al.

21 MEMBER McFARLANE: Okay, great.
22 So I want to start again with Steve's words.

1 You made such an impression on us, Steve.

2 Your last words, if nuclear
3 proliferation represents a threat to the US,
4 then, to the effect, the US, you know, we
5 should be thinking carefully about our own
6 domestic policy decisions. So, in that vein,
7 could or how could the US explicitly support
8 reprocessing or recycling without an
9 international impact?

10 Then let me broaden that out a bit
11 and ask some of the others to jump in, and
12 ask, are there types of, in your view are
13 there types of reprocessing technologies, like
14 pyroprocessing, for instance, that offer the
15 advantages or the cover or whatever that would
16 allow the US to do such a thing?

17 DR. MILLER: First, I'd just say
18 in partial response with Dr. Moniz that on the
19 question of sticks, many of the behaviors we
20 would like to discourage or encourage are
21 either permitted by the NPT or not required by
22 the NPT, and so it's very difficult to create

1 international political traction for punishing
2 somebody who's doing something acceptable
3 under the NPT. We might not like it, but
4 that's different from saying they have no
5 right to do it. That's where the incentives,
6 again, come into play.

7 I've spent much of the last
8 several years traveling around to places like
9 Saudi Arabia and Egypt and Singapore and so on
10 talking to nuclear elites in these other
11 countries, and there's a very wide perception
12 that the nuclear marketplace is heavily
13 politicized. If you're on good terms of Uncle
14 Sam, you get carveouts and exceptions, and if
15 you're crosswise of Uncle Sam, you not
16 permitted even to pursue your inalienable
17 rights under Article IV. Some of those
18 perceptions are probably exaggerated, some of
19 them are perhaps unfounded, but they are a
20 political reality that we have to deal with.
21 Then they ripple through our ability to arrive
22 at various international solutions because the

1 trust that's necessary to build a system is,
2 in fact, lacking.

3 The principle that at least a
4 group of us up in Cambridge has been
5 advocating is, no further national fissile
6 material production capabilities, period, as
7 an operating principle. In order to get to
8 that, you might need to de-nationalize the
9 existing national fissile material production
10 capabilities sooner or later. That, then,
11 gets you into, under what circumstances can
12 you imagine people buying into and relying on,
13 you know, an internationally managed and run,
14 operated reprocessing facility if the global
15 choice is that we need additional
16 commercialization of plutonium?

17 But that's, that's the one
18 circumstance under which you can imagine that
19 you could have, you could go down the
20 reprocessing order, the additional enrichment
21 route, and not eventually run into additional
22 nonproliferation worries.

1 But the Jordanians have refused to
2 accept the Abu Dhabi pledge that they will
3 neither enrich nor --

4 MEMBER McFARLANE: Same with
5 Saudi.

6 DR. MILLER: Saudis, the
7 Egyptians, and so on. Some of this is just a
8 declaration of principle, that they don't have
9 any intent to do it but they don't want to
10 establish the precedent that they're prepared
11 to sacrifice their rights.

12 In the case of Jordan, they have
13 domestic uranium, and they think that they can
14 make money through the value additive of
15 enrichment. So they see it as a commercial
16 opportunity, and why should they give that up.
17 Other people do it; why not them? They're
18 permitted under the Treaty.

19 So that's exactly the dilemma that
20 we're hoping to avoid, that 20 or 30 years
21 from now, we wake up in a world where many
22 more states and very different sorts of states

1 are engaged in this process that gives them de
2 facto weapons-making capability.

3 DR. von HIPPEL: I'd like to pick
4 up on that and also pick up on something Steve
5 said. On the question of proliferation
6 resistance, I mean, we had great debates on
7 about five years ago about whether
8 pyroprocessing was more
9 proliferation-resistant than PUREX, which is
10 the one that the US developed to separate
11 plutonium for weapons. So, certainly, you
12 can't argue it's proliferation-resistant.

13 There was recently, in 2009, there
14 was an internal lab study which I think
15 finally brought some closure to this debate,
16 which basically concluded, yes, there is a
17 difference, some differences between these
18 different technologies with regard to
19 subnational diversion of materials, but there
20 was essentially very little proliferation
21 resistance against national diversion of
22 materials. I think you could understand that.

1 The big trick with regard to
2 reprocessing is you have to do this remotely,
3 behind very thick shielding. Once you have
4 that remote management capability or once you
5 even separate most efficient products, which
6 all the, you know, pyroreprocessing does, then
7 it's quite easy to, you know -- even if you
8 don't have pure plutonium, you could -- to
9 separate out pure plutonium.

10 Now the other thing with regard to
11 the question of no new national fissile
12 material production capabilities is I'd just
13 like to say that, of course, I'm against
14 reprocessing, period, but we still have the
15 problem of enrichment, and that's the struggle
16 we're having with Iran right now. I think the
17 US has an opportunity to, to show that one can
18 do enrichment under multinational auspices.

19 In fact, de facto, the industry
20 has been moving that way. URENCO is building
21 one of the new U.S. enrichment plans. AREVA,
22 the French conglomerate, is building an

1 enrichment plant in the US The, if the laser
2 enrichment gets built, it's a
3 US-Japanese-Canadian consortium. There's only
4 one enrichment plant that may or may not be
5 built that's purely national.

6 But we haven't made a virtue out
7 of the, out of what's happening. I mean, it's
8 also happening elsewhere. The, you know,
9 France is building an enrichment plant with
10 URENCO centrifuges, the Chinese enrichment
11 plants are based on Russian centrifuges, so
12 that there, it's really possible, I think, to
13 take advantage of these industrial trends and
14 actually to say, well, what would we like a
15 multinational enrichment regime to look like?

16 CHAIR HAMILTON: Al?

17 MEMBER CARNESALE: First, a
18 statement, a reminder -- that while we have
19 this broad title of the Blue Ribbon Commission
20 on America's Nuclear Future, our charge is not
21 promoting nuclear power in the United States.
22 Rather, it is focused on the back end of the

1 nuclear fuel cycle and decisions that relate
2 to that.

3 Secondly, it is not to solve the
4 proliferation problem. Proliferation is an
5 important, perhaps the most important, factor
6 in considering choices that we make about the
7 back end. The difficulty of arguing that
8 example matters in proliferation is our
9 example is that we have more than 5,000
10 nuclear weapons and talk about the need for
11 possibly some new ones. So we got a problem
12 to begin with when we talk about
13 proliferation: Follow our example.

14 We're already quite limited here.
15 We're talking about examples as they relate to
16 the nuclear fuel cycle. But in that context,
17 for countries of concern, just on the front
18 and for a moment, I think it's perfectly
19 legitimate to worry about assurance of fuel
20 supply. Yes, there's a market, but if you
21 want to make political hay in the United
22 States, you don't talk about climate change,

1 you talk about energy independence; right? We
2 would depend on anybody else for energy, but
3 others should somehow depend on this
4 arrangement.

5 It might work. I mean, if we can
6 pull it off, I'm all for it.

7 But it's useful to be somewhat
8 realistic here. We've seen, if you're another
9 country, you've seen oil embargoes, UN
10 sanctions, national sanctions, you've seen
11 people manipulate natural gas supplies for
12 political ends, so let's not kid ourselves.
13 But it helps.

14 On the back end, the principal
15 thing that came out of the Ford and then the
16 Carter administration was not the argument
17 that we weren't going to reprocess. It was
18 that we weren't going to reprocess because it
19 made no economic sense. It wasn't, look at
20 us; were giving up something good. It was,
21 look at us; we have learned that this makes no
22 sense. What we hear now looking at the

1 problem 35 years later is it makes no sense,
2 not economically, not from a resource point of
3 view.

4 So it's not so much that people
5 will follow our example or not. I gather it's
6 more that if we proceed, it provides others
7 with some cover. They can say, well, gee, you
8 reprocess; there must be some reason why
9 you're doing it. We should not fool -- those
10 will be the real countries of concern that
11 will use it as cover. But there, countries
12 that would have liked to have done it anyway.

13 So, while we're all in favor of
14 minimizing the spread of these facilities, we
15 should keep in mind that most of their choices
16 are not going to be based on whether or not we
17 do it. If we think that's what's important,
18 we'd better look at our arsenal before we
19 worry -- which, by the way, I'm not in favor
20 of disarmament. I'm just saying we shouldn't
21 kid ourselves as to what we can accomplish or
22 can't accomplish with these choices.

1 So again, my question is, so what
2 do you think of that?

3 DR. REIS: You're all wet, Al.

4 CHAIR HAMILTON: Let's see. Dr.
5 Reis, and then Dr. McCombie.

6 DR. REIS: No, I think you, you
7 know, I think in large measure the discussions
8 of reprocessing and which one, and what won't,
9 I think is a red herring. We're not going to
10 do reprocessing in this country; we're not.
11 Economically, politically, you name it, we're
12 not going to do that, and I think everybody on
13 this panel, one way or another, would -- you
14 know, I'm not making a policy. I'm just
15 telling you that we're just not going to do
16 it. So the real question is, what should we
17 be doing? Which, of course, is what your
18 panel is supposedly going to do.

19 What comes out of the discussion
20 is really, what are we going to do for a
21 repository? Right? I mean, that's really
22 where the rubber meets the road because, if

1 you can have a repository, then you can do
2 interim storage. If you can do interim
3 storage, then you can you take-back. Now
4 there are political problems all along the
5 way, but it all gets back to thing, do you
6 have a repository?

7 My statement -- I hate to sound
8 like a one-trick pony on this -- is that we
9 demonstrated in this country that you can have
10 a repository that can be licensed, that the
11 local community, at least, represents, you
12 know, an enthusiastic support -- I mean, some
13 of the -- you know, that we really do
14 understand the environment, that we really
15 have worked out that problem to a fare thee
16 well, that we've got the National Academy
17 saying that this is the best, you know,
18 ultimately this is the best solution.

19 Now there is still obviously, some
20 work, basically some work to be done. But if
21 we do that, if you people can recommend that
22 as moving ahead, I would argue that the other

1 pieces, all the carrots, are technically
2 feasible, and spending your time whether it's
3 worried about whether it's by pyroprocessing
4 or PUREX is a waste of time because we're
5 simply not going to do that.

6 You should be thinking about,
7 okay, how can we make salt or even something
8 else, you know, the viable option? The
9 administration, I would argue, is waiting.
10 You know, they're taking you very seriously,
11 and the sooner you come up with a solution,
12 the more, the quicker we'll be able to move
13 ahead.

14 CHAIR HAMILTON: Dr. McCombie,
15 then Dr. Miller, in response to the question
16 from Al, and then we'll go to Susan.

17 DR. McCOMBIE: I'd just like the
18 back up that independent of reprocessing or
19 not, spent nuclear fuel is nasty stuff, and it
20 will be nasty stuff for a long time into the
21 future, whatever you do with it. At 50 years,
22 it will kill anybody who's close to it still.

1 Now do we want to have spent nuclear fuel in
2 61 countries or however many come for the next
3 hundred years?

4 It's great to say that in the US
5 they say, we'll keep it for a hundred years or
6 200 years or 300 years. If you've seen
7 pictures of the country which has problems,
8 social or economic problems, if you've seen
9 pictures of naval nuclear fuel in Russia
10 falling to the bottom of ponds and rusting
11 there in a big rich country like Russia, do we
12 really want to have spent nuclear fuel and 68
13 countries around the world for the next
14 several decades? Or do we want to show them
15 that there's another way to do it, there's a
16 better way to do it? That's where the US
17 could show a lead, show that there is
18 something you can do with it.

19 It's nasty stuff, and even if you
20 don't reprocess it, you do not want, anywhere
21 in today's world, any of the substate actors
22 to get their hands on these very, very nasty

1 materials. So that's an issue there that's
2 important.

3 CHAIR HAMILTON: Dr. Miller, and
4 then Mr. Timbie, I guess, wants to comment.

5 Dr. Miller?

6 DR. MILLER: I think Al makes a
7 number of good points about the limits of the
8 power of our example, but I would sort of
9 refine how I was thinking about it by saying
10 that the aspiring nuclear newcomers are making
11 big decisions, and often with fierce debates
12 inside. So there's a question of what
13 arguments are available for deployment, what
14 kind of perceptions do they bring to these
15 debates, and so on.

16 You know, if international
17 organization is such a great idea at both the
18 front end and the back end of the fuel cycle,
19 why haven't we done it? We, the United States
20 has been in the nuclear business for 70 years.
21 We've had decades to do it. We haven't done
22 it. So why is it a good idea for Egypt?

1 Al's point about reprocessing and
2 why we didn't do it, which is, we came to the
3 sensible conclusion that, for the current
4 context, it doesn't make economic sense, this
5 is a very powerful message. If others learn
6 it, that's good.

7 I mean, I spent an afternoon in
8 Tehran sitting through their energy briefing,
9 and they make about their nuclear, civil
10 nuclear power program every optimistic
11 assumption in the book, many of which they
12 borrow actually from the Japanese. It's very
13 much like sitting through briefing in Tokyo
14 about the likely costs of things, about the
15 eventual cost of nuclear electricity, and so
16 on. Those, then, ripple through the decisions
17 that they make.

18 So, that's kind of the context in
19 which I think we need to think about our own
20 behavior, is that it affects their perceptions
21 of what's desirable, what's feasible, what's
22 acceptable, and if we didn't think it was good

1 enough to do it, then why should it be a good
2 solution for them? That question comes up all
3 the time.

4 CHAIR HAMILTON: Mr. Timbie,
5 you'll have the last word on this question.

6 MR. TIMBIE: Al's comment focused
7 on the value of leading by example, and I have
8 advocated that; the others have also advocated
9 that. And it's also certainly easier to make
10 your argument if what we're doing, actually
11 doing, supports that.

12 But I'll also just point out that
13 in addition to setting a good example, there's
14 also the question of putting ourselves in a
15 position to do helpful things. I mean, Russia
16 provides fresh fuel to Iran and takes back the
17 spent fuel, and that has a major
18 nonproliferation benefit. And if other
19 countries were in a position to do that and
20 that became the norm rather than the
21 exception, we'd be better off.

22 CHAIR HAMILTON: Okay. We have

1 two more commissioners with questions, Susan
2 and then Pete, and that will have to conclude
3 the morning.

4 Susan?

5 MEMBER EISENHOWER: Well, first of
6 all, I want to thank the panel for terrific
7 presentations. It was very provocative
8 because I must say that by the time I got done
9 listening to these presentations, you know,
10 I'm impressed by the array of countries that
11 are moving towards nuclear energy who are not
12 anchored, you might say, in the West who are
13 certainly are not American allies.

14 But we've got -- at the same time,
15 I think it only added to the urgency, I think,
16 of General Scowcroft's original idea that we
17 need to find some kind of comprehensive system
18 here. It's hard for me to imagine that the
19 United States alone could shoulder the burden
20 of take-back or anything else.

21 So my question to the panel is: Is
22 there a short list of other countries we could

1 engage on an immediate and urgent basis to
2 create some kind of, you know, the first steps
3 towards an international system that might
4 also, for international security reasons, take
5 back some of this nuclear fuel? I think it
6 was in Frank's paper that he very articulately
7 said that in certain, even Western, countries,
8 having spent fuel sitting around is not
9 acceptable.

10 So, what would a short list of
11 other countries look like that might also help
12 the United States with taking back spent fuel
13 from various places or even taking spent fuel
14 off the hands of countries who don't have
15 populations that will find it acceptable to
16 house that material?

17 So the question is, first of all,
18 would the United States agree to a short list?
19 It's hard for me to imagine, with the domestic
20 circumstances as they are without our own
21 solution in place, that we're going to be able
22 to take back a lot of this stuff. So, if you

1 agree with any of those assumptions, what
2 would a short list look like? Would they have
3 to be all U.S. allies or U.S. allies plus
4 weapon states? Or, what would that look like?

5 DR. McCOMBIE: Well, actually I've
6 worked on an international project for the
7 back end and we did pull up sets of criteria
8 for such things. It didn't include being a
9 U.S. ally. It didn't include being
10 internationally well founded, though.
11 Internationally, not U.S.

12 If you go to another country and
13 say that we, we, the US, thinks this is a
14 great idea, I think it could be
15 counterproductive if the United Nations goes
16 and says that we think this is really good for
17 the international community. It could be
18 different, and we experienced that in very
19 direct. It's documented.

20 We had an international project
21 which was based in Australia. From a
22 technical angle and many other angles,

1 Australia would be an ideal country. It's a
2 big uranium producer and a good incentive
3 there. There are people that are interested
4 and so on. Of course, it's a non-nuclear
5 nation, which makes it very difficult. But at
6 that time, I think we did get the direct help
7 from some U.S. government figures and so on,
8 but it did not turn out to be very positive to
9 look as though the US was asking them to do it
10 rather than in a wider setting.

11 So, to answer or try to answer a
12 little bit of your question more directly,
13 however, the kind of obvious states that you
14 can involve the weapon states, very clearly,
15 or maybe the big uranium producer states with
16 the take-back kind of thing. It's been
17 discussed at different levels in most of the
18 big uranium production states and certainly in
19 Australia and Canada and Kazakhstan and so on,
20 or maybe in some state that actually could use
21 the business. And certainly if there was a
22 kind of international guarantee that the thing

1 would be done state-of-the-art and fair to all
2 concerned, you might have a chance of doing in
3 some of these other states.

4 CHAIR HAMILTON: Dr. von Hippel,
5 and then Dr. Miller, and then we'll go to
6 Pete.

7 DR. von HIPPEL: The country
8 that's been mentioned is, of course, Russia,
9 and Russia did take back spent fuel from
10 Eastern Europe, Finland, Armenia. The
11 Soviet-supplied reactors -- it was the Soviet
12 Union that was taking back the spent fuel. As
13 I mentioned, that has pretty much stopped, and
14 I think both -- it was mentioned that the
15 price went up.

16 Also, think on the European
17 countries, the EU developed -- which, you
18 know, a number of the countries moved into the
19 EU, the customer countries, and the EU sort of
20 felt that that wasn't responsible to export
21 their spent fuel, and that left Ukraine and
22 Armenia basically.

1 Ukraine recently actually did,
2 after the election, start to send spent fuel
3 back. As far as I know, they're the only
4 country. It's not for reprocessing. It's for
5 storage.

6 MEMBER EISENHOWER: I'm sorry.
7 Which country?

8 DR. von HIPPEL: Ukraine, which
9 has a big nuclear sector.

10 But there was also a great debate
11 in Russia. I mean, there was really a push on
12 the, when Russia felt, really when the nuclear
13 sector felt very poor, to try to make this a
14 business taking other countries' spent fuel
15 back. There was a large public opposition.
16 In fact, they had to change the constitution,
17 I think, to make it impossible to petition
18 against this and for a referendum. And so,
19 Sergei Kirienko, who's the head of Rosatom,
20 announced a policy that Russia would not take
21 back spent fuel as a whole, although there's
22 exceptions, and it's not quite clear how will

1 actually work out.

2 Certainly, Iran in Ukraine seems
3 to be an exception. But certainly, the only
4 country which has done this is Russia and it's
5 an obvious partner.

6 CHAIR HAMILTON: Dr. Miller?

7 MEMBER EISENHOWER: Could you --
8 oh, I'm sorry.

9 CHAIR HAMILTON: Excuse me.
10 Excuse me, Susan.

11 MEMBER EISENHOWER: Just as a
12 quick follow-up to Frank, though, okay,
13 there's Russia. What about the short list of
14 what would be acceptable for the US, in your
15 opinion, the US national security community?

16 DR. von HIPPEL: I think it's, I
17 mean, it probably is a pretty long list, and
18 the question is whether it's acceptable, of
19 interest in those countries. I mean, it was
20 mentioned, Australia was mentioned, where --
21 which is obvious; physically, a great place;
22 you know, lots of desert. China is another,

1 you know, has lots of desert, and in fact,
2 it's thinking of siting it's -- well, of
3 course, we've tried to site our repository in
4 a desert.

5 So there are, you know, candidate
6 countries out there, which I think would be
7 acceptable from many points of view.

8 CHAIR HAMILTON: Dr. Miller.

9 DR. MILLER: I just wanted to pick
10 up for a moment on where you started your
11 interjection, which was with the notion that
12 we need a comprehensive system, and I draw
13 attention to some ideas in which, actually,
14 Charles and Tom Isaacson have played the role
15 about linking the front end and the back end
16 of the fuel cycle.

17 Spent nuclear fuel is an
18 unavoidable but problem for everybody, and if
19 you could find a way of solving it
20 internationally -- granted, a big if -- this
21 would be very attractive to countries that
22 wish to have nuclear power. If you could link

1 that to some sort of buy-in to an
2 international fuel provision scheme, that
3 would then give countries an incentive to
4 overcome some of the impediments that Al
5 described so precisely, about why states are
6 reluctant to internationalize their fuel
7 supply.

8 So, there is some thinking out
9 there about trying to create a comprehensive
10 approach to international management of the
11 whole fuel cycle. There are plenty of
12 barriers on both sides, so maybe this is
13 compounding, this is problem squared rather
14 than fixing anything, but it's an interesting
15 idea that builds on the Timbie notion of
16 incentives.

17 CHAIR HAMILTON: Final question to
18 the panel. Pete?

19 MEMBER DOMENICI: Well, Mr.
20 Chairman, let me say to the panel I think
21 there's been something said about, what would
22 you think about all these countries around the

1 world, small and large, et cetera, having to
2 dispose of their own waste and keep it and
3 take care of it.

4 I think one of the panelists said
5 that was not an acceptable situation. I
6 assume, then, if that's not acceptable, you
7 would have in mind that some country like
8 America would, would offer to take waste from
9 other countries, and if that's part of what
10 you're suggesting, I like you to say it in the
11 record. I myself think that's very difficult
12 while we're writing this report to put on top
13 of everything else we're saying, but I think
14 you're implying such.

15 My second question is
16 international also. When you speak of the
17 adequacy of supply of uranium -- and we don't
18 have to worry for a long, long time, if ever,
19 about getting the fuel out of the spent fuel
20 rods because we have plenty of enriched
21 uranium that can come from uranium -- is that
22 true for the world or for America or how does

1 that international situation match up in those
2 two? Does anybody know that?

3 Will you answer the first one
4 first? I mean, are you all expecting that the
5 United States will be the repository for
6 foreign spent fuel from small countries and
7 others? Is that the recommendation?

8 DR. McCOMBIE: No, not directly.
9 It would be very good if the US could do it.
10 the US has bigger hurdles than many other
11 countries to do it now. It would be good if
12 one of two things happened. Either a large
13 country -- it does not have to be the US; in
14 fact, it would be better if it was more than
15 one country for very obvious reasons -- if a
16 large country would accept this small
17 increment, it would be very good for the
18 global nuclear system.

19 The other option, at that point I
20 very briefly, is that small countries get
21 together, but even to do that, they would need
22 help from the international community, and

1 they could make their own multinational,
2 international, whatever you want to call it,
3 repository.

4 MEMBER DOMENICI: Thank you very
5 much. Anybody going to talk about the world
6 adequacy of uranium and the adequacy of energy
7 coming from the spent fuel rods, that we don't
8 need to worry about it, we can put those away?
9 Does that mean worldwide also?

10 DR. von HIPPEL: Yes, I think the
11 picture that the MIT study drew about the
12 availability of uranium is correct. I mean,
13 it is a global picture but I also agree with
14 them that it's important to nail that down.
15 It's sort of -- the, actually, if you look at
16 their paper, it sort of goes back to a 1970s,
17 an article or a study done in the 1970s in
18 Princeton actually, by some geologists about
19 the geological abundance of uranium. I think
20 it would be good to put some money into that.

21 But you know, there's also the
22 issue of how much uranium from sea water would

1 cost. There's a huge amount of uranium in the
2 oceans. It's very dilute. People are
3 claiming that it could be extracted maybe at
4 twice the current price of uranium. And if
5 that could be firmed up, that would really
6 provide us a sort of definitive sort of,
7 something you could nail this question to the
8 floor with.

9 MEMBER DOMENICI: Thank you very
10 much, Mr. Chairman. I would just put on the
11 record here, for our staff as much is
12 anything, that Senator Sam Nunn is Chairman of
13 the National Threat Initiative nonprofit
14 corporation. They deal exclusively, of late,
15 in the issue of trying to solve the problem of
16 getting back uranium -- goes out is used, and
17 it, and there's a system to get it back and
18 have it. I think they run a lot of problems,
19 it's cost a lot of money, but they've had some
20 successes, and it would be good for us to know
21 what that's about.

22 I thank you.

1 CHAIR HAMILTON: Thank you very
2 much, Pete. Our thanks to the panelists,
3 Reis, von Hippel, McCombie, Timbie, and
4 Miller. It was an extraordinarily informative
5 panel, and we thank you very much for your
6 contributions. You've brought a lot of
7 expertise to the attention to the Committee.

8 We stand now in recess for lunch.
9 We will reassemble at one o'clock.

10 (Whereupon, the above-entitled
11 matter went off the record at 12:09 p.m. and
12 resumed at 12:51 p.m.)

13 CHAIR SCOWCROFT: We'll start now
14 this afternoon by exploring the ethical and
15 societal foundations for nuclear waste
16 management. The Commission has heard many
17 references to the need for fairness and equity
18 in nuclear waste management both within and
19 across generations, and we would like to spend
20 some time focusing on that topic.

21 As in the morning session, we will
22 hear from each speaker for a maximum of 15

1 minutes and then engage in a panel discussion.
2 So we would ask the Commissioners only to ask
3 clarifying questions during the presentation.

4 The first speaker is Mr. Bob
5 O'Connor, Director of the Social and economic
6 Sciences Program at the National Science
7 Foundation. Thank you for joining us, Dr.
8 O'Connor.

9 DR. O'CONNOR: Thank you very
10 much, General Scowcroft. I also should thank
11 you for the promotion. I really, I run a
12 program called Decision Risk and Management
13 Sciences at NSA.

14 I am not the entire Social and
15 Economic Sciences --

16 CHAIR SCOWCROFT: You just got
17 promoted.

18 DR. O'CONNOR: -- Division, but
19 thank you very much. It's the highlight of
20 the day.

21 But I really appreciate and am
22 honored to have the opportunity to address

1 this truly blue-ribbon commission. A couple
2 of background things though. First is the
3 disclaimer: I'm not speaking for the National
4 Science Foundation, which the Foundation has
5 a charter which prohibits us from taking
6 positions on any issues. So, second, why am
7 I here then? Well, I'm speaking as an expert
8 on public opinion on long-term, on certain
9 risks. I began studying opinions about
10 radioactive waste and spent fuel -- and by the
11 way, in my presentation, I'm going to refer to
12 it as radioactive waste, although I mean the
13 whole plethora of spent fuel and actinides, et
14 cetera.

15 Okay, I began in 1984 when DOE
16 hired me to prepare a seminar for DOE
17 officials on public opinion and the history of
18 intergovernmental relations regarding
19 radioactive waste storage and disposal. Last
20 evening I read my report in 1984, and I must
21 report that when it comes to public attitudes
22 in the salience of the issues, the

1 fundamentals haven't changed much. The level
2 of support is almost very similar. The amount
3 of opposition has been reduced a little bit.
4 Many people are kind of in between. But you
5 know, the fundamentals haven't changed.

6 Anyway, since '84, I've done some
7 work for, I've done research on this off and
8 on, intermittently, research funded by DOE,
9 EPA, NSF and other sources in my previous life
10 as a political science professor. I've had
11 the honor of working with scholars such as
12 Carol Silva, Hank Jenkins-Smith, and Gib
13 Bassett. And this presentation is really a
14 revision and some new thinking about a paper
15 given, I presented at a waste management
16 conference three years ago. I will mention
17 that I have not shared this presentation with
18 anyone, so they, you cannot blame them for my
19 mistakes and interpretations.

20 Okay. What I'm talking about, my
21 focus, is public opinion about radioactive
22 waste disposal facilities. Where do people

1 get their ideas to favor or oppose citing, and
2 nuclear power? What are the challenges to
3 acceptance? And what policies would build
4 support and reduce opposition to reasonable
5 policies to address the problem of radioactive
6 waste and spent fuel storage and disposal?

7 Okay, why focus on human
8 considerations? Let me propose an after-lunch
9 thought experiment. If all that matters is
10 technical acceptability, the federal
11 government could demonstrate that the waste is
12 harmless by building a repository in the
13 Washington, DC area. Technically, this idea
14 is not far-fetched. Engineers tell us that
15 high-level waste disposal is a trivial
16 engineering problem, that transportation also
17 is nothing to worry about -- after all, we
18 have DOE running trains into the canister and
19 the canister not being broken -- you know, so
20 long as the geology of the place is
21 appropriate.

22 Well, under the Nuclear Waste

1 Policy Act, in the 1980s, DOE began to do
2 exploratory work on a second repository,
3 presumably, in the east. Well, one potential
4 site identified is a stable granite formation
5 in Northern Virginia, including Rosslyn, a
6 neighborhood in Arlington one Metro stop from
7 here, across the Potomac from Georgetown.
8 Well, the amendments of 1987 terminated
9 granite research but not for technical
10 reasons.

11 I notice you are smirking or
12 laughing because the idea of putting the
13 repository in Rosslyn doesn't seem to have --
14 you're thinking, what did this guy, ingest
15 during lunch? But my point is that successful
16 management must take into account technical
17 feasibilities of cost. This is a technical
18 problem, but the more difficult constraints
19 involved the humans, what the humans are
20 willing to accept.

21 Okay, returning to reality, I want
22 to talk about five sources of public

1 perceptions that constrain policy options for
2 radioactive waste management. Some of these
3 five we can do something about fairly easily;
4 others we really can't. Let me just go
5 through the five.

6 The first is the inherent nature
7 of the risk. This is the psychometric
8 research by Paul Slovic, Baruch Fischhoff.
9 What they found, that there are some risks
10 because of their inherent nature, have
11 characteristics that make the risk associated
12 with threats that people see as unacceptable.
13 Other types of risks which scientists tell us
14 may be more dangerous to health and safety,
15 people find acceptable or even seek out. In
16 skydiving, people will do that because they
17 want to. Americans are not necessarily
18 risk-averse, but there are certain kinds of
19 risks that our research shows people find
20 scary and unacceptable, and it makes them
21 angry.

22 So what are the characteristics of

1 this, from this psychometric literature?

2 Well, first off, is there a catastrophic
3 potential? One worries a lot more about
4 terrorist attacks, a catastrophe caused by
5 some kind of attack than we worry about people
6 dying because of obesity. It has to be
7 imaginable, if you can envision it.

8 One reason people aren't terribly
9 frightened about radon is, you know, it's not
10 a scary image. Something blowing up, however,
11 is a scary image, and nuclear has the famous
12 mushroom cloud. Now you are thinking why is
13 this guy saying this? Everybody knows that he
14 radioactive waste facility cannot blow up.
15 You in this room know that, but a lot of other
16 folks don't, and when you mentioned
17 radioactive waste repository -- a.k.a. nuke
18 dump -- the image of the thing blowing up, you
19 know, is salient to people.

20 Another psychometric is the level
21 of personal control. If you can control it or
22 think you can, like driving, it's much less

1 riskier than living near a waste facility
2 where you're not even allowed into the
3 facility. You don't have any personal
4 control.

5 Another psychometric is the
6 origin. If the humans have caused it, it's
7 much more likely to be acceptable than if
8 nature has. I mean, people find asbestos from
9 a manufacturing plant waste much more
10 dangerous than the same amount of asbestos
11 occurring naturally in the ground.

12 Victim status -- if the, is the
13 risk imposed by others or self-selected?
14 That's why we worry less about minors, who
15 presumably have self-selected to take that
16 risk, than we do about a neighborhood of
17 innocent homeowners being faced with a threat
18 that explodes something. The recent
19 California gas explosion, that will make
20 people really angry.

21 And finally on these
22 psychometrics, the level of societal benefit

1 really matters. People find radioactive waste
2 from medical devices much more acceptable and
3 less dangerous than the same level in the same
4 exact radioactive waste from non-medical
5 devices. If it's useful, it's less dangerous.
6 That's how people think.

7 Okay, so there's the psychometric.

8 In conclusion, radioactive waste facilities
9 fall on the unpleasant side of all of these
10 psychometric factors that tend to define risk
11 acceptance.

12 Another reason people believe the
13 way they do is their beliefs about fairness.
14 Most people share an understanding which we
15 were taught in kindergarten, that if you make
16 a mess, you should clean it up yourself; you
17 don't ship it off to somebody else. If you
18 benefit from something, you should clean up
19 the mess you've made. If you asked me, Bob,
20 design a program that would make people think
21 it's really unfair. I think, okay, here's
22 what you do: You have one repository, you put

1 it in one state, and you pick a state that has
2 almost no nuclear power; that'll raise all
3 kinds of fairness issues.

4 I'm not saying this is right or
5 wrong. I'm not accusing anybody of being
6 unfair. I'm talking about perceptions, and
7 when it comes to citing a facility or people
8 finding different policies acceptable,
9 perceptions matter, especially as a difference
10 between moderate opposition and outrage.

11 Okay, a third is questions of
12 managerial competence and trust. Now this is
13 probably very unfair to DOE because, if you
14 look at the history in the last 40 years of
15 radioactive waste management and say, well,
16 you know, how many people has DOE killed or
17 maimed by the way they've managed this waste,
18 I believe the number zero. So, you know,
19 there's much to be proud of.

20 But having said that, so what?
21 Trust in government is not high these days.
22 You have Katrina. You have dead sheep from --

1 you know, there's a history there that people
2 don't look back, either actively or not, and
3 say, well, of course we can trust the good
4 government. By the way, there's a number of
5 folks who say, yes, I believe you when you
6 tell me that technology is fine and that the
7 waste can be managed responsibly without
8 risking anyone's health and safety, but who
9 says it will? Remember the time blah, blah,
10 blah.

11 Okay. A fifth, or maybe fourth,
12 factor is the framework for radioactive waste
13 citing of a repository is what some have
14 called dump it and leave. This is the Nuclear
15 Waste Policy Act framework. Okay, you're
16 asking federal government to do this: To come
17 into a state -- Oregon, you pick the state; it
18 doesn't matter, Indiana -- and say, hi, I'm
19 from the federal government; I want to bring
20 extremely hazardous substances in your state
21 that's hazardous for like, oh, 500,000 years,
22 maybe a million, we can argue about it, but a

1 very long time.

2 Now here's the plan: I'm going to
3 stick it in the ground or into the side of a
4 mountain, then I'm going to backfill it, I'm
5 going to put a sign on top saying "please
6 don't dig here," and then I'm going to leave.
7 That's the plan in the Nuclear Waste Policy
8 Act. Well, you know, that's not reassuring to
9 many Americans. They may be misguided, but
10 that framework does not build trust and faith
11 and say, go ahead, bring it in. You know, we
12 want to help out.

13 And finally, this probabilistic
14 risk assessment methodology for 500,000 years
15 is a little problematic. It's difficult to
16 make a case for safety for almost forever, and
17 unlike what my economist friends would tell
18 us, people do care about what their land will
19 look like 500,000 years from now. We may tell
20 them they're misguided, but a lot of folks
21 really do care about future generations long
22 after they are dead. So that's the background

1 factors for why people believe what they do
2 believe. I have five steps that could be
3 taken toward acceptance of a solid, acceptance
4 of policies that would solve this radioactive
5 waste problem.

6 One is, plan on continuous
7 monitoring forever. Drop the dump and leave
8 framework. Pass legislation or whatever that
9 says, look, we reevaluate every 50 years or 60
10 -- a lifetime; it doesn't matter. If we
11 compare technological developments from 50
12 years ago or 100 years ago to now, the change
13 is amazing. A lot of scientists say that
14 different forms of this waste may become a
15 resource rather than a burden. So plan on
16 continuous monitoring.

17 Second, monitor in conjunction
18 with local and state officials and other
19 stakeholders. Instead of asking for trust,
20 provide verification. In other words, you're
21 saying, look, you can look at the dials. Come
22 in once a week; we'll work it out. Is this

1 adequate? What do you want to do? We will
2 monitor this with you. So you're not saying,
3 hey, trust the federal government; you're
4 saying, let's do this together and verify.

5 Third, I would avoid assigning
6 specific probabilities to extremely rare
7 events over long time frames. I would use
8 Bayesian and related methods for shorter
9 periods, and I would view all decisions as
10 reversible. We're using the vast risk
11 methodologies we have now; this is where we
12 stand; but we will revisit.

13 Okay, fourth, site high-technology
14 research centers at repository sites. There
15 is, as I think Hank Jenkins-Smith mentioned to
16 you, this group, right now all we have is
17 benefits -- I have one more -- not risks, all
18 we have is cost and not benefits. Framing
19 this to bring some benefits -- and by the way,
20 don't just give them a lot of money because
21 that looks like a bribe, and that makes it
22 even more unacceptable. But a high test

1 facility is different.

2 And finally, we need to increase
3 efforts to educate the public on the benefits
4 of nuclear power. Americans want to decrease
5 our dependence on foreign oil, mitigate
6 climate change and improve air quality.
7 Nuclear power is a renewable energy source for
8 all intents and purposes. Solving the
9 radioactive waste problem should be framed as
10 an environmental success because of its
11 stimulating effect on nuclear power, which
12 every true environmentalist should support.

13 Thank you.

14 CHAIR HAMILTON: Thank you very
15 much, Dr. O'Connor. We appreciate it. We'll
16 get back to questions a little later.

17 Next, we will hear from Dr. Wes
18 Cragg, Senior Scholar and Professor Emeritus
19 of Business Ethics at York University in
20 Canada.

21 Dr. Cragg, thank you for coming
22 down.

1 DR. CRAGG: Well, thank you for
2 the opportunity to talk to you.

3 What I'm going to suggest is that
4 the most important issue that you have to
5 address is, what is the issue that you have to
6 address? What's the problem here that you're
7 facing? And there are a common or
8 conventional approach which you will be quite
9 familiar with, and one which I'm going to
10 suggest, which is an alternative approach.

11 The common approach is to think of
12 the waste disposal issue as a knowledge issue,
13 in which case you focus on research, you focus
14 on technology, and you focus on education.

15 And you've heard a lot of that this morning,
16 and no doubt in the work of your Commission.

17 But what if it's not a knowledge issue? What
18 if that's not the fundamental issue that you
19 face as a society, as a political organism?

20 What if it's an ethical issue that you face?

21 Then how do you approach the task that you

22 have in front of you with respect to nuclear

1 waste disposal? I'm going to suggest that
2 it's an ethical issue, not a knowledge issue,
3 and I'm going to suggest that that's the
4 approach that, in fact, the Canadian Nuclear
5 Waste Management Organization followed, and
6 that's the approach that they're attempting to
7 follow.

8 Well, if you began with the idea
9 that it's an ethical issue, not a knowledge
10 issue or a management issue, as is
11 traditionally responded or thought of, then
12 here's where you're going to start. You're
13 going to ensure that all research, all
14 activities, all decisions, all recommendations
15 are framed by explicitly articulated ethical
16 values from the beginning and at every stage
17 of the problem resolution process. So that's
18 where you start, which is, I think, not a
19 common approach in management and in many of
20 the other issues that we're taking.

21 What, then, does that require?

22 Well, it requires that the first and most

1 important management task is to articulate the
2 ethical values that will frame all aspects of
3 the nuclear waste disposal process. All of
4 them. That's, then, the first management
5 process or the first management task, and
6 that's a challenging task because managers
7 aren't trained to do this. This is not what
8 happens in management schools. This is not
9 thought to be a fundamental responsibility of
10 managers for the most part, and neither is it
11 thought to be a fundamental responsibility of
12 scientists or technologists or people who are
13 generating technology. So you have yourself,
14 then, a very, very significant challenge in
15 front of you.

16 Well, why? I'm going to suggest
17 the fundamental waste disposal challenge is
18 building, winning, earning justified trust.
19 That's the issue that we face when we're
20 dealing with the disposal issue, and that's
21 the stopper. That's the showstopper, is the
22 lack of trust in our society for the people

1 and the recommendations that are being made by
2 the scientists and by the people who are
3 developing the technology and by the groups
4 that are generating the recommendations that
5 people have to evaluate and accept.

6 Trust is an important phenomenon.
7 What people frequently forget is that trust is
8 grounded on ethics. That's to say, trust is
9 grounded on the belief that those asking for
10 one's trust will be guided in all relevant
11 aspects of the relationship by shared ethical
12 or moral values. That's where trust
13 conference. It's always grounded on ethics.
14 We can try to create other bases for it in our
15 society; we do in marketing, for example. But
16 if you're going to generate justified trust,
17 then you have to identify the values on which
18 it's based, and you have to identify
19 commitment to those values.

20 Well, what that means, then, is
21 that the relevant aspects of the relationship,
22 that's to say the relationship of those who

1 are trying to resolve the problems of nuclear
2 waste disposal, has two dimensions. First, it
3 focuses on all the decisions that are going to
4 be made, and that's relatively easy to
5 identify, and maybe we're not all too
6 uncomfortable with that because we know what
7 decisions are.

8 But the real challenge is that it
9 also has to be involved with all knowledge
10 creation, generation and assembly, and that's
11 where the real challenge comes because
12 typically we don't think that ethical values
13 are very much to do with the generation of
14 knowledge, with scientific research. Indeed,
15 one of the fundamental aspects of our
16 intellectual culture is to separate values and
17 science, to see science is non value-laden or
18 non value-based.

19 So, the approach that I'm
20 suggesting requires that we move away some,
21 from some very deeply held paradigms and
22 understand that those people who are involved

1 in the knowledge generation and those people
2 who are proposing technological solutions also
3 have to be thinking within an ethical
4 framework, and they have to be evaluating
5 their work from an ethical perspective. What
6 this requires, then, is that the pursuit of
7 all scientifically grounded solutions to the
8 disposal issue should be guided by explicitly
9 articulated ethical values. All of them from
10 the ground up, from the very beginning.

11 Now, what I'm going to suggest to
12 you is that this is the path followed by
13 Canada's Nuclear Waste Management
14 Organization, so we're not talking just
15 theory. We're talking about an organization
16 which has approached the issue of waste
17 disposal from this explicit perspective. I'm
18 not going to suggest that they did it
19 understanding that this is what they were
20 going to do from the beginning -- in fact, I
21 think they didn't know what they were going to
22 do from the beginning -- but they were guided

1 by a leadership that understood intuitively
2 that this was, in fact, a fundamental issue,
3 and the way in which the process was organized
4 followed this model that I'm suggesting.

5 So, the first thing that they did
6 -- well, they did a number of things, and of
7 course, I'm summarizing here -- it created,
8 the Nuclear Waste Management Organization
9 created an ethics roundtable. They did it in
10 2003, right at the very beginning of the
11 process, which was involved in coming up with
12 a plan for disposal of nuclear waste in
13 Canada, which by the way had been
14 extraordinarily controversial issue over a
15 very extended period of time. Canada tried at
16 least twice prior to this particular effort to
17 find a management system or an approach which
18 would work.

19 And the ethical roundtable or the
20 ethics roundtable was charged with the
21 responsibility of identifying the ethical
22 standards that should guide all aspects of the

1 operations of the Nuclear Waste Management
2 Organization. I mean that seriously. It was
3 to guide all aspects of it, the scientific
4 aspects, that technology, and all of the human
5 relations aspects of the work, and then to
6 organize those standards into a coherent
7 ethical and social framework, which is what
8 they did. But it wasn't to be an exercise
9 focused just on the work of experts, if that's
10 what we were.

11 Rather, the Nuclear Waste
12 Management Organization then undertook
13 extensive public consultation and engagement
14 with a view to doing, again, two things,
15 identifying the values that the public
16 believed should guide the disposal of nuclear
17 waste -- so, you find out what the public
18 thinks -- and organizing those values into a
19 set of objectives that the public would
20 recognize as reflecting what was heard in the
21 consultation process. So feeding back a
22 framework to the public that the public could

1 see was there framework and not the framework
2 of a group of experts working independently of
3 that, of them and their values. And these two
4 systems of values were then integrated into
5 the proposal or the approach that the Nuclear
6 Waste Management Organization came up with.

7 So the result was an ethical
8 framework constructed around a series of
9 questions, and I'll talk about those in a
10 moment, focused on both procedural and
11 substantive values. The framework did not
12 tell people how they ought to think, ethically
13 speaking. It proposed that they ought to
14 think ethically and identified the values that
15 they would need to resolve, thinking
16 ethically. That is to say, it proposed that
17 ethical reflection needed to be a part of the
18 entire process at each stage. And so the
19 ethical framework was organized around
20 questions, not around imperatives.

21 And the second element of it was a
22 set of eight objectives to guide all aspects

1 of the decision-making process. And these,
2 then, were the values that had been identified
3 by the consultative process: fairness, which
4 you've heard about already, public health and
5 safety, worker health and safety, security,
6 economic viability, community well-being,
7 environmental integrity, and adaptability.
8 Those were presented then as reflecting a
9 Canadian consensus on the fundamental values
10 that ought to guide the process, which would
11 result in the long-term solution of the
12 disposal problem.

13 The examples of values relevant
14 to, or the question framework -- I'll just
15 give you some examples, and these are
16 truncated to get them onto the overhead
17 slides. But this will just give you an
18 example of where it was that we were going.

19 Is the Nuclear Waste Management
20 Organization conducting its activities --
21 these are procedural questions -- in a way
22 appropriate to making public policy in a free

1 pluralistic and democratic society. That's a
2 pretty challenging question to put to people
3 who are involved in this kind of process.

4 This is not an upper-level question. This is
5 a question that's to be integrated into all
6 aspects of the operations of this
7 organization.

8 Are those making decisions
9 impartial? So, this is a question that those
10 making the decisions have to think about as
11 they make their decisions.

12 Are they, have they established,
13 are they impartial in the work that they're
14 doing?

15 Are groups wishing to make their
16 views known being provided with the forms of
17 assistance they require to present their case
18 effectively? This is a question that needed
19 to be continuously asked as the public was
20 engaged in the process.

21 Is the Nuclear Waste Management
22 Organization committed to basing its

1 deliberations and decisions on the best
2 science, the best aboriginal knowledge, and
3 the best ethics? Again, a question that
4 needed to be asked continuously as the process
5 continued because this would be one of the
6 questions that the public would continuously
7 ask of the process as it developed.

8 Example of substantive values --
9 do the nuclear waste management organizations
10 reflect respect for life? That's a
11 fundamental question, and not an easy one.

12 If implemented, would nuclear
13 waste management decisions be fair?

14 Question 11 -- so again, these are
15 just selected -- do the recommended provisions
16 protect the liberty of future generations to
17 pursue their lives as they choose, not
18 constrained by unresolved problems caused by
19 our nuclear activities? A fascinating
20 question, but fundamental, and again, to the
21 integrated into the management process.

22 These are questions that managers

1 are to wrestle with as they proceed to resolve
2 the problems that they are proceeding to
3 resolve.

4 And then, specific issues that
5 were identified by the ethics roundtable --
6 monitoring, remediation, and if needed,
7 reversal; risk reduction versus access;
8 permanent or interim storage; lessons to be
9 learned. And this was a really important
10 issue that came out of the ethics roundtable.
11 What lessons are we learning about the use of
12 nuclear energy as we proceed through this
13 process? What can we tell ourselves and what
14 instruction can we acquire with respect to the
15 appropriate use of nuclear energy based on the
16 problems that were facing in trying to resolve
17 disposal issues?

18 So, the characterization of the
19 management model, and this is my
20 characterization, a values-based management
21 model -- a process of continuous ongoing moral
22 reflection is what the model requires, and the

1 management challenge is to build this approach
2 into a vastly expanding and diverse
3 organizational system and culture. It's not
4 clear, to me at any rate, with the Nuclear
5 Waste Management Organization has succeeded or
6 is succeeding, but that, at any rate, is the
7 trust, the challenge.

8 And then, a final trust-building
9 principal which was discussed by the ethics
10 roundtable, and in my view, perhaps the most
11 important principle, that processes of the
12 sort that we're talking about here also
13 applies to issues like mining, for example,
14 have to make, and that is Nuclear Waste
15 Management committed itself to a no-go
16 principal, what I call a no-go principal.

17 That's to say, it said that if a
18 potential receiving community said no, the
19 decision would be respected. That meant that
20 the decision to receive the waste would be a
21 voluntary decision on the part of the
22 community that it would involve. A facility

1 would not be placed in or near a community
2 that did not want it.

3 Now, that's a trust-building
4 decision that the Nuclear Waste Management
5 Organization made and perhaps the most
6 difficult decision that could have been made
7 because, essentially, it does two things.
8 Essentially, it says, we trust the community
9 to do a serious job trying to understand
10 whether or not this disposal should be placed
11 in their territory. But the second thing it
12 does is it creates trust by saying to a
13 community, you can talk to us without being
14 conscripted. You're not going to be co-opted
15 by the process. You can engage in serious
16 dialogue with us and then step away, and we
17 won't stop you. And that means you could
18 engage, or the communities could engage in
19 conversation with the Nuclear Waste Management
20 Organization without the fear that they will
21 be trapped.

22 This is the approach that was

1 identified. I've sketched it out very, very
2 briefly. If you want the whole story, there
3 it is. And of course, it's an ongoing story
4 because the Nuclear Waste Management
5 Organization recommendations were accepted by
6 the Canadian government and are now going
7 forward. They've gone through a process of
8 first evaluating a siting process with the
9 Canadian public, and now they're engaged in a
10 siting process. And I understand there are
11 three communities already that have identified
12 a willingness to talk to the Nuclear Waste
13 Management Organization about the potential of
14 their community as a site for the long-term
15 disposal of nuclear waste.

16 Thank you.

17 CHAIR SCOWCROFT: Thank you very
18 much, Dr. Cragg, for a very interesting
19 presentation.

20 For our next speaker, we welcome
21 Dr. Andy Kadak back to the podium. Dr. Kadak
22 of MIT, the floor is yours, sir.

1 DR. KADAK: Thank you again.

2 First, I'd like to just say that I'm very
3 gratified that this Commission is looking at
4 this question. When, we first started the MIT
5 fuel cycle study, this question wasn't really
6 on the top of their list, but luckily, we did
7 get it included.

8 I'm going to talk about two
9 studies that I participated in. The first is
10 a National Academy of Public Administration
11 study done, I think, in the mid-1990s, I think
12 finally published in 1997, on
13 intergenerational risk decision making, which
14 I think is something that is really important.
15 And that also factors in the intragenerational
16 decisions that have to be made as part of the
17 intergenerational equity question.

18 I do have to control the slides;
19 yes?

20 This study basically had about 35
21 or 40 people from various backgrounds --
22 artists, Native American tribes, industry

1 people, union people, engineers, regulators.
2 There was a very diverse group of people. And
3 what I'm going to report to you is the
4 outcome, the findings, of this study, which
5 had consensus from this diverse group of
6 people, about how to deal with
7 intergenerational equity issues.

8 So, as you can see here, this is
9 the overarching principle that we tried to
10 follow, and I think it's pretty much
11 consistent with what's been previously said;
12 namely, no generation should be needlessly --
13 the words are very important -- needlessly,
14 now and in the future, deprive its successors
15 the opportunity to enjoy a quality equivalent,
16 quality-of-life equivalent to its own -- sure?

17 MEMBER CARNESALE: I thought in
18 the material, we got reading ahead. This was
19 an issue in the final -- this came up in the
20 workshop.

21 DR. KADAK: This was -- yes.

22 MEMBER CARNESALE: And the final

1 report did not include the word "needlessly".

2 DR. KADAK: I thought it did, but
3 I cannot say that it -- it looked like
4 "needlessly". I thought it was "needlessly".

5 MEMBER CARNESALE: I'll check.

6 DR. KADAK: Okay, you can check.

7 MEMBER CARNESALE: But I think --

8 DR. KADAK: You're not on the mic.

9 MEMBER CARNESALE: But I thought
10 it had been discussed, and the word -- I might
11 be wrong.

12 DR. KADAK: Okay.

13 MEMBER CARNESALE: I'll check.

14 DR. KADAK: That's the last thing
15 I saw, was "needlessly".

16 Now, part of that was some
17 supporting principles, and these supporting
18 principles were trusteeship, sustainability,
19 chain of obligation, and precaution. Let me
20 just quickly go over what those, in fact, are.
21 The trusteeship, obviously, is pretty clear.
22 You have an obligation to be the trustee for

1 your future generations.

2 Sustainability -- again, dealing
3 with, not depriving future generations of the
4 opportunity. And the question of resource
5 stocks, clearly we're going to be consuming
6 oil, coal, and natural gas, which, depending
7 upon how far you look into the future, will
8 not be there. So we have an obligation to
9 replace those resources with equivalent types
10 of functional utilizations.

11 The chain of obligation principle
12 is also quite important, and it talks about
13 providing the needs for the living -- living -
14 - and succeeding generations, depending upon
15 how far you go out. And it says, "Near-term
16 concrete hazards have a priority over long-
17 term hypothetical hazards," a la one-million-
18 year standards. So this society has an
19 obligation to protect the interests of its
20 own, such that there is a future generation.

21 And the last is precautionary,
22 which I think everybody understands. It's,

1 don't pursue courses of action that have the
2 threat, a realistic threat, of irreversible
3 harm and catastrophic consequences, again,
4 unless there is compelling or countervailing
5 need to benefit either current or near future
6 generations. So this set of principles
7 basically gave us some very key guidelines for
8 how to make a decision.

9 And the other thing, the other
10 bullet that came out of the study was no
11 decisions can be so-called final, but
12 decisions need to be made. I was a little
13 concerned about the MIT fuel cycle study in
14 the sense that it may be perceived as we don't
15 need to do anything for a long, long time, a
16 hundred years or more, but that's clearly not
17 what we're saying, and I think the earlier
18 discussion pointed that out.

19 A lot of things are linked. The
20 repository is linked with the ability to site
21 an interim storage facility, credibly. I
22 mean, how -- I mean, the previous speaker said

1 it's, it's highly unlikely that a community or
2 a state will accept an interim storage
3 facilities without some next step. So we
4 looked at this "no decisions can be final, but
5 decisions can be made" as part of the
6 requirement for intergenerational equity.

7 And the last bullet basically is
8 the so-called rolling futures approach, with
9 credible intragenerational standards. Now
10 why, what is a rolling future in the sense of
11 how we meant it? What we meant is societies
12 change, technology changes. Right now, if you
13 look at the Yucca Mountain standard, it
14 basically says you need to know everything now
15 for a million years, and therefore, we will
16 grant you a license to construct and operate
17 this facility. That just doesn't make sense,
18 even in a intergenerational, from an
19 intergenerational perspective.

20 So, if I took these principles and
21 I applied them to the Yucca Mountain approach,
22 this is what we would come up with as an

1 example. And I mentioned this earlier this
2 morning. Design the repository to meet long-
3 term disposal to defensible standards.
4 License the repository as an underground
5 storage facility, completely retrievable,
6 completely retrievable. Do all the
7 monitoring, all the performance validation
8 tests you need to do, to satisfy yourself that
9 you understand enough to either close it or
10 keep it open. And monitor it for a longer
11 period of time.

12 If you follow the MIT approach,
13 that basically is you need, at some point, to
14 decide whether spent fuel is a waste or a
15 resource prior to closure if that's your
16 intent, but you do have time to make this
17 decision. And it is quite consistent with the
18 rolling futures approach. And then, if you
19 have to, and if you decide, well, we want to
20 close this thing, we're done with it, you then
21 can license it based on a lot of monitored
22 data performance, which gives you high

1 confidence that this, in fact, can be safe.

2 If this isn't acceptable, namely
3 the repository is not acceptable or you want
4 to keep it open, you at least have a safe
5 underground storage facility until an
6 alternative disposal solution is found or
7 other uses are decided.

8 So, if you take the, apply it to
9 the Yucca Mountain and take all this criteria,
10 you can see trustee -- manage the waste --
11 sustainability, use of nuclear to preserve
12 energy options for the future, particularly
13 fossil fuels.

14 Chain of obligation -- you break
15 it into periods, an engineered barrier period
16 of 1000 years where you can, in fact, show
17 complete containment, technically. The
18 geological period you use, as they've done in
19 the PRA or total system performance
20 assessment, to design it to reasonable
21 standards for the long term.

22 The precautionary principle as

1 applied is, when you load the repository,
2 assure real retrievability for the entire
3 repository inventory, and then monitoring for
4 as long as you need to keep it open.

5 And then the rolling future
6 basically says, okay, we can develop new
7 technologies for disposal, new technologies
8 for the use of the fuel, spent fuel. But
9 there is no perfect million-year solution,
10 which is why said my statement that I
11 submitted to the Committee that the licensing
12 process is fatally flawed, especially from an
13 intergenerational basis.

14 And you look at the costs and
15 benefits, and this NAPA study also looked at,
16 or at least my paper looked at, you know, what
17 could we spend the extra \$10 billion for that
18 we spent for Yucca Mountain? Cancer? You
19 know, food for needies? This is a societal
20 question that has intergenerational aspects.
21 We just can't look at these issues in
22 isolation.

1 The next study that I worked on
2 was in support of the fuel cycle study, and it
3 was largely done by now Dr. Benham Taebi from
4 Delft University. He came over the summer as
5 a result of this NAPA paper, was intrigued,
6 and asked if he could work with me for a
7 summer on looking at specific fuel cycle
8 choices and, as they affect the intricate
9 generational effect for fuel cycles.

10 So we came up with a set of moral
11 values. You know, why is it we call it a
12 moral value? Basically, they're built around
13 the principle of sustainability. That's the
14 moral value, sustainability. And we listed
15 several criteria -- resource durability, which
16 in a sense means how much of the resource we
17 have and whether we will preserve it for the
18 future; economic viability -- how expensive it
19 is and what burdens it places in terms of
20 cost; technological applicability basically
21 means are we ready to deploy and what kinds of
22 things are available perhaps in the future;

1 environmental friendliness is quite clear;
2 public safety deals with the risks associated
3 with dealing with the transportation, storage
4 and operation of nuclear facilities; and
5 security is essentially the terrorist
6 question, people who want to do harm.

7 So, in looking at this criteria,
8 we basically set forth a description of the
9 fuel cycle. Now this is very, very busy. I'm
10 not going to go through the detail. But what
11 it attempts to do, if you look at it, you can
12 see Generation 1, Generation 2, and Generation
13 N. And for each of the criteria, we identify
14 certain activities that are impactful, and the
15 light shaded area is sort of the burdens, and
16 the dark shaded areas are the benefits.

17 So, as we looked at -- we set this
18 out -- now this is for the current once-
19 through fuel cycle. You can see that there --
20 and it identifies which generational that is
21 burdened. So as we look at this, you see a
22 lot of gray in terms of burdens, and you see

1 the real benefit, basically, is that
2 associated with the production of energy,
3 which is the resource durability one. But,
4 lots of burdens. And you can see for final
5 disposal of spent fuel and other waste, let's
6 just say it's out to the million-year
7 standard.

8 Now we looked at the number of
9 fuel cycle options to basically make a
10 comparison, and the second one we looked at
11 was the one that I just described. Namely, it
12 was underground storage then if works for
13 disposal. And the arrows, if you look at it,
14 basically say increasing burden and up, the up
15 arrow, is increasing the burden, and the down
16 arrow is decreasing burden. So as you can
17 see, for this cycle, the Generation 2 burden,
18 basically, or the Generation 1 burden on
19 transport of recycled fuel goes up because you
20 have to ship it somewhere.

21 The reduction in terms of spent
22 fuel storage goes down, the burden goes down,

1 because in fact you're now getting rid of it
2 in a sort of a geological foundation. And the
3 time dependency, if you will, of the storage
4 hasn't changed, but the burden of spent fuel
5 storage goes down. Nothing is changed on the
6 production end as a benefit, and the
7 retrievability is still a benefit that you can
8 still have in this particular scenario.

9 If you go into the next scenario,
10 you'll see, now this is the transmutation
11 scenario, light water reactor fuel going into
12 a fast reactor, and you try to say, well,
13 we're going to minimize the waste streams or
14 waste management. And this has, obviously,
15 some benefits because you have reduced mining;
16 you've recycled some of the energy. Transport
17 goes up substantially because you're doing a
18 lot of moving of fuel. Reactor operations and
19 the decommissioning period, another set of new
20 reactors being proposed. And the final
21 disposal, that burden goes down because you're
22 disposing of less material if you will.

1 So, if you work your way through
2 it, essentially, the benefits are essentially
3 limited, but you do have additional new
4 burdens that come up, and those are the red
5 arrows -- I mean, sorry, the red circles. And
6 if you do this systematically, you can be able
7 to see which generation benefits and which
8 generation takes the burden in each
9 incremental step of the fuel cycle.

10 I'm going to do two more and then
11 I'll sort of end with this. The breeder makes
12 it more complicated, but you can see the big
13 difference in the breeder is that energy
14 production for thousands of years. That's a
15 real benefit. The burdens are, in fact, going
16 to be placed on this generation and the next
17 one to deal with the opportunity to create
18 energy for future generations. That's the
19 trade-off is being made.

20 And sorry about this one. What
21 this chart is intended to do, and if you read
22 the report and the paper, it looks at, the red

1 is sort of bad unless it's resource-dependent,
2 green is good, but it breaks out each of these
3 impacts on, as the current practice once-
4 through fuel cycle and alternatives as we
5 talked about them. What this basically shows
6 is a, perhaps a misleading picture relative to
7 burdens. You can see, the last breeder cycle,
8 there's lots of impacts but tremendous
9 benefits for future generations. So what I'm
10 trying to summarize here is a systematic
11 approach to look at intergenerational equity
12 on a step-by-step basis for each generation
13 that we're talking about because there are
14 risks and there are benefits.

15 My conclusion after having gone
16 through all of this is we, as a nation, are
17 willing to undertake the burden of dealing
18 with nuclear waste for the benefit of a future
19 generation, not that, because we're generating
20 wastes; we are burdening future generations.

21 It changed that whole dynamic around.

22 Okay, well, thank you very much.

1 CHAIR SCOWCROFT: Thank you very
2 much, Dr. Kadak.

3 Our final speaker for this panel
4 will be another repeat performer, Dr. Charles
5 McCombie.

6 Welcome back.

7 DR. McCOMBIE: Thank you.

8 Okay then, I hope I can complement
9 some of the points just made by Andrew Kadak.
10 The first one to be made is that it's not new
11 to talk about ethical issues in waste
12 management. I've been in this for many years,
13 and for decades, people have talked about it,
14 but they talked about it to one another and
15 not to the people they should be talking to.
16 And the Canadian program, of course, is an
17 excellent example of taking that outside, into
18 the circles that it should be discussed in.
19 So it's nothing new. There's been lots of
20 talk about it.

21 There's a whole set of principles
22 that have been discussed. The two that I'm

1 going to talk to are the intergenerational
2 equity, which again, the fairness word --
3 fairness to future generations, and intra-
4 generation equity, fairness to current
5 generations. The other principles that are
6 bulleted, I won't have time to talk about, and
7 luckily, on the intergenerational, Andrew
8 Kadak has already said much of the things that
9 have to be said there.

10 Well, let's look at
11 intragenerational. I think this gets
12 neglected very often. It's not just -- I'll
13 come to the real point of it -- the "inter"
14 afterwards but the intragenerational equity.
15 There are really serious issues there.

16 The risk levels relative to other
17 activities, these social economic impacts --
18 we really spend lots and lots of money on
19 this. I've often made the statement that one
20 of the worst things that happened with nuclear
21 power is that it's so efficient that you can
22 afford to do things you shouldn't be doing and

1 other industries don't do. So you have many
2 intragenerational issues associated with that.

3 You have a special distribution.
4 One of the earlier speaker was mentioned it.
5 You know, it's, it looks pretty unfortunate
6 from the outside that the repository comes
7 where the reactors aren't, and so the answer,
8 that's a fairness issue that gets picked up.
9 I think Wes mentioned that.

10 This issue of compensation, which
11 has never really come on the table in the US
12 but is very important in other countries, the
13 compensation of the people or states or
14 communities that are willing to host as
15 communities.

16 And then last, and certainly not
17 least, is public involvement is very important
18 here, a dialogue. We never, ever in the
19 nuclear industry, got around to having real
20 dialogue until recently, and the Canadian
21 example, again, I use as a special example
22 there.

1 On the intergenerational equity
2 issues, there are these three main points, and
3 I'll skip the first two in a minute because
4 I'll come to them afterwards. The ones that
5 came up afterwards, this "maximize choice"
6 actually came up very late in the discussion.
7 It came originally from Sweden, from an
8 advisory group there. We certainly put this -
9 - the preventing burdens to future generations
10 was set on the same level as providing choice,
11 flexibility for new generations. That was a
12 new thing that led to an increased discussion
13 about surface versus disposal, surface storage
14 versus disposal, and also led to a huge
15 increase in the interest in retrievability,
16 which of course keeps options open.

17 All of these issues came at the
18 current practice. I won't go into this slide.
19 It's just a reminder that even in legislation
20 in most countries, there are ethical
21 principles involved in the intragenerational
22 side. These are things for doing radiation

1 work.

2 More to the point is the future
3 exposures. These are also fixed, and these
4 are fixed in high-level documents that most
5 countries, including the US, have bought into
6 and signed even, the Joint Convention of the
7 IAEA, and the principles that it's based on.
8 And the two principles here, of course, are
9 the protection of future generations. In
10 fact, the assertion there is that they should
11 not be exposed to greater exposures than we
12 would accept today. That's a debatable issue
13 maybe you discount for in the future.

14 And the other one is that they
15 should not have burdens, undue burdens, as it
16 was used here, and not unnecessary. These are
17 the exact wordings in the documents which have
18 been worked out at the international level.

19 So the first part of my message,
20 then, this has been discussed at great detail,
21 in the inside circles at least, and what has
22 it led to? I'll try to skip ahead. If I were

1 to word my conclusions here in respect to the
2 general programs and the US program, the first
3 point's we've got to realize, again, enforce
4 it, this deep geological disposal can be safe
5 if you do it right, and there is no other way
6 to do it. We keep ignoring that.

7 Sometimes physicists are -- I used
8 to be a physicist, so I can criticize them --
9 are one of the worst of people there. It's
10 toys for the boys. Let's have something new
11 to play with. Let's pretend that it will do
12 away with the disposal issue. It won't do
13 away with the disposal issue, and that's been
14 said often enough but not as often still as it
15 should be.

16 Of course, for technical reasons,
17 this is all going to take decades anyway.
18 We've seen that very well illustrated today.
19 Safe storage is feasible for all that time,
20 but it's not a final solution to the issue
21 here.

22 Then comes the point I want to

1 make most strongly. Every responsible program
2 should have a credible geological program.

3 Now I want to try and say what I think is a
4 credible program. It doesn't mean to have a
5 repository working. It means to have a
6 feasible technical design, one that's accepted
7 as being a design that can be safe. And you
8 can argue whether that's the case or not when
9 nobody's judged the US designs.

10 It needs a funding mechanism that
11 really is assured for the future. That's
12 really important. Again, you can debate about
13 how assured the US funding mechanism has been
14 up until now. And then very importantly, it
15 needs a site, or sites, which have been
16 investigated at the level where people say,
17 yes, that would do; that would do; that site's
18 okay.

19 And then the fourth point, it's no
20 good if we all believe that unless you have a
21 sufficient societal consensus that these
22 components have all been filled, these four

1 components. Remember that because I'm going
2 to come back to that. In fact, the US almost
3 took a leading step here, this "One Step at a
4 Time" report, which was mentioned before,
5 where Tom and I worked on it and actually went
6 through and tried to use many of the
7 principles which have been talked about today.
8 It used the wording "adaptive staging".

9 These were some of the key aspects
10 of adaptive staging. Again, I'm not going to
11 go through them all, but if you just look at
12 the first two or three even, you can see that
13 the deliberate decision making of a process to
14 transparently make decisions between stages
15 wasn't done here, wasn't done in many
16 programs, and again, I could give you an
17 example. So, without going through the whole
18 list, you can see that most of them were not
19 done in the US here.

20 Focus on program progress rather
21 than prearranged milestones. This
22 predilection for putting dates into laws that

1 nobody, everybody knows at the beginning you
2 can't, you cannot simply keep has lapped over
3 from this side of the Atlantic to the other
4 side. A European commission did exactly the
5 same thing quite recently and tried to make
6 laws with dates in them that were so
7 transparently non-achievable that all they did
8 was lose credibility for everybody inside the
9 system.

10 So these are some of the keys.

11 The report, the adaptive staging report
12 actually made specific recommendations that
13 the DOE should adopt this, that they should
14 work toward pilot and test facilities and
15 possibly demonstration facilities, that they
16 should have an independent scientific
17 oversight group, which didn't really happen at
18 that level that we were talking at,
19 scientific. So all of these were put up, and
20 most of them were not done.

21 The DOE, I think, inferred that
22 this was more or less how the program was run,

1 but we didn't interpret it quite that way, and
2 it was too far into the system anyway. So it
3 wasn't done, and these messages were picked up
4 much more strongly in the Canadian program
5 that you heard about.

6 Jumping now to, what does that
7 mean for the future? What should any program
8 do to be ethically prepared for the future?
9 Now, as you will have realized by my, twice in
10 speaking to you today, that the repository the
11 center. You know, it's like the Clinton era;
12 it the economy, stupid. I think, it's the
13 repository, stupid, is the mantra that we
14 should be having here. We have to have some
15 plausible thing there.

16 And that does not mean -- that
17 could be different variations. You can't have
18 a first-stage repository. And I think
19 somebody mentioned, I think it was Ernie
20 Moniz, that you could do it with defense
21 wastes, for example. But a real demonstration
22 that works, even if it's with a small part of

1 your inventory, that would be much more
2 convincing. You could, of course, build a
3 full geological repository -- that's also been
4 mentioned -- with retrievability, or even, you
5 can stop short of implementation.

6 If everybody's happy to sit back
7 and say, we've satisfied the four criteria
8 that I put up, at that stage, you can then
9 say, okay, next generations, it's up to you.
10 The money's there, the technology's there,
11 even the site or sites are there. Do it or
12 don't do it. Keep your options open then.
13 But there, you have established your exit
14 strategy. So I think that, for any program,
15 would be a sensible way to go forward.

16 For the US program -- I repeat
17 again because, as you will have again
18 interpreted, I'm really worried about the
19 message that's coming out to the rest of the
20 world from Yucca Mountain -- Yucca Mountain is
21 a policy decision that has, up until now,
22 nothing to do with the scientific and

1 technical merits of the site.

2 The middle bullet is the really
3 important one. To really increase the
4 credibility and the ethical framework of the
5 US program, don't just sit back for your
6 hundred years or 200 years and do what is
7 mentioned in the MIT report. But I would like
8 it to be much more bold print. Start up a new
9 adaptively staged siting program that's
10 geographically and geologically and broad
11 based in the beginning, and again, related to
12 Wes Cragg's thing, include specifically at the
13 beginning that this will not be done unless
14 the host community is willing. Experience has
15 shown in the world now that that is a, is not
16 a stumbling block to a program, but it's a
17 potential help.

18 That's what happened in Finland.
19 That's what happened in Sweden. That's what
20 happened in France. That's what is happening
21 in the USA -- in the UK, sorry. So all of
22 these programs have found that making it clear

1 that it will not be thrust upon you, you have
2 a veto right, has turned out to be a positive,
3 and that could be part of the US strategy.

4 And of course, they acknowledge in
5 the last bullet, this does not in any way
6 prevent or stop the idea that you should be
7 working on advanced technologies because the
8 nature, the volumes, the kind of the wastes,
9 will change as you go down the line over all
10 these decades, and we should be prepared for
11 that at all times.

12 Thank you.

13 CHAIR SCOWCROFT: Thank you very
14 much, Dr. McCombie.

15 If the panel would now take its
16 place, we'll have questions from the
17 Commission.

18 Susan, you had the first question.

19 MEMBER EISENHOWER: Well, I thank
20 all of our panelists for terrific
21 presentations, and you covered much of the
22 same territory but in different ways, so that

1 was very welcome.

2 My question is for Dr. Kadak,
3 though others may wish to chime in here. I'm,
4 I'm sorry to sound like a bit of a broken
5 record on this, but I'm sort of curious to
6 know the assumptions going into doing, you
7 know, the, these very useful charts. There's
8 nothing like a good illustration.

9 Before you answer that question,
10 let me just say that it strikes me that some
11 of it is probably inevitably subjective
12 because burdens can be defined in all kinds of
13 ways. For instance, you kept mentioning the
14 transportation burden. Well, it turns out
15 that we've never had an accident, a nuclear --
16 we've never had an accident involving nuclear
17 materials in transportation. I mean, no one's
18 been killed. There haven't been any -- so
19 it's interesting that you classify that as a
20 burden when in fact, you know, so far this is
21 the success story. Now, I think I know what
22 you mean. It's an implied risk.

1 But the other thing I wanted to
2 ask you to comment on is the word "burden" --
3 implies that this is a siloed study because,
4 in fact, if the alternative is worse, then
5 it's not a burden. In other words, if we're
6 back to trying to solve the climate change
7 problem, then having a severe case of climate
8 change that may affect the coastal areas of
9 the world, et cetera, is a far greater burden
10 for future generations than the burden of
11 bearing something in a permanent repository.

12 So maybe you could just comment on
13 the, the going-in assumptions and the
14 subjective nature of the study, if you would.
15 And if anyone else has any comments, I'd
16 appreciate that too.

17 Thank you.

18 DR. KADAK: On the MIT fuel cycle
19 study, intergenerational equities, it was an
20 attempt to describe a process. How would you
21 go about making decisions, looking at the
22 various aspects, whether they be burdens or

1 benefits? It clearly was subjective. The way
2 we, the way we figured, you know, a burden
3 was, using the transportation example, there's
4 a big effort required for transportation of
5 all this stuff from where it is to some other
6 place. There's a big effort in designing
7 reactors, fast reactors and thermal reactors.
8 So that's how we classified burdens.

9 Benefits are mostly, obviously, in
10 the resource area. Declining or increasing
11 benefits or burdens, how much of this stuff is
12 eliminated from the process, or how much gain
13 can you get in the resource? So it's clearly
14 subjective. But to look at this as a way to
15 deal with the question, not a clear analysis
16 of which of these approaches is best. Okay?

17 MEMBER EISENHOWER: If I could
18 just follow up by saying, at least in the, in
19 the stimulus world, putting a big effort into
20 a new technology is regarded as a plus, not a
21 minus.

22 DR. KADAK: Yes.

1 MEMBER EISENHOWER: And so, I
2 don't know. Maybe the problem I've got is
3 with the word "burden" as opposed to benefit.
4 Maybe there's some other -- because, you know,
5 what is one man's burden is another man's, I
6 don't know, opportunity or something.

7 DR. KADAK: But you also need to
8 go back to the NAPA study because both should
9 be used together about what is the best thing
10 to do. And in the NAPA study, we really
11 didn't focus that much on intragenerational
12 benefit. But in my paper, I did. And that
13 basically gets to your second problem about,
14 you know, is nuclear really a benefit?
15 Relative to what? Relative to what is rising
16 water levels. So it's a much broader scope
17 paper than either of the NAPA studies nor the
18 fuel cycle study.

19 MEMBER EISENHOWER: Thank you very
20 much.

21 CHAIR SCOWCROFT: Senator?

22 MEMBER DOMENICI: Mr. Chairman,

1 fellow Commissioners, I, I just wanted to make
2 an observation and make it for you all. I'm
3 wondering why you experts had not sought out
4 how the community of the City of Carlsbad, New
5 Mexico, County of Eddy -- it's amazing to me
6 that you didn't go find out how they
7 determined the ethical and other feasibility
8 matters pertaining to an existing underground
9 permanent repository. There is one. It is
10 established. It's done. It's been solved.

11 And if you're talking around, if
12 you're telling how things occur, it would seem
13 to me that, as experts, somebody would have
14 interviewed those who were part of this
15 decision. It's 10 years old. It's been open
16 for 10 years. The transportation -- in 10
17 years, no accidents; one scratched fender.
18 Why is that not something that adds to your
19 theoretical discussion and talks practically
20 about how a permanent repository was
21 established?

22 From my standpoint, most of what

1 you're talking about, I would hope this
2 Commission would go find answers to by
3 interviewing and spending some considerable
4 time with the local, state, and national
5 leaders who, over a period of six years,
6 brought into that community an underground
7 disposal facility. They are filling it up at
8 a super high rate of truckloads. It will run
9 out of space in eight or 10 years, and it has
10 plenty more of it on -- the legislative space,
11 I mean. That state and city turned the
12 population around such that you could learn
13 from it.

14 Instead of telling us
15 theoretically, you could say that the
16 population of a medium-sized community can
17 apparently be educated sufficiently on this
18 subject to where they, they go on the truth
19 instead of on fairy tales. That's what
20 happened to that community. They didn't
21 believe the fairytalers who talked of blowups
22 and the rest. They went to meetings and found

1 it didn't blow up. And what did it add to the
2 community? Instead of adding burdens, it
3 added tremendous plusses.

4 Now, I think that's all, Mr.
5 Chairman, more relevant, to be honest with
6 you, than their testimony. I believe that you
7 can find out what was conceived as ethical and
8 fair to those people, how you got the subject
9 across, and contrary to the rest of the
10 country -- I tell you, I was there. Did you
11 see my picture by accident on one of those
12 slides? That was because I was in that place.

13 We had been dragging people,
14 having meetings, and at the end, there was
15 such an excitement that they were going to get
16 an enterprise that would employ a thousand
17 highly educated, skilled people, and there
18 would be no risk, and their disciples or
19 apostles -- whichever is a higher rate of
20 somebody that'll go out and give a message,
21 their apostles or disciples -- that you can
22 have a repository, it can involve nuclear

1 waste, it is not dangerous, and it adds to the
2 community.

3 Now, I will tell you -- I want to
4 leave one other comment. I think there are
5 now, in the United States, regions, regions,
6 that have already have experienced the entire
7 episode that we're talking about. Down in the
8 Carolinas where we have all the radioactive
9 work that's being done by the federal
10 government --

11 SPEAKER: Savannah River.

12 MEMBER DOMENICI: -- yes, Savannah
13 River, up there in the salt of New Mexico and
14 a couple other places, communities are already
15 fully aware of all the things that have been
16 talked about here today, and they're just
17 willing to talk about, what are you going to
18 do in our community to make sure you're not
19 going to leave something that has no jobs and
20 no benefits? And if that's answered, they're
21 already ready to accept it, in my humble
22 opinion.

1 And I think we are going to go
2 there -- I hope; you've said that -- and
3 probably have a meeting before we close our
4 episode. Is that not right, Chairman? I
5 think we're going to go down there. But thank
6 you.

7 I just want you all to comment.
8 Do you know about the waste isolation project,
9 either or any of you?

10 DR. O'CONNOR: Yes, real quickly.
11 Yes, it, it has been extensively studied by
12 social scientists who've asked, and your
13 points are certainly well taken. There are
14 other reasons also.

15 Frankly, it's a poor area with
16 heavy unemployment, although probably less
17 poor since the WIPP. The other -- you had an
18 institutional review board from the state, you
19 know, verifying, looking over, et cetera. But
20 I think the point is well taken that -- you
21 know, I spoke in general about public opinion.
22 Well, there's no such thing as public opinion.

1 There's publics' opinion. There are different
2 publics by all different types of criteria,
3 including geographic.

4 And so, anyway, WIPP was also --
5 it was, the Waste Isolation Pilot Plant is the
6 name. It's not the nation's high-level
7 radioactive waste repository.

8 MEMBER DOMENICI: I know that.

9 DR. O'CONNOR: -- for all the
10 waste -- anyway.

11 MEMBER DOMENICI: I've never said
12 that, and I --

13 DR. O'CONNOR: I realize, sir.

14 MEMBER DOMENICI: -- and I'm not
15 even saying that they would want to be. It is
16 radioactive. It is long-lived radioactive,
17 radioactive material.

18 Anybody else -- and incidentally,
19 you could also learn from what he just said,
20 that in order to convince the public of much
21 of the things you've said up there, you could
22 have said, in one community where there is a

1 repository, an independent review board was
2 set up, paid for by the government, and that
3 added to the credibility. That should be
4 something you would be telling this panel, it
5 seems to me.

6 I'm telling the panel that's
7 something we ought to put in there, that they
8 can have an independent review board and we'll
9 pay for it, and at least there won't be any
10 argument in the future as to whether you can
11 have it or not.

12 Any of the rest of you have any
13 comments?

14 DR. McCOMBIE: Well, in a vital
15 sense, it's a very good point that we should
16 not assume that hosting a geological
17 repository is a burden. In the best example
18 of that, I think, in the world today, in fact,
19 is in Sweden again, where two, two communities
20 competed to host the facility, and at the end,
21 one had to be chosen because they just needed
22 one facility. And there was a pot of

1 benefits, financial benefits, to be
2 distributed, and the larger part of the pot
3 went to the ones who lost the repository,
4 which sets a really nice signal that the
5 repository is then suddenly switched from the
6 burden side to the benefits side.

7 DR. KADAK: Just to -- Senator,
8 I've been into Yucca -- WIPP -- so I know, and
9 I have a very good feeling for what is there.
10 But I think there are a couple of
11 distinguishing differences.

12 If you look at how WIPP was
13 licensed, it was licensed by the EPA under a
14 very different process than the NRC uses, and
15 there was state support eventually for the
16 project, which obviously doesn't exist in
17 Nevada.

18 I'd like to contrast that with the
19 private fuel storage facility, an interim
20 storage facility already licensed ready to go.
21 But my recollection was there was some
22 congressional interference and --

1 MEMBER DOMENICI: Which one?

2 DR. KADAK: This is the private
3 fuel storage facility in Utah. There was
4 congressional and administrative interference
5 on actually allowing the project to proceed
6 because the state opposed it. The local
7 community loved it.

8 So there's, we need to find a
9 balance between what the local community likes
10 and what the state will accept, and that's
11 always been the problem.

12 MEMBER DOMENICI: The point, the
13 point I'm making is the one in New Mexico
14 offers an example as to how you can go about
15 getting all the things necessary to establish
16 and build one. In that case, the state went
17 along because we had strong leadership pulling
18 them. The national representatives believed
19 the truth instead of the fairy tales and
20 thought, these are engineering problems that
21 are not terribly unsurmountable problems.
22 Engineers and smart people with good

1 communications can solve the problems. And
2 that's what I think can be learned from that.

3 We're not supposed to be relying
4 upon one set of licensing and permitting.
5 We're going to recommend how it is. So what
6 New Mexico used might be considered, that it
7 be EPA instead of -- I wouldn't vote for that,
8 but that might be that this group might think
9 that the EPA ought to be in the licensing
10 process.

11 Anyway, thank you very much for
12 listening.

13 Thank you, Mr. Chairman.

14 CHAIR SCOWCROFT: I have a
15 question that follows directly on this, all
16 the criteria that you all laid out. This is
17 according to whom? What sample of the
18 citizens? Are you talking about the country
19 at large, or are you talking about the local
20 community? And what do you do when there's a
21 sharp difference, as we've already seen in a
22 number of perspectives? In answering these,

1 they may be honest answers, depending on what
2 group of citizenry you choose, and how do you
3 decide among all those?

4 DR. O'CONNOR: Well, I guess I'm
5 the survey research guy. I have very little
6 trust when I see a single survey at one point
7 in time. It can be influenced by some event
8 that has made the issue more salient. There's
9 all kinds of factors.

10 In terms of nuclear power and
11 waste facilities, there are, you know, over a
12 thousand surveys with different question
13 wording over time, so when -- for example,
14 this psychometric stuff, which just doesn't
15 apply to the radioactive waste but to all
16 kinds of substances, that's been replicated by
17 many, many scholars in different places. So
18 there, there is much more faith.

19 I agree thoroughly, by the way,
20 that you don't get everyone saying the same
21 thing in every point in time in every place.
22 Overall, the positive note from now, from 1984

1 when I did that initial work, is that the
2 amount of opposition of people who were just
3 strongly opposed to even talking about a
4 facility, and really are strongly opposed to
5 nuclear power, is substantially down.
6 Something like 19 percent, where it was much,
7 much higher. People favorable -- there is,
8 that hasn't changed very much, depending upon,
9 of course, on how you ask the question.

10 But you know, there is a lot of
11 nuance, but the survey results are
12 consistently consistent.

13 DR. CRAGG: Perhaps I can make a
14 comment. I'm not familiar with the details of
15 the American search or the American process,
16 but it seems to me that one of the problems
17 here is thinking you have to find the answers
18 to these questions before you actually go out
19 into the community or you start the decision-
20 making process. I mean, that's a question
21 that the community needs to be asked, how do
22 you know?

1 In the case of the Canadian
2 experience, for example, the Nuclear Waste
3 Management Organization has determined that
4 the community is going to have to agree to the
5 siting before the decision is going to be
6 made. There, there has to be agreement. But
7 what they haven't done is to say how they're
8 going to determine whether there's going to be
9 agreement.

10 Now, for some people that would be
11 judged to be incompetence or ridiculous. But
12 in fact, what the Nuclear Waste Management
13 Organization has in fact said -- they haven't
14 said it deliberately, but in fact, this is
15 implied by their position -- is that they're
16 going to have to find out what the answer to
17 that question is, and it's not going to be
18 their answer.

19 They're going to have to engage
20 the communities that are involved, and the
21 public because the public is going to be
22 involved in passing judgment on the decisions

1 that are made in this particular process.
2 They're going to have to engage in a dialogue
3 whose purpose it is to find what the
4 appropriate answers are.

5 One of the difficulties I think we
6 face in this area and many other areas is a
7 belief that that's a process that can't lead
8 to a realizable conclusion, when in fact, if
9 you engage in these discussions, I think you
10 can find that it can generate answers that
11 people, even if they disagree with them, are
12 perfectly prepared to respect.

13 So the issue here is not coming to
14 an absolute consensus where everybody says
15 this is the right decision. Rather, it's a
16 process of coming to a decision that everybody
17 can respect whether they agree with it or not.

18 DR. KADAK: Just to amplify a
19 little bit, in my role as a waste board
20 member, we had the opportunity to go visit the
21 United Kingdom and the Sellafield site. We
22 met with the local community people, and they

1 were one of the quote-unquote "volunteers" for
2 a repository.

3 And in pushing the question, I
4 said, well, why did you volunteer? And I
5 think the same might be applied to the Swedish
6 case. It's because Sellafield is there; it's
7 a mess. We have to do -- if we don't do
8 anything, we're stuck with it, no matter what.
9 So why not be part of the process to clean it
10 up or to fix it rather than sit on the
11 sidelines? So their volunteer process is
12 really one in which it's almost, they have to
13 participate, they have to volunteer.
14 Otherwise -- the alternative is worse.

15 And I think the same is true in
16 the Finland and Sweden case where, even though
17 they had a volunteer competition, the sites
18 that were ultimately competing were sites
19 where there were nuclear power plants. Same
20 answer -- we've got the power plant. It's
21 going be stored on-site, so why not find a
22 better place to put it, like underground in

1 our community or near our community? And
2 there was consensus. There was national
3 consensus that this was okay.

4 Senator Domenici said
5 "leadership". That's what is needed to get
6 this thing done.

7 CHAIR SCOWCROFT: Thank you.

8 Phil Sharp, you're next.

9 MEMBER SHARP: My line of
10 questions is following up our practical
11 problem of how do we do implement the general
12 principles. You've articulated several very
13 similar sets of principles, and I must say,
14 Dr. Cragg, I'm very impressed with your
15 presentation and the effort made in the
16 Canadian politics. As folks here south of the
17 border, we actually do admire many of the
18 things Canada achieves and their ability to
19 get a social consensus when we seem to be
20 incapable of it in many cases in the United
21 States.

22 But what I wanted to follow up on

1 a little bit more was whether there's any more
2 -- you talked about how you determine whether
3 there's a go principle or no-go principle,
4 that that's not yet established. I was going
5 to ask that, but to step back one more, and
6 that is, who has to give approval? I mean, is
7 it the community that's within two miles, 10
8 miles, 250 miles? Is it the provincial
9 government? Is it the neighboring provincial
10 government because they have a lot of
11 transportation coming through? How far do we
12 have to expand in order to get consensus?
13 Because, of course, this is, the example is
14 already articulated in the United States.
15 Where we've run into trouble actually has not
16 always been at the local level. It has
17 actually been at the state level or something
18 else.

19 And the follow-on question to that
20 is, is there any -- do we have to take the
21 assumption that the decision is always up for
22 grabs again? At the next election the city

1 council turns over, the county commission
2 turns over, the state legislature turns over,
3 somebody has decided to make their political
4 career out of undoing the previous decision.
5 In other words, do we have a contract?

6 Do you have any insights into
7 those?

8 DR. CRAGG: Well, one of the
9 interesting things about the question is that
10 there isn't an answer yet. I mean, and this
11 has very much to do with the trust-building
12 process. And if you provided an answer before
13 you started, you would almost certainly
14 generate very intense controversy, and the
15 community would divide. There would be, there
16 would be a debate. But the process that's
17 been selected for this, for resolving these
18 questions, is to engage in dialogue and talk
19 to the various publics that will be impacted
20 by the decisions.

21 First of all, you engage the
22 public in a discussion of whether or not the

1 way in which you're going to proceed with the
2 siting process is acceptable, which is what
3 the Nuclear Waste Management Organization did.
4 Many people would regardless this as terribly
5 inefficient, a very time-consuming process.
6 I think, in fact, it's the essence of
7 efficiency because it means you have agreement
8 as you go along.

9 So first up was to say, this is
10 how we intend to proceed, these are the kinds
11 of discussions that we intend to engage in
12 with the communities, this is the kind of
13 support we are going to offer, financial
14 support, to communities to hire the
15 researchers that they think that they need to
16 answer the questions that they have with
17 respect to these kinds of questions. This is
18 the kind of dialogue.

19 So, effectively, it was, the
20 decisions all had to do with the nature of the
21 dialogue. And we will listen to all comers,
22 essentially, and we believe that we can come

1 to a conclusion which is agreeable to the
2 various parties that are going to engage in
3 the discussion. But we don't have an answer.
4 We don't know what the answer to that question
5 is. We don't know how we're going to
6 determine or how the community or how the
7 public is going to determine whether or not
8 there's consensus at this point in time.

9 And we don't know which
10 communities are going to be involved. Will it
11 be the communities that the waste travels
12 through as it goes to the central site? We've
13 decided that there's going to be a central
14 site. That's a part of the process. Now we
15 have to engage in a discussion, which I think
16 the Nuclear Waste Management Organization has
17 indicated will take at least 10 years to
18 resolve these kinds of questions. But the
19 answers are going to be discovered on the
20 basis of a process of dialogue guided by
21 ethical principles that have been agreed on as
22 the discussion proceeds.

1 MEMBER SHARP: Mr. Chairman, I
2 have one other question, if I might.

3 I'm not on the other subcommittee
4 that's already had extensive hearings on the
5 ultimate disposal project and how to begin
6 establishing a process by which to make that
7 decision, so I'm speaking with even greater
8 ignorance than normal, but let me ask you
9 this: if the Commission were to decide on a
10 process, start from scratch, look for a new,
11 one or more deep geologic disposal sites, what
12 can you say ought to be -- should anything be
13 said or need anything be said about Yucca
14 Mountain?

15 In other words, could the local
16 county there simply apply and say, we already
17 have \$8 billion worth of investment here, we
18 are ready to go with these new arrangements,
19 we'd be happy to entertain that process?

20 DR. CRAGG: Who are you directing
21 that to?

22 MEMBER SHARP: Any of you, but

1 several of you mentioned Yucca Mountain and
2 how mistakes were made in the process of doing
3 that, and I was just curious if that --

4 DR. McCOMBIE: I'll give you a
5 cross-comparison rather than an opinion on the
6 US situation. In two cases, three cases at
7 least, in the UK, where a repository site was
8 refused, in Switzerland where a repository
9 site was refused by -- legally turned down,
10 and in Germany where the Gorleben site was
11 stopped by the government.

12 In all these three cases, they
13 afterwards introduced a more modern or more
14 societally acceptable process, and in each of
15 these three cases, it was decided there was no
16 good reason to keep the original proposal off
17 the table; it should be on the table with
18 other ones. In these three cases, that's what
19 happened.

20 DR. KADAK: My sense is that if
21 we're looking for a good site or a site that
22 will work for geological disposal, that should

1 also be concluded. It should not be off the
2 table, as they say.

3 DR. O'CONNOR: Yeah, I think maybe
4 one of the points here is that siting is a
5 very geographic-specific activity, and you
6 almost have to go place by place. One reason
7 for the opposition in Nevada is that the
8 gaming industry opposes the siting, fearing
9 that southern Nevada would be stigmatized and
10 people would be unlikely to want to go there
11 to gamble. I personally think that's not
12 accurate, that these are not risk-averse
13 people --

14 (Laughter.)

15 DR. O'CONNOR: -- but it is
16 believed, and that matters.

17 MEMBER SHARP: The point I'm
18 trying to get at is whether or not the process
19 ought to allow for a change in the social
20 contract under the original Nuclear Waste
21 Policy Act. Obviously, you would probably
22 start with a new process altogether. But,

1 thank you.

2 MEMBER ROWE: I would like to make
3 an observation. I thought of trying to
4 torture it into a question and failed.

5 (Laughter.)

6 MEMBER ROWE: But it concerns a
7 conundrum between what I think is the very
8 powerful weight of what this group has been
9 saying to us and some of the issues the folks
10 in my industry face. I have, for some time,
11 advised my board and the larger public that I
12 would not recommend that my company start a
13 new nuclear plant, on a new site at least,
14 until there is a meaningful and tangible and
15 believable solution to the waste problem so
16 that you can go to your neighbors when you try
17 to build the plant and tell them where the
18 waste will go. That's part of trust in my
19 world. Also part of economics. I'm very
20 risk-averse.

21 Now I listen to this panel, and we
22 describe a process that seems to have at its

1 root consent from a number of layers of local
2 entities, and I think the case for that is
3 very powerful. It may even support such a
4 principle at the end. But I don't see how
5 anyone rationally starts building a new
6 nuclear plant while that goes on.

7 There are those who disagree with
8 me and who will proceed. They may be the wise
9 ones and I the fool. But, you know, we may
10 have a blessing right now in that cheap
11 natural gas pretty well removes the need for
12 new nuclear plants, as an economic matter, for
13 a decade; perhaps two.

14 But you know, we're dealing with
15 very difficult questions, not just of trust at
16 the siting level, of trust at a business level
17 and trust with those with whom businesses deal
18 every day -- my customers, for example -- and
19 it's very difficult to see how this Commission
20 can recommend so much consensus on solving
21 problems that we already have and still think
22 we're creating a trustworthy ground for

1 business or government investments going
2 forward.

3 And I hope that doesn't sound
4 shrill. I don't mean it to be shrill because
5 I think there's a great deal to be said that
6 the only efficient processes are those that
7 have a great deal of consent behind them. But
8 it does suggest that a very long-term solution
9 to one set of problems involves stalemate in
10 what some people consider to be solutions to
11 other sets of problems. I know that's been a
12 concern to Senator Domenici, and one I share.

13 Excuse me for the monologue.

14 CHAIR SCOWCROFT: Vicky, are you
15 next?

16 MEMBER BAILEY: Okay. I was
17 getting lost in what Commissioner Rowe was
18 saying. I think he presents the conundrum
19 very well. And I don't necessarily have a
20 question either, but we've been very
21 fascinated by the Canadian experience. We had
22 a presentation by, I believe it was Liz -- was

1 her last name Downwoody?

2 PARTICIPANT: Dowdeswell.

3 MEMBER BAILEY: Yes, we had, we
4 had a presentation by her, and I was just
5 following up on some of the things that
6 Commissioner Sharp was asking as it relates to
7 the applicability to the US. I mean,
8 obviously, your procedures and your
9 substantive values and things you list here in
10 your comments and in your presentation, I was
11 just, you know, can they be overlaid as is to
12 the US? Do you think that's a possibility or
13 realistic as we search for this issue of
14 public involvement in trying to build trust
15 and confidence in what we're trying to do as
16 we go forward? I mean, it's going to be a big
17 part of our decision-making on this
18 Commission.

19 And I address that really to Dr.
20 Cragg.

21 DR. CRAGG: Well, I don't really
22 think I can answer the question as a Canadian.

1 I guess if I were to answer it, I would say I
2 think it's doubtful that you could take the
3 process that was developed in Canada and just
4 lay it on, if you like, in the United States.
5 I don't think that's how this sort of process
6 works.

7 I think what might be learned from
8 the Canadian experience is the importance of
9 identifying the ethical dimensions of what it
10 is that you're doing and the principles by
11 reference to which they're going to be
12 resolved, and to understand that it's not a
13 scientific issue, it's an ethical issue, how
14 it is you go about resolving this particular
15 problem, and trying to drive out in a way
16 which generates respect -- not necessarily
17 consensus, but respect -- the values that are
18 going to guide the process.

19 And to go back to the comments
20 made by your colleague just before you, see,
21 I think this, too, is an ethical issue.
22 There's the practical issue, why should

1 someone or group of people who have a
2 substantial sum of money that wish they wish
3 to invest, perhaps, in a nuclear project, why
4 should they proceed if the issue of disposal
5 hasn't been resolved, or should they proceed?
6 I mean, that's a practical problem that they
7 have to resolve.

8 But behind it is an ethical issue.
9 Should, in fact, nuclear development proceed
10 if, in fact, one of the fundamental issues
11 that a society faces -- namely, how the waste
12 material will be disposed of -- hasn't been
13 resolved? It seems to me that that needs to
14 be addressed as well. And that, in fact,
15 putting those kinds of issues on the table is
16 itself a trust-building exercise.

17 That's how you build trust, by
18 acknowledging the issues that need to be
19 addressed from an ethical perspective are
20 going to be addressed, and it takes an
21 enormous amount of faith in your community
22 when you say, we think the community, the

1 society, can do it.

2 So one of the really fundamental
3 issues, I think, that are around these goes
4 well below what it is we're talking about. It
5 has to do with the faith that a community has
6 -- and I'm thinking here of the American
7 community -- a political community has in its
8 capacity to address these kinds of issues in
9 a way that will generate respect, which is
10 essentially an ethical way. And I think that
11 what you have to do is to find a process that
12 will generate respect for a political process
13 that will lead to outcomes that are beneficial
14 for your community.

15 But it's a matter of faith. Does
16 the community have within it the values that
17 allow the kind of discussion that will address
18 the fundamental issues with positive outcomes?
19 And there's no way you can do a cost-benefit
20 analysis on that one.

21 CHAIR SCOWCROFT: Yes?

22 DR. KADAK: Just to compound John

1 Rowe's conundrum question, I think when the
2 Nuclear Waste Policy Act was passed in 1982,
3 amended in 1987, the nuclear industry felt,
4 aha, our hands are clean; the solution is the
5 government's responsibility. And so we kind
6 of sat back for many, many years leaving it to
7 the government to deal with this question.
8 Unfortunately, it didn't work.

9 And as a business, how do you take
10 the durability of the political process in
11 business decisions where you have a law that
12 says, you will do this by such a date, and the
13 law wasn't met? So his conundrum really is,
14 can I even trust the law to enforce or at
15 least implement certain things? And as you
16 start looking at the history of the nuclear
17 waste issue, you will find many instances
18 where we thought we were making progress, and
19 Congress intervened saying, I'm sorry. As
20 you'll hear from David Leroy, that is his
21 examples.

22 The problem is we need to find a

1 way, and I think your committee needs to try
2 to figure out a way, and maybe the MIT fuel
3 cycle study suggestion of a quasi-government,
4 independent agency, hopefully free of
5 political interference, could be organized to
6 implement this work. Now, I know you're
7 smiling and I think we discussed this at one
8 of our advisory committees, and they looked at
9 me like I'm some kind of a planet Pluto
10 person, but this is something that you ought
11 to strive to do. The political interference
12 is the problem, not the technology, as has
13 been mentioned thousands of times.

14 DR. McCOMBIE: Well, the question
15 was whether you should have nuclear power if
16 you don't have a solution, and I'd like to go
17 on record as saying, no, you shouldn't. You
18 should have a solution, but what does a
19 solution mean? Again, using my international
20 experience, it doesn't necessarily mean having
21 a repository.

22 Again, starting with the examples,

1 in Sweden, they passed a law, the Stipulation
2 Act, back in the '80s, and it said you cannot
3 run your nuclear power stations unless you can
4 convince us that you have a solution. And the
5 convincing didn't include building a
6 repository. It included doing a lot of
7 scientific work, doing a very solid project
8 and having it reviewed by independent experts,
9 and then being pronounced at the government
10 level.

11 In Switzerland, exactly the same
12 thing happened in '97 to '98, with a new
13 atomic law, and it said you cannot run your
14 existing stations -- never mind new ones --
15 unless you have a solution that we believe in.
16 Again, it went through a long process, a
17 multi-year process, and at the end, government
18 at the level of the cabinet agreed that they'd
19 been there. But that only works in countries
20 where there is sufficient trust at that level.

21 If I compare that with the USA,
22 what's happened here? What was the solution?

1 Well, many times -- I remember one previous
2 director of OCRWM, of DOE, who is not in the
3 room I should say, who went around many times
4 saying that if Yucca Mountain dies, nuclear
5 power in the United States is dead. That was
6 what the statement said over and over again,
7 yes? And suddenly, Yucca Mountain is not
8 there, but -- it's not. So what do we have
9 instead? We have a waste confidence statement
10 that says, we believe there will be a
11 solution.

12 You know, somehow, you've got to
13 find something that is sufficiently consensual
14 that there is an agreement that a solution can
15 be found. And consensus is not enough just
16 between us specialists. It's got to be wider,
17 and that's what it seems to me has been
18 lacking, and you can't wait until you have a
19 repository. We've seen it takes too long if
20 you want to expand nuclear power.

21 So you definitely need some kind
22 of agreed mechanism. An agreed mechanism,

1 maybe the Canadian example, is you should get
2 agreement on the mechanism before you go out
3 and pronounce what the mechanism is. But you
4 need to have some level of societal agreement.
5 Without some sufficient level of societal
6 agreement that the waste issue can be solved,
7 then I think you should not be having nuclear
8 power.

9 DR. O'CONNOR: Just a quick
10 comment. I think you really need to take a
11 look at alternative institutional arrangements
12 for reaching this goal because what's there
13 now is not working.

14 CHAIR HAMILTON: Allison.

15 MEMBER McFARLANE: Okay, great.
16 Thank you. One quick observation or question,
17 and then a longer question. The first one is
18 for you, Andy.

19 In this paper that you talked
20 about where you did these different scenarios,
21 it seems like it was inconsistent with the MIT
22 report because you seem to assume, you know,

1 things like the importance of volume and in
2 these different -- is there, are there
3 inconsistencies?

4 DR. KADAK: Yes --

5 MEMBER McFARLANE: There seem like
6 there are.

7 DR. KADAK: This study was --

8 MEMBER McFARLANE: I just don't
9 want everybody to be confused.

10 DR. KADAK: No, no. This study
11 was done to develop a methodology, okay, a
12 process by which one can maybe judge
13 intergenerational --

14 MEMBER McFARLANE: Right, but it
15 seems to assume things that the MIT report
16 does not.

17 DR. KADAK: Now, the volume
18 question really gets to the -- shipping
19 issues, I think, is the section where volumes
20 were addressed, and of course, as you noted,
21 breeder reactors were not one of the preferred
22 choices. So we just have to make a selection

1 about scenarios that we'd study. So its
2 relationship to the MIT study is -- from that
3 standpoint, not necessarily, does not need to
4 be consistent.

5 MEMBER McFARLANE: So, a larger
6 question then, especially for Dr. Cragg.

7 I'm wondering -- you said in the
8 Canadian process, you know, it's something
9 that you're just dealing with in the
10 communities, but it seems like there is an
11 important scientific or technological aspect.
12 I mean, if you decide, a community decides
13 that it would like the site, and it is, from
14 a technological or scientific point of view,
15 inappropriate, what do you do? And where --
16 and so I'm interested in where the science
17 comes into your process, first of all.

18 And then secondly, you know,
19 listening to all of you speak, it seems to me
20 it's really important to try to keep politics
21 out of the process as much as possible, and
22 that seems next to impossible in this country.

1 Look where we're sitting; we should be outside
2 the Beltway, at least. So, any suggestions as
3 to how to do that would be helpful.

4 DR. CRAGG: Well, the short answer
5 is that if it's not an appropriate site, the
6 answer's no. I mean, it's a dialogue; it's
7 not a one-way decision process.

8 MEMBER McFARLANE: Right, but
9 where do the scientists come into this?

10 DR. CRAGG: Well, the scientists
11 are, the responsibility of the Nuclear Waste
12 Management Organization to the Canadian public
13 is to determine that in fact a site is an
14 appropriate site before the dialogue gets
15 really serious. So one of the first steps in
16 the discussion is, is this an appropriate
17 site? And so the scientists are involved in
18 the discussion all the way.

19 But if the community is concerned
20 about the quality of the science or about the
21 quality of the decisions that are being made,
22 they can enter into the dialogue. I mean,

1 they can, in fact, hire their own science, if
2 you want to put it that way. They can set up
3 research whose purpose it is to verify,
4 validate the conclusions that the Nuclear
5 Waste Management Organization has come to, so
6 that the community is in the position of
7 dialogue.

8 This is a dialogical process here
9 where nobody holds all the cards. It's not
10 just a community decision. It's an issue that
11 the Canadian public has to make. So, I mean,
12 that's one of the first decisions. The
13 Nuclear Waste Management Organization has to
14 work out with the community that this is an
15 appropriate site, and if it's not, then it
16 doesn't go there. Just, it wouldn't be there.

17 And just, just one comment before
18 the others launch in on the issue of politics.
19 I mean, one of the really crystal questions,
20 I think, and golly, this is something that --
21 I mean, one of the most important issues that
22 we face as societies in Canada and the United

1 States is whether we're going to keep politics
2 in or keep out. And I think one of the
3 reasons that -- for discouragement is the idea
4 that in order to arrive at a sensible
5 position, you have to keep politics out.

6 I mean, it's a political decision.
7 I mean, we're talking about a political
8 community. We're talking about democracy.
9 We're talking about fundamental values about
10 how we're going to relate each other as human
11 beings and as, in particular, societies. And
12 you can't keep politics out. It is a
13 political decision, but that's nothing
14 fundamentally wrong with politics if you're
15 democrat -- and I don't mean an American
16 Democrat --

17 (Laughter.)

18 DR. CRAGG: I'm in trouble now for
19 sure. I'm not involved in your political
20 debates.

21 (Laughter.)

22 DR. CRAGG: -- if you believe in

1 democratic principles, which are fundamental
2 to your Constitution, then you have to find a
3 way to build a political dialogue that leads
4 to sensible conclusions, and that means you
5 have to have faith in your community to engage
6 in sensible political dialogue. But that's an
7 act of faith.

8 DR. O'CONNOR: Can I follow up
9 quickly? Just that, you know, there's, in
10 America, we have tend to have this view, we've
11 got a problem; now if we could just get
12 politics out of it and get, in this case, even
13 values out of it, and go to the technical
14 solution that the experts can tell us is the
15 way to go, that'll solve our problems and
16 we'll all be happy. That is so naive. I'm
17 not -- I'm sorry. I don't mean to sound
18 insulting. I wish it were true, but the
19 humans, humans have different values and have
20 different tolerances and different cultures in
21 this great nation of ours.

22 So, to me, you know, we, to try to

1 insulate this process from politics -- I think
2 the Canadian example, as you said, is
3 intensely political. Now, "political" does
4 not necessarily mean "partisan", and as a
5 political scientist, I don't use politics as
6 an epithet, but --

7 MEMBER McFARLANE: Yes, I don't
8 mean politics writ large.

9 DR. O'CONNOR: Okay.

10 MEMBER McFARLANE: I mean special
11 political interests that have a lot of power,
12 in part because they have a lot of money
13 behind them. So that, the -- your average
14 member of the public, their voice is gone.
15 How do you get it, you know, how do you make
16 sure it doesn't get captured, this whole
17 process doesn't get captured by certain
18 political interests?

19 DR. O'CONNOR: That is looked at
20 institutionally. I think stakeholders are
21 stakeholders. The ones we don't like we call
22 "special interests". The ones we do like we

1 call our favorite, you know --

2 MEMBER McFARLANE: Even the term
3 "stakeholders" is a bit laden, I'd have to
4 argue.

5 DR. O'CONNOR: Okay. But, you
6 know, my thing is that this is, this is your
7 task, and it's not simple and easy how to
8 create institutional forms appropriate for our
9 culture that will give rise to authentic
10 participation.

11 CHAIR SCOWCROFT: Very quickly,
12 because we have to move on. I know. I've
13 got, I've got three more questions.

14 DR. McCOMBIE: Very quickly then,
15 to Allison's question about, what happens if
16 a site's not suitable? Of course the answer
17 is, you don't accept it. A real practical
18 case is, I've worked very closely with the
19 Japanese program on their volunteer program,
20 which hasn't worked, and also with the UK
21 program. But in both cases, this is made very
22 clear up front, there will be a set of

1 criteria quickly applied, and if it doesn't
2 pass it here, it won't go on. Of course, that
3 depends on the local community having trust in
4 the people who apply the criteria, and that's
5 where, again, it falls down on it.

6 DR. KADAK: And very briefly, I
7 was the one that sort of suggested that we
8 insulate it from politics, recognizing that
9 you can't quite do it.

10 I think what you can do is create
11 an organization, an independent organization,
12 that is politically insulated -- let's argue
13 that Nuclear Regulatory Commission is
14 apolitical, they have Republicans and
15 Democrats, and they operate independently. If
16 this institution had money and the mission,
17 you could get this thing done, but what I was
18 concerned about -- and set up in a trustworthy
19 manner.

20 Establish all the criteria for
21 transparency, openness, but clear rules of
22 people need to follow in terms of knowing what

1 the success criteria are. And then,
2 hopefully, giving them the money and authority
3 to implement this job, it insulates them a
4 little bit. But having it ethical, if you
5 want to use the generic term, but I also
6 understand that politics will always play a
7 role, but you need to do something to keep
8 happening, keep from happening what has been
9 happening to this waste program.

10 CHAIR SCOWCROFT: Okay, we have
11 two more questions. Al Carnesale, then Pete
12 Domenici.

13 MEMBER CARNESALE: Well, this time
14 I might not even pretend there are questions.

15 (Laughter.)

16 MEMBER CARNESALE: Let me do two.
17 First, a clarification. Radioactive waste is
18 a burden. This is unambiguous. We should not
19 fool ourselves. It's a burden the same way an
20 incinerator is a burden, a landfill is a
21 burden, a refinery is a burden. However,
22 there may be benefits that outweigh the

1 burden, but the radioactive waste is
2 unambiguously a burden. If you're having
3 radioactive waste problem in your vicinity and
4 having a repository there will make it better,
5 that's not saying radioactive waste in your
6 backyard is a good thing. If it brings jobs
7 to a poor area -- and where new refineries
8 wind up? Where do landfills wind up? They
9 wind up where poor, powerless people are. It
10 is likely that that's where this will wind up,
11 and it will be the equivalent of a negative
12 auction, right? Who will take it for the
13 lowest price? But we want to do better than
14 that if we can.

15 Second is on the ethical question,
16 is why would one proceed with nuclear power
17 before the radioactive waste problem is
18 solved? We heard the ethical answer: global
19 warming and climate change. And that's the
20 trade-off between these two. Now, different
21 people can differ in their views about which
22 wins, but there certainly is an argument to be

1 made for urgency. On the Canadian plan as you
2 apply it to the United States, or even as you
3 apply it to Canada, number one, certainly no
4 guarantee of convergence; secondly, 10 years
5 to find out if it will converge.

6 If we think that in the United
7 States, our need is to have some strategy that
8 clearly will converge as opposed to an
9 interesting experiment in morality, that
10 clearly will converge, then we need more than
11 that. The two can go in parallel, but we need
12 some default option that says if that doesn't
13 converge, here's what we're going to do
14 because we have all kinds of information that
15 indicates that nuclear power isn't going
16 anywhere unless we have a strategy for
17 disposal, which we all agree is not the same
18 as saying, we have to have the geological
19 repository open and running.

20 So, I think there are things to be
21 learned from the Canadian experience, but it
22 simply does not apply directly to our current

1 problem. And that took me less time than if
2 I would have tried to pretend they were
3 questions.

4 (Laughter.)

5 MEMBER DOMENICI: Well, a few
6 things have been said that cause me to ask to
7 be heard for couple of minutes.

8 First of all, I think somebody
9 made the point that Yucca Mountain, that it
10 was a policy decision. Apparently, there's
11 more concern about Yucca in Europe than there
12 is here. Yucca Mountain was not a policy
13 decision. It began with a "P" all right, but
14 it was a political decision, and no question
15 about it. I lived it. They're not denying
16 it. The senator from Nevada is powerful
17 enough to stop it; he stopped it. That's it.
18 And it won't come off. It won't go anywhere
19 else, because by the time this president is
20 out of office if he did not have a second
21 term, it will already be divested enough that
22 it's gone.

1 So, it was a close call that it
2 might be gone by regulatory action, but it was
3 canceled because the senator from Nevada asked
4 the president to do it, and he did. Now, if
5 anybody doesn't think that, I was there, so
6 you know, he's one of my best friends, the
7 senator from Nevada. And that's how happened.

8 So now, to go to the next question
9 that you all have raised, I don't understand
10 the use of the word "values" and the like in
11 this discussion, so forgive me. This process
12 is much simpler, in my opinion, than you all
13 are talking about. First of all, what we have
14 learned is you don't try to go to a community
15 that doesn't want you. So we've got to start
16 with that. You just forget about it unless
17 it's a last resort for your country, nothing
18 else works, and we're choking on waste and we
19 have to dictate it to a city. If that's not
20 the case, then you don't choose that area.
21 Who is it that says they're for you?

22 The best you can do is the elected

1 officials that are credible, and you ought to
2 have enough antennae to know that, whether
3 you're dealing with scoundrels or not. Don't
4 deal with scoundrel politicians; just put them
5 in the "no" column and go to another
6 community. Get decent politicians in the
7 community to say, we want you.

8 The third proposition is the
9 sponsors should be truthful. Whatever they
10 tell the politicians they're going to give the
11 community and what burdens they must assume
12 should never be violated because you will lose
13 it as soon as you get down there with the
14 public, and if it's different than you were
15 told, you're a dead duck.

16 If we want to say you have to have
17 local concurrence or local veto -- whichever
18 we say -- that's going to be part of our
19 writing of recommendations and/or the state's
20 going to be in it. You can decide how much
21 authority they have, Mr. Chairman, or whether
22 it's just yes or no, and then the local

1 community runs it from that point on. You can
2 have different versions. But it's the
3 community that wants it and then local leaders
4 that want it. Supply plenty of money and
5 resources for the community to do its own
6 investigating. Whatever they want to do, set
7 up committees, because this whole process must
8 start on the proposition that is much
9 different than we've been talking about. We
10 must have concluded as a group that what we
11 are recommending can be done in the United
12 States is, engineering and construction-wise,
13 a safe production.

14 In other words, if it's an
15 underground repository, we're saying it is
16 safe. If it's aboveboard, we are saying it is
17 safe. And we start with that proposition, and
18 we don't have any ethics involved because
19 we're not selling anything that's not safe.
20 It is safe, or we're not peddling it, and this
21 Commission ought to say that, that if it's not
22 safe and whatever you want say is safe, we

1 don't try to sell it. If it is, you proceed
2 with it, and that's what you're telling a
3 community, this is safe.

4 Now if a local group can convince
5 the constituency that it is not safe and you
6 don't want it, then obviously you've done
7 something wrong. Either your original stuff
8 is wrong or you're not answering the questions
9 right, and you lose. But if you have truth
10 following you right along, then you don't have
11 to be so worried about these issues of value,
12 these issues of ethics, because the ethics is,
13 what you're sending down there, if built
14 right, will be safe.

15 Now, am I right in that? I don't
16 think anybody wants to build a temporary
17 repository that is not engineering and
18 scientifically safe. You said it in your
19 report. It is going to be. If it's a
20 repository underground, it's going to be safe.
21 So the promoter starts with all ethics on his
22 side. It's a safe thing, or we never brought

1 to you. And if you can't do it that way, then
2 you'll have no chance of winning and you
3 shouldn't win.

4 The third point, if it's going to
5 be a freestanding, above-ground temporary
6 repository for a hundred years, you'd better
7 put something in that says you're going to
8 give the community something besides the
9 repository because nobody's going to want this
10 thing when you finish building it, it just
11 sits there. It's got to have some benefits to
12 the community. Now if you're doing something
13 like WIPP and you offer a thousand jobs by the
14 time it's finished, that's self-evident, but
15 it's bad too because it's going to close
16 pretty soon. So, you know, that's the other,
17 the flip side of the coin because they're
18 going to have it full.

19 MEMBER SHARP: Would the Senator
20 yield?

21 MEMBER DOMENICI: I'm about
22 finished. I just wanted to go sit up there in

1 the middle of those four, and I couldn't, and
2 go up there and say I would just like to talk
3 about the reality of ethics and the reality of
4 values; here's what it is when we lived with
5 it. Not because you are not the right people
6 for the job, but just we don't need you. We
7 already have the best case in New Mexico. We
8 don't need your, what you're talking about,
9 theoretically.

10 New Mexico and its experts and its
11 citizenry can tell you what ought to happen,
12 and they'll, it'll be more right than a
13 theoretical case study that will be made here
14 and given to us.

15 That's all I'll say.

16 MEMBER SHARP: Would the Senator
17 yield?

18 MEMBER DOMENICI: Yes, indeed.

19 MEMBER SHARP: I appreciate it
20 because what you've gotten at is something I
21 think is going to be a continually troubling
22 problem, and that is, what lessons do we take

1 from our experience so far? And Dr. O'Connor
2 expressed one that I've said, others have
3 said: well, we messed it up under the Waste
4 Policy Act, so we ought to try to get some
5 other institutional framework to do it and get
6 it off the government books somehow, out of
7 the politics, whatever. The statements have
8 been made.

9 But the reality is, the most
10 successful one, the only one operating, was
11 precisely done under current institutions,
12 significant political interference, if you
13 want to use that term, as well as local
14 approval and local engagement. So, it's a
15 little hard to come to an instantaneous
16 conclusion as to, as if there's some new magic
17 box out here.

18 Now, I personally am quite open to
19 looking at other institutional ways to
20 organize this, but we'd better be a little
21 careful about the conclusions that are getting
22 drawn because we don't like the outcome of the

1 Nuclear Waste Policy Act. One, there are
2 plenty of criticisms of that, and I was
3 involved in some of those decisions, and we
4 were wrong, and I confess, you know --

5 MEMBER DOMENICI: Now, we don't
6 want to get involved in a congressional
7 debate, but what I want to tell you is I did
8 not intend by my statements to indicate that
9 the existing law is great, hunky-dory,
10 shouldn't be changed. It's very tough.

11 MEMBER SHARP: Right.

12 MEMBER DOMENICI: And we've got to
13 make it easier. But essentially, what I said
14 will be pervasive under a new law which would
15 be much, much more fluid, much easier to
16 operate and much more certain, a lot more
17 certitude in it. The one we've got is pretty
18 vague on these issues. We should have learned
19 a lesson that we want to say whether the local
20 community says yes or no; no implications.
21 Put it in the law. How much power does the
22 state have? We've got to put it in the law.

1 The federal government controls such and such,
2 we ought to put it in the law. It's not in
3 now. And so, this one is a written, free-
4 standing statute written by a couple of people
5 and me and some others, and we introduced it
6 and then it got amended a hundred times, and
7 so it's statutorily created. We don't want to
8 do that to the future of our country and
9 nuclear power.

10 CHAIR SCOWCROFT: I'm assuming
11 these last two interventions are statements,
12 not questions.

13 (Laughter.)

14 CHAIR SCOWCROFT: I want to thank
15 the panel very much for what was obviously a
16 stimulating discussion.

17 We'll take a break now and be back
18 at three o'clock.

19 (Whereupon, the above-entitled
20 matter went off the record at 2:51 p.m. and
21 resumed at 3:03 p.m.)

22 MR. FRAZIER: Okay, we'd like to

1 get started again if the Commissioners can
2 take their seats.

3 We're ready when you are, sir.

4 CHAIR SCOWCROFT: Okay, can we get
5 started now? The final topic we will explore
6 to the is the consideration in siting nuclear
7 waste management facilities, including public
8 and community engagement.

9 We're going to start off by
10 hearing from Dr. Tom Cotton, who is a senior
11 consultant to our Commission staff. Dr.
12 Cotton will deliver a presentation which was
13 intended to be delivered by Mr. Alvaro
14 Rodriguez Beceiro of ENRESA in Spain. The
15 Spanish government is currently in the midst
16 of the storage site identification process,
17 and Mr. Beceiro had to attend to that
18 important business.

19 Dr. Cotton has been following the
20 Spanish program closely and will now provide
21 us a brief overview.

22 Thank you.

1 DR. COTTON: Thank you very much.
2 Mr. Beceiro sends his apologies for not being
3 here. I know he wanted to be here very much,
4 and he appreciated the opportunity to explain
5 the siting process that Spain is engaged in at
6 the moment. But as of last Thursday, the
7 Spanish government took what I think is the
8 penultimate step in their process, and things
9 have gotten very, very busy and active back
10 there, and he has to remain there while they
11 take the next steps.

12 So, I think this is a very
13 important process that they're engaged in.
14 This is a real-time volunteer siting process
15 for a spent fuel storage facility in a very
16 diverse country politically, with a level of
17 government between the local government and
18 the national government. So it's important to
19 watch and to see how this works.

20 ENRESA is the state-owned limited
21 liability corporation that handles all
22 radioactive waste in Spain. It's owned

1 primarily by the research organization under
2 the Ministry of Science, but it reports in a
3 policy sense through the Ministry of Industry
4 and the activity associated with energy
5 policy. It is controlled through a general
6 radioactive waste management plan, which
7 ENRESA prepares every four years. It is
8 responsible for all the radioactive waste in
9 Spain, not just high-level. They handle, in
10 addition, the decommissioning of reactors,
11 they do the R&D on waste management
12 activities, and they handle all of the funding
13 which comes from radioactive waste producers.

14 The nuclear facilities in Spain
15 are primarily 10 reactors when they started --
16 or their maximum was 10 reactors. They have
17 eight operating reactors now supplying about
18 20 percent of Spain's nuclear electricity,
19 which is similar to our own level. They also
20 have a low-level waste disposal site operating
21 here and a number of fuel cycle, fuel
22 production facilities.

1 The amount of waste that they're
2 handling is -- typically, most of the waste is
3 low-level waste, a very small amount of spent
4 fuel and high-level waste, approximately 6,700
5 tons of spent fuel will be what they're
6 handling. They have a very small amount of
7 glass high-level waste, which I'll talk about
8 in a minute. It happens to be one of the
9 drivers in their waste program. What they're
10 doing now with respect to low-level waste is
11 disposal at the facility in southern Spain.
12 They're in the process of decommissioning and
13 dismantling two reactors.

14 The real policy activity is here
15 at the spent fuel high-level waste management
16 area. What they've been doing with respect to
17 temporary storage is reracking all of the
18 pools in their reactors. They've done that
19 very effectively. One reactor has run out of
20 space, so they've built one dry storage
21 installation, the Trillo reactor. One of the
22 pressures for going to a centralized storage

1 facility is to avoid having to do that at the
2 other reactors. We have built them now pretty
3 much at every reactor, but in their case,
4 they've got pools everywhere except one.

5 With respect to final disposal,
6 they are in a wait-and-see mode. They're
7 planning a central storage facility with about
8 a 60-year storage period. What they're doing
9 is generic work on repositories, and they're
10 also doing work separately -- but ENRESA's not
11 doing it -- on transmutation, or separations
12 and transmutation. This is just a picture of
13 that low-level waste site in Southern Spain,
14 which has been working extremely well for
15 quite a number of years.

16 The waste that will go to their
17 storage facility, again, I said, is primarily
18 the 6,700 tons of spent fuel from the reactors
19 but also an amount of waste from their
20 dismantling the power plants. And this very
21 small amount, 13 cubic meters, of high-level
22 waste coming back from France that was a

1 result of reprocessing fuel from one reactor,
2 Vandellos, which had graphite fuel, and they
3 pretty much had to reprocess it. They
4 otherwise stopped their reprocessing plans
5 back in the mid '80s.

6 But they have this waste that,
7 under the contracts with COGEMA, has to come
8 back and has to start back here in, back to
9 Spain at the end of this year. And if it
10 doesn't start coming back by the end of this
11 year, ENRESA has to pay COGEMA penalties,
12 quite a high penalty of, I think it's, what
13 I've read is p50,000 a day, which comes to
14 about \$20-some-odd million a year. So that's
15 the other driver for a centralized storage
16 facility. They don't have any place right now
17 to put it, so that's what the other purpose is
18 for that.

19 This is just another picture.
20 This is where the reactors are and where all
21 the spent fuel is stored. The one that has a
22 dry storage installation is Trillo, and here's

1 all that reprocessing waste just sitting up
2 here on the French border waiting to come in
3 at the end of this year.

4 So what happened? The -- in 2004
5 at the end of December, there was a resolution
6 passed by the Congress of Deputies calling on
7 the government to set up a process for coming
8 up with a centralized storage site. At that
9 point, ENRESA got on with designing a facility
10 and got approval from the safety authority.

11 In parallel, they updated their general waste
12 management plan, got it approved, and the
13 government set up an interministerial
14 commission to implement the process for
15 finding the site. Bear in mind, this is a
16 governmental siting process. Even though
17 ENRESA is responsible for doing the
18 management, it is an interministerial
19 commission that was responsible for setting up
20 the process.

21 They got a process going,
22 providing information out here, but from what

1 I can tell from the press, there was some
2 decisions that, because of the timing of local
3 elections and the subsequent national
4 elections, they deferred opening up the actual
5 call for volunteers until late last year.

6 But the key points that he wanted
7 to make about this process, and I think a very
8 important one, there's a very high level of
9 political commitment at the national level.

10 The congressional resolution that called on
11 the government to come up with the storage
12 site was unanimously supported by all of the
13 parties in the congress, and I would really
14 like to know how they did that. But it was,
15 that's been important in maintaining the
16 support. They've gotten approval of their
17 plan and they have established this
18 interministerial commission to set up a siting
19 process and carry it out.

20 The commission is made up of very
21 high-level members from key ministries and
22 from the presidential cabinet. Its functions

1 were to define the conditions for the sites,
2 and that's define the site selection criteria,
3 establish an open and transparent public
4 information process, and develop a procedure
5 whereby municipalities could volunteer to be
6 the host for this facility. And then based on
7 that, the volunteer proposals that they got,
8 they would come up with a proposal to the
9 government for a site to use. What they have
10 done in that process was to develop a number
11 of basic support -- reports to support it.
12 They started with the siting criteria. It had
13 to be clearly defined.

14 The next one -- this is an
15 important one -- a report justifying the need.
16 This is very important when you're trying to
17 site a facility that a lot of people may not
18 want. You have to explain very clearly why
19 you have to have it. They came up with an
20 analysis of what other countries are doing,
21 safety analysis, analysis of transportation of
22 spent fuel. Then they set up a public

1 information program, including a website with
2 all of these reports on it. And the minutes
3 of all of the commission meetings are
4 available online.

5 And then finally, in December of
6 last year, they issued what everybody knew was
7 coming -- this was not a secret -- but they
8 issued the call for voluntary proposals from
9 the communities. And the process was for
10 communities who were interested to submit
11 their own proposal for why their site was good
12 and why it should be selected. They would do
13 an initial analysis of it against the
14 screening criteria. They would have an
15 iteration with more public information and
16 inquiry, and then more detailed proposals
17 would be evaluated by the commission. And
18 then finally, they would come up with a report
19 basically recommending which would be the
20 preferred site. And finally, there would be
21 a government decision picking it.

22 Now, what happened last week was

1 the results of this report were made public.
2 That's the penultimate step, and we're waiting
3 for the government decision.

4 So, this is my slide. I added
5 this to bring in some information that I was
6 aware of that seemed to be relevant to things
7 that we've been talking about and you've heard
8 here in this Commission having to do with,
9 what are the benefits to the community for a
10 facility like this? Well, there are cash
11 benefits. It's on the order of \$2 million a
12 year -- p2 million, excuse me -- p25,000 per
13 ton of spent fuel, and p3,500 per cubic meter.
14 And what I've read in the press is that the
15 total of all of these payments could come to
16 on the order of p10 million a year.

17 In addition to the project
18 investments themselves, they're on the order
19 of half a billion euros. So this is a very
20 significant investment. The employment is,
21 what, 300 during construction and 110 during
22 operation. Now, you bear in mind that many of

1 these communities that are interested may be
2 on the order of 500 people, so this is a very
3 major employment opportunity.

4 Now this one, I think, is very
5 important, and we've heard discussion about it
6 today. Combined as an integral part of the
7 facility is an advanced technology research
8 Center for ENRESA. So it's not just a fuel
9 storage dump, it is an advanced center for
10 both research on all aspects of interim and
11 final disposal of high-level waste, spent fuel
12 and low-level waste, but also work on
13 separations and transmutation, with the
14 possibility of some sort of demonstration
15 facility.

16 In fact, this focus was part of
17 the congressional resolution calling on the
18 government to establish something. So they're
19 pursuing two paths with a high-tech research
20 center. And there's also an industrial park
21 there both to support the development and
22 operation of the facility but also to help the

1 local government and the local people with
2 employment.

3 This is just a picture of the
4 facility, artist's rendering. I want to point
5 out what's missing here is, you notice that
6 there is no big field with large storage
7 casks. This is not a cask storage facility.
8 It is a modular dry-vault storage system,
9 which is similar to one that's also being used
10 in the Netherlands and also to the storage
11 facility that you saw up at Hanford, for the
12 N-reactor fuel. It's a large building. And
13 what happens is they're bringing in their
14 spent fuel from the operating reactors. It
15 goes in here, put into canisters, and then
16 they're put into vertical cells, concrete
17 cells that are below grade.

18 And this kind of facility turns
19 out to be, I think, more cost-effective when
20 you know that you have a substantial amount of
21 storage to provide for a long period of time.
22 It's modular in the sense that they can add

1 another chunk on the side to add more
2 capacity. Completely passive air-cooled; no
3 moving parts.

4 So what happened with the process?
5 Well, they got something, I think it was about
6 14 initial proposals from communities, so
7 there was a lot of interest out there. They
8 screened out, I think, six that did not meet
9 the initial criteria and wound up with a set,
10 suite of eight candidates.

11 Now, what's interesting, and this
12 shouldn't be surprising after the discussion
13 we've been having, is, whereas you had eight
14 candidates in a number of these -- the large
15 areas are what they call the autonomous
16 communities, which are the equivalent of our
17 states, and the political leadership of all of
18 the autonomous communities in which a
19 volunteer community was located have come out
20 in opposition to it. This is not surprising
21 to us.

22 So what happened last Thursday was

1 the report was made public that indicated this
2 site, Zarra, in Valencia, was the preferred
3 site. And immediately -- and I mean within a
4 matter of hours -- the political leader, at
5 least one, in the community, autonomous
6 community of Valencia, said that they're going
7 to appeal the decision. So the Spanish
8 government then decided to defer the final
9 approval, which is the last step, while they
10 were having, I think, a legal analysis of the
11 implications of an appeal by Valencia. I also
12 heard that it's also, that it's equally likely
13 that there will be appeals by the losing
14 communities too. So they're -- you can see
15 why he's busy right now. They're dealing with
16 this.

17 So the summary of the experience
18 was, at the political level -- this is
19 interesting; I think we've run into this --
20 very high commitment at the national level,
21 very good cooperation and participation at the
22 municipal level, and opposition in the middle.

1 And this sounds, this sort of sandwich is a
2 fairly familiar experience.

3 At the public level, it's
4 interesting. Apparently, the attitude of the
5 public at large is this was not a big deal.
6 They're essentially neutral. They had some
7 confrontations in some of the municipalities.
8 I know that one mayor, who was a little
9 premature and jumping the gun back in 2007,
10 and stuck up his hand, was barricaded in his
11 office for about a half a day by some unhappy
12 residents. But that, I think, passed.

13 The media had been reasonable in
14 their treatment of it, and that's been my
15 impression of what I can glean from the
16 Spanish press.

17 The environmental organizations
18 have been actively negative from the very
19 beginning in the process. There was an anti-
20 nuclear cemetery coalition that was formed,
21 and they've been basically opposing the siting
22 process everywhere. It's not so much

1 opposition to particular details or particular
2 sites but just general opposition.

3 And in general, the process took,
4 in his view, too long. I would say that it's
5 been only four years. This is the speed of
6 light by our experience.

7 And I will end with two things
8 that I found in the Spanish press, two
9 pictures that I think capsulize the problems
10 of siting. It's not just the Spanish problems
11 but the ones that we've been talking about and
12 probably will talk about some more.

13 This is a sign from the community
14 of Zarra, and it says, "ATC" -- that's the
15 facility -- "Equals Future Development", very
16 positive.

17 The next one is a sign from, some
18 signs put together by the neighbors. I don't
19 know if you can see that, but this is a
20 caravan of, very slow-moving on the highway
21 from Valencia to Madrid with signs that are
22 saying "No Nuclear Cemetery in Zarra" with

1 your little mushroom cloud on it.

2 So that's the doughnut problem of
3 local support and folks around it not being
4 quite so supportive. And that's been
5 resolved. I hope it will be successful, and
6 I hope we'll know fairly soon.

7 Thank you.

8 CHAIR SCOWCROFT: Thank you very
9 much, Tom.

10 Our next presenter is Doctor
11 Claudio Pescatore, who leads the Forum on
12 Stakeholder Confidence within the OECD Nuclear
13 Energy Agency in Paris.

14 Dr. Pescatore, thank you for
15 coming here to be with us.

16 DR. PESCATORE: Thank you, sir.
17 I'm very happy to be here. Thank you for
18 inviting me.

19 So, I will try to concentrate in
20 15 minutes to give some of the main messages
21 of what we've been learning over the past 10
22 years -- it's been, in fact, 20 years for

1 myself. In my presentation, first I will give
2 some key messages if you like. Then I will
3 give a feel for the amount of understanding
4 which has been raising in the past 20 years,
5 in fact, and then the way we've been
6 formalizing what we've learned.

7 This is the leaflet of our
8 workshop that just took place in Europe. I
9 was struck by two words. It says, "Nuclear
10 Energy in Europe: From Acceptance to
11 Ownership". These are two important words --
12 acceptance can be passive, and in fact it can
13 be resigned; ownership is something that you
14 want, it's something that you want to, in
15 fact, continue on, perhaps giving honors and
16 heritage. This is a very important word and
17 one I will use, in fact.

18 My first very important message is
19 that the necessary goal of siting is not just
20 to have siting per se, in fact. It implies,
21 it's something that you have to create an
22 ownership in the facility that will last many

1 decades. So the concept of ownership is very
2 important, and therefore you have to create
3 conscious relationships, construct
4 relationships, many type of them.

5 Of course, this concept of
6 ownership rests on people who are comfortable
7 about safety, so you have to talk about safety
8 and what it is, safety. In fact, many times,
9 it's really a sort of construct. It's not
10 something very clear what it is. People have
11 to also be accepting. They're not condemning
12 a deviant practice, and somehow this has to do
13 with the deviation of power. But point in
14 fact, it is the broader interests of society.
15 We learned before that if people feel
16 responsible for the waste, perhaps they will
17 move on to do something about it. And also,
18 that the facility will contribute to the
19 quality of life and the community across the
20 generations. All the above is necessary, of
21 course and it takes time, so it's necessary,
22 perhaps not sufficient, and it takes time.

1 Basically, another thing which is
2 important to know, and that social scientists
3 have been telling us, in fact, is that
4 radioactive waste repositories are part of a
5 larger class of an unwanted type of
6 facilities. A classical problem is the siting
7 of hazardous facilities. What complicates, in
8 fact, the siting of radioactive waste
9 facilities also has to do with radioactivity,
10 which is especially dreadful. It has to do
11 also with debates about nuclear/no nuclear.
12 And the debate also moves on quite quickly on
13 how trustworthy the various actors are, et
14 cetera. Therefore, you can say the siting
15 cannot be seen in isolation from a host of
16 other issues. That is really the problem of
17 siting.

18 The problem also, that, over time,
19 the stakeholders change, the boundary
20 conditions change over time; therefore, what
21 is there to be done? We have to construct a
22 process of decision making that is robust over

1 time. And robustness, the first thing for
2 robustness is that this project must be seen
3 as being fair, and we'll talk a little bit
4 about it later.

5 So how is the evolution of the
6 knowledge over time? What has been learned
7 over time? This is a study that was done in
8 1992, in fact, by the equivalent of the NWKRD
9 in Sweden. They realized that basically, the
10 strong technical portion of work, basically,
11 they saw it. They looked at experience in
12 several countries -- Sweden, Canada, France,
13 United Kingdom, Switzerland and USA -- and
14 they end up saying systematic screening,
15 technical screening, really doesn't work very
16 well. The one which work most are those that
17 are based on back-end involvement with a
18 systematic political scheme in a reduced role.

19 Ranking sites for their technical
20 suitability is a temptation but not a smart
21 policy, because if you're telling people,
22 well, these are the best sites, then if the

1 communities do not accept them, then you've
2 lost the ability to have any other sites. And
3 also, ranking sites is already difficult in
4 itself because the data is never really
5 equivalent, for instance. Also, you can find
6 some of the real bothersome scenarios, like
7 human intrusion, they are really independent
8 of sites. Then, if you add things like
9 remoteness and other things, then it destroys
10 the credibility of the process.

11 The other thing that was very
12 clear is that local governments, and of
13 course, regional governments, they have an
14 effective veto power. So, in our democracy,
15 governments will find the ways to block
16 projects. The starting study itself affects
17 the ability of the Commission in the counties
18 who block the projects, so the way they are
19 approached is important.

20 This is what they were saying, the
21 people who were working in the hazardous waste
22 management field in 1995, I think something

1 which is still valuable today, also for our
2 projects, is that for successful siting of
3 hazardous waste facilities, there is no
4 recipe. There are some ingredients, though,
5 there. Certainly, a facility should not be
6 sited if it's not needed, so one should
7 establish the need for this facility. Is
8 there really a need? If it is perceived as
9 acceptably safe, so we have to say something
10 about safety.

11 Then we need a process that is to
12 be seen as transparency, but in fact, because
13 the concept of fairness changes with publics,
14 you have to come up with negotiating this
15 process -- which is what is happening, in
16 fact, in Canada.

17 Now, other examples. There are
18 many, many studies over the past 20 years.
19 This is, in fact, again, this is from the
20 Canadians. The Canadians are trying to get
21 learning experience from a siting experience,
22 and here are some messages they found. The

1 first one is very important, that there is not
2 a universal definition of "willing host
3 communities". They look at eight case
4 studies, and they see that in none of them
5 there was a successful definition of a
6 "willing host community". People come in from
7 all sides. They claim they have, or have not,
8 an interest. So that is a very difficult
9 thing.

10 So when we talk about community,
11 we must be careful. We must have this in the
12 back of our mind. There's not a single way to
13 look at community acceptance -- referendum,
14 not perhaps a great idea. There are, in fact,
15 several perhaps stepwise processes by which
16 you gauge how the community -- so you have to,
17 again, negotiate in the community and what is
18 community acceptance.

19 The siting process, of course, can
20 be lengthy and the outcome can be uncertain.
21 We have heard this before. In order to
22 effectively -- the issue there is very much

1 about also aboriginal knowledge, and to some
2 extent, this is also true here in the United
3 States, and basically, again, we have to build
4 the time allowances for this to have
5 culturally sensitive communication and
6 research methods. It is very important to
7 build capacity in these communities. They
8 have to have their own funding to hire their
9 own experts, for instance. It is important
10 that this methodology -- there are agreements.
11 This adds rigor to the process, and patterning
12 could be an effective tool. Engage
13 communities in transparency. I put in two
14 websites where you can find, first of all,
15 these findings and then also how they were
16 going about developing a siting strategy in
17 Canada. I think these are interesting reads.

18 In our case, for 10 years, we've
19 been looking in a professional way very
20 collaboratively with society at large. We've
21 had seven workshops in seven countries.
22 Understand the dialoging, in fact, with

1 people. Overall, you can see at least 500,
2 600 people from all walks of life, not just
3 specialists and practitioners. We have now a
4 database that you could access online, which
5 is probably the largest in this field.

6 And perhaps enough on these direct
7 examples. I'll just go to formalizing the
8 learning -- look at things from top down
9 rather on bottom up. What we see is that
10 decision making should be performed through
11 interview processes, and utilizing, if
12 possible, a stepwise approach. We should try
13 to evolve, to try to have social learning,
14 mutual learning, as much as possible and to
15 involve the public is much as possible.

16 Now this has three principles.
17 What are these three principles? To increase
18 familiarity of control by all stakeholders,
19 all the publics; familiarity and control there
20 about safety; To enhance and maintain trust
21 and confidence amongst the institutional
22 actors and stakeholders. Now, I put it in red

1 because this is something you don't hear very
2 much, at least at these hearings.

3 Trust in the actors is very
4 important. It is very low. To establish
5 legitimacy in a system, we need to get to the
6 decisions and also to promote, in the end,
7 ownership. When I say that the authorities
8 are not very much trusted, there is data from
9 the Eurobarometer in Europe.

10 We can see that when people are
11 asked, who should be involved in a decision
12 regarding underground disposal, you can see 56
13 percent of the people say the concerned
14 citizen; 22 percent, which is quite amazing,
15 the NGOs; and only 15 percent say the
16 authorities. The authorities are the ones who
17 tell people what to do. They would not be
18 very credible unless they are into a process
19 by which they establish their credibility and
20 their authenticity as well. Probably this can
21 also be transferred to other countries and to
22 other continents.

1 We find that basically, the
2 national, the siting of facilities embedded,
3 therefore, in a larger system of decision
4 making. There are several rungs of decision
5 making. One is about energy policy. We heard
6 this morning about nuclear power. The other
7 one is about really constructing the reactor
8 waste management system and then going down to
9 siting. So we have to have at least that kind
10 of line before we go to any communities. And
11 of course, you must keep implementing
12 decisions, otherwise you lose altogether your
13 ability, and this is what Senator Domenici was
14 saying.

15 So, you're talking about different
16 publics; national policy is not a matter of
17 the local community. So we have to look at
18 this at different levels. We have to try to
19 think keep this different level sort of clear
20 so that there is most ability for decisions.

21 The national energy policy, what
22 people would like to know, then -- if there

1 was a debate on energy, that we want, in fact,
2 nuclear or we don't want nuclear but we have
3 the waste. So this must be clear. It also
4 must be clear that there are liabilities.

5 There are ways to address who owns this waste
6 in the long term, and especially for the long
7 term, in fact, because, you know, you can sort
8 of fizzle out; you can play out in a short
9 time. But the long term is very unclear, in
10 fact. What is closure of the facility for
11 instance?

12 Then we have to have a regulatory
13 system, which is not only the technical
14 regulator. The regulatory system is involving
15 -- in this case, for instance, in this
16 country, you could end up with the DNC as the
17 Congress, so the whole system that basically
18 checks the authenticity and the trustfulness
19 of this process.

20 Then other tools in which you made
21 involve the right people -- clearly, people
22 can accept decisions that they don't like if

1 they think or if they find that the process
2 was fair.

3 Again we have, the waste
4 management system has to be fairly clear
5 again. You must define the type of waste
6 you're getting, how much you're getting, from
7 where you're getting it, and how much of
8 you're going to give to the communities, and
9 will there be more waste come. In Finland,
10 they had to make sure that they -- they had a
11 decision for the waste to which the country
12 was committed and separate it from any future
13 nuclear power before the decision for the
14 community would be positive.

15 You should establish broad safety
16 principles, and then also suggest which way
17 you want to go about a site. You go site
18 first, technical method first, or a parallel
19 way?

20 And never propose a turnkey
21 package. I mean, everything -- we will learn
22 those from Canada -- everything has to be, to

1 some extent, negotiated, finalized at the
2 proper time, in time. This way, you'll build
3 this iterative, if you like, way of improving
4 the project and bringing in new knowledge.

5 The ideal site selection process
6 is a stepwise process which combines
7 procedures for excluding sites that do not
8 meet criteria with procedures for identifying
9 ones where residents are willing to discuss
10 concerns about safety. Now, "residents" is
11 really just more than just the local ones. As
12 we said, the ideal community is difficult to
13 define. And we know that statewide, even in
14 this case, in the country, is important, so
15 when we say "residents", I mean, we should
16 really be using the word in the larger meaning
17 of the word.

18 It should be a voluntary process
19 in which communities are allowed to withdraw
20 if they wish under certain conditions.
21 Ideally, there should be multiple communities,
22 and eventually, they should be disconnected by

1 safety. If safety is the same, then other
2 communities may be invoked.

3 The nuclear communities has a
4 special role because they do not have to build
5 this big round of trust and removing the fear
6 of radioactivity, and of course, those who
7 have the ways, they want to be part of the
8 solution as well.

9 You have to go to communities,
10 also, with the project which is credible. It
11 should be seen as a win-win, basically,
12 solution, and there should be packages of
13 community benefits. But these community
14 benefits should also accompany oversight
15 schemes. We already talked about this.

16 An example that seems to be going
17 to sustainable solutions -- here are a few
18 countries where there's spent fuel or low-
19 level waste. Some of them -- the region is
20 very important. All of them, they go through
21 stepwise level decision making.

22 These are countries where the

1 future is a bit unclear for certain types of
2 waste.

3 Basically, the final conclusion is
4 that we are no longer in Kansas. We were in
5 Kansas, also, 30 years ago in this country by
6 the way. So I would like to say that the
7 experience of siting exists within and beyond
8 adaptive waste management. As well, there's
9 a large body of analytical work beyond all
10 sorts of reactor waste management.

11 There have been many years of
12 trial and errors. Things have been learned.
13 You can see on the right, at Osthhammer, 80
14 percent saying yes. So there have been
15 important changes in attitudes. Some
16 countries are moving forward. I would say
17 that for the motivated publics, three
18 basically important things to keep in mind for
19 us are safety, which is a social construct --
20 it's not only technical safety --
21 participation with real influence, which is
22 also part of this concept of safety, and the

1 durable improvement of the quality of life.

2 Thank you.

3 CHAIR SCOWCROFT: Thank you very
4 much, Dr. Pescatore.

5 Our next presenter is Dr. Charles
6 Powers of Vanderbilt University. Doctor
7 Powers is a Co-Principal Investigator with the
8 Consortium for Risk Evaluation with
9 stakeholder participation.

10 Dr. Powers, welcome.

11 DR. POWERS: Hi, and thank you
12 very much for asking me to come before you.
13 It's a little bit daunting because if you
14 actually spend much time, as I have recently,
15 with your website, you've heard almost
16 everything I can think of that someone might
17 say about almost every one of these issues,
18 and then you listen today and try to figure
19 out how someone who was actually trained in
20 ethics might somehow relate that to the siting
21 experience, and you just spent a lot of time
22 working on that. So I'm going to try to move

1 through this presentation relatively quickly,
2 picking out just a couple of things.

3 You could, I guess, I go this way.

4 You don't have to look at this for
5 longer than to say that if you really take on
6 what it is that, where we are on the full set
7 of issues that one must resolve, about
8 managing nuclear waste in all its forms,
9 public and private, defense and civilian, and
10 then try to relate that to all the different
11 classifications as they currently exist, you
12 realize that very little is resolved. You
13 only see those very dark colors on the
14 left-hand side where some things are okay for
15 the last next 30 years, but nothing begins to
16 match what it is that we need in terms of any
17 kind of permanent resolution of these issues.

18 I want to suggest that a common
19 theme really, but really not actually
20 explicitly said enough, it seems to me, is
21 something that actually Phil Sharp said late
22 in the morning of your second day, which is

1 that if you were going to actually do
2 something as a commission, you're going to
3 have to figure out how to integrate all the
4 things that you have talked about. We all
5 know that we need an integrated back-end
6 strategy to move forward to break the impasse,
7 and we know we need to acknowledge that we do
8 not know yet where the technology will take us
9 that may might make some ways they save
10 resource, and we know that only phased-step
11 processes can win the assent of the needed
12 parties. I mean, everybody sort of knows that
13 now.

14 The problem is that those two
15 things run into each other. They are directly
16 apposite. That is actually the task that you
17 post have, to try to figure out how to put
18 those two pieces together because they do not
19 naturally they fit, because in order to come
20 up with an integrated strategy, don't you have
21 to tell people things you don't know on the
22 basis of what's coming in from the other side?

1 But you've been given a job. You
2 will make recommendations for a new plan. And
3 that new plan, actually, if you start thinking
4 about it, has all range of options about a
5 whole range of different -- I could have put
6 forth four or five or six things up there at
7 the top, of components of what a fully
8 integrated strategy would look like. But if
9 you're going to do something other than come
10 up with a list of options, you have to figure
11 out exactly how the key pieces are going to
12 fit together.

13 Anybody who thinks that you can do
14 siting as anything independent of that, I
15 don't think understands the problem that you
16 have. What I'm going to talk about, in one
17 sense as an abstraction from what it is that
18 you have to do, is to try to figure out some
19 characteristics of that siting process that
20 must eventually fit with what you're going to
21 say on timing, about institutional mechanisms,
22 about who's going to run this thing. I'm

1 going to give you an example of something
2 that's really quite specific.

3 The objective of this presentation
4 is actually to take you through a number of
5 issues that place the challenge of nuclear
6 waste facility siting in the context of what
7 would create integrated nuclear waste
8 management, including three guiding principles
9 for a plan -- you've heard all this stuff in
10 one sense but not quite this way -- safety,
11 informed consent and equity.

12 To define the importance of a very
13 early commission decision as to whether and,
14 if so, how storage and disposal of defense of
15 private nuclear waste should be governed by
16 the same or separate policies and
17 institutional processes. That is fundamental,
18 and it is a problem that is not actually
19 shared with many of the European counterparts
20 that have not been in the defense business.

21 To explore briefly how the pre-
22 suppositions that governed what went on in the

1 late '70s and '80s helped lead to the current
2 siting impasse and what concrete steps could
3 be taken to make a new start successful, and
4 to explore the structural ways to address
5 perhaps the major impediment: the perception
6 that on nuclear waste, the government does not
7 keep its promises. That is huge. I think
8 that's the root of the trust problem.

9 To propose a scenario -- threat
10 and all the rest of it, I think are enormously
11 important. I've got a doctoral student
12 working solely on the question at the moment.
13 But I don't think that that's where the major
14 problem comes from. To propose a scenario
15 where citing efforts would seek to elicit
16 local and state proposals to serve as sites
17 for regional interim storage and for
18 developing fuel cycle options -- probably
19 putting those two things together, as you've
20 heard a couple of times.

21 While simultaneously, the waste
22 streams, in an appropriate geological and

1 geographical settings context, for geological
2 disposition are defined on siting for them.
3 You've heard a lot about that from MIT this
4 morning. What I didn't hear enough about is
5 the imperative to try to relate those things
6 in a timeframe that you will be convincing if
7 you put them forward.

8 To draw on the work on experience
9 of the Consortium Group for Risk Evaluation's
10 participation related to work to explore the
11 relationship between credible technical work
12 and public acceptance where nuclear waste
13 decisions are at issue. I think the whole
14 business of splitting those two pieces between
15 credible technical work and public acceptance
16 misses the boat.

17 And I'm going to try to suggest
18 some experience and suggest we're better than
19 that if we set the right context, and to
20 suggest the basic outlines for the
21 authorities, and key practices of a successor
22 commission to this one that would have to

1 operate for at least a decade to facilitate
2 nuclear waste facility siting as a specific
3 business. Specifically, what kind of
4 authority and resources would be needed to
5 allow it to address the local and state
6 issues.

7 I want to point out that's what
8 "safe" means is a lot more complex, when you
9 really start thinking about it, across the
10 full range of things than you have been
11 hearing. It incorporates preemptive
12 monitoring in place and provides for
13 retrievability of nuclear materials for many
14 generations. But don't forget that WIPP, our
15 one success, has absolutely no retrievability
16 whatsoever. So you need to figure out what it
17 is that you're going to be putting into that
18 kind of context.

19 "Provides for technically safe
20 permanent disposal of the future generation"
21 shows that option without placing unreasonable
22 financial burdens on future generations.

1 That's the way in which I'm not handle it.

2 I'm going to go quite quickly past
3 intergenerational material because you heard
4 so much of it.

5 "Allows no implementation of any
6 facility or process whose implication in
7 foreseeable adverse consequences for
8 preventing proliferation have not been
9 addressed." That's part of the safety
10 envelope. These are built right into it. It
11 was developed materially by stable and
12 credible institutions to ensure management and
13 resources consistent with these criteria over
14 the full term of its operation. An
15 arrangement to lock in those assurances, trust
16 funds, irrevocable agreements, leases and
17 escalating liability provisions would, in
18 fact, make those things durable and overcome
19 this problem of promise-keeping.

20 I'm not going to spend much time
21 at all with the issues that we've talked about
22 at great length today. I do think that the

1 intragenerational problems are the ones we
2 addressed most poorly in what we did in our
3 own context here. We need to go from what it
4 was that we started with in 1977 and on to the
5 way in which the Canadian folks have been
6 talking about these, at least as interpreted
7 by Tom Isaacs, and then move on to the fact
8 that we do know a lot about what the
9 generations closest to us are about, and we
10 ought try to figure out some way to protect
11 number two while in fact recognizing what it
12 is that we can't say because of the fact that
13 we know so little about things 10 and 20 and
14 100 generations out the future.

15 "Informed consent" is, the host
16 community is fully familiar with the nuclear
17 energy or nuclear systems to be operating in
18 form and knowledgeably agrees to the local
19 siting and operation throughout the process of
20 the facility development. It's really quite
21 fundamental to any democracy that that's what
22 goes on. We're going to have to come back to

1 that in a minute. I'm not going to walk you
2 through all these. You can actually read this
3 in a paper that I gave to the Commission.

4 What I suggest is that where we
5 started back in 1977 pushed us in the wrong
6 directions on some fundamental issues that, if
7 in fact you rethink those fundamental premises
8 and presuppositions, you're probably moving
9 toward what it is that will be a paradigm
10 shift toward the kind of larger integrated
11 systems you're going to be talking about.

12 Put simply, the Commission should
13 commit to the following basic criteria to
14 guide every aspect of the site selection
15 process: stable, credible, transparent
16 processes; state and local assent -- I'm going
17 to come back to that because that's the
18 hardest -- geographic equity; establishing
19 appropriate geologic and geographic setting;
20 and a comprehensive safety case established to
21 address known, and provide mechanism to
22 address evolving, issues. While these

1 criteria seem self-evident, it's arguable that
2 it's only four and possibly five. I don't
3 think, really, the comprehensive safety case
4 has been done in terms of what we've been
5 doing.

6 I want to say very quickly that I
7 think you need to sort out just exactly what
8 you're going to do about the relationship
9 between civilian and defense waste. There are
10 really powerful reasons to go either way on
11 those, but you can't think very far into the
12 siting question and give much guidance to
13 anybody about what you're going to do unless
14 you're trying to figure out, you know, whether
15 or not you're trying to do both defense and
16 civilian waste, in some way, in the same
17 context, particularly if you're heading for
18 the same disposition facility, and the
19 possibility of separating them.

20 You know, there is good reason to
21 learn from what we did learn from legacy waste
22 processing and all the problems we've created

1 with it. We do have WIPP siting example, as
2 Commissioner Sharp just said a little while
3 ago. There are possible dual storage
4 locations if you keep them together. On the
5 other hand, does weapons legacy work tarnish
6 the nuclear energy, and does current overlap
7 limit institutional innovation on the private
8 side? It confused resolution of the
9 distinguishable high-level waste disposition
10 questions, and they really are
11 distinguishable. Every aspect of what the
12 Commission decides about all key issues in the
13 plan it has been charged with producing will
14 flow from its decision on this
15 defense/civilian issue.

16 And I just want to say something
17 very quickly about the issue of, to propose a
18 scenario where the siting effects would seek
19 to elicit local and state proposals for sites
20 on a regionalism storage basis. I want to say
21 that, while it's true that the NRC just said
22 last week that it's okay to leave things where

1 they are for 60 years after a reactor closes,
2 I think we need take concrete steps to
3 normalize. Unless we get nuclear waste
4 management somehow into the swing of things
5 this country knows how to do, as people were
6 talking about, the problem with the MIT study,
7 I don't think we'll move forward.

8 WIPP is not some exception. Make
9 sure that WIPP is not some exception but some
10 model, modified as appropriate. We need to be
11 doing what we need to do and be taking modest
12 but sure steps to prove that we can proceed by
13 continually adapting as pursuit of full plan,
14 including a repository.

15 It seems to me that we need to
16 understand, have the public understand, that
17 nuclear waste management issues are large and
18 hard, yet tiny comparison to what we expand,
19 the risk we run, and the property we sequester
20 to generate other forms of energy in this
21 country. That's part of the larger task.

22 I'm part of CRESP. This is an

1 organization that's been going now since 1995.
2 It has been working almost entirely on issues
3 associated with the legacy waste, and I want
4 to say a few things about what we've been
5 doing. We've been working through four
6 different modes of operation -- strategic
7 analysis, research, review, and research
8 itself -- and at the full range of the DOE
9 complex sites, more at some than at others,
10 and we have enormous breadth of experience.

11 In that, we try to figure out how
12 to get accepting publics, not cheating them,
13 not promising things, but getting accepting
14 public so we can persuade regulators and
15 decision-makers to go ahead in a functioning
16 relationship with an integrated DOE of
17 technically sound basis. We have a
18 cooperative agreement that's advisory to DOE,
19 but the fundamental difference between what
20 this organization is, is that as it has now
21 built, the sense that what it will say is
22 technically competent and is responsive to how

1 we have spent time understanding what the
2 public are thinking about the issues we're
3 talking about at the same time we're trying to
4 figure out what the technical resolution of
5 them is, we get drawn in by states -- the
6 state of Alaska, the state of South Carolina,
7 by EPA in response to the issues along the
8 Savannah River by SSABs, when the SSAB at SRS
9 asked us to do a major epidemiological study
10 of workers, on Native American groups and
11 other regulators like the Defense Board.

12 The fact that we're asked into
13 issues continually by the full range of groups
14 is now known across the complex, and what I
15 think you folks need to think about is whether
16 or not some such process that would establish
17 such a way of thinking about how technical
18 issues are addressed might actually be
19 helpful.

20 I've just spent eight years
21 chairing something called the New York/New
22 Jersey Harbor Consortium for the New York

1 Academy of Sciences, and we spent eight years
2 building across 80 organizations in the
3 region. Understanding of what the technical
4 issues were associated with prevention of new
5 toxins coming into the Harbor. We got
6 consensus before we were through on hundreds
7 of regulations because we had a process that
8 people began to believe was one in which the
9 definition of "what is" and the explanation of
10 "what ought to be" did not stop where certain
11 interests were but went through to the entire
12 process. There are ways of doing that in this
13 country that we have not yet explored
14 effectively, and figure out how to do that I
15 think may be a key to what you try to come up
16 with.

17 What we also learned is that the
18 general public knows very little about nuclear
19 waste, even as to where it's currently
20 located. There are some demographics-specific
21 differences. The American mind appears to
22 close when it hears the word "nuclear", but

1 not well understood is the extent to which
2 that is currently changing, and we need to
3 keep track of that as there are emerging
4 age-specific differences. As I said, I have
5 a psychology student -- not a student -- a
6 doctor, post-doc, who's emerging as a major
7 researcher.

8 The federal advisory committees at
9 DOE waste sites, the SSABs plays a major role
10 in providing what appears to be the most
11 effective way yet devised for promoting an
12 effective mechanism of broader public
13 understanding linked to the technical and
14 public policy challenges nuclear waste
15 managers face. Trying to figure out how
16 you're going to build one of those into the
17 process by which you're deciding seems to be
18 a goal as you try to figure out what it is
19 that you're going to be doing. The public
20 that's nearest DOE and its nuclear facilities
21 are generally more knowledgeable and receptive
22 to additional nuclear facilities.

1 I want, very briefly, to say one
2 of the things that we keep on saying is that
3 this is not primarily a technical problem in
4 almost all the fundamental search researcher
5 goes on. It's not that CRESA doesn't know how
6 to figure out, how to evaluate pulse jet
7 mixers at the major vessel under which the
8 waste will go at the WT facility. But it also
9 knows that you're actually working at the same
10 time on nuclear law and policy, and you're
11 going to be missing a whole range of things
12 unless you're working to try to figure out
13 just exactly what's going on in the public.

14 This is the fourth iteration of a
15 longitudinal study that's tracking the
16 relationship between ways in which people
17 think within the doughnut and the outer pieces
18 of it as we try to understand what's going on
19 with nuclear waste. What was fascinating is
20 that most people have no idea where it is that
21 we put our nuclear waste in this country, and
22 only 10 percent of the people have some idea

1 that it's actually at the power plants.

2 That's a fascinating figure, and it runs
3 pretty consistently that runs across the full
4 range of people who are described there.

5 Well, these are the issues about
6 what communities seem to want. I want to pick
7 up the doughnut concept and say, but the
8 states are the linchpins to the siting
9 process, and United States' failure to achieve
10 an active participation of the host state in
11 the decision to site a nuclear waste site will
12 simply not work. But the question is, how do
13 you go to work on that?

14 States have not been persuaded
15 that permitting one of the communities in
16 their states; they appear to be -- there's
17 scant evidence that, taken as a whole, there
18 be an inequitable distribution of benefits.
19 They're dubious that they can guarantee a
20 long-term commitment from the federal
21 government. Popular fears of transportation
22 of waste of those facilities remain extremely

1 high, and states see no evidence that the
2 federal government has established law or
3 practice in this case that will provide equity
4 at the national level, and in fact, it's been
5 working very hard to prove that's the
6 opposite. And then, they have an enormous
7 adverse experience with promise-keeping. I
8 think focusing how you're going to address
9 issues of the state in this context, the
10 problem is not going to be getting, as I think
11 Leroy will talk about, is not getting the
12 communities to step forward in this process.
13 How is it that you can address this set of
14 issues with the states?

15 I want to talk about WIPP for a
16 minute. Anybody who thinks that was a simple
17 process, you know, that the state voluntarily
18 came along and said, okay, let's have the
19 first underground nuclear repository in the
20 world, it was very strenuous. It remains a
21 pilot project. The state demanded and
22 received a major new road and \$300 million of

1 unrestricted federal dollars in the final
2 negotiation. It's supported by a
3 congressional jurisdictional fair factor. It
4 was able to limit the waste received, the
5 Defense waste. It controls the
6 characteristics of the two it receives. It
7 uses RCRA to help it do that, so it's a
8 relationship along with EPA authority, and it
9 exercises that authority, and fought hard to
10 ensure that government guarantees regarding
11 WIPP would be binding in the site-specific
12 federal law.

13 That is not a process that simply
14 says, oh, well, you got the states to go along
15 with it, but you need to get the communities
16 going. It is a very -- try to figure out,
17 then, institutionally what you have to do to
18 take the experience of the waste negotiator,
19 which you're now going to hear about, and try
20 to think that experience into something that
21 allows you to say, on the issue about siting,
22 no typical bureaucracy.

1 The same institutions who actually
2 managing existing facilities, or those who
3 regulate the facilities, to make any one of
4 them primarily responsible for the issues of
5 siting for this country is to great role
6 confusion. Safety, informed consent, and
7 equity are the triangle of principles the
8 institution with implements them must do
9 everything that it does and exhibit that it
10 creates no confusion about what its mission
11 is. I think the way to do that is actually to
12 create a commission subsequent to yours that
13 would actually have that task, again,
14 integrating it with a whole range of other
15 integrated waste management processes that
16 you've come up with.

17 So, we'll go ahead. It seems to
18 me, while I didn't talk much about this, I
19 think you are be getting 90 years from removal
20 of reactor as a way of sort of making sure
21 that you begin to move toward figuring out how
22 to look at the next generation of fuel cycles

1 and establish a pilot repository. But I
2 really urge you to think seriously about the
3 impact of having multiple regional interim
4 storage locations to get this program on the
5 way and moving, provide geographically,
6 include informed consent, show that in fact
7 you know how to do compensation and
8 opportunity development, with reverse
9 auctions, et cetera, possibly existing federal
10 facilities if you decide that's what you want
11 to do.

12 It's actually the same advice I
13 gave to EPRI in 1991. Many in this room
14 agreed then, whether quietly or openly. It's
15 my own personal hope that the Commission's
16 plan can incorporate these principles and
17 recommend these practices in the context of an
18 integrated nuclear waste system that
19 facilitates the new culture that's needed.

20 Thanks.

21 CHAIR SCOWCROFT: Thank you very
22 much, Dr. Powers.

1 Our final presentation is by David
2 Leroy, an attorney in private practice who's
3 a former lieutenant governor of the state of
4 Idaho and was the first head of the US Office
5 of the Nuclear Waste Negotiator.

6 Welcome, Mr. Leroy.

7 MR. LEROY: Thank you, General,
8 Mr. Co-Chairman, Members of the Commission.

9 Perhaps some of you have seen that
10 national television beer commercial that's
11 currently being broadcast, where a gentleman
12 of modest stature and advanced years with gray
13 hair and a grizzled beard is seated at a table
14 with a trio of young ladies around him, and
15 he's introduced as the "most interesting man
16 in the world" to sell the product. Well, I've
17 never been that fellow, but --

18 (Laughter.)

19 MR. LEROY: -- from 1990 until
20 1993 I must have been some kind of relation
21 because I ran around the country giving
22 speeches saying that I had the most

1 interesting job in America. I was called by
2 the national media and some international
3 press by less formal names. I was
4 characterized as the Most Unpopular Man in
5 America by the New York Times. I was called
6 the Monarch of Mock. I was called the Sultan
7 of Swill.

8 (Laughter.)

9 MR. LEROY: And my official title
10 was United States Nuclear Waste Negotiator.
11 In 2006, I wrote a paper that was published in
12 a professional journal, copies of which I've
13 given to your secretariat, and perhaps he's
14 distributed those to you. The title was
15 "Political Life and Half-Life: The Future
16 Formulation of Nuclear Waste Public Policy in
17 the United States." I observed that
18 government by popularly elected officials
19 serving two, four and six year terms is ill-
20 designed to create and implement public policy
21 controlling highly unpopular and long-lived
22 nuclear wastes. I commented upon NIMBY, "not

1 in my backyard," and its corollary, NIMTOO,
2 "not in my term of office."

3 I predicted that instead of the
4 bold policy initiatives that we saw in the
5 1980s on siting questions, during the first
6 decade of the 2000s, we were going to see,
7 instead, small, practical, improvised,
8 necessary waste management tools such as
9 narrow necessary consensus amendments to
10 existing laws, memoranda of understanding
11 between regulatory agencies, the issuance of
12 interpretive guidelines, licensing, perhaps,
13 of nonthreatening facilities or expansions to
14 existing facilities.

15 And I noted, of course, that
16 public reaction to perceived waste threats,
17 such as that continuing controversy at Yucca
18 Mountain, were becoming hardened and constant,
19 and there was even an occasional ballot
20 measure where some constituency or another
21 around the country took an anti-nuclear waste
22 stand. It was my thesis that politicians had

1 come to understand that the public is now
2 empowered and that we can no longer simply
3 decide, announce, and defend the siting of
4 nuclear waste facilities in an unwilling
5 population and expect success in that siting
6 initiative.

7 The conclusion to my paper was as
8 follows, relevant to the mission of this
9 Commission:

10 "The next visionary policy
11 concepts regarding United States will
12 necessarily deal with the subject of interim
13 storage of high-level waste at those
14 commercial sites which can no longer expand on
15 site. In the future, an anxious U.S.
16 electorate will still demand that its public
17 officials at all levels create and oversee a
18 proper policy on nuclear waste. Predictably,
19 the politicians will duck the controversial
20 waste issues to the maximum extent possible.
21 They will defer those decisions as far as
22 practicable to successors or to future terms

1 of office. Unlike members of Congress in the
2 1980s, they will think small. Few will stand
3 tall, but with emerging less formal public
4 policy tools and procedures which effectively
5 deal with those waste issues, the United
6 States will continue to enjoy the benefits of
7 the nuclear age."

8 It's my thesis, Mr. Chairman, and
9 one reason I was eager to accept your
10 invitation, that this Commission actually does
11 have a chance to stand tall and that you are
12 empowered to think broadly, if not largely,
13 about public siting and nuclear waste policy
14 issues. It's my belief that your Disposal
15 Subcommittee has framed before it precisely
16 the right question when you ask, how can the
17 United States go about establishing one or
18 more disposal sites for high-level nuclear
19 waste in a manner that is technically,
20 politically, scientifically, and socially
21 acceptable.

22 Mr. Chairman, from 1987 to July 1,

1 1995, the United States had an approach, a
2 solution, which partially answered that
3 question, in my opinion. Congressman Morris
4 Udall from Arizona is typically given the
5 credit for offering an amendment in the 1987
6 Nuclear Waste Policy Amendments Act which
7 created something called the Office of the
8 United States Nuclear Waste Negotiator.

9 You recall that the earlier Policy
10 Act of 1982 had failed socially, politically
11 and technically when it attempted to site two
12 deep geological repositories for commercial
13 spent fuel in the East and the West of our
14 country from 20 candidate sites in a science-
15 driven search. The public outcry, the
16 political pressure arising from each and all
17 of those candidate sites, in fact, enabled
18 various locales at various times through
19 various processes to drop off that candidate
20 list. And the premise, within five years, of
21 a nationwide politically balanced,
22 scientifically driven siting process was

1 destroyed. The policy was in shambles.

2 In 1987, with Congressman Udall in
3 the wings in the House, the Congress revisited
4 that policy and decided instead to
5 characterize one site, Yucca Mountain, and
6 created the Office of the Nuclear Waste
7 Negotiator. The history of the Office was not
8 uncheckered. It took them three years to find
9 someone to fill the post. When the White
10 House called me, they explained candidly that
11 it had been offered under the Reagan
12 Administration, now under the Bush
13 administration, to others who had declined to
14 take the job. It seemed to me that one could
15 probably complete the mission by simply
16 sending out a self-addressed, stamped postcard
17 upon which one would ask governors, Indians
18 chiefs, and territorial officers to mark one
19 box: I would like, or I would not like,
20 nuclear waste for my jurisdiction.

21 Nevertheless, I took the job
22 because I decided it was not about an answer,

1 or not even about waste, so much as it was the
2 challenge of whether the United States of
3 America, through its government, could develop
4 an entirely new way of doing business with
5 states, with sovereign Indian tribes, with
6 territories on something so controversial as
7 waste siting.

8 We were to find a repository site
9 or what was then called a monitored
10 retrievable storage site, a temporary above-
11 ground commercial spent fuel storage location.
12 We were to do so with a budget of
13 approximately \$1.5 million a year. We were to
14 do so with a staff of 10. And I was confirmed
15 in August of 1990 to begin that mission.

16 Our first communication went out
17 in May 1991 to 623 jurisdictions, the 50
18 states, all of the then-federally recognized
19 Indian tribes, and a certain number of
20 territories listed in the Act. We were to be
21 an independent agency, independent of the
22 Department of Energy, reporting directly to

1 the President and directly to the Congress.

2 And with that banner, in October of 1991 we
3 issued a formal invitation to dialogue and
4 participation to the same jurisdictions, that
5 went out with an information packet and this
6 program.

7 If someone was interested in
8 talking with the Office of the Negotiator upon
9 this topic, they could apply for three
10 different sets of grants -- a phase 1 grant in
11 the amount of \$100,000 to do their own
12 feasibility assessment, to hire their own
13 experts, to approach the issue in their own
14 way. On a short form that application went to
15 the Department of Energy.

16 If they wished to proceed further
17 after that, they could file an application for
18 a Phase 2A monetary benefit to conduct public
19 outreach and begin discussions with the
20 Negotiator's Office with a public emolument of
21 \$200,000 associated with that. And should
22 they choose to go further, they could apply

1 for a Phase 2B grant up to \$2.8 million that
2 would actually encompass their expenses during
3 the process of negotiation and local
4 characterization, as well as all the local
5 processes necessary.

6 Within three days of the time that
7 we issued that call for invitation and
8 dialogue, we had our first application from
9 the Mescalero Apache tribe in Senator
10 Domenici's New Mexico, and it was back to us
11 upon the following principles announced in
12 that solicitation:

13 (1) the process must and will be
14 truly voluntary;

15 (2) requests for information and
16 preliminary dialogues will not be viewed as a
17 commitment to proceed any further;

18 (3) any dialogue is terminable at
19 the will of the prospective host;

20 (4) Indian tribes and states will
21 be provided with the resources to obtain
22 independent, credible information upon which

1 they can make their own decisions;

2 (5) all discussions should begin
3 and end with the thoughtful evaluation of
4 issues related to health, safety, and the
5 protection of our environment;

6 (6) choices of technology and
7 participation in oversight controls should be
8 utilized with assure compliance;

9 (7) there are no irrelevant
10 issues;

11 (8) a prospective host is entitled
12 to achieve an equity for helping to solve a
13 national problem, and the nature and means of
14 achieving that equity should represent the
15 individual needs, concerns, and desires of the
16 host;

17 (9) the process should encourage
18 broad public participation, seeking and
19 credibly consider the views of all affected
20 stakeholders; and finally

21 (10) process can only work with
22 participation.

1 We did have, within 19 months, a
2 total of 20 applicants for the initial
3 dialogue. Discussions were conducted at the
4 state, county, tribal council, and tribal
5 leader levels. Interest was expressed from 16
6 sovereign tribes from four counties within
7 four separate states, and directly from one
8 state governor who discussed initial
9 activities with us in private.

10 Various benefits of various
11 natures were conceptualized by the volunteers
12 themselves. Some wanted to talk about
13 infrastructure improvements. Some,
14 environmental improvements. Some, public
15 school assistance programs; there were higher
16 education programs discussed. Some were
17 interested in healthcare benefits. Some
18 proposed co-locations of this site with other
19 federal projects. Some worried about general
20 economic development programs. Some wanted to
21 transfer ownership of federal properties.
22 Others wanted direct financial assistance.

1 And some wanted public recreation improvement
2 projects.

3 Three of those applicants had
4 sufficient staying power to come to the
5 application 2A phase level. There was one
6 county that wished to do that, but consistent
7 with our obligation, we believe, to the state
8 governments, we allowed the governor to veto
9 that initiative. In September 1992, we
10 proposed even changing the grant program to
11 make it more sympathetic and useful based on
12 our experience.

13 And finally, in October of 1992,
14 the original five-year term of the Office was
15 extended for another two years to January
16 1995. As we progressed into that fall, there
17 was, in November of 1992, a presidential
18 election, in January 1993, a change of
19 administration, and in July 1993, a change of
20 negotiators began. We unfortunately, in that
21 process of changing personnel, lost momentum,
22 and my successor was not able to pick up where

1 we had left off. In January 1995, the Office
2 sunsetted, and it no longer exists in the
3 federal Christmas tree.

4 At least two or three of the
5 volunteer sites that were contacted by that
6 initiative remained interested and so
7 sufficiently interested that they continued,
8 even without the promise of federal benefits,
9 to pursue the siting of relevant facilities on
10 their own initiative or in concert with
11 utilities. Thus, as Canada has shown us
12 today, as we experienced then, it's my belief
13 that voluntary siting dialogues on high-level
14 spent fuel can commence, will continue, and
15 may work if nurtured.

16 Consistent with your mandate from
17 the President and the Secretary of Energy, I
18 recommend that you apply the following
19 nutrition:

20 Number one, change terminology.
21 Eliminate the words "waste." Eliminate the
22 words "dump." I liked my friend Andy Kadak's

1 suggestion today that we adopt a parallel from
2 the field of fossil fuel oil. It would, in my
3 opinion, aptly describe the material that you
4 are working with if we called it the
5 "strategic nuclear fuel reserve." In this day
6 and age of 15-second sound bites, tweets and
7 twitters, anything with so negative a
8 connotation as "dump," "waste," or even
9 "cemetery," is doomed to failure at the
10 outset.

11 Secondly, commit to
12 retrievability. You've heard, through the
13 Disposal Subcommittee, Professor Hank Jenkins-
14 Smith on September 1 indicated that there's a
15 very direct correlation between public support
16 and retrievability. This Commission needs to
17 commit to retrievability.

18 Third, endorse centralized
19 storage. Make it a clear message. It doesn't
20 matter so much the range of technology, or
21 even as we suggested this morning, the
22 rationales utilized, whether you call it

1 safety economy or just programmatic. But
2 centralized storage needs to be a feature of
3 this Commission's report.

4 Fourth, in so doing, please
5 require volunteer siting. A new-generation
6 nuclear waste negotiator or a commission, as
7 Dr. Powers has suggested, can get new leads
8 for this initiative if properly empowered.

9 Fifth, start immediately. I've
10 been a part of a number of commissions that,
11 when they produce a noble report at the end of
12 a long process, see that report consigned
13 library shelves all over America. It seems to
14 me that while you have the President's mandate
15 and his ear, you could and should work with
16 the relevant Cabinet officials in the White
17 House to, even now, begin to craft some
18 legislation that could be perhaps introduced
19 as contemporaneously as your early preliminary
20 report next July.

21 Sixth, embrace risk-based, risk-
22 informed regulation. For the National

1 Research Council of the National Academy of
2 Science, I chaired, in 2003 to 2006, a study
3 commission that wrote a report on improving
4 the regulation and management of a low-
5 activity radioactive wastes, which castigated
6 this 60-year patchwork of statutes and
7 regulations we have based on source-based
8 management decisions. We need to move to
9 risk-informed activity. You can help that.

10 Finally, Mr. Chairman, I hope this
11 Commission will rise to the challenge and
12 counsel the political leaders of our nation
13 and our localities to commit to long-term
14 action on this topic. You have in the name of
15 your Commission both the word "America" and
16 the word "Future," and we must somehow or
17 another, hopefully starting with you, get
18 beyond NIMTOO, that short-term focus that has
19 so badly hamstrung our efforts to develop
20 intelligent policy in this area.

21 If you will each spend some of
22 your current political capital to urge elected

1 leaders to do likewise, then perhaps, indeed,
2 America will have an uncluttered nuclear
3 future utilizing, protecting, and storing
4 materials in a nuclear fuel reserve.

5 Mr. Chairman, I urge the
6 Commission to pledge, to design and to
7 implement voluntary siting for this reserve
8 and to create appropriate spent fuel
9 facilities for the United States on a
10 voluntary basis, as we once did long ago when
11 I was unpopular.

12 Thank you, Mr. Chairman.

13 CHAIR SCOWCROFT: Thank you very
14 much, Mr. Leroy, for that challenge. We
15 appreciate it.

16 MR. LEROY: You're welcome.

17 CHAIR SCOWCROFT: All right. Do we
18 have comments, questions from the Commission?

19 Phil.

20 MEMBER SHARP: I have a question,
21 first of all, for Chuck Powers.

22 You talk about informed consent,

1 and it seems to me there are two different
2 versions of informed consent, one of which I
3 think is imperative, which is you clearly
4 provide opportunity for people who have to
5 make a decision, a local community and their
6 officials, to understand what's going on. But
7 the second and harder version of that is,
8 where you could actually go in and know that
9 people have received the information and were,
10 in fact, informed.

11 I don't know that that standard
12 can be met, given a society which is so hard
13 to get people's attention against all the
14 other clutter and distractions and the
15 tendency, from my political experience, to
16 recognize that many people will step forward
17 in a serious manner when that opportunity
18 arises -- and there have to be multiple
19 opportunities; you don't have just one meeting
20 -- to learn. But many won't hear about it,
21 won't become informed, until some other thing
22 activates them one, two, three, four years

1 later.

2 So I guess I'm asking if you're
3 looking for that second standard because you
4 made several allusions to the low level of
5 technical knowledge among the population.

6 DR. POWERS: Actually, I think the
7 second standard in the context of where we are
8 with -- what is the proper term -- strategic
9 nuclear fuel reserve --

10 (Laughter.)

11 DR. POWERS: I think it's required
12 for any affected community because there's no
13 question in my mind that a community is not
14 going to participate in this process --
15 Carlsbad is a particularly good example of
16 this -- without being pretty actively engaged
17 in it. And so, trying to figure out how that
18 group, that larger community, can at least
19 have the opportunity of having people they
20 trust translate to them, either their own
21 local people or some way of getting some sort
22 of technical people who are helping them think

1 in risk-informed terms that Leroy was just
2 talking about, is going to happen anyhow, so
3 I think you ought to plan that that is, in
4 fact, what is going to happen.

5 It is surprising to me to see that
6 around DOE facilities, only 11 percent of the
7 people know that, in fact, the reactor
8 material is actually sitting at current
9 reactors. Don't forget, a number of those
10 facilities never had reactors, so it's not
11 that they don't know something is close to
12 them. Yes, I think you want to get the public
13 sufficiently engaged and, I think, working on
14 that issue.

15 I guess my experience,
16 Commissioner Sharp, is that when you do that
17 and you've figured out some way of delivering
18 that information by way of some form of
19 institutional mechanism that has built some
20 sort of credibility with the affected parties
21 -- often that can be local university people,
22 et cetera -- it's amazing what kind of

1 agreement you can work out.

2 I'll never forget walking into the
3 Idaho site, actually, and presenting two
4 pieces of information that was thought to be
5 contrary to what it was, that the folks that
6 were from the Snake River Alliance, who were
7 effectively were at that point leading the
8 Citizens Advisory Board at Idaho, and walking
9 them through a process, by which they came to
10 understand what they were actually dealing
11 with and what their actual options were and
12 emerging from that meeting with a consensus
13 among them that was quite different than what
14 they entered with. I don't think that these
15 things are impossible, and I think that you'd
16 better take it on earlier rather than later
17 because I think it's going to come up. I
18 think, if you don't have it there, you're not
19 going to get there now.

20 The states are a much more
21 complicated business. How you keep the state,
22 the governor or those folks from making the

1 exact immediate response that David Leroy got
2 when he tried to approach that governor, I
3 think, is a really complicated issue, and
4 that's why I don't think that a single office
5 can do it. I think it takes a commission to
6 start really working those questions so that
7 what is actually brought to the state is
8 something quite concrete and broad and meets
9 those fundamental criteria that I was talking
10 about.

11 Obviously, working with a state,
12 there's going to be two groups -- those within
13 the Governor's office and the environmental
14 protection or whoever it is, who actually can
15 comprehend it, and then all the political
16 stuff around that. What you want to do is
17 have built the understanding so that, in fact,
18 any -- I don't think you're going to anything
19 done. I think we've just proved that over the
20 last 37 years; not that many quite, just 27 --
21 unless a state assents, you're not going to
22 actually get there.

1 Incidentally, I don't necessarily
2 assume you have to give up on Yucca at this
3 point, at least for some possible role. But
4 I don't think you'll ever get there by forcing
5 it down their throat.

6 MEMBER SHARP: Well, I tend to
7 agree with much of what you said. What I was
8 trying to get at is, if we were to advocate
9 the principle "informed consent," what do we
10 mean by it? And certainly, I believe we have
11 learned, and I think Mr. Leroy's impressive
12 efforts just confirm, that you can provide
13 assistance, do all kinds of things. You have
14 to provide persistent institutional, both
15 support and interaction, in order to get a
16 community informed, and I believe you will get
17 activists and you will get officials who will
18 become informed. Indeed, on our trip to
19 Hanford, it was clear to me, the incredible
20 knowledge that individual citizens had who'd
21 worked at this for decades in some cases.

22 My point, though, is I can't

1 imagine us suggesting that we have to wait
2 until there's a certain level of testing
3 that's done in the community that tells us,
4 oh, now they're informed, so now they can
5 agree to consent. I think the best you could
6 hope to do is set up some very effective
7 procedures, you finance their capacity to get
8 knowledge, kind of proposition.

9 Indeed, one of the hopeful signs,
10 I think, in all of this process is one we keep
11 hearing about, and it was Mr. Leroy's
12 experience again, that there are places to
13 willingly consider these propositions --

14 DR. POWERS: Absolutely.

15 MEMBER SHARP: -- as long as we
16 will nurture them. And second of all, my
17 stunning impression of Hanford -- perhaps I
18 misread the local politics; I was only there
19 briefly -- was that compared to what I heard
20 in the 1980s from members of the House, from
21 the state of Washington, the state of South
22 Carolina, and other places, the intense

1 hostility they faced toward the Department of
2 Energy and its relations with the local
3 community appeared to me to be significantly
4 less and that a whole series of techniques
5 have been developed. I'm sure they don't all
6 work perfectly every day, but it's a different
7 kind and style of operation which we can build
8 on.

9 DR. POWERS: Well, I agree with
10 you. And you know, you heard interesting sort
11 of variations among the tribal folks, for
12 example, who -- I went over that set of
13 testimony pretty carefully because I know that
14 situation exceedingly well. I also know that
15 some very interesting things have been done to
16 try to much more effectively -- and again,
17 that FACA is very important to making that
18 happen out there.

19 However, I do not expect that
20 you're going to get interim storage of spent
21 nuclear fuel at Hanford.

22 MEMBER SHARP: I want to be clear,

1 I was not there for anything.

2 CHAIR SCOWCROFT: Allison.

3 MEMBER McFARLANE: Okay, I'm --

4 DR. PESCATORE: Perhaps, at the
5 risk of being naive also, you have to go and
6 try to create this informed consent, it seems
7 to me. That is, you have to do all efforts at
8 the several levels I was talking about before.

9 It was ten years ago, and the
10 government of Canada asked the industry, they
11 said, show me that you have a method. And
12 these guys went all over Canada. Of course,
13 it was difficult to get people to come and
14 talk, but in the end, you know, they could
15 claim that they had spoken to enough, big
16 enough section of Canada so that they got the
17 kind of information they wanted about the
18 waste management method.

19 When they go down to a community,
20 these three communities for instance, that are
21 there now, they been very careful with these
22 communities, saying, okay, just establish your

1 interest; let's understand that you have real
2 interest; in fact, we'll pay you to understand
3 your interest. And they want informed consent
4 in a very, very important way. So I believe
5 that the Canadians, the Canadian NWMO would
6 not accept basically to continue in serious
7 negotiations with a community where a majority
8 of the people were not aware actively of what
9 was going on.

10 MEMBER SHARP: Well, I should be
11 very clear. I believe the government, in
12 trying to get us to a decision, has to be very
13 aggressive about trying to help people know
14 what the possibilities are and allowing for
15 and more than allowing for their
16 participation; in fact, they can reject it, in
17 my view.

18 My own political experience in
19 running for office, however, suggests that if
20 you think you're going to wait until you
21 genuinely have a large populace well informed
22 on the issues, I think that's a standard that

1 you may not -- I think you'll decay the waste
2 more rapidly than you will achieve that.

3 I don't mean to be flippant about
4 this. It's just, we have to come to some
5 realistic understanding that you aggressively
6 allow for. Of course, communication today
7 means that at any moment of the night or day,
8 you can become informed if you want to the
9 websites and things, even of this Commission.

10 So, I'm all for those
11 possibilities, but I think it would be rather
12 naive for us to assume that after you make
13 that aggressive effort, you indeed have
14 everybody onboard.

15 I'd be interested in those
16 communities you go into in Canada and just see
17 -- I don't have any doubt that the majority
18 knows something is happening on the issue.
19 The question was going back to the
20 presentation of what they know about is at a
21 very low level, according one of Chuck's
22 polling pieces of data there. You know, I

1 would not say, so, we can't make a decision
2 because enough people don't know. No, there
3 has to be enough opportunity and a very
4 aggressive effort at it, and you have to keep
5 at it to do it, and you have to have allowed
6 retrieval of some stuff in the issue too.

7 DR. PESCATORE: In fact, the study
8 shows that it is very difficult to define what
9 is community acceptance, which goes in your
10 direction.

11 MEMBER McFARLANE: Okay, I'm going
12 to do something a little different right now.
13 One of our commissioners couldn't be here
14 today, and he sends his apologies. That's Per
15 Peterson. And he sent me a couple questions
16 which I agreed to ask, and one was just asked.

17 So there are two more. You
18 started getting into the second one, in which
19 he asks, if local communities were to develop
20 voluntary proposals to host a centralized
21 interim storage or disposal facility, what
22 type of state-level approval or ratification

1 of the proposal should be sought, and when in
2 the proposal development and initial site
3 characterization process should such
4 state-level approval or ratification be
5 sought? So, that's the first question. Why
6 don't you guys go for that, and then I'll --

7 MR. LEROY: Mr. Chairman, I can
8 speak to our experience. Chuck can probably
9 speak to the theory. When we took over this
10 mission, there was no particular way of
11 coordinating with states. It was not even
12 clear that we did not have the authority to
13 negotiate directly with a locality without
14 considering the wishes of a state legislature
15 or a governor.

16 I made the decision, once again
17 because we were to find sovereigns with whom
18 to have equal treaty negotiations, in effect,
19 that we would give the governor voluntarily,
20 at any stage in the proceedings when he or she
21 wished to exercise it, a veto power over a
22 county or a municipal subdivision of the state

1 involved in that process. In some regards,
2 although you don't get to the informed or
3 consent part of the populace that's
4 interested, if you have a governor exercise an
5 opt-out very early, there is a utility in
6 that.

7 Our approach was to try to find
8 willing citizens, willing sovereigns, and we
9 included giving the governor a veto as a part
10 of what we voluntarily determined would be
11 best in conserving limited resources.

12 MEMBER McFARLANE: Can I ask a
13 clarifying follow-up for that? So, did you
14 also give the governor a veto over the Indian
15 tribes' decisions?

16 MR. LEROY: Mr. Chairman,
17 Commissioner, we did not because we regarded,
18 as does federal law, the Indian tribes as
19 separate sovereigns. So, as in the case of
20 the Skull Valley Goshutes in Utah who remain,
21 17 years later, very interested in just such
22 a facility as they proposed talking to us

1 about. There are transportation corridors and
2 other issues that do involve the states, but
3 in terms of consent, we allowed the states to
4 express it early in terms of their own
5 subdivisions.

6 In terms of tribes and tribal
7 relations, we attempted to involve
8 congressional delegations and governors in as
9 much information about where the process was
10 with those entities as possible, but we gave
11 neither of those governmental groups a veto
12 power over tribal initiatives.

13 MEMBER McFARLANE: In hindsight,
14 was this the right thing to do?

15 MR. LEROY: Mr. Chairman,
16 Commissioner, I believe so. As I hinted, and
17 without giving details then, now or in my
18 remarks, we actually had a governor who met
19 with us to talk about state approval, and some
20 of those things on that checklist of benefits
21 came from that governor's initiative and were
22 initially explored, although the state never

1 got to the point during the limited time that
2 we existed of filing an application. There
3 was a possibility that that state would have
4 done so.

5 But it seemed to me that, back to
6 the informed consent observation of Mr. Sharp,
7 in each of these jurisdictions, tribal or
8 otherwise, you have to take their own
9 judgment, have their own entities, and each
10 citizen within those entities a measure of how
11 much is enough to be informed and by what
12 process do they consent. We tried to
13 discourage very quick and early votes on
14 anything, whether it be by county commission
15 or by a plebiscite.

16 In the case of some Indian tribal
17 organizations that may have had a tribal
18 council at the front of the room but may have
19 had a matriarchal society for the last 10,000
20 years, it wasn't anybody in the front room
21 that was making the decision. It was the
22 wonderful little grandmother of the Bear Clan

1 in the back wrapped in a shawl that was going
2 to actually make the decision. You have to
3 take your volunteers you find them.

4 MEMBER McFARLANE: Great. So the
5 second question is for is for Dr. Pescatore.
6 Dr. Peterson writes, "In your written
7 testimony, you recommend that 'successful
8 disposal facility siting implies creating the
9 conditions for continued ownership of the
10 facility over time' What might be the best
11 way to implement such ownership, for example,
12 if a new nuclear fuel management corporation
13 were created to construct and operate storage
14 and disposal facilities? Would it be helpful
15 to have the majority of corporation's board of
16 directors appointed by governors from states
17 hosting these facilities so these states would
18 collectively have majority control over the
19 Corporation? Are there other approaches?"

20 DR. PESCATORE: Do I understand
21 correctly, you're asking what for a acceptable
22 facility, the board of directors of this

1 corporation is to be a represented --

2 MEMBER McFARLANE: I think it's
3 more a question of what's the best kind of
4 management agency, you know, in general. What
5 would you recommend, based on your experience?

6 DR. PESCATORE: I see that the
7 most successful -- experience shows up to now,
8 the most successful has been agencies which
9 are related to the industry that the nuclear
10 industry has to set apart to build an agency.
11 This is the case in Sweden, the case in
12 Finland, the case in Canada, and also the case
13 in Switzerland, by the way. And to some
14 extent, you can see also in France it is sort
15 of state owned, but it is -- okay, that's
16 independent; that is not state owned. So you
17 must have, perhaps, the industry themselves
18 working towards the problem.

19 In some states, perhaps in this
20 country, it may be even better for the
21 industry to be seen rather than to be the
22 government, the federal government. I believe

1 that the industry can be more flexible, can be
2 effective to have a leaner operation, and to
3 have really an interest in solving the
4 problem.

5 So, in industry-based, let's say,
6 institutions, organization could be very
7 effective. This is my feeling.

8 DR. POWERS: Let me suggest that -
9 - I think what Dr. Pescatore was heading for
10 with focusing on ownership really gets to
11 something very important because if you
12 actually get past the dread point, if somehow
13 there's actually some sort of effective
14 discussion about the possibility of actually
15 doing it, then the next issue is, certainly a
16 relationship to interim storage, is, will they
17 ever leave? And you heard a lot of that at
18 Hanford.

19 My guess is that the one way is
20 you start looking for mechanisms that give
21 people a sense that they have continuing
22 control over something. So maybe the

1 ownership, even if this whole operation is run
2 by a quasi-public entity, the actual ownership
3 of the site and rights associated with
4 ownership might actually be a way to function,
5 and you work out very long-term leasing
6 agreements that are contemporaneous with
7 whatever it is you have agreed to do about
8 getting the material both there and off the
9 site.

10 Trying to figure out what it is
11 that is going to sound persuasive after the
12 series of things that we have not done that
13 we've said we were going to do is going to be
14 a fundamental challenge to any effective
15 siting process, and that's one of the reasons
16 I think that the Commission has to put all
17 these pieces together and come up with
18 something that deals with it.

19 I think that exploring issues like
20 ownership, very strong liability principles,
21 clear commitments, unbreakable -- and maybe
22 that's why it's possible that you actually

1 have more capacity to do that with tribes than
2 you do with communities that, in fact, because
3 there are sovereign obligations that we've
4 seen within the last year that the federal
5 government sort of owned up to some treaty
6 obligations that it had walked away from for
7 very long periods of time -- that kind of
8 creativity that is particular to the kind of
9 waste being stored or disposed of, that
10 relates to the specific nature of the
11 relationship between the local government, the
12 county, the state, and the possible other
13 entities that have certain kinds of authority
14 in these matters, that needs to be very, very
15 imaginatively explored specifically within the
16 context of this integrated strategy I'm
17 talking about.

18 DR. PESCATORE: About ownership
19 and imagination, I mean, you can really go
20 very far. Of course, there are many
21 empowerment measures. For instance, people
22 can be also helping, the organizations, for

1 instance, for helping monitor the facility.
2 And there are ways to invest in the education,
3 and education for the community creates
4 opportunities so that they can create out of
5 business on their own. So it can raise the
6 knowledge level of the community.

7 But you can also be more
8 imaginative. Some of the things we're
9 thinking, for instance, is create a facility
10 that is distinctive. This is, for instance,
11 if a facility can begin a cultural value. Is
12 the whole country 20 percent of the energy
13 for, I don't know, for 30 or 40 years that is
14 basically now represented there? So it can be
15 given cultural value with that.

16 This facility need not to be ugly.
17 You need not to separate, to fence off the
18 land for 10,000 years. You can say, look, I
19 mean, as soon as we are done with some part of
20 the land, we can visit it; we can make a park;
21 we can do a barbecue there. You could do
22 this. You could do these things. It's not

1 crazy. So you must think in terms of
2 distinctiveness, understandability of
3 amenities. There are things you can do from
4 the point of view of creativity. I believe
5 this is going to happen.

6 Next April we'll be going to have
7 this national workshop that usually we have in
8 Sweden. One of the activities, in fact, will
9 be to talk to the town architect who is
10 involved in this, and we have published, in
11 fact, a report on this type of creativity.
12 The idea is the added value, giving it
13 additional value, and to continue this
14 relationship for a long time. In the
15 beginning, nobody wanted it. Now, everybody
16 wants it and wants to maintain it. They want
17 to keep the memory of it, and so on.

18 So there is enough interest,
19 enough money, to do amazing things.

20 DR. POWER: Don't lose track of the
21 fact that you're working in a somewhat
22 different context than David Leroy was

1 working.

2 Incidentally, I spent a little
3 time trying to help his process, and what he
4 described today, it was amazing that with this
5 tiny staff, he was able to sort of put this
6 whole thing together, and it's really a shame
7 that the country couldn't figure out a way of
8 continuing to support the Office and see
9 whether or not some of what he had going would
10 actually get going.

11 But I really suspect that we're
12 sort of shortchanging the difference of the
13 context of within which you're functioning.
14 People do know now in ways that they did not
15 before, or they're learning very quickly, that
16 nuclear energy does not generate greenhouse
17 gases. That is part of why it's important.
18 They've learned the importance for national
19 security and for all the things I'm not, you
20 know, I decided not to talk about all because
21 you know them all. But that creates a
22 different context. And he was functioning

1 beginning five years after Chernobyl. We're
2 now way out there.

3 This post-doc I have working for
4 me is actually, who's both doing focus studies
5 but also doing a lot of sort of anecdotal
6 epidemiology, thinks that there may really be
7 a difference between what people under 25 are
8 thinking about these issues than what it was
9 that those of us that have the kind of gray
10 hair that both David and I do.

11 I'm sorry, David.

12 CHAIR SCOWCROFT: Are there any
13 other questions?

14 (No response.)

15 CHAIR SCOWCROFT: If not, I'd like
16 to thank the panel for a very stimulating
17 discussion. We appreciate it very much.

18 We will stand adjourned until 8:30
19 tomorrow morning.

20 Thank you very much.

21 (Whereupon, the Committee was
22 adjourned at 4:45 p.m.)

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