UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD

WINTER BOARD MEETING

January 28, 1997
Bob Ruud Community Center
150 N. Highway 160
Pahrump, Nevada

BOARD MEMBERS PRESENT

Jared Cohon, Chairman, NWTRB
Jeffrey J. Wong, Session Chair
John W. Arendt
Clarence R. Allen

INCOMING MEMBERS

Alberto Sagues
Priscilla Nelson
Debra Knopman
Norman Christensen
Florie Caporuscio
Daniel Bullen

OUTGOING MEMBERS

Edward J. Cording
Donald Langmuir
John J. McKetta
Ellis D. Verink
Patrick Domenico

SENIOR PROFESSIONAL STAFF

Daniel Fehringer
Russell McFarland
Leon Reiter
Daniel Metlay
Victor Palciauskas
Sherwood Chu
Carl DiBella
NWTRB STAFF

William D. Barnard, Executive Director, NWTRB
Michael Carroll, Director of Administration
Paula Alford, Director, External Affairs
Frank Randal, Assistant, External Affairs
Helen Einersen, Executive Assistant
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COHON: Good morning. As you're moving to your seats, please let me inform you we're expecting a rather large turnout today, unlike some other meetings. This might actually be a full house. And because not everybody of course arrives at 8 o'clock, if you could fill up the front part of the room, so that late arrivals can sit down gracefully in the back, it would be appreciated.

My name is Jared Cohon. I'm the Chairman of the U. S. Nuclear Waste Technical Review Board, and it's my pleasure to open this meeting and to welcome all the members and staff, program members, consultants, the public and other visitors to this meeting.

Let me say on behalf of the Board how pleased we are to be here in Nye County and in Pahrump, and our thanks especially to the people who made available the cookies and snacks and coffee, not a typical thing you get at our meetings. It's a very nice touch. Thank you very much.

I'd like to call on Nye County Commissioner Ira Copass, who is going to welcome us officially to Nye County.

Mr. Copass?

COPASS: Thank you very much. My name is Ira, but everybody calls me Red. As you can tell, I've got red hair. I was telling a gentleman a while ago about the fact that
many fraternal organizations have a graying problem, and
sometimes I think politicians and others do, too, but that's
de side the point.

But anyhow, I'd like to welcome the NWTRB, which is
t the full board, to Nye County, and especially here in
Pahrump. I understand this is some of the new board members,
and it's one of the first meetings this year, and I must tell
you being here in Nye County is quite an adventure and I hope
you also find it so. And believe me, I don't know whether
you realize it or not, but it's very important for the people
of Pahrump to have you people here. And without trying to
get into somebody else's, whatever they want to say, I think
I'd better shut up and get off the air and say welcome to
Pahrump and I hope you do good.

Thank you very much.

COHON: Thank you, Mr. Copass.

This is a time of change and transition both for
the Nuclear Waste Program and for the Nuclear Waste Technical
Review Board. That statement is not a new one; it seems to
me that ever since I joined the Board about a year and a half
ago, every one of our meetings has been opened with a comment
like that. It's a time of change, it's a critical time, it's
a crucial time, and it was always true when that was said
before, but it's especially true now.

I don't need to tell the people directly involved
in the program either about the changes that have occurred or
the changes that we might be going through. I'd like to tell
you about how critical this is. You've all noticed I'm sure
that it's 1997. My guess is that the people who work in the
Nuclear Waste Program are not guilty of writing 1996 by
mistake on their checks and on their memos. I think they're
keenly aware of the year, and that 1997 is only T-minus-one,
as it were, 1998 being such a critical milestone in the year.
The Board has undergone dramatic change, the most
dramatic change since it was created. I stand before you as
the new chairman. That's change in and of itself. But in
addition, we have several new members, and that means as well
several departing current members. I want to take this
opportunity to introduce you to the new members, but also to
acknowledge the departing members at the same time. I'm
going to introduce everybody, so don't be put off by this,
members.

Clarence Allen. You have to raise your hand,
Clarence. Thank you. That's all you have to do. Professor
Emeritus of Geology and Geophysics at Cal Tech.

Ed Cording, Professor of Civil Engineering at the
University of Illinois. Pat Domenico, Professor of Geology
at Texas A&M. Don Langmuir, Professor Emeritus of
Geochemistry at the Colorado School of Mines. John McKetta,
Professor Emeritus of Chemical Engineering at the University
of Texas. Ellis Verink, Professor Emeritus of Metallurgy at the University of Florida.

Two of our members who are ending their terms could not be with us today, but I want to acknowledge them as well. Garry Brewer, Professor of Resource Policy and Management at the University of Michigan and John Cantlon, retired chairman, Professor Emeritus of Ecology at Michigan State University.

These men have provided outstanding service to this Board. It's been a pleasure and a privilege for me and for the other continuing members and the staff to watch these people perform, watch what they've done to shape this Board, watch what they've done to educate all of us, members, staff and people involved in the program as well. They are large shoes to fill indeed. We will do our best.

Please join me in acknowledging and thanking these people for what they've done for us.

(Applause.)

COHON: Well, John and Jeff, we are now the old men on the Board. And I would like to introduce them to you, though most of you know them already. John Arendt. John is a specialist in the nuclear fuel cycle and inspection of radioactive material transportation, and has worked in those fields for many decades.

Jeff Wong, who you'll be seeing more of shortly,
John as well. He is science advisor to the director of the Department of Toxic Substance Control of California Environmental Protection Administration.

Now, as I mentioned, we have several new members, six in total, with, we expect and hope, two more to be announced soon. These six people were appointed by the President ten days ago and we rushed to get them plane tickets and get them to clear their calendars so they could be with us today. Three of them are actually in this room and you'll see them in a moment.

The other three are in the State of Nevada but not here. They happen to be in a big tunnel that you all dug not so long ago, and they'll be joining us tomorrow, and tomorrow I'll ask them to stand up so you can see who they are as well.

Let me introduce the missing members anyhow at this time. Florie Caporuscio is senior geochemist in the Los Alamos Office of Informatics, formerly Advanced Sciences, Inc. He received a Bachelor's Degree in Geology at the University of Massachusetts in 1977, and a Ph.D. in Geology from the University of Colorado in 1988.

Before assuming his current position, he served in a variety of capacities, as a geologist at the Los Alamos National Laboratory, as a Post Doc at the University of Pavia in Italy. He was acting section chief for the WIPP Technical
Review at EPA, and he took up his current position in 1993. His focus is on nuclear waste, and has been his career, particularly in characterization of geologic media.

Norman Christensen is dean and professor at the Nichols School of Environment at Duke University. Norm received his Bachelor's in Biology at Fresno State in 1968 and his Ph.D. in Biology at Santa Barbara, U.C. Santa Barbara, in 1973. He's been at Duke ever since, rising through the ranks and became dean, his current position, in 1991.

Norm is an ecologist who focuses on disturbance and its effects on the structure and function of ecosystems and especially shrub lands and forests.

Debra Knopman is Director of the Progressive Foundation Center for Environmental Economics. She received a Bachelor's Degree in Chemistry from Wellesly in 1975, a Master's Degree in Civil Engineering at MIT in 1978, and a Ph.D. in water resources and geology from Johns Hopkins University in 1986.

She's had a varied career. I didn't say checkered; varied career. After receiving her Ph.D., she worked for Pat Moynahan as an assistant for two years before becoming a professional staff member with the Senate Committee on Environment and Public Works. She then put in a stint with USGS where she was staff hydrologist, rising through the
ranks to Chief of Systems Analysis Branch at the Survey from '91 to '93.

From '93 to '95, she served as Deputy Assistant Secretary for Water and Science in the Department of Interior. That's the branch of the Interior that has the Bureau of Reclamation, USGS and the Bureau of Mines under them.

Debra is an expert in ground water and policy. She's focused particularly on ground water monitoring network design and in other capacities on water policy.

The other three members who are with us today in this room, Daniel Bullen, and Daniel, now you have to stand up. They have to see the full body.

BULLEN: Thank you.

COHON: Thank you. He's Program Coordinator and Professor of Nuclear Engineering at Iowa State, where he also received his Bachelor's Degree in 1978, after which he got a Ph.D. in nuclear engineering at Wisconsin in 1984.

He's worked at Lawrence Livermore National Laboratory and in private industry. He started his career in academics at N.C. State in 1989, followed by Georgia Tech, and then returned to Iowa State in 1992 to assume his current position.

Believe it or not, he's an expert in performance assessment, as well as barrier systems in nuclear waste
disposal. He's worked and works on the radioactive effects on materials as well. Welcome Daniel.

Priscilla Nelson is a Professor of Civil Engineering at the University of Texas. She's currently on leave from that position to serve as the Director of the Geomechanics, Geotechnology and Geo-Environmental Systems Program at the National Science Foundation.

Priscilla received her Bachelor's Degree in Geological Sciences at Rochester in 1970, a Master's in Geology from Indiana in 1976, an M.S. in Structural Engineering from Oklahoma in 1979, and a Ph.D. in Geotechnical Engineering at Cornell in 1983.

She's a Peace Corps volunteer in Equador. She worked for a private company in Alaska out in the field. She took a job teaching in Texas in 1983, where she's been ever since, except for her current stint at NSF. She's an expert in rocks and underground construction, and we're very pleased to have her join the Board.

I should point out that she's also a member of the National Academy of Science's Board on Radioactive Waste Management.

Alberto Sagues is a Professor of Civil and Environmental Engineering at the University of South Florida. He received his Bachelor's Degree in Physics from the National University of Rosario in Argentina, from where he
hails, in 1968. He received a Ph.D. in Metallurgy at Case Western Reserve University in 1972. He's been at South Florida since 1985. Prior to that, he had a stint as a visiting scientist at the Nuclear Research Center in Germany. He worked at Argonne National Laboratory. He was on the faculty at the University of Kentucky before taking up his current position. He's an expert in corrosion.

Welcome again to all our new members. We know we have a challenge before us, but we look forward to it.

Let me turn now to the meeting itself, now that we have the introductions behind us. We designed this meeting keeping in mind the fact that we would be in Nye County. We wanted to choose topics and expose them and pursue them in a way that is especially relevant to the people who live here. We chose, therefore, today total system performance assessment and transportation. Those will be our two major focal points.

As you know, total system performance assessment has emerged as a key element in the DOE program, as it must. It's become a focal point for viability assessment and a focal point for suitability determination. It's become the basis for the revised site characterization criteria and it's certainly the focal point for NRC and EPA in thinking about their standards. It's, therefore, critical that we be, and
the citizens of Nye County, be fully informed about TSPA. If a repository is opened in Nye County, there will be a substantial number of shipments, as there must be, of nuclear waste to get it to the repository. Transportation is a key issue, therefore, and one that is receiving increased attention by DOE. It always has received attention, but that has picked up in activity, raising some interesting questions about the role of the private sector, among others, and we'll be exploring that this afternoon.

Tomorrow, which we'll get to when we get to tomorrow, but I just want to preview for you, we'll be receiving presentations on some of the key technical investigations that DOE has been carrying out at Yucca Mountain. And in particular, we'll be focusing on the plans to reduce the uncertainties associated with the hydrology in that portion of Yucca Mountain where spent fuel and high level waste is being placed, if it is placed.

Before I turn the meeting over to my colleague, Jeff Wong, let me just point out some logistics. There will be a public comment period at the end of both days. And if Mr. McGowan is here, let me assure you we know about your time constraint and we will accommodate you.

Because several of the Board members, three to be exact, are visiting the site today and could not be here, we elected to videotape this meeting. Don't be put off by that,
but you want to make sure you look your best when you're up here.

Finally, microphones are very important, and it's also very important that for the benefit of the people transcribing and recording this meeting, that you identify yourself before you start speaking. Okay? Those are the ground rules, and if you break them, we will remind you.

With that, let me please ask Jeff Wong to take the podium.

WONG: Good morning. Can you hear me out there? My name is Jeff Wong, and I got to be the session chair today because now I guess I'm one of the old members. I find that kind of amusing. And I'll be the chairman for this morning's session, and since I'm from California, in the tradition found in the west, I'm going to change the order of the agenda. I'm going to ask that Dr. Paul Stern and Dr. Abe Van Luik change places, so Dr. Paul Stern will be first.

I'd like to say that I do appreciate the hard work that goes into this agenda. This is not a rock concert of the Grateful Dead, so there are no warm-up acts. Each one of our presentations are important to all of us in understanding what the TSPA and the role it will play in site suitability. TSPA is taking on a critical role in the civilian and radioactive waste management program. The DOE is currently performing the fourth generation of TSPA. It will
be released as a part of its viability assessment. The DOE has currently proposed revisions in 10 CFR 960 and its role in the site suitability decision. Again, if adopted, those guidelines will be used to decide whether or not to recommend Yucca Mountain as the site for development as a repository.

Also, we understand that the NRC is considering revisions to its regulations; that it will make the yet to be promulgated EPA environmental standard. These revisions may also rely heavily on the TSPA.

Over the years, the Board has recognized the value of conducting such analysis. Yet it also realizes that the way in which they are performed can make an enormous difference, both in terms of their technical quality and in terms of their credibility within the technical and lay community.

Today's session looks closely at the question of how to make the TSPA as transparent as possible. We have a number of excellent presentations that will examine this question from a variety of perspectives. It's our hope that the DOE will find some of this information useful in terms of its lessons and how they can be applied to their effort as they carry out performance assessment during the next few years.

So our list of speakers includes Dr. Abe Van Luik from the DOE and Dr. John Austin from the NRC, Pierre Barber,
Gerald Ouzounian from France, Dr. Paul Stern from the NRC, and Ms. Judy Treichel from the Nevada Nuclear Waste Task Force.

So with that, I would like to invite Dr. Paul Stern up here to give our first presentation. Dr. Paul Stern is with the National Research Council, the operating arm of the National Academy of Sciences, and the National Academy of Engineering.

He has recently published about six months ago a major study entitled Understanding Risk. This study, which Dr. Stern directed, formulates important ways how risk assessments ought to be conducted. The key idea that came from the study is that risk assessment must be a deliberative, analytical process in which the public has a central role in all the states.

Dr. Stern?

STERN: Thank you. I guess as my first visual aid, I'll wave a copy of the report. There it is. I'll talk about it some, and I am going to be going back and forth from time to time to the transparency projector.

We produced the report Understanding Risk was a result of a request from quite a variety of federal government agencies, this is a list of the members of the committee, to look very broadly at the question of how do we make informed decisions about risk to human health, safety
and the environment. The responses included the Nuclear Regulatory Commission, the Department of Energy, but they also included the Department of Agriculture and the Center for Disease Control, and on and on. The EPA sent lots of responses.

And because this is a broad scope, we put together a committee with a broad range of people, some who are familiar with the nuclear waste issue, but also people who are familiar with other kinds of things. We've got ecologists and epidemiologists and toxicologists and expertise in physics and chemistry, communication, and we even have a philosopher of science, somebody who studies science policy, quite a range of expertise in different kinds of risk.

The context of the study was a continuum of dissatisfaction and controversy over risk decisions, and a widespread belief, at least in a number of federal agencies, that risk characterization somehow was at the center of the problem, that clear and concise characterizations of existing information about risks, costs and benefits would lead to informed and acceptable regulatory decisions.

There was a presumption on the part of a lot of people that when the committee formed, as committees sometimes to, it questioned the question, questioned the presumption, and wound up through deliberations restating the
problem as not as many saw the problem of how to translate existing information from the language of scientific and technical experts, to the language of other kinds of people, including the heads of government agencies, not so much a translation problem, but a problem of how to develop decision relevant understanding. It's not quite the same thing.

The committee paid a lot of attention to what kind of a process could produce decision relevant understanding, and concluded that only the process that did that would lead to good risk characterization. So there's a strong focus on the process, as a result of which the committee came up with a slightly reformulated definition of risk characterization. It might look familiar, but when I go into it in a little bit more detail, you'll see how it's somewhat different from the old view.

Risk characterization is a synthesis and summary of information about a potentially hazardous situation that addresses the needs and interests of decision makers and of interested and affected parties. The idea is that in a democracy, anybody who cares enough about the issue has the ability to get involved at some point or another, and they are decision makers, or potential decision makers.

Risk characterization is a part of decision making and depends on an iterative, analytic-deliberative process. That's a bit of jargon, and I'll explain as I go along.
There are several implications of that definition that deserve to be elaborated. One is that a risk characterization has many users. It's not used only by legally designated decision makers such as government officials, but also by anybody who might be interested in or affected by the ultimate decision and can become involved in the decision. So risk characterization should be useful to multiple parties with different interests, concerns and information needs. It should be basically user-driven or decision-driven rather than being determined by available information.

Secondly, risk characterization requires broad understanding of the relevant losses, harms or consequences to the interested and affected parties. For some decisions, the only things that matter to anybody are consequences to human health and environmental quality, but sometimes there are other kinds of concerns, including things like geographical, racial or economic equity, informed consent and so on. So it's necessary for understanding risk not only to get the science right, but to get the right science so we address the needs of those who are involved in the decision and their concerns.

The third point is that effective risk
characterization depends upon the process involving iteration
and feedback. Now, those are a lot of jargony terms. One
way to think about it is to contrast what the committee is
talking about with this familiar diagram that many of you
have seen before about risk assessment and risk management
that has risk characterization down here, and it is basically
an effort to summarize available scientific and technical
information on these things. It's fed across this line into
a decision process where public officials consider basically
the science as well as the stuff on the left here, and the
other issues that are involved in decision making in making a
decision. And it's kind of a linear process. Everything
feeds into this funnel and this funnel, and the decision
comes out.

What the committee came up with is another diagram
that was their attempt to describe a somewhat different kind
of process that's not linear and in particular, is
characterized by feedback. And there's a lot of loops here.
There are a few things to be stated about the diagram, and I
think they'll come out here. If not, you'll ask me.

Now, again, iteration and feedback contrasts with
the common notion of a linear process where there's an
analysis and then a risk characterization that feeds into a
decision. The risk decision process does include several
steps that can be arranged in a logical progression. You see
them going from left to right, and the top half of the big
arrow on the left. But there are also important feedbacks.
The demands of risk characterization, that is, the
need to inform the participants in the risk decision, should
affect the steps that precede the act of summarizing the
scientific information, such as formulation and information
gathering. But before you do that, you need to think about
what the decision requires, what do the people involved in
the decision need to know.

The next major point is that risk characterization
depends on an analytic-deliberative process. We see analysis
and deliberation going through the whole process in the
diagram. Analysis involved systematically applying theories
and methods from natural science, social science,
engineering, decision science, mathematics, logic and law.

Deliberation includes the methods by which people
build their understanding or reach consensus through
discussion, reflection, persuasion and other forms of
communication. And it may include interaction between
experts and others. Scientists deliberate, politicians
deliberate.

To understand risk, you tend to need a deliberative
process, and it includes lots of kinds of people. As you see
on the left of the diagram, public officials, natural and
social scientists and interested and affected parties all
have roles to play in the process that leads to understanding risk.

The next point is that problem formulation is of paramount consideration. To address the needs of decision participants, you need to get the right science, which means asking the right questions. Often it's not obvious how to do that. Hazards can have multiple effects and different participants in the decision may be concerned about different ones. A set of realistic options may determine the information needed, and a set of realistic options might be in dispute.

Consequently, the questions that are asked of analysts need to be determined in consultation with the decision makers and the interested and affected parties. This is one of these loops. You need to think about the decision before you start on the science in order for the science to be decision-relevant.

The next major point is that effective risk characterization depends on appropriate representation, involvement and participation of the interested and affected parties, involving an understanding of risk by helping develop an acceptable formulation of the problem, identifying the issues that cause greatest concern and for which analysis is needed, providing information for improving the analyses, deliberating about the meaning of the information and helping
1 to determine how to summarize information useful, resourceful
2 and addresses the parties concerns. It can also help ensure
3 that those who may be affected by the risk decision are
4 sufficiently well informed and involved to participate
5 meaningfully in the decision.
6 And a final general point about this model is that
7 the appropriate level of effort for a risk characterization
8 is situation specific. The committee believes that analysis,
9 deliberation and participation have too often been
10 inappropriately restrictive in the processes leading to risk
11 characterization. But at the same time, the most extensive
12 and expansive conceivable efforts in these directions are
13 only rarely warranted. Judgment is critical in determining
14 the amount, content and timing of analysis, deliberation and
15 participation. They're appropriate for supporting a
16 particular risk characterization.
17 I should not stop here without saying to this
18 audience that when the committee was considering the
19 different kinds of risk decisions that are made in society
20 and trying to come up with a classification of types, the
21 type that we refer to as the wide-impact decision, of which a
22 permanent nuclear waste repository is considered to be a
23 paragon example, is the kind of thing where you're most
24 likely to need the greatest amount of coordination,
25 involvement, deliberation at various steps in the process.
The committee identified five criteria for successful risk characterization, and there they are. First is get the science right. It should go without saying to a group like this, but it's very important. The analysis that's done should meet high scientific standards, taking into consideration the level of effort that's possible for the analysis.

Secondly, which doesn't without saying, get the right science. The analysis should address the significant risk related concerns of public officials and the spectrum of interested and affected parties, with emphasis on the issues most relevant to the decision. To get the right science, you have to find out what gives you the answer.

Thirdly, get the right participation. The analytic-deliberative process should have sufficiently broad participation to ensure the important decision-relevant information and user process, that the important perspectives are considered, and that the parties' legitimate concerns about inclusiveness and openness are met.

The fourth criteria is to get the participation right, which means that the analytic-deliberative process should satisfy the decision makers and the interested and affected parties that it's responsive to their needs, by adequately taking their information and concerns into
account, consulting, and then want them to affect the way risk problems are defined and understood.

And, fifth, developing an accurate, balance and informative synthesis. The risk characterization should reflect the range of knowledge and perspectives, satisfy the parties that they've been adequately informed, and treat the limits of scientific knowledge with an appropriate mixture of analytic and deliberative techniques. And we can come back to that in the question period if anybody wants to.

The five criteria are related to each other. To be decision-relevant, risk characterization needs to be accurate, balanced and informative. That requires getting the science right and getting the right science. Participation helps ask the right questions of the science, check the plausibility of its assumptions, and ensure that any synthesis is both balanced and informative.

Finally, some implications for organizations that are responsible for characterizing risk. The first is that those organizations should begin by developing a provisional diagnosis of the decision situation so that they can better match the analytic-deliberative process to the needs of the decision, particularly in terms of the level and intensity of effort and representation of the parties.

They need to consider what kind of a decision it is, what the type of risk is, the state of knowledge, who the
affected and interested parties are, what their likely concerns are, legal constraints, organizational issues, and doing a characterization of available time and resources, and so forth.

They need to tentatively plan the level and type of effort appropriate for the situation. I'll throw up one more transparency here. I'm not going to talk about it, but it identifies the range of questions that need to be considered in the diagnostic process.

They need to consider whether routine procedures can appropriately be applied, or whether the procedures should be modified or new procedures developed. And the task that's facing you, in each situation, it doesn't probably make a lot of sense to directly adopt something that's been used somewhere else.

The responsible organizations need to secure the appropriate participation, involvement or representation of the spectrum of interested and affected parties. In assessing the risk characterization, the organization should consider who needs to be involved. The operative question should be not whether to involve the parties, but how to involve the parties and in what steps.

The process needs to be designed so as to integrate analysis and deliberation at all steps, and to make the deliberation appropriately broad. It's important to
emphasize proper formulation. This has been a particular
sticky point with the work that you are doing.

It's important to build an appropriate possibility
in the process leading to risk characterization and to plan
for iteration and for revisiting things if some new
information comes out. The original diagnosis of the
situation is only provisional. When the parties are fully
participation, there might be good reason to modify the
process.

It's also important to enhance the organizational
capability to conform to the principles of sound risk
characterization. To organize the full range of analytic-
deliberative processes, the organizations responsibly may
need to make special efforts to acquire analytic expertise
with regard to ecological, social, economic or ethical
outcome. It might turn out to be important to make
organizational changes, and especially to learn from
experience such as with research and evaluation efforts.

Unfortunately, the committee was not able to write
a prescription for how to organize an analytic-deliberative
process. It really is situation-specific. There's not a
whole lot of research on how to do it well, and we need to
learn as we go.

Finally, it's important to consider the analytic-
deliberative process in terms of the potential benefits and
costs to the organization's budget and to society.
Organizations should be prepared to incur short-term costs or delays in the process leading to risk characterization if they judge that these roles incur more serious difficulties with decision making later on.

And the committee quotes the old carpenter's maxim, "Measure twice, cut once; measure once, cut twice," and it advises that a lot of effort be made to get it right the first time.

I think I'll stop here. There's a lot more to say, but I'll try to be responsive to people's questions. I see a hand back here. Who can I recognize?

WONG: All right, do we have any questions for Dr. Stern? We'll take comments or questions first from the Board, Board Staff, and we'll take comments later from the public at the end of the session.

STERN: At the end of the morning session?

WONG: Yes.

STERN: Okay. I won't be around at the end of the afternoon, so if that's an issue, you need to know that.

WONG: Okay. We'll get to you, sir.

COHON: Did the committee discuss the consequences of not following the kind of process that you laid out? And if there are some past examples that the committee discussed or identified?
STERN: Of not following the process?

COHON: Right, what kind of disasters may happen.

STERN: Boy, is that a question. No, and I'll tell you why. The issue of a permanent repository for high level nuclear waste concerns at least a number of people on the committee, the classic case of what happens when somebody figures out what analysis needs to be done.

It seems to some people on the committee, I don't know the situation in detail, that the history of this particular problem has been one where a decision was made about what kind of analysis is needed, namely a whole series of technical issues about the geological and other kinds of permanent ability of a particular site to contain the radioactivity and so forth.

Without checking to see what the concerns are, you know, other kinds of concerns keep coming up. And it's even more complicated than that, of course, because by act of Congress, there was a restriction on what could be analyzed. You now have to look at one site, and it's separate from the question of the risks associated with the alternatives to putting a repository at that one site. But I'm not going to try to pass judgment as a non-expert in this on this particular problem, but it's one that's been contentious for a long time and it's likely to continue to be contentious for a long time.
I think in the opinion of a number of members of the committee, one of the reasons for that, but not the only one, was the use of a kind of a linear model where you say we do the technical analysis, then we get the results, then we give it to the political process and they deal with it from there, and we get reactions from that.

COHON: Just to pursue my question, what you just said was valuable and I'm glad you said it, but it's not what I asked you.

STERN: Okay.

COHON: What I wanted to know is whether the committee identified any other problems that needed to be handled in a linear fashion that resulted in either disaster in the decision making sense or a difficult process.

STERN: EPA deals with a lot of issues where the result is years and sometimes decades of information focused on details of risk assessment. You know, they may be in the middle of this with dioxin where you have a generic risk assessment, but is a particular problem because it's supposed to be useful for a wide range of decisions, where each decision has a bunch of concerns of the interested and affected parties.

But the EPA dioxin risk characterization was also this kind of thing where you need to know what the health effects, and then more recently, some of the ecological
effects of dioxin are, and the presumption is that once we know that, everybody involved will feel sufficiently informed that they can make decisions on policies related to dioxin. But EPA runs into this all the time. That was an agency that was very much in the minds of a number of committee members, DOE as well.

LANGMUIR: I was interested in the approach and request for the systematic way of doing the thing. What concerns me is the reality of it, the fact that essentially every risk you approach with this methodology has already been analyzed in some way, usually incorrectly, by politicians and reacted to by special interest groups. You have all that baggage to walk into with this approach. And even if you didn't have that baggage, if you start out on a new problem that had risks with this approach, how would you keep it from getting to the news media, to the special interest groups and having them mess up the nice objective way that you view the problem, and make it very difficult for you to bring closure on this approach.

STERN: Well, the committee thought about that a lot, and there's a chapter in the report on implementation, which unfortunately doesn't have a silver bullet. You know, no matter how well you do it, there's always some potential for somebody, and there were some cases that the committee looked at where, for example, there was a case where EPA tried to
1 organize a regulatory negotiation on the effect of by-
2 products on water, where they were going to try to come up
3 with a standard.
4
5 There was analysis built into that, but they got a
6 whole bunch of stakeholders around the table and they tried
7 to figure out what kind of a standard there should be and
8 what kind of additional analysis they ought to have so that
9 they could revise the standard in the future if the analysis
10 showed a need for that.
11
12 And it worked very nicely, except that one of the
13 stakeholders boycotted the process and waited for it to act
14 and then went to Congress and tried to undermine the result.
15 That does happen, you know, and it tends to happen with
16 highly contentious issues, and you're dealing with one.
17
18 Another thing that tends to happen is that there's
19 always at least one interested and affected party in the
20 process that benefits from dragging the process on, and they
21 would like to deliberate ad infinitum if they could. And we
22 thought some about how you--when to do the enclosures.
23 Ideally, what you want to do is try to come up with some
24 rules for closure in advance that all the participants will
25 sign onto so that they'll be embarrassed if they go back on
26 their word.
27
28 Sometimes you can't and sometimes the agency is
29 responsible for the process, has to make a unilateral
decision, and we thought a little bit about that and other defensible criteria for doing that, and came up with some. You know, when the deliberation stops bringing in new information that you need to consider for the analysis, you seem to have come to a point of diminishing returns and you can maybe defend closing the process up.

But there are no guarantees. The hope is, and it's based more on the lessons of bad examples than on the lessons of good examples, the hope is that if you have a process like this, you're less likely at the downstream end of it to have parties who are so dissatisfied that they're going to tie the thing up endlessly.

You know, you folks are dealing here with probably the most difficult risk management problem facing the country, and I was saying to Dan Magley the other night the country has sort of dug itself into a big hole, in a manner of speaking, with this one. You know, it will take some creativity and there are no guarantees, but that gives you some idea of the committee's thinking on the practicalities of it.

CORDING: Cording, Board. One of the technical or practical details is how to convey technical information to non-technical people who are participants in the process. Did the committee discuss that?

STERN: It did, but mostly in terms of process. I mean,
we did not try to come up with some kind of a manual for how to summarize the information. In fact, we drew on a previous study of risk communication that also wound up looking at the process, and they recognized that in a sense whatever summary you come up with with problems like this where there's scientific dispute and uncertainty, it's always possible to do more than one summary that's equally true to the information.

And, you know, when you have a contentious situation, you're likely to get that. You know, if one agency comes up with what it feels to be a fair and accurate summary of the scientific information, it's possible that one of the stakeholders will come up with a fair and accurate summary of the scientific information that gives non-experts a very different impression. And given that that sort of thing can happen, what it seems that you need to do is to try a process that involves a range of people to do something that in some sense builds people who speak to particular constituencies, can carry a message back in their own way. And if you do it well, the different messages that you will inevitably get won't be as conflicting as they have been by the other process.

CORDING: Just a question regarding how one looks at risk depending on the person and the experience with it. There are many times in major projects, engineering projects,
for example, that the problem is treated somewhat differently depending on what your experience is and whether you're working within the range of your previous experience or extrapolating beyond it. How do you test the assumptions? How do you observe conditions if one needs to, or in a situation where you're not certain? Those are all things that we think about normally as we handle more routine, let's say, projects. And I wonder if you had some discussion of that sort of issue.

STERN: Extrapolation is one of the areas. In fact, deliberation always goes on, and it's normally one of the technical experts. You know, the case that's the most prominent case that I can think of is in the risk of cancer from exposure to chemicals, you know, where you have a whole set of data and animal models with high doses in the different species and you have to extrapolate to low doses, and there's scientific dispute about that. So there's a discussion among technical experts.

Now, in other cases where you need to make assumptions, there's also a dispute, and I'm trying to think about some of the kinds of things that you face, you know, where you may need more than technical experts, the one that comes to mind is you have transportation problems where you need to make assumptions about human behavior basically. You know, what happens in transportation systems and how the
equipment is likely to be handled, where it may be helpful for deliberation about what kinds of assumptions to make for the analysis to be informed not only by people who know about trucks and trains and caskets, but also about—sorry, that's not my field. But, you know, also by people who know about the behavior of those who manage and operate transportation systems.

I hope that's responsive.

CORDING: It's a big topic. I don't have further questions. Thank you.

WONG: All right, I have just one comment. I look at your process up there, and I think a lot of the community and interested public excluded in the present process, could be excluded even greater in the process that you propose up there, because many communities and some of the interest public do not have the time or the resources to meaningfully participate in that resource.

The EPA experimented with these technical assistance grants, but stepped back on that, and I know my own agency has also participated in providing that kind of assistance to communities so they can participate. What were your thoughts on that?

STERN: The committee did think about that, and had a little bit to say about it, and realized that there are interested and affected parties who don't have the time, who
I don't have the resources, sometimes you have the expertise, and there is some discussion in the report and it's important to get that input somehow, and sometimes you may need to do those sorts of things.

I should also say that there are different ways to get the participation and representation of the interested and affected parties, and sometimes it may mean that you need a farmer at the table and sometimes it may mean that you need an ecologist who has spent a lot of time talking to farmers and understands what their situation is. You know, that will depend on what kind of a decision you're deliberating about.

But the committee did consider that and it said that sometimes you need to put some resources into making sure you get that input.

WONG: I know that we're trying to keep to the schedule, and I'd like to entertain one more question, and that was from the gentleman who came up from the back.

MC GOWAN: Thank you for your consideration. My name is Tom McGowan. I'm a member of the interested and affected human and universal public. I say that for a specific reason. My question has to do with is it limited to a finite context or does it extend into infinity. In my view, it is infinite, in which case how does the public and the future generations participate, at what point and at what means. And if not, how is this a tool to assist in performance
STERN: The committee did think about that, and obviously in one way, there's no answer for, you know, how can an unborn population speak for themselves. They can't speak for themselves. And what we need to do is to find some people who will try to speak for them and to consider that. Ultimately, it's the people who are alive who have to make the decisions, and if there are enough of us who care about the future generations that would try to imagine what they will care about, we will do it, we have no alternative.

WONG: Thank you.

(Applause.)

WONG: Thank you, Dr. Stern

Okay, we're again trying to keep to the schedule, and our next speaker will be Dr. John Austin. He's the Chief of the Performance Assessment and the High-Level Waste Integration Branch with the United States Nuclear Regulatory Commission. John will talk about the types of issues that a regulator thinks about as he views the performance assessment. We appreciate John coming here today, and I'll turn the podium over to John.

AUSTIN: The TRB staff asked that I give some specific examples of where performance assessments have not been transparent. And if I could have the second chart?

Today, I'll be describing NRC's review of DOE's assessment with genuine public input.
TSPA-95. I will identify the five key topical areas that we
selected for a detailed review so that we could give DOE a
prompt feedback. These five topical areas were ones that
have major influence on total system performance.

I will then make some general observations about
the transparency of performance assessments, and I'll get
into some details of three of the major issues that we
examined in TSPA-95. Those three key areas were the total
system performance, infiltration and deep percolation, and
the third was groundwater dilution.

Finally, I'll make some suggestions on how
performance assessments might be made more understandable and
credible. The third chart?

For our audit and review of TSPA-95, NRC selected
five very specific topical areas of key importance. We held
a technical exchange with DOE in May of 1996. We think that
there was a very positive exchange, that we learned a lot,
and I think DOE learned a lot in that effort.

We transmitted a summary of our comments to DOE in
July, 1996, followed by details that deal with the five key
areas, which were sent in November of 1996.

We are currently wrapping up a broader review of
TSPA-95 and expect to transmit those comments to DOE in March
of 1997. The thought is that as much feedback as the
regulator can give to DOE early, the greater the chance we
have for influencing the TSPA viability assessment in 1998.

We had addressed, or we will be having a technical exchange with DOE on April 10, 1997. We believe that DOE is addressing many of the concerns that we have expressed. This is based on our review of the TSPA, VA plan that DOE has published, as well as some of our what we call Appendix 7 visits with DOE.

Chart 4, again, the five topical areas that we reviewed in detail were total system performance, infiltration and deep percolation, groundwater dilution, how DOE calculated the temperature and relative humidity, which is very important for the onset of waste package degradation, and finally we reviewed the waste package failure modes, what failure modes should be included and what possible modes could be excluded from a total system performance.

General observations about performance assessment transparency. First and foremost, I believe one needs to have clear and accurate documentation of decisions made and of the rationale supporting those decisions. This is very important, because in our experience primarily in the reactor world, incomplete documentation frequently leads to significant problems in contentious cases. Where there is not a clear flow of documentation, hearings, contested hearings can drag on for many years while the documentation is attempted to be generated or straightened out.
We have sent this message to DOE numerous times and we're very encouraged to learn that DOE has drafted a position for documenting their decisions. That is under review. One suggestion I would make is that that document be reviewed by those who have experience in litigation, because that is where the adequacy of the documentation will be tested. It will be tested in the hearing process.

Finally, I would note that the Nuclear Energy Agency, Performance Assessment Advisory Group has a draft report out for comment, where they observe that incomplete justification and documentation are relatively common in performance assessments, and that includes NRC. I would hope that we are getting better. It is very important not only for DOE to have a transparent performance assessment; it is important for the regulator to have transparent reviews and comments on that. We can learn from today's proceedings as well as DOE, I think.

And the sixth chart, I'll now be entering some of the specific issues and examples of the lack of transparency. In TSPA-95, the results were presented as complementary cumulative distribution functions of total radionuclide release and doses. These are very critical to a compliance determination, particularly as we go into the new arena of possible dose based standards.

In the results, DOE had varied heat load, backfill,
infiltration ranges and thermohydraulic models. However, there was never an explanation of the results in terms of what factors or basic performance indicators were driving those results. That would be very helpful in terms of being able to follow the logic, follow the reasonableness of the results, and to try to duplicate aspects leading to the results.

In TSPA-95, it was very difficult to determine the correctness and the reasonableness of the results and, therefore, we are performing independent calculations to see if we can reproduce TSPA-95 results.

On the seventh chart, TSPA-95 identified distribution of percolation flux as the primary site characterization issue. Infiltration and deep percolation are important for waste package degradation and radionuclide transport through the unsaturated zones. We could not reproduce the results based on the information in TSPA-95.

Another example here is that there was what we think is an unsupported assumption that fractures must be completely saturated for movement through the fractures and, therefore, they under-predicted the velocity of moisture flowing through the fractures.

We found that there was not a full correspondence between the results of their process models and their abstracted models, detracting from the confidence that we
have in the overall results. Because of this, we are not sure whether the results of TSPA-95 are conservative or are they optimistic. This also led to some of our technical experts having a very difficult time following the logic in TSPA-95.

On Chart 8, we selected the groundwater dilution as an issue to review because this is extremely important in a dose based calculation. What one considers by way of dilution of dissolved radionuclides flowing through the unsaturated zone and reaching the groundwater, how much dilution you get there is essentially linear to what the dose is. If there is substantial dilution, the doses will be substantially lower than if there is not substantial dilution.

We had difficulty with some of the models that were in TSPA-95. The stirred tank model was not adequately supported. There was what we think is basically an assumption that when the moisture reached the saturated zone, that it mixed in the top 50 meters of the groundwater.

The advection and dispersion model did not consider the full range of field data. If you cannot check a calculation against the data, that draws into question the transparency and adequacy of the models and calculations. On the other hand, DOE did not consider the potential for dilution at the pumping end of the analysis.
That is, in order for there to be a dose associated with the repository, the water must be pumped from the water table to the surface, and realistically performing that calculation, there should be a significant dilution factor. Pumps will not pump solely from the contaminated zone. There will be quite a depth from which there would be water pumped, and that will provide basically a natural dilution of the radionuclides. DOE is reconsidering the models they used here.

Finally, I'd like to talk about making performance assessments more understandable and credible. First and foremost, they must be logical. Whenever anyone views any document or reads a novel, one is looking for logic. If you don't see the logic there, you soon lose interest.

There needs to be clear documentation of what data is to be used, what significant data should be excluded and why. Clear documentation of all of the assumptions that are significant to the analysis, and a justification for models used and for incredible or possibly credible models rejected.

Third, one must think of who is the audience. Is it the regulator? Is it policy makers or is it the public? The regulators, we think in terms of adjudication. Can we defend what we do? Can we understand what DOE has done. For policy makers and the public, the story is quite different. In the technical community, scientists tend to talk to other
1 scientists, and they're very reluctant to back off from
2 scientific elegance and scientific precision. But when one
3 gets away from the scientific community and tries to convey
4 what is being done, I believe the scientists must give up the
5 elegance and the precision and seek authority and
6 communication.

Fourth, for credibility, it is important that all
8 legitimate concerns be addressed in some fashion somewhere.
9 Failure to address the concerns, legitimate concerns of
10 interested people just detracts from credibility of the
11 analysis.

Finally, I'd like to give a couple suggestions on
13 how to improve the understandability of performance
14 assessment. Yesterday, I visited the Science Center for
15 Yucca Mountain in Las Vegas, and found that a very
16 educational experience. They've had tremendous efforts
17 trying to translate very complicated subjects into language
18 and videos that high school students can understand, lay
19 people can understand.

I think a possible logical next step that could be
21 taken is to develop a story book of processes, events,
22 features 10,000 years in the future, as well as 10,000 years
23 in the past, the thought being that, one, here is what will
24 happen progressively, end of institutional control, migration
25 of water into the repository, whatever number of thousands of
1 years, degradation of the waste package, migration into the
2 groundwater. In 10,000 years, spent fuel maybe looks like--
3 just giving this picture. But few of us can really
4 understand what 1,000 years or 10,000 years, what it's really
5 all about. To give perspective, go back in history. We all
6 have read history, and here is what happened 1,000 years ago,
7 5,000 years ago, just to give a perspective on what a
8 repository is all about.
9
10 Another suggestion is that recognizing that
11 computers can generate animated films. Computers can
12 simulate nuclear weapons phenomenon. Why can't computers
13 simulate in a three dimensional fashion what a repository is
14 doing over the performance period to give a better
15 visualization to the public and to the policy makers as to
16 what all of these equations the scientists are solving, to
17 give a better picture of what it's really all about. This
18 could be interactive, in which a person could vary the
19 parameters from high to low. If they want to go outside of
20 the range program, hit another button and there would be a
21 lay description of why the range was selected and why we
22 shouldn't go outside the range.
23
24 And finally, the suggestion is that perhaps
25 intelligent but non-technical people should prepare summary
26 of a complicated analysis. This has been done, is being
27 done. Westinghouse at Savannah River had a group of about 15
1 high school students summarize their environmental report in language that everyone could understand.

3 DOE has an EIS on bringing back spent fuel from research reactors. Non-technical people wrote the summary of that, and I'm told that it was very, very understandable.

6 And finally, I'd like to close by just pointing out I had one copy and an original of the document prepared by NRC on communicating risk issues to the public. If you'd like more, let me know and I'll arrange to have that happen.

10 Thank you.

11 WONG: Thank you, John. Questions from the Board? Pat?

12 DOMENICO: You referred to infiltration and deep percolation and groundwater dilution, arguably two of the most important—we discussed dilution and were examined by simple models, but these are both very difficult problems to understand. Does NRC have any position on utilization of simplified models?

18 AUSTIN: Yes, we recognize that performance assessments are basically a higher approach on that issue, take your data and develop process models, very complicated issue, try to examine what are the key variables, and from that, abstract a faithful model that would be used in TSPA itself. So, yes, we recognize the need to develop simplified models, but that in that simplification, there needs to be a flow of logic and rationale on why the simplification is faithful to the
science and to the data.

DOMENICO: Just the demonstration that it's not sufficient unless it reproduces something we observe?

AUSTIN: Demonstration that they are conservative is a suitable approach. The problem with relying solely on conservatism is that it can drive you in an inappropriate direction. Just as a hypothetical, if you become too conservative, one might ask for four or five areas within the repository. If you're more realistic, perhaps two would suffice. So conservatism can lead to unnecessarily significant increases the cost. So there is that trade-off.

DOMENICO: Thank you.

WONG: Any other questions from the Board?

ARENDT: A non-technical question that has to do with transparency. Is this an NRC term or is it a DOE term, number one. Number two, or is it defined? Number three, when you're trying to communicate with the public, why do we use terms like transparency? I saw the term up there as understandable and critical. I assume that's what transparency is, is understandable and credible. And if it is, then why don't you use it in the first place?

AUSTIN: Transparency is not my word. I don't know where it came from and I consciously do not use the word transparent for the reasons you're alluding to. But understandable and credible is what I think transparency
1 means. Transparency has too many meanings.

2 COHON: I have several questions. I find your
3 presentation very important, giving us this very pointed
4 criticism of TSPA, which as has been noted, has become the
5 centerpiece of DOE's program.
6
7 First, as a point of clarification, on your
8 seventh, I guess I won't call it a transparency, if we say
9 could not reproduce transport simulator based on information
10 in TSPA-95, does NRC run its own models, their own version of
11 DOE models?
12
13 AUSTIN: We are developing our own performance
14 assessment. We have gone through two iterations. I think
15 DOE has gone through three on theirs. And we are embarked on
16 Version 3 of our performance assessment code.
17
18 But one of the reality checks we try to go through
19 is if we were to take DOE's data and put it into our code,
20 would we come up with the same result. And if not, why not?
21 Or does DOE have a model approach that we find acceptable so
22 much so that we can stop this. But, yes, we are developing
23 our own performance assessment code so that we may make an
24 independent judgment on the suitability of the application
25 and suitability of the mountain as a possible repository.
26
27 COHON: I believe I heard that NRC was cutting back its
28 expenditures, its program for Yucca Mountain. Is that
29 correct?
AUSTIN: Our appropriation has been cut back. NRC is not cutting back. The appropriation has been cut back.

Without getting into carryover and all that, it is down several million dollars from the starting point of 22 million from the nuclear waste fund. What we are appropriated for high level waste, we spent.

COHON: Will you be able to continue this work on TSPA?

AUSTIN: The TSPA effort is one of the highest priority efforts because of its importance to compliance determination. So our whole program is being restructured to focus on those aspects that are most important to performance. We've broken it into ten key technical issues. With the budget reductions, we have stopped work at the Center for Nuclear Waste Regulatory Analysis on three of those key technical issues, with the rationale that we may be able to catch up at application time, assuming the budget request. But performance assessment would be the last to go.

COHON: Back on your overhead Number 7, the poor statistical correspondence between process-level and abstracted calculations. This surprised me because my understanding is that the abstracted models are derived basically from process-level models, specifically to achieve a certain statistical correspondence. So if my understanding is correct, for this observation to be made is to basically say the whole procedure they went through is knocked out. So
is my understanding correct, and second of all, if it is,
what is your observation?

AUSTIN: There are a variety of methods of going from a
process model to an abstracted model. The more complicated
the process model, the more challenging it is to go to an
abstracted model and still be faithful. These are pioneering
efforts, unprecedented efforts, and I am not surprised that
we found this area. We have difficulties ourselves going
from process models to abstracted models.

And I should mention, you started out by saying
it's very important about these pointed criticisms that I
have made. First, I was asked to point out problems in
understanding. Here is areas for improvement, but there are,
I believe DOE has come a long way from TSPA-93. But, again,
I'm not surprised of the difficulty going from the
abstracted.

COHON: Do you mean that the degree of conservatism in a
particular parameter, let's say, was unknown or that, which I
find that that would be just not acceptable if that was the
case, or do you mean that there's some derived level of
conservatism based on a combination of various assumptions
about parameters?

AUSTIN: Well, one thing, for example, narrow the
parameter to a range, but to propagate that through to an
ultimate result, may be a very complicated, lengthy
calculation. One could demonstrate that using the upper end of the range only with the simple model flowing through in the abstraction, that you have bounded the calculation, and DOE is free to lay out that kind of logic anywhere in the performance assessment.

On the other hand, if one has, for example, the stirred tank model with an assumption of 50 meter mixing without adequate justification, we know, or we would conclude that that is not conservative. Therefore, we would look to something different or a better justification. So that it is we, in making the reasonable assurance determination that the performance assessment bounds or faithfully gives a reasonable estimate of what the risk is, we look for areas of conservatism, reasonable conservatism, and areas for where there might be an optimistic—no infiltration would be optimistic.

COHON: But that's different from your point here. That's not how you know the degree of conservatism. That's a degree of conservatism that you don't find acceptable. You know what it is, but you don't like it.

AUSTIN: If, in a calculation involving many of these steps, it may be that some are conservative, some are non-conservative. What's the bottom line?

COHON: I think that's a crucial point, because it seems to me that the way the program is headed would be complete
reliance on TSPA for suitability determination. But the real 
question will be uncertain. I mean, that's the real 
quantification, and not whether a particular design meets the 
different standards and the degree of certainty with which it 
meets it or not. So I'm glad to have it. Thank you.

LANGMUIR: I'd just like to have you revisit, you were 
giving a specific example for purposes of affecting your 
points, and you happened to break one up that was interesting 
to a lot of us on the hydrology or chemistry side of things, 
and that is the DOE assumption of the 50 meter mixing zone, 
which is critical to the long-range dosage. I presume you 
have some folks in NRC's organization who would have some 
opinions of their own about this, and I was curious if anyone 
had expressed opinions within your organization or its 
contractors about the acceptable or the validity, if you 
like, of the 50 meter mixing zone, rather than simply 
reacting to DOE's proposal. Have you thought about it in 
your organization?

AUSTIN: We have hydrologists that have reviewed this. 
They were there, a technical exchange with DOE last year 
expressing the concerns of this assumption. We have 
documented that concern in May and in November of last year. 
But this issue may be moot, in that DOE is revisiting its 
dilution models in preparation for TSPA/PA.

But, again, even at the technical exchange, I think
1 DOE recognized the need for better justification. But we
2 have continued on trying to document these concerns to give
3 DOE a better feel for where the regulations are coming from.
4 We feel that the more we have these kinds of feedbacks to
5 DOE, and we learn from them through our feedbacks, that the
6 greater the potential for success of complete application.

ALLEN: Clarence Allen. Let me ask a very general
8 almost philosophic point of view here. Why should the
9 public, why should our political leaders have any reason to
10 believe your technical experts at the NRC any more than those
11 from DOE, the State of Nevada?

AUSTIN: We take an oath of office to be independent
13 regulators. The law says that NRC shall license any
14 repository for high level waste and spent fuel. We have a
15 hearing process which is composed of administrative judges,
16 technical folks. Typically, it's a panel of three that sit
17 as judges. We go under oath before those judges and DOE
18 would go under oath before those judges to lay out the case.
19 They must make findings of fact, findings of law, and we get
20 judged upon the adequacy of the NRC's staff effort, the
21 adequacy of the applicant's effort.
22 This then is all reviewable in the appeals court.
23 It's part of the checks and balances to assure that there is
24 reasonable assurance that the public health and safety is
25 protected. We're independent. We're paid to do the job that
Congress has asked us to do, has told us to do.

ALLEN: Well, how can we be guaranteed you have the competence to do so, as compared to the other reasons?

AUSTIN: The capability and challenge of any of the NRC staff that goes into a hearing is challengeable. If a party does not think that they are qualified to speak on the subject, they can challenge them. It's almost like a court of law. I could not go in and testify on tax law. It would be found totally unacceptable by an opposing attorney. So, you know, the qualifications are reviewable when challenged in the hearing process, so the public will have a chance, we will lay our technical analyses and technical experts out there, and have at it.

DOMENICO: I think there are qualified people on both sides always.

AUSTIN: Yes.

DOMENICO: I don't think that's the issue. I think, for example, you said something about you could not reproduce the transport simulated information. Frequently, even the same processes will give two different results. So that's really not surprising. And another thing is I thought that when you talked about the degree of conservatism, you weren't talking about parameters, you were talking about the results.

For example, 50 feet mixing zone may certainly not be conservative, but the total aspect of the mixing model may
be conservative in itself, and just may be conservative
enough to determine that. Now, I'm not saying that it's so,
but it could be so, and that could be demonstrated eventually
if we get some good results from the dilution tracing tests,
and then you get to see what kind of dilution you're getting
and then maybe you could say something about effective
values. I would challenge efforts on either side. I think
this is a very complicated problem and we're going to be
doing things that brings up these differences in results that
you get.

AUSTIN: I totally agree there are competent people on
all sides of this issue. It is very healthy to have the
exchanges that we have through this documentation. If we
cannot reproduce the results, that is not necessarily a fatal
flaw. We need to know the reason why it can't. If models
produce different results, it is better to discuss them and
understand why now rather than in a contentious lawyer-driven
hearing process.

So, again, I think and I would hope all interested
parties are building on their knowledge base as we go through
each one of these iterations, and if we have some surprises
and differences, let's work them out peacefully together and
go on.

WONG: Okay, going from this Board to the other Board.

BULLEN: I'm Dan Bullen. I'm the Board designee. I
I have just a couple of comments that you may not even need to respond to. Specifically with respect to your suggestion for improving transparency or improving understandability, your animated video was a great idea, but I'd like to toss a word of caution out. One of the favorite videos in my family at home is Jurassic Park, and my children are completely convinced that those dinosaurs are real. So whatever you put into an animated video may or may not be acceptable to the public.

And the second point I want to make is that I agree that to make TSPA transparent, you have to tell a story, and I think to tell the story, you have to start at the beginning with what are we trying to do, describe in layman's terms the assumptions that are made and the processes that you want to model, and then come up with a result and try and talk about the effects of that result on the population nearby. And if you make that story credible, it has to be able to be readable by my 13 year old daughter, and I think if you take a look at your story board and you make sure that whatever you put out for TSPA that's got to go to the public to be transparent, it has to tell the whole story, not in terms of equations or in terms of how many experts you have, but in what are we trying to model, what are the effects of the model and how convinced you are that this may actually be the case.
That's all I had to say. Thank you.

WONG: Are there any more questions? Leon?

REITER: Leon Reiter, Board Staff.

John, I just wanted to ask you one thing about the technical exchange also. Something came up that appeared to make me a little bit uneasy, and that was that apparently there was an attempt, because of difficulty in understanding parts of the TSPA-95, there were attempts by some of your consultants to contact people who had actually carried out the TSPA, and that was viewed negatively, direct communication, viewed negatively by the NRC. Am I correct on that?

AUSTIN: Well, unfortunately, I could not attend that technical exchange. And when I signed a letter transmitting the summary of our comments to DOE, it was May of 1996, I thought I was signing a letter that just said here it is, and for those receiving it, they read it and they seemed to think there was something very negative in it, which I didn't see. And the staff that worked with me in writing that letter did not express any negative thoughts about the exchange with DOE. In fact, the feedback I got from the technical people was that it was a very informative, positive, technical exchange.

We have varying personalities within the staff, as does DOE, and some people may naturally come across a little
more negative, when for those who know them, that's a positive.

REITER: I'm sorry, maybe I didn't make myself clear. The question is if the scientists at the Southwest Research Institute viewed the TSPA and didn't understand something, had a question, the logical thing would be call up somebody who conducted and carried out the TSPA and say what did you mean by it. And apparently, there's some objection from the NRC to doing these informational kind of clarifications.

AUSTIN: Good point. The Commission is committed to conducting the pre-licensing reviews of DOE and the public. We're a full disclosure agency. We try to have exchanges as much as possible in a public forum, none of this closed doors, behind the scenes, smoke filled rooms; that, you know, we get out and into the open. And, yes, there are phone calls between technical folks on what did you mean by this, but there is value in having a public record where these things are clarified as opposed to all right, I never need to bring this up again because so and so explained this to me over the phone.

That is not a document we could ever reference, and in fact in licensing reviews, I have had safety evaluations where it is a phone conversation that served as the basis for the judge. That's inadequate. We need to have a document that says here is how we resolved this. Here is the concern
and here is how we resolved it, so that anyone can go into
the public document room and try to find the paper trail.
So, yes, it may be a little more painful and not appear
to be efficient to raise these in a public meeting in Las
Vegas as opposed to just getting on the phone and getting
clarification, but they do happen, but it still has to be
done in public if it's relevant or significant.
MC GOWAN: I'll be uncharacteristically transparent.
In view of the sequentially ordered determinations
by DOE regarding suitability application, followed by EPA
that was consistent to revise standards, compliance and
followed thirdly very closely by U.S. NRC's licensing
requirements, mandated as consistent with EPA, ergo also
consistent with DOE, to what extent can you invalidate or
independently clarify your independence and wholly objective
process?
AUSTIN: Well, by law, we are independent. We have a
lot of people checking us to see are we independent, are we
keeping an arm's length from the applicant. We are
professional technical people who take pride in reputations.
We do analyses that are placed into the public document room
where anyone at any time can review and check the validity of
what we have done.
I think that if you see our analyses in performance
assessment, they are not the same code or codes that DOE
uses. They are developed by NRC and its contractor in San Antonio, Texas. And we are ultimately checked by a licensing panel, the Commission itself and the appeals court, and I think all of that combined assures us that we are independent, and I think DOE would say we're independent, too.

WONG: Thank you, John.

I'd like to thank Paul and John for this morning's presentation. We will have the coffee break I guess until maybe five after 10:00, and we will return and talk again and hear presentations from the French program, DOE and the State of Nevada.

(Whereupon, a recess was taken.)

COHON: Please take your seats.

Some very important announcements, very important. I didn't intend to do this, but when I acknowledged the retiring Board members, I introduced for the first time at a Nuclear Waste Technical Review Board meeting the notion of applause. This is something that's foreign to us and we would prefer that henceforth, unless the Chair, me, starts to applaud, that you all hold your applause.

The reasons are clear. One, it takes so much time. The other is that if we get into this habit of applauding and then you choose not to applaud, and a third reason occurs to me, we tend to be so quantitative and analytical. I think
I noticed Leon out of the corner of my eye designing an applause meter.

So henceforth, please no applause. Thank you.

(Applause.)

COHON: That's very good. My introduction this morning was so long, it didn't leave time for me to acknowledge the superb staff--no applause--the superb staff of this Board. They are wonderful. They do all sorts of things from the highly technical to the incredible, like getting 30 plus people to Pahrump with no one getting lost, so far as we know.

I also erred in introducing Priscilla Nelson, for which I apologize, and I want to rectify and correct it right now. In fact, she has terminated her appointment at the University of Texas--sorry John McKetta, Texas will not be represented on the Board--and has become a federal employee effective in August with the NSF, as program director in civil and mechanical systems.

Also, I should point out that she used to be a member, is no longer a member, of the Academy's Board on Radioactive Waste Management, for reasons that are probably obvious.

Finally, in listening to the excellent presentations this morning, it struck me that there may be members of the audience at this meeting who are not clear on
what our Board is vis-a-vis DOE and NRC, so there are three
entities at least here involved.

You've gotten a sense already of what NRC is. They're the ones who regulate and they must grant a license
to repositories. DOE is charged with the responsibility of
developing a repository plan. Our board is an independent
board, and you've heard the word independent before. We were
created by the 1987 amendments to the Nuclear Waste Policy
Act, and we were created specifically to provide independent
advice to DOE and to Congress. We are required by law to
report twice a year to the Secretary of DOE, to the President
and to Congress.

DOE does not have to listen to us, but in fact the
law anticipated that and basically said something like they,
Congress, would be surprised if DOE didn't listen to us, or
something to that effect, but they're not obligated by law to
do what we advise, unlike NRC, which has to grant a license.

Sorry for all these interruptions. Back to Jeff.

WONG: The new chairman has made his mark; the no
applause rule. And he's once again put us behind schedule.

All right, in this part of the session, we're very
fortunate to have two gentlemen from ANDRA, the French
effort. We have Messieurs Pierre Barber and Gerald
Ouzounian. They're from ANDRA. This is the organization
that is responsible for the development of repository in
In 1991, the French rewrote in fundamental ways their nuclear waste legislation. Volunteer communities were sought for two underground research laboratories, and greater emphasis was placed in this effort in involving the public at key steps in the decision making process.

Among other things, the French have recognized how critical it is that their performance assessment be viewed as credible by wide segments of the French public.

Messieurs Barber and Ouzounian will speak today on these developments in France, and I would like to thank the gentlemen for coming today. They have flown all this way to address us, and they're on a very tight time frame, and they will be returning to France tonight.

BARBER: Thank you, Mr. Chairman. Good morning, Ladies and Gentlemen.

First of all, I would like to apologize because during my presentation, I will use a curious language, which is neither French nor English. I name it Frenglish. So don't worry if you find some words which are not absolutely Oxfordian English.

Well, my problem today is to try to tell you some experience which has been raised in France. First of all, I set the scene. We are at the end of 1989. We are in France, obviously. And the organization in charge of radioactive
waste management, that is ANDRA, is trying to find all over France a location, a site, for high level waste. So the situation is at this time we have just finished siting design and construction of the low level waste site, that is the Op Center. It is almost ready to start, and we are starting to find a site for high level waste.

We are, in fact, at that time four potential zones. One is in granite, another one in salt, a third one in clay and a fourth one in schist, and we are technicians and we are trying to make some site experiments at different sites.

Well, setting up of the Op Center has given not too many problems, and we are in the sense period, that is, we are trying to solve the question which has been raised to us. And unfortunately, the public does not seem to understand exactly what we want, and we are encountering some quite serious difficulties on site, especially on one site, up to the point that the Prime Minister at that time, Mr. Ogarth, decided to stop all experiments and all testing on site. But stopping everything on site does not solve the problem. He was a clever guy and decided to ask one commission in order to propose something.

On the Parliament side, the office, while a part of the Parliament decided also to think of this problem and constituted a small commission to deal with the problem. Curiously, the two commissions issued almost the same type of
report, which gave verse to the law in 1991. So we are in 1991. The Parliament has discussed the law and the law has been issued. This law gives one important idea. We have not yet the solution for high level waste, that is, we need to go on with research to really understand what this high level waste and how this level waste can be taken, and the Parliament will make a decision in 2006, in fact 15 years after the law. So we allocated 15 years to make some research. What is in fact inside the law? I told you this is a law of research and three different objectives for this research, separation and sorting of the various kinds of waste and potential transportation of those wastes, and this part of the research has been given to the French Atomic Energy Commission. The second part of the research, second access of research, to find retrievable or known retrievable geological disposal. So this is the objective of the long-term, but up to 2006, we are to make research on at least two research underground laboratories, strengthen the processes for immobilizing the waste, and in order to, I would say a longer term surface storage, in reaching for another final solution. And this research is also given to the French Atomic Energy Commission. So as ANDRA, that is the waste manager, we are in
1 charge up to now to conduct all the research on this deep
2 geological disposal. So this is the first big point of the
3 law.

4 The second point, the second point in fact is a
5 question of organization in France. This law is setting up a
6 world organization. The old law at that time was part of the
7 French Atomic Energy Commission. We were, since 1969, one of
8 the divisions of the French Atomic Energy Commission. And so
9 it was we were I would say surrounded work from people in
10 charge of military devices and I would say a culture of
11 secrecy was really one of the points.

12 So the item which was requested by the law was to
13 be open, to come from the cultural secrecy to an open minded
14 type of work. And perhaps the important part of the law, the
15 independence, and when I say independence I mean separation
16 from the French Atomic Energy Commission, and that was also a
17 question I would say of ethics. And it's difficult for a
18 waste manager to ask a requirement and questions to its
19 authority.

20 It's impossible really to have a full
21 responsibility of waste when you are a member of a waste
22 producer. And so we were separated from the French Atomic
23 Energy Commission, and even almost the same statute as the
24 CEA itself, but also as EDF, the big waste producer, or
25 Cogima, the three main waste producers.
Another part is the external control. So now in France you are below, you are an organization in charge of managing waste and doing something, but this organization is fully responsible, but as fully responsible, that means also that it has to be controlled by the external, the environment. The environment I would say first technical control by our authority, that is in France, DSIN, and also by authorities, the OPRI in charge of the affect of ionizing radiation. So this is the normal control.

We are also controlled by the government, by our ministry. We are reported to three different ministers, the minister in charge of research, clearly this law is a law of research, so the minister in charge of research. We are also reporting to the ministry in charge of industry. Clearly, industry, that's EDF, EDF is prediction of waste, so we have a link. And we are also reporting to the ministry in charge of environment. And this was quite new in France at the time. There's a link between the waste manager and the environment. The commission which was set up inside the French Parliament is also existing, and I will note, controls.

What does openness mean? Openness means that globally speaking, we are in charge of issuing annually one big progress report. We are reviewed by a National Evaluation Board, and this National Evaluation Board is
almost as what I have in front of me now, it's I would say not the qualifications, the missions are almost the same. So we have to report to answer all the questions of this National Evaluation Board, and you will see that we have been asked a lot of questions.

But what is also inside this openness is a discussion with the local communities. And this is quite important, because in fact the objective is to build a good confidence with the local communities, with the public at the local level. Discussion with local communities means that by law, it is created at each potential site, a local commission in charge of checking what we are doing. In fact, this commission is able to ask as many questions as it wants. It is funded to do that. It's a local commission in charge of being the link between the future operator of the site, as the site is decided, and the local public.

And also the important part, we are again making research, and the objective is to a final governmental decision in 2006 after a debate in front of the Parliament. And if Parliament decides to do something really clear or to decide to build a repository or not to build a repository, it has to do so by a new law, which is important. So this is a full community, it's the French community which tackles the problem. It's no more a small part of technicians; it's really the community.
Again in this field of openness, the government decided to designate a negotiator. You know what a negotiator is in the U. S. You all had one. Our negotiator was in charge to find volunteer communities, and I insist on the word volunteer, and it received something like 30 volunteer requests from local communities.

Well, these 30 requests were clearly not all suitable for a disposal for a site, due to the geology. The first screening has been done in view of the geology of the site. From these 30 volunteer requests, ten were remaining after this first screening, and Mr. Bataille, who was the negotiator, went personally to discuss with the ten local communities with the ten elected people, or the elected people of the ten communities with the local association of these ten regions, and he was in charge of choosing the most potential requests to design a site.

Well, how he chose, after discussing, he requested a vote from the local organization, and he chose the one where the vote was all unanimous, all unanimous, minus one, and this minus one means one abstention, that is, no negative votes. So he selected four sites, and I can give you the sites. Here's a map of France. He selected two sites, two potential zones in clay.

So you see this blue layer. This is the Meus Department and the Haute Marne Department. He selected also
a small part of the Gard Department, a small part which is somewhere here, and he selected also a part of this department in granite somewhere in this part. He selected these four potential zones, and proposed that to the government. And the government agreed, and we were requested by the government to start again, fortunately, after four years doing--I wouldn't say doing nothing--but after four years, we were requested to start again some research, some tests on sites. So in '94, we were able to go on site, and this was a big point.

I just would like to tell you a few words about the National Evaluation Board, your equivalent. There are six people, six experts, named by the Parliament and the Senate, and what is quite interesting is that there are at least two international experts. Up to now, there are internationals, I mean, there is one person from the OECD and one person from Switzerland. Fortunately, they speak French. And six other named by the government, four proposed by the Academy of Science, and two by the High Council on Information and Nuclear Safety.

What is the purpose of this Board? The Board is in charge of reviewing not only the deep geological disposal research, but the overall thing. And so it has to provide each year to the government an annual report giving the events of the three research directions, and is in charge of
setting up a global evaluation report in 2006. This global evaluation report being transmitted to the government and then to the Parliament in order to decide something.

What is the result of this organization? Up to now, we have been issuing four important reports, two scientific reports, one per year, and two reports to the government. I have used the word earring. It's not exactly an earring like this one, it's maybe a little closer, but we have had a hearing by this National Evaluation Board, something like once a month for three years now. And the result of this work is that now we are issued three application files for three potential laboratories.

In fact, I told you that we are to investigate four sites. Very clearly, the two sites in the north have a common border, the two departments have a common border and the geology does not respect the administrative limits and so we discussed with the local population to make only one proposal for that. So we have three potential sites, and the objective was out of these three, to reduce the number to two. But after all the investigation we have made, we did not find any reason to dismiss any of the three sites, so we requested the authorization from the government to present three, which authorization was granted. At the end of September or November, the last application file had been submitted.
Final result: the public inquiries will start in a few days in France on these three sites, and the objective is to start digging the laboratories the beginning of '98. We have three potential sites. We have three local inquiries. Nobody is able to tell exactly what will happen on the three sites. Maybe one will disappear due to maybe the opposition of local population or something else. But today, we have three sites.

I do think that Gerald will give you some idea now on the technical work.

OUZOUNIAN: Mr. Chairman, Ladies and Gentlemen, now as Pierre Barber told you, the French law decided to start or restart investigations in three different ways. The first one was partitioning and transmuting. The aim was to make sure that all of the possibilities have been investigated and are to be applied if technically and economically feasible.

The second one is the underground deep disposal, and the third one is the long-term storage and the separation of the radionuclides. So ANDRA is mostly in charge of the second way, which deals with deep geological disposal. But we have very close links with the other ways in order to take account of the research of the other ways, let us say for example if there is a way to partition and transmute, for example, of americium, which takes account of known disposal of americium in the same conditions as actually. This is an
example.

The other one, a very easy one, is the long-term disposal, the long-term interim storage which can be part of the management before the geological disposal.

Now, about our research for the deep geological disposal, I give you the master plan for surveys and research on deep geological repositories. As Pierre Barber told you, we had two years of site surveys from surface, also with bore holes, but without mining, and this resulted in three applications for three different underground laboratories which have we call these applications DAIE in French. These files are being instructed by the administration, and public inquiries, as Pierre told, will start next week.

So we are waiting for the result by the end of '97, and we plan to start our mining and excavation works by the middle of '98, in order to get access to the underground laboratories between 2000 and 2001. At that time, we shall follow the investigations in underground laboratory, but also from the surface for hydrogeology, geochemistry and all investigations from the surface.

During this time, we have also to develop the concept for disposal. As you will see, our concept is guided first by your fundamental safety rules which give the general rules for the concept, and then is closely dependent from the characteristics of the sites and also from the packages, from
the waste packages. The concepts are to be chosen during this year, 1997, and then we shall proceed to the qualification of the concepts, first from paperwork and then from the underground laboratories.

The last part of our work is the performance allocations and the preliminary safety exercises, the safety assessment with safety exercises which results have been given in the application forms, and then the safety exercises will allow us to adjust the concept and also to design our experimental program. Then finally, by 2005, the final safety and demonstration exercise will allow us to assess all the work performed in the underground laboratory, and also in the other fields. All of this work will give rise to the report to the French government, which will be assisted by 2006.

Just another word about the general methodology for designing the concept. As I told you, we have basic safety rules in France which define two things; first, the main characteristics for the geological sites, and we spent two years in order to understand how the sites were suitable for the works, and the second thing which is described by the safety rule is the basic concept, and I assure you an overhead a little later about the basic concept.

So this is the base of our work. We have then two main inputs which are the site characteristics, geological,
1 geometrical, hydrogeological, geochemical and so on, and also
2 the characteristics of the wastes to be disposed of. Then
3 from these two things, we cross it to the designing of the
4 concept for the geological disposal. The results are
5 assessed with safety assessment instrument. And at each
6 step, we come back to the site characteristics and to the
7 characteristics of the matrix of the waste matrix in order to
8 adjust our concept.

I'll just show you about one site, the different
characteristics which have been taken into account. So these
characteristics are defined by the fundamental safety rules.
First of all, we have the depth, which has to be higher than
200 meters. We recognize this is for the east site. We
recognized between 400 and 600 meters depth, 130 meters thick
clay formation. There were no faults. This has been seen by
three dimensional seismic geophysics. These are the
characteristics which are still to be confirmed by further
research.

The other favorable gained element was about
hydrogeology. We had nearly no water in this formation, so
no permeability, and no water even on the level above the
formation. So we have to confirm the low vertical hydraulic
gradients and we have to follow up the characteristics.
About the geological stability, no seismicity has been
recognized and we have to confirm this.
About the important characteristics from this fundamental safety rule, we have to make sure that the mechanical and thermal properties are understood from the samples, from small samples recorded from the drill holes. We have to make sure that these characteristics are favorable for further development of the work on the site.

About the geochemical properties, I'm speaking here about two things; first for the water geochemistry and the second one, the rock geochemistry, and mostly the retention power of the rock for radionuclides. We could perform a series of tests from the surface, but as I told you, there is no water, so it's very difficult to characterize the water when there is no water.

So we performed a series of retention measurements, but here also, as we had no water, we had to use synthetic water. We have to confirm the characteristics about retention on site into the formation.

About natural resources, we did not recognize any natural resource on the site. We have to make sure that there is no natural resource. So this is just an example. We have the same kind of characteristics, and allows for all the three sites.

Now, coming back to the basic concept given by the fundamental safety rule, the basic concept requires that we work with a multi-barrier system.
is given by the waste package which represents the first barrier, and what we call a waste package is the matrix with the radionuclide content, and with the container. We have to consider an engineered barrier. At the present time we work with two kinds of engineered barriers. We tried to work with natural clays from the site, and we try also to work with concretes. So we are studying. We did not make any choice at this time. We are still studying the best engineered barrier. Within the engineered barrier, we can also be allowed to use another fact, mainly for reviewability considerations.

The third barrier is a geological one, and you can understand that this is the most important and the main barrier for the long-term safety. At the present time in our performance and safety assessment, we do not consider that we have a container, that the container has a role for safety, and we do not consider the biosphere as a retardation factor.

Now, how to describe our general objective for operations. If I summarize what we have to do, it's first to find a site, second to understand it. We have to make sure that the only way for the radionuclides to come back to the surface is water, so we have to understand the answer to a few questions. From where does the water come? How long does it take? Where does it go? How long does it need to go there? And what can be the chemical charge of this water in
the presence of radionuclides?

So these are the basic questions, but we have to understand and organize these questions, and in order to develop the deep geological disposal, we have to answer two questions. First of all, is it possible to demonstrate that the long-term containment capacity is possible in the formation. And the second question is is it technically possible to make a disposal in the formation.

So about the second one, I will not speak too much about the second one. It's mostly a question of engineering, engineering and cost. About the first one, and this is a priority, we have to demonstrate that containment can be achieved. We have two—the first one is the geological environment. As I told you, we have two series of inputs which are the geological survey as performed from '94 to '96, and second, the packages and the knowledge about the engineered barrier.

So from this input, we have the knowledge of the geological and environment to develop, and we have also to develop our knowledge about the packages. Between these two, as you have seen, we shall use engineered barriers, engineered systems and sealing systems, and our main understanding of the system will be through the understanding of the interactions between the different systems.

Which kind of interactions? These interactions
1 are, first, geometrical. Is it possible to put the amount of
2 packages in the space given by the geological formation.
3 Second, mechanical. Is it possible to have stable
4 formations. Is it possible to have stability for a longer
5 period of time with the constraint of heat. And the third
6 and the most important one is the chemical interaction and
7 the possibility of transportation interaction between water,
8 packages, materials and rocks.
9
10 Just a word about retrievability. As Pierre told
11 you, by law, we are requested to work about retrievable or
12 non-retrievable deep geological disposal. The law does not
13 say anything more. So we have to understand what
14 retrievability or reversibility is, and our basic approach is
15 to design a concept for each site which ensures the long-term
16 containment of the radionuclides. And then about each
17 concept, we try to define different steps of retrievability
18 by deciding to close first the bore holes which contain the
19 packages, second the galleries to transport the packages, and
20 third, for example, to seal the complete system.
21
22 So today, reversibility or retrievability level is
23 somewhere between the final disposal and interim storage. So
24 we have to manage all our research programs in this field and
25 the aim is to ensure the best safety for the system.
26
27 The determining factors for designing the concept
28 of the deep geological radioactive waste disposal, we have
three determining factors. First, the waste stock and the expected production. That means the amount of radionuclides. The second one is the thermal load given by the radioactive wastes in order to design the most suitable materials and also to have the best emplacement for the different packages. And, third, the third determining factor is the retrievability or reversibility.

About the first one, the packages, just two words. In order to give you the amount of radioactive waste which will have to be disposed of, the production, the net product by 2020, which is based on the reprocessing of all or nearly all of the nuclear fuel, so the amount is 80,000 cubic meters of intermediate level wastes and 5,000 cubic meters of high level waste, which are vitrified.

By 2070, we shall have more than 80,000 cubic meters of intermediate level wastes, and we shall have about 8,200 cubic meters of glass, in the case we decide to reprocess all the fuel. In the case we don't decide to reprocess the fuel from 2020, we shall stay at about 80,000 cubic meters of intermediate level waste, 5,000 cubic meters of high level waste as glass, and 24,000 tons of spent fuel. So we did not translate the tons in cubic meters, as we don't know the kind of package we shall use.

Just a few words about the different research programs, about the knowledge of the geological environment
1 and structure. On this overhead, I gave the scope, the
2 objective and the research topics.
3 About geology, the objective is to make sure that
4 the geometric characteristics are possible, and that the
5 tectonics are compatible and consistent with the system. The
6 research topics are geophysical measurements and
7 interpretations from the surface, and then in the underground
8 laboratories.
9 About the geological evolution, the objective is to
10 make sure that the long-term evolution of the sites will
11 ensure a stable environment for the disposal. We have to
12 understand the past events to try to understand if these
13 events can come again, and measure the consequences for the
14 disposal.
15 About geomechanics, we have to understand, except
16 for the construction, which is a separate thing, but for the
17 long-term, we have to understand the impact of very small
18 constraints and very small movements on the long-term, and
19 the impact on the disposal.
20 About hydrogeology, we have to measure the water
21 fluxes and to understand the water movements in very low
22 permeability systems, either continuous--that means porous
23 systems--or discrete--that means fractured systems--
24 continuous flow of the clay systems, discrete for the
25 granite.
About geochemistry, the difficult part is to understand the chemical behavior of non-natural radionuclide elements which will be disposed of in the system. About the packages, we have the same kind of questions, first of all, make sure that the inventories, that the amount of the content of radionuclides is well known. About the canisters and the overpacks, we have to be sure to guarantee the safety, but we have also to design canister and overpacks in order to make sure that the short and medium-term mechanical strength is attained, is possible. About the matrices, we have to understand the long-term behavior of the matrices to be disposed of. This is a source of our performance or safety assessment models. About engineered systems, we have to design the most suitable engineered systems for the engineered barrier. We have to understand the material to make a choice about the material, to design the amount of material, to design the geometry and so on. About the sealing, we have to also understand to make sure that the structure, the location and the material is able to ensure the long-term safety. About the interactions, it's one of the most important, the interactions, here, I just give the research topics. I don't give the objectives because those are to be designed yet in detail during the year 1997. People know
more or less what they have to do. They know where they have
to go, but they have to put the questions very clearly.

So the different types of interactions we studied
and we have still to study are the radionuclides/water
interactions; the package/water, that means corrosion,
interactions; package and engineered barriers interactions,
that means the stability during the time of the engineered
barriers; engineered barriers and geological environmental
interactions; sealing and geological environment. The
problem is not only to achieve the right permeability of the
sealing system, but also to make sure that we have no
mechanical deformation behind it, the wall of the rock which
has been excavated. Geological environment and air during
the opening of the system, and last, the radionuclide, the
interaction between radionuclides and biosphere, migration in
the plants and the soils and in the animals for the last
part.

I still have two overheads. I wanted to give just
an idea about the link between our concept design and the
industry.

We have to develop specifications for disposal
about the waste packages. We cannot decide to accept any
kind of package at any price for any condition. We have to
define to make sure that we understand the system, what we
have to dispose of packages, and from the characteristics of
the system, we have to give specifications to make sure that the long-term behavior of the packages will be achieved.

This is a general approach about this. This is the work performed by ANDRA about the packages, the preliminary specifications, long-term behavior understanding and specifications. Here, is the concept which is developed, our first choice of concept is being decided and we have until the end of '97 to make our definitive choice. And then our concept and feasibility will be given by 2005.

About the waste producers, at the present time, we used characteristics of the existing wastes, but very soon we shall define our preliminary specifications in order that the industrial options which are available or which will be available very soon will be taken into account into our design, and this will give a rise to the final specifications and to the characterization tests which will have to be performed by the producers. And then we shall start to approve the waste packages.

This morning, we had a series of presentations about total system performance assessment. I want to just give you not a total system performance assessment as a first illustration, but just the safety assessment of the geological part which has been used for our applications. This is, according to the time, this is the amount of radionuclides. Here are just the fission products. We have
the fission products entering into the geological barrier from the packages. So during the time, you see the amount of radionuclides entering into the formation from the package to the geological system.

Here, we have the same figure, but after the geological system, so maybe you remember in our fundamental system. In the upper one, in this one, this figure describes the amount of radionuclides from here to here. And here in this one, during the same time, we have the amount of radionuclides, just the fission products, coming outside the geosphere, the geological barrier, to the biosphere. That shows that we have a very big filter here. At the entrance, you can see that we have all the fission products, but at the outlet of the filter, this is like a chromatograph, we have just, if I remember, zirconium and technetium at very, very low levels.

Another scheme, but this time about total system assessment performance, this is an example which is from an exercise for actinides, and this time, we don't choose the chemical property of the system in order to assess it, but the impact as it's pressed by sieverts per year, and you can see that this was in granite. You can see that for actinides, we have very low levels of actinides, but at about 1 million years or 10 million years, and this level at 10 to the minus 8 is at five orders of magnitude lower than the
limit given by the fundamental safety rules, which gives a quarter of milisievert.

So the last one, it's exactly the same exercise, but for the intermediate level wastes. You can see that iodine and cesium, which are mobile radionuclides, will reach the biosphere with 10,000 years, but even at three orders of magnitude lower than the limit given by the safety rule. This is a kind of very important result, but each time we give this result, we have and we do this, we have all of the hypotheses given linked to the table. And the results are just the reflect of the hypotheses we use and our hypotheses about the field are what we measure, and we try to make sure that we can reduce our uncertainty and go closely to the best suitable representation.

Thank you.


LANGMUIR: Dr. Ouzounian, it looks as if you have an excellent site. The clay sites appear to be very good in terms of type. My sense is that you're using performance assessment only on one piece rather than the whole system. From what you've described, it's being used only to look at the releases that might occur from the waste package. And in our system over the years, we've been evolving and it's been getting better, we think, I certainly think and I think most
1 of us do, to the point where TSPA, performance assessment is being used to determine what kind of research we should spend money on.

And your lists were all inclusive, the proposals of things that you might accomplish at the site scientifically reminded me of what this program was looking at around 1990, 1991 when we had the site characterization program, books which were just full of things scientists would like to do, all of which could be argued would help isolate the waste. But then the question is how many do you have to do?

If the site is this good, shouldn't we be looking at total system as a way to eliminate some of these scientific studies that aren't needed because it's such a good site. Shouldn't we be looking at it in terms of cost and selection of activities? I'm wondering if you've gotten to that point yet.

OUZOUNIAN: Today, we have very good sites. That's true. We have very good sites mainly for the clay system, but also for the granite one, but it's much more difficult to make the demonstration for the granite system, as we have a fracture hydrogeological system. So what we do is to use the total system performance assessment in order to design our program in order to identify the highest uncertainties and to define the uncertainties which have to be reduced by priority.
So what I have shown here is just about the geological system, the performance assessment of the geological system, as we had authorities to make an application for the underground laboratories. So we did not take account of the packages and the engineered barriers of the biosphere for this application, but we did give the sizes in order to understand where are the points on which we have to focus our attention and to develop our research. This is our management tool for research, and this will become our assessment tool by 2005.

BARBER: I do think that there's a main idea to take from this presentation, and that is safety. System performance assessment is a tool, an iterative tool in order to predict what we need, what we need to do, and to focus, really to focus our attention on specific points, the objective being again to get a real safety assessment. But from the beginning, this system performance assessment is the indicator in which region we have to go in order to predict what we need.

LANGMUIR: I guess what I did not see was indication that there was a TSPA, total systems performance modelling approach which incorporated all of the features of a repository, including waste package and near field performance and corrosion and absorption and so on, which would then give you some idea of where you should devote your
energy and you efforts in terms of cost. I saw it only being used at the tail end in the dose discussions rather than in terms of the overall cost and selection of priorities within the program.

OUZOUNIAN: Yes, just a few words about this. What we can say is we will have this approach, which is explained with details. Our main approach is to say that the interaction of the exchanges, the migration will be through water, so we have our basic fundamental approach, which is based on the interactions between water and the geological system, natural system.

And then between this water and the engineered, and then between the water as modified with the engineered barrier with the canister and so on. And at each time, we reduce and make a reduction of our fundamental logical models. That means we reduce at the limits of validity of our models in order to make simple models to be taken into account in the safety and performance assessment system, and we developed a total system performance assessment system with small models, but which have very limited application. But if you are interested, I can send you some documentation about this approach.

WONG: Pat Domenico?

DOMENICO: You say there's no water present, or there's no water movement, I'm not sure, but my feeling about clay is
if you have water and it's held by capillaries and everything else, once you heat that medium up to the temperatures that you anticipate, you're going to have a porous medium, which will be an entirely different chronology than you're dealing with now.

OUZOUNIAN: No, no, you're right. So our experience is first from the Belgium system where we spent a lot of time for experiments. We have more than 20 percent of water in the clay formation, and we needed more than one month in order to recover 100 meters of water from the borehole.

DOMENICO: During a thermal test? Was this during the thermal test?

OUZOUNIAN: Yes, but we tried to freeze the formation and to recover the water. We tried to press the water, and so we tried many things. But this was just in the borehole, 20 meters depth from borehole, and it was very difficult to recover water.

In our sample, we used all of these experiments in order to measure the amount of water in our clays. The best indication we have is that the water content is between 4 and 8 per cent, and which is very closely linked to the structure. So it's very difficult to make this water move. I'm not sure that this is not water from the structure.

But now we have a--in order to understand, we have a convection system or diffusion system. So we think that we
have a diffusion one, but we cannot make sure at the present time.

DOMENICO: I couldn't tell from the map. It seems like you're getting pretty close to the German border with those clays.

OUZOUNIAN: In Germany it's salt.

WONG: Ed Cording?

CORDING: I was just--I was interested in whether you have some limitations or agreements regarding the use of the sites, the experimental sites, as potential candidates for the high-level waste. Can they be a candidate site ultimately, or is there a restriction on that--the present test sites?

OUZOUNIAN: No, they cannot be automatically disposal sites, but if experiments are performed, it's having in mind, and this is very clear, to go to disposal.

CORDING: So it could be at that site?

OUZOUNIAN: Yes, it's a possibility.

CORDING: It's a possibility?

OUZOUNIAN: Yes.

BARBER: Well, it's clear that your duty is to find a disposal site. We are trying. We have laboratories in which we make characterization of the site, and we decide either to go to the disposal or to do something else. But potentially, each site can be a disposal of the other.
WONG: Okay. One more, Don.

LANGMUIR: A more specific question about the thermal loading. You listed that as one of the items, one of the characteristics of the waste disposal system that you could adjust or modify, and my understanding is that you're dealing with waste that will be well below 100 degrees or below 100 degrees. And if they've been around for some long time in storage quite a bit below 100, when you look at thermal loading as an option that can be altered, are you speaking only then of the spacing between the waste packages? What other approaches might you make to modifying thermal loading strategies?

OUZOUNIAN: We have three ways of approach about the thermal load. The first one is spacing in depth, but this means a very high cost.

The second one is to space in time. That means that we have to--interim storage room, turn to interim storage in order to gain a lot of thermal load.

And the third way, and I think it's the most difficult, is to make sure that--we not be sensitive to the thermal load. I think this last--this one is the most difficult.

Today what we say is we try to work with a limit at 100 degrees Celsius. If we can manage 150, which I do, but
today we cannot give the demonstration. So all our concepts are derived for 100 degrees with an option to 150, today.

LANGMUIR: How long do you envision the repository to maintain those kind of temperatures? Are we speaking of thousands of years or 100,000 years?

OUZOUNIAN: No, the maximum of the thermal load is given at about 200 years. So, and then we have a very sharp decrease. That means at about 1,000 years, we have no thermal effect, nearly no thermal effect.

WONG: Okay. We will have one more question.

TREICHEL: As I understand it, these communities volunteered to be test sites or to be laboratories for this. If it's determined that one or more of these sites is to be built as a repository, does that community have the right to say no, and if they have the right to do that, is there a cut-off time, a time at which you no longer can vote this thing out?

BARBER: As I said, the site where the community--that's absolutely clear. Now, we are at the point to decide to have two or three laboratories, but it is a procedure which is now underway. In order to decide the site or the number of laboratories, the site themselves, involve the population, and the population at any time is able to say no. This is democracy.

TREICHEL: Even after you've started work?
BARBER: Without starting work.

TREICHEL: Without starting work, okay.

OUZOUNIAN: Yes, an important thing, we think about reversibility, and that also means that at each step of our process, we are able to stop our job if we find any characteristics which is not consistent with the requirements.

TREICHEL: But one of those characteristics wouldn't be refusal of the population?

OUZOUNIAN: For example, if we have water flex, much more important that--that what we vote before mining it. So at that time, we have a plan to stop our jobs and to close the system and to--how to say--to--

TREICHEL: Abandon the site is what they--

OUZOUNIAN: Abandon the site. Thank you.

TREICHEL: Thank you.

WONG: All right, with that, I wish to thank--

MCGOWAN: Point.

WONG: Okay. Real quick.

MCGOWAN: Very succinct. First of all, welcome to the United States, Pahrump. And I have a quick two-part question.

a) It is my understanding, and correct me if I'm wrong, that approximately 80 per cent of your electrical energy is produced by nuclear power, and the assumption,
obviously, would be that 80 per cent of your population, or
thereabouts might be well nuclear power and pro your method
of disposal.

Now, the second question is a little bit more
pointed, and actually it's directed to anyone in this
assembly. When and where will the next earthquake occur,
either in France or anywhere on the planet, and if we don't
know when and where, how can we tell when and where it won't?

Thank you.

OUZOUNIAN: About the production of--the nuclear
production in France. So what we do--what we have to do is
take account of the possibilities for our design. So today,
the nuclear production, the electricity from nuclear
production is about 73 per cent, and we keep as a hypothesis
that this will be the case for the 50 or 70 years to come.

But this is, what we say--this is a maximum case we have to
take into account in order to design our case. So, but this
is independent from the policy--from the policy of energy.

About the second question, about the seismic.

Okay, so one of the main requirements about our site
selection is to make sure that we have--we are on sites where
there is no seismicity.

So the first thing we have to do, and we did, was
to reconsider the historical seismicity to make sure that the
zones where we are working did not know seismicity by the
past, and then where we have--with the identification of all
the faults and detection of the faults in order to see where
the faults did work and where they are around the site. But
we are very far from the seismic systems, or far enough.

WONG: Pierre, Gerald, thank you very much. Thank you.

You'll notice I wasn't clapping.

Our next speaker will be Dr. Abe Van Luik. He's a
technical manager for performance assessment, U.S. DOE. Abe
will talk about what the DOE's doing to increase the openness
for the TSPA/VA. Abe has spoken before the Board a number of
times on the subject of performance assessment, and again, we
look forward to hearing his thoughts on the question of
traceability and transparency in that effort.

VAN LUIK: I must say that I learned something this
morning. I will get a copy of the report that you reference
on risk and read it. And the French program I think has been
very good in setting an example for us in the way that they
treat their biosphere. I'm very impressed with your
cooperative work with the Spanish, for example, where you
have selected a couple of bonding cases, analyzed them and
really answered the problem of, you know, you have an
infinite variety of futures, and you've got a good handle on
that somewhere.

So we do watch your program, and we're impressed
with some of your work, and hopefully that goes both ways.
As far as the NRC talk, I'm kind of glad to be following it because it makes my talk easier. As I said, I'm Abe Van Luik. Here's my phone number.

But what I wanted to say is from having been on this program in various capacities since 1982 in various aspects of the program, it's very heartening to me to see that after Integrated Performance Assessment I and Integrated Performance Assessment II, and you may hold this against me, but especially after the Center came on Board and provided a good basis of expertise, the Nuclear Regulatory Commission, from my experience, has become a lot more understanding and reasonable in their expectations of us.

So I will applaud the fact that they are duplicating our efforts and really working at understanding what we're doing.

You'll be pleased that I define traceability, and I base my definition on our work in the Performance Assessment Advisory Group that John has also made mention to. It's a subgroup of the PAAG, the Performance Assessment Advisory Group of the Nuclear Energy Agency where it published performance assessments. If yours isn't published, it didn't make it.

And two of them were addressing Yucca Mountain, one by DOE and one by the NRC. And this is not a criticism of just the DOE and the NRC, but across the board, the subgroup
1 noted problems in clarity, readability and completeness, and
2 by completeness they didn't mean, you know, the universe as
3 described. By completeness they meant that here's a result,
4 can you backtrack how that result came to be? And they call
5 that traceability and transparency.

6 As a member of the subgroup, we wrestled with these
7 definitions, and we decided that traceability is a complete
8 and unambiguous record of decisions and assumptions and of
9 models and data and their use in arriving at results. In
10 other words, how did you get to this result you're showing
11 me? Can I backtrack and look at all your assumptions?
12
13 Transparency, what is it? Well, we decided that
14 that is giving the reader or reviewer a clear picture of what
15 was done, what the outcome was and why, and it's in the "why"
16 part I think that we--as John Austin's people have noted,
17 that we have some failures.

18 Transparency is audience-dependent. What's
19 transparent to a regulatory reviewer or an independent
20 performance assessment team may not be transparent to a
21 member of the public, and the PAAG group said, but it
22 couldn't fit on here, and vice versa. Sometimes the public
23 has insights that we, as specialists, completely gloss over
24 because we have made assumptions that we learned about in
25 school, and they may not fit the situation at hand.

26 The purpose of the reading itself, you know, if I
read their document to understand one thing or another thing, the transparency could change. If I'm reading to understand a conceptual model, that's very different from reading to repeat an analysis.

Okay. We've got it defined. How do you get there, and this is the type of wording that makes for adult presentation, so I'll try to make it fast. You achieve traceability through documenting, explaining all the decisions made as part of the analysis. If you do an analysis, you see that every step of an analysis is in essence a decision. You've got to document what you did.

The PAAG subgroup insisted on putting this bullet into recommendations, and I make no apologies for it, but they thought that aspects of traceabilities could even be proceduralized to be given a quality assurance pedigree to be audited and surveyed, and they thought that this would help. Traceability and documentation is achieved if an independent performance assessment group can reproduce reported analyses, and what you heard from John in his talk is that there were some problems there. But it was also recognized that for—especially for a license application safety analysis, you may need to write supporting technical documents to allow independent reproduction of analyses for certain types of higher level total system analysis documents. In other words, sometimes the analysis is so big
that you just can't contain everything in one volume and still have it useful.

Transparency is addressed through ensuring completeness and using a logical structure. And, you know, this is where if somebody can follow it from beginning to end--I think John hinted at this a couple of times--to facilitate the in-depth review of specific issues.

This was an interesting observation on their part because when I read TSPA-95, I thought this is a good read. When I read it to answer their questions, and they had a list of hundreds of questions to be answered, it was a very difficult read because when you look at one specific technical subject, like the NRC was doing, you have to go to different places in the document to pick up different pieces where it was used in the analysis. The analyst writes according to what they did.

And so if you're just interested in an uncertainty analysis, there's plenty in TSPA-95 in uncertainty analysis, that you have to go through every chapter and look at the uncertainty section in that analysis.

And so, you know, there are aspects of the writing that need to take into consideration what the needs of the readers are. I won't go through this checklist. Any group that sits down and writes a checklist like this to address the completeness would come up with a different list.
Let me go to our experience with our own work. In TSPA-1991, an evaluation by the DOE, specifically Yucca Mountain. In 1993, in order to basically benchmark the code that would be used in TSPA-95, we in the M&O looked at the 1991 TSPA document by Sandia National Laboratories and tried to reproduce that assessment using this different code. Of course, there were some conceptual model differences, other differences, but by and large, the traceability was very good because it took just minimum clarification from Sandia on some of their assumptions.

So from our perspective—now, again, this is speaking as performance assessment specialists, not as interested lay public or even the regulator, the traceability in that document was quite good.

This also, however, pointed out a problem with this definition of traceability. We could reproduce the results; however, the linkage of this model into the database and to the process level modeling was just not there yet. And we tried to do better in '95, and you've already heard from the NRC that we didn't do quite as well as we had hoped, but we're making progress. You did say that, yes.

If we look at TSPA-1993, the experience gets real personal because I tried to write a unified TSPA-93 document, and I did write it, but it was overtaken by events. By the time we finished it, we were well into TSPA-95, and the
analyses and the results were looking different enough that it really didn't make sense to continue this. But I tried to create a single transparent document using these two documents. We had two independent analyses in TSPA-93. And my experience writing that document was this: My overriding goal for the unified document, since we had the technical documents that each person could go to, was to write a transparent document for an audience that extended well beyond the regulatory and performance assessment community.

So I started out giving basically a primer on performance assessment, the nature of them, scientific terms and concepts that are specific to Yucca Mountain, talking a little bit about the nature of unsaturated zone hydrology, et cetera, and then I reviewed the results of 12--there has been a lot, and in fact my criticism that I got from some people is that I didn't include theirs. But I looked at 12 pre-1993 Yucca Mountain specific system performance assessments that have been published and gave short overviews of what their approaches were and what they learned.

Then I went to traceability, and one of the reasons that I had to look at traceability is because I wanted to--like, for example, for the waste package degradation, I wanted to have one section that basically included the approaches from both, and I found that I had to write an A
1 and a B section a lot of times because the conceptual models, 2 the--I mean, each document was a very good document, but the 3 approaches to even a subpart of the analysis were different 4 enough that I could not just create one table and say this 5 was the common data set and the common assumptions that were 6 used.

So the comparisons that I was making in this 8 unified document were less clear and effective because of 9 that, and I don't see any way around that except to only 10 write one document and make it completely transparent and 11 traceable.

Moving on to TSPA-95, our third project-wide 13 evaluation, we did attempt to make it traceable and 14 transparent, but experience on several fronts, and you've 15 already heard from the NRC, showed that improvements are 16 still needed, and I'll talk about these in some detail.

We had an excellent independent review from a 18 Sandia expert. He happened to be the primary author, or the 19 first author, of TSPA-93, and he pointed out several 20 weaknesses, which I'll get into in a second. And then we did 21 have the audit review, and you have already heard everything 22 that you need to know about that.

This is not in your package, but at the request of 24 one of your staff, I get into some details. The Sandia pre- 25 publication TSPA-95 found four potential errors in the
documents, and this was pre-publication, so most of these were corrected. Four major disconnects in the documentation that needed at least acknowledgement, if not explanation. In other words, here was an expert reading a document, and as he was reading, he hit a place where he just couldn't figure out what we were trying to say. And then 63 places where clarifications were needed of a less important order; 22 places identified were statements that we thought were obvious were potentially misleading, it could be read either way; 34 places where editorial changes could improve clarity. And like I said, most of these comments were addressed prior to publication.

Had we not done this review, John Austin's talk would have been twice as long.

John has already covered this, but I wanted to highlight that they put out an annual report, and I didn't get the title exactly right because I did this in the middle of the night. But it's new Reg CR 6513 No. 1, just came out last week, a very fine document, and Chapter 8 gives an overview of their TSPA-95 audit review.

Concerning technical differences, they noted that most were clarified--not that they were resolved, but clarified during the technical exchange and in some cases resolved. This is an indication that the document of itself was not sufficient to let them know enough that they knew
exactly what the issue was.

That same page also notes that, for example, why didn't TSPA-95 look at disruptive events like was done in 1991 and 1993. They thought that just a statement that it didn't wasn't satisfying to them, and I would agree with that.

Pages 8 through--4 through 8 through show several instances, and I think John has already mentioned what they were, where the independent NRC calculations called into question our work and led to specific comments and recommendations from the NRC to us. And in four of these cases, the NRC staff commented that they noted with some satisfaction that we acknowledged receiving those comments and that we had planned to address their comments in the TSPA/VA.

So we see this audit review as a very valuable preparatory thing for the TSPA/VA, and we hope for the same kind of interaction to get us to the LA.

Several non-DOE readers, and I just picked two that were federal agency people to whom we have to pay some attention--I didn't want to identify the agency because that gives it all away. But one of them noted that there was no derivation or justification for the treatment of galvanic coupling in TSPA-95. We cited only a personal communication, and, you know, we know that there's a need to quantify this
process in future TSPAs. But to our credit I must say that it's because we did not have a firmer basis that we included this as a sensitivity study only and did not include this process in our base case. TSPA-90--I mean TSPA-98--TSPA/VA is what I meant to say, will, of course, show a basis for this process.

And another federal employee, and this one is more serious because in his conversations with me he used that three-letter word L-I-E, but he challenged my characterizing the saturated zone transport as being confined to a five kilometer distance and a 50-meter miracle mixing depth that's been referred to before. He said, no, that is not true. That's putting it nicely. It was unconstrained vertically and carried beyond five kilometer, and he cited 7.6 in TSPA-95.

I went back and reread 7.6, and it's clearly, knowing the document somewhat, clearly a sensitivity study addressing the importance of mixing depth to transport. In other words, it was a "what if;" you know, "What if it's this, what if it's that, and what if we go out a lot further." It was not part of the base case for any dose plots in TSPA-95. However, I must say it was identified as a sensitivity study on mixing depth in the middle of the section. If you just missed one little line, you would be totally confused, as this person was.
So these are good reminders of why we should use external reviewers and at least people not external to DOE, but when we prepare these documents, use reviewers outside of the PA community.

I'll skip the next one because I just said everything in there.

So what are we doing about it? Well, one thing that is striking fear into the hearts of some of our analysts is that the M&O has procured an attorney experienced in adjudicatory licensing processes, and he loves to ask--take each analyst and ask probing questions to teach the how to think--and this is important, how to think and write to anticipate the information needs of regulatory and other critical reviewers.

We have a major multi-tiered effort in progress involving the review of the process-level modeling inputs to TSPA. In fact, we have just established a peer review group that their first meeting is soon, and this group will be a long-term participatory peer review, ending with the document being in their hands to go into a classical peer review.

And the main thing that we want to learn from these people is what do we need to do differently in the LA. The LA, license application, is the primary focus in the long term. The VA is a step along that way.

We have a formal expert elicitation underway
addressing the site-scale unsaturated zone flow model, which we believe was the most important of the foundational process-level models. Other elicitations are planned, and, in fact, another one has just been kicked off on the--I believe it's the waste package degradation.

Okay. And what we hope to get from these is some concept of the bounds on the uncertainties and the identification of the uncertainties in the modeling.

And then we have a series of 11 internal process model abstraction and testing workshops in progress to address exactly the thing that John pointed up, is that in the--for example, in the saturated zone, we used the model that didn't seem to be clearly linked to the data in the process level modeling. These are in process and are trying to do exactly that as input to the TSPA/VA.

A few more words, identifying uncertainties, identifying available data and information, its status, identifying areas of potential weakness, and we will report those areas in the TSPA/VA, identifying areas of strength in which work is essentially done supporting an aspect of the modeling.

We are looking, in other words, with these two at a realistic status of what we know and what we need to know.

In terms of transparency, we continue to participate in the Performance Assessment Advisory Group, who
1 is looking at this exact issue from a larger experience base. The NRC is also a participant in this group, and we have other national regulatory authorities. In fact, the French regulatory ambassador to this group is a very reasonable person, and we don't envy you because we have very reasonable persons, also. But it's interesting to see the parallel thinking that is going on in the different nations who are struggling with these same issues.

And this initiative that I'm talking about here is one that I'm just kicking off. In fact, I've invited someone in to speak to me and probably to my bosses about looking at ways of presenting TSPA results in a more transparent and graphical fashion, largely for the non-performance assessment specialist. It's very difficult to get used to complimentary accumulative distribution functions as a way to look at the world. Once you have done it, you don't want to step away into anything else, but I realize that there's a big learning curve for anyone not familiar with the concept.

Let me go to my conclusion--no, I'll just do this: Other things, we have a lot of little things that may be important to transparency and traceability. For example, we're looking at the use of hypertexting in the TSPA/VA document to make it easier for the regulatory reviewer to click on a reference and go right directly to that reference rather than to have to wait two weeks to get the reference.
and forget what the question was. And I would like to follow my presentation with a demonstration of that that's canned and ready to go and be very short.

Another system that we're looking at within the performance assessment community, to then move into the general database framework for the project, is one to help trace the decisions that go into selecting data from a database. So with your indulgence, after I stop talking and maybe after the questions, we could have those two demonstrations.

For conclusions, I personally, since this is a big ticket item for me, appreciate the reminder from the Board that we need to focus attention on creating a TSPA/VA in anticipation of the TSPA/LA that's both traceable and transparent. We feel that we already were heightening our awareness of this issue because of the increased scrutiny from the NRC staff, which strangely enough we do welcome, the increasing national awareness of an attention to the need for quality and performance assessment documentation, and this is coming about because we have participants in these international forums that have gone through licensing, intermediate level waste sites, for example, in Finland, and so there is an experienced body in these bodies about how you're going to be asked questions and how you need to prepare for that. And, of course, looking at other TSPAs
than our own, we are always learning.

And finally, and this is a big item, the experience of DOE's Waste Isolation Pilot project, as it enters its licensing process, has sounded a warning to us in this project. We do converse with those people, and they have said that they had to do a major effort unplanned, and they said it was difficult to exaggerate the manpower that went into that effort to recapturing and documenting the basis for numerous small assumptions and decisions that played a role in describing the site and evaluating its performance. And we will continue to monitor their experience and learn from it.

They were participants with us in our latest abstraction workshop and said things like, "If only we had done that, it would have saved us a lot of grief in writing our application to the EPA and answering their questions."

So I believe, you know, we're doing something right. It's painful. It's resource intensive, but I think we are addressing traceability and transparency.

And please allow time for my two demos.

WONG: Sure. So would you like to do the demo first or entertain questions?

VAN LUIK: Well, maybe we should entertain questions first.

WONG: Okay. Questions from the Board? Don Langmuir?
LANGMUIR: I think we've come to believe and have confidence that by and large, as we wished it to be, TSPA is the driver for the selection of priorities within this program. I wonder, though, if it's--let me ask you a very specific question: The Board has been concerned about DOE's understanding of the hydrologic properties of the repository block in total, and I wonder if TSPA was used as a basis for concluding you did not have to have an east/west crossing. How much uncertainty can you attach to not knowing the information you would gain from such a crossing, and is that uncertainty within the TSPA analysis?

VAN LUIK: That specific issue, if you've read TSPA-95 and our subsequent work, was not addressed at the TSPA level. However, it was addressed in the process level model, the site scale model, and the result of that assessment was that there was a recommendation that, you know, as soon as we could get to it, we need an additional hole in the west side of the mountain. But to obtain data, you know, just basically to verify the predictions for that side of the mountain, there was not a conclusion that we had to drill a huge hole through the mountain to get to that little spot.

LANGMUIR: How about a little hole?

VAN LUIK: Well, being a large person, I think a little hole would not help me. But from the process level modeling point of view, this has been addressed, and I think, you
1 know, in Dennis' presentation later in this meeting, you can
2 ask that question again.
3     WONG: Ed Cording?
4     CORDING: It does seem--the transparency really goes
5 down, it goes in several levels, and it seems to me that a
6 good program ultimately is something that is understandable
7 and can be explained to people. But I think also there's
8 the--the transparency is very much needed among the technical
9 people as well, as you pointed out, the people that don't
10 understand perhaps the--as much about performance assessments
11 as those that are expert. But it's also, you know, a means
12 of the people involved in the various portions of the
13 discipline to be able to--the people on the hydrologic side
14 to be able to come back in and say--to look for weaknesses in
15 the TSPA and how it fits with their models.
16     And I think that being able to relate to some
17 determinate type models, bounding sorts of things, an
18 overview of a waste strategy, of an isolation strategy, if
19 you can compare those things with your TSPA, it seems to me
20 to be extremely important.
21     And I think your talk has been pointing in that
22 direction, and I just wanted to see if you're--if what we're
23 saying here is on track.
24     VAN LUIK: In fact, the issue you bring up about
25 understandability, when I was talking about CCDFs and how
opaque they are until you really get to know them and love
them, one of the things that we have learned and was
recommended to us by the Performance Assessment Advisory
Group, looking at 10 different performance assessments, even
if you do a fully probabilistic analysis as we are doing, you
buy a lot by doing a few deterministic cases that bound the
problem, that show the expected value because people, even
scientists, do not think probabilistically. They need to be
shown, you know, if everything is what we think it is, this
is kind of what the answer is, and then you can talk about
the uncertainty bound. So we are learning and listening.
CORDING: The very problem of--the very thing that
you're trying to do at TSPA is bringing things together, is
part of the reason it's very hard to determine what's--and I
think it's a tremendous effort that really I don't think very
many people in this field have ever had to deal with before
to this extent.
VAN LUIK: I agree.
WONG: Further questions from the Board? How about
Board staff?
Okay. Entertain questions from the community?
MICHAELS: Yeah, I have a question--a comment and a
question. Transparency should apply not--my name is Gordon
Michaels. I'm from Oak Ridge National Lab, a member of the
public. We're not involved in the program.
Transparency should apply not only to the calculations that you do, but to the answers that you predict. And as I've gone through the total system performance assessment, I am struck by the fact that the answers that you provide are given as a fraction of the EPA dose limit, and as a matter of fact, it's a dose limit that's been disestablished and was disestablished at the time that the report came out.

And as I apply EPA dose conversion factors on the regular nuclide specific basis to your projections, I come up with several hundred fatalities as the health impact. Now, the TSPA is the only probabilistic risk assessment I've seen personally published by DOE that does not list health impacts; you know, fatalities, cancer incidents, genetic effects. I can't calculate from your results what the cancer incidents rate is and what the genetic effects might be. Would you comment on why you don't give health effects and whether you're going to be doing that in your next iteration?

VAN LUIK: Okay. I'll be happy to comment on that. The EPA standard, as it was promulgated in 1985 did all that work for us to take the uncertainties out of the licensing process. In other words, they set a standard of what the allowable health effects would be from this repository, and then back calculated using a generic
conceptual model what the releases should be, and that's the EPA limit that you're looking at. They did that specifically to take that out of the licensing arena.

And what we are looking at now is for them to do that same type of homework and calculate instead--instead of us going completely to risk and having all of these variables open in the licensing procedure, I believe that they are moving towards, and I'm not sure yet, at least during the calculation from risk back to dose and giving us a dose standard. And I think we will show exactly that is the dose standard. We will not try to second guess mother nature and go into, you know, different age groups and all the health effects that it could probably have. I realize that there's expertise out there to do that.

MICHAELS: Yeah, I guess my comment--and the reason I brought it up as part of transparency is the document seems designed to satisfy a regulatory audience, but not a public audience. And for the public, the public wants to know what are the health impacts of the repository, and it just seems that from the point of view of making it transparent and in trying to gather public acceptance, that you're missing that last step that interprets the information in a way that people can understand it.

I personally don't think that a couple hundred fatalities over a 10,000-year period given 70,000 metric tons
of spent fuel is a very large number. I'm comfortable with that number, but others might not be. And it seems like if you're, you know, on a session on transparency, the interpretation into publicly understandable figures of merit is--you know, should be an open question here.

VAN LUIK: Yes, I think I understand the comment. In 1992 we published a risk assessment that went to fatalities in fact, but decided that given the regulatory environment we're working in, that's not really necessary. My management and I will take this under advisement.

MCGOWAN: Tom McGowan, Dr. Van Luik. Excellent presentation. I am a member of the genuine public unaffiliated with anybody or NL, or whatever. And I concur with Dr. Michaels except for one point. I'm fully in favor of someone being impacted in the future as long as it's not one of my direct descendants. Yours is all right.

I have a two-part question. How does the strategy referenced in the first bullet under Arabic 1 transparency differ substantially from the realistic strategy of coaching the witness? And why is the public as external to DOE, and certainly the public is DOE's paymaster I recall, excluded from the transparency or review process when the public is the ultimate receptor you're attempting to persuade? If I am mistaken, please on the public record, so indicate in real time. Thank you.
VAN LUIK: I'm not sure what your first question refers to. Oh, the attorney. Oh, yeah, the attorney, we are fully aware that where the rubber meets the road is in the regulatory licensing process, which is an adjudicatory process, as we've heard before, and adjudicatory processes tend to probe very deeply into the basis for assumptions, et cetera, et cetera, and we are trying to use the attorney to prepare us to think in that mode. That's only one aspect of traceability and transparency.

MCGOWAN: I fully appreciate your understanding as you presented it. I would qualify it solely as follows, if you don't mind: We are apparently on a learning curve. This has been referred to as a historically unprecedented process anywhere in this history in mankind, and attorneys, like the rest of us, educated or otherwise, have an opportunity, as the saying, everybody gets one mulligan. I would prefer to see an attorney cope and come up with his solution rather than be managed to any extent in how to think. We assume he must know something about how to think or he wouldn't be an attorney.

VAN LUIK: Well, I think, you know, this is an interesting thing, but we see attorneys as part of the human race.

MCGOWAN: It's just a question of the--it's really a question of the efficacy of management because it's just one
1 step from there--

2   VAN LUIK: Yes.

3   MCGOWAN: Do you follow what I'm saying? We have to let
4   some of these things happen even if they're wrong.

5   VAN LUIK: Right.

6   MCGOWAN: And then determine--

7   VAN LUIK: Let me get to the second part of your
8   question.

9   The performance assessment that we will produce for
10  the VA with some augmentation will show up in the
11  Environmental Impact Statement. There the public is invited
12  to comment, you know, to their heart's content. And so there
13  is an avenue for public participation in this process. It's
14  the avenue set by law.

15   MCGOWAN: We can describe that a little bit more fully, if
16  you don't mind, as ex post facto non real time
17  participation. It is not at the predecisional stage by any
18  means. DOE is required by law to consider public commentary,
19  but not necessarily mandated to include it. That's entirely
20  a matter of discretion. They do not have to incorporate it
21  in anything they're doing unless it furthers their position,
22  and that's probably what they would do.

23   And so thank you very, very much for your succinct
24  response. I feel much closer and have better understanding
25  of the entire issue at this point. I don't think it could
have been achieved any other way. Thank you.

COHON: I just wanted to add one point. I agree with Mr. McGowan about the--or let me--I do agree with him, but let me convey this in a different way.

I had a similar reaction to your bullet about the attorney. I think it's a good thing that you hired the attorney to coach you, to work with you, thinking about what you will face when you get to that point with NRC. But sitting here reading that, I was wondering--and I kind of flipped ahead looking at other bullets looking for the investment in public participation, and it wasn't there.

So it invites this kind of reaction. There's nothing wrong with attorneys. In fact, you need them. But where's the proactive approach?

VAN LUIK: Well, yeah, my view is that in the draft EIS, you will see the TSPA in full glory, and it will go out to thousands.

COHON: Abe--

VAN LUIK: Yes.

COHON: --let me now appeal back to Dr. Stern's talk. The principal--the kernel of their idea, which is a very powerful one, is that to gain public confidence, you have to involve the public early and often and substantively.

VAN LUIK: I committed to read the document, yes.

COHON: The EIS is the end of the process after you're
done. You're not going to gain public confidence with that. So by saying the public can be involved as much as they want at that stage is really not being responsive, and it's getting you--it leads you exactly on the linear path. In fact, how is it linear? But the length of that linear line is incredibly long, and I would propose that the longer that line is, the harder it is to get the public in.

WONG: Dan Metlay?
METLAY: I don't have anything further to say.
WONG: Well, Abe, you had a demonstration for us?
VAN LUIK: Yes.
WONG: Can it be done in four seconds?
VAN LUIK: No, about five minutes for one and six minutes for the other. Okay, too long? Okay, after the next speaker, that would be fine. That would be fine.
WONG: All right. So we had a vote up here, and Abe will be brought back to complete a presentation.

All right. The next speaker is Judy Treichel, Executive Director for the Nevada Nuclear Waste Task Force. Judy has been following the Yucca Mountain program as a concerned citizen for many years. She has often spoken to the Board from the floor during the public comment session. We've asked her to participate, to present her views as an interested member of the public who has invested considerable time trying to understand the key technical issues and
analysis of the Yucca Mountain project. Judy?

TREICHEL: My presentations are always a little
different because I can't afford transparencies, and I also
like when I can just talk off the cuff. But with a subject
like this, I think I better read what I put down so that I
don't get it wrong and I don't miss anything.

Firstoff, I am here for the Nevada Nuclear Waste
Task Force. We are a non-profit Nevada corporation and have
been working for about 10 years to promote public involvement
in this program, to provide avenues for the public to
interact either through putting on debates, forums,
encouraging people to file comments and answering an awful
lot of questions. Most of what we do is on the phone, and
it's answering every wide range of question. So for the new
Board members, that's a little bit about who we are.

The civilian radioactive waste management program
plan, which is this document, it was published in May of
1996, and it defines the objective of a TSPA as the
evaluation of the probable behavior of the potential
repository. More specifically, it refines performance
evaluation by considering both normal and disrupted
conditions from events such as earthquakes and volcanism.
Additionally, it makes predictions about performance by
considering the levels of uncertainty in key areas, such as
groundwater flow, thermal effects, corrosion, et cetera.
But it's important to note that when members of the general public hear the word repository, they think only in terms of the natural site.

At the beginning of site characterization at Yucca Mountain--some of you are old enough or have enough stamina to be here since the beginning. Many public meetings were held, and there was a lot of media attention given to this project in an effort to inform the community about what the program was and what was going to happen out at Yucca Mountain. People were told repeatedly that Yucca Mountain would be the most intensely studied real estate in the world, and that "If it can't meet the regulations, those that were in existence and still are, or if it doesn't fit the requirements of the guidelines, we'll walk away."

Specific statements were made such as "If it's found that the groundwater can travel to the accessible environment in less than a thousand years, if it's 999 years, we abandon the site." And that was why I made that statement when I was at the microphone before. We heard a lot about abandoning the site.

The public was led to believe, both in face-to-face meetings with the project officials and through many media reports, that Yucca Mountain could and would be disqualified as a repository site if any one of the qualifying conditions could not be met or if any one of the disqualifiers was
there. Never was it mentioned during that time of frequently held public meetings and updates that disqualifiers could be fixed or mitigated or averaged against other factors.

So the existing public conception of what this project is about and how it's conducted is not the result of misunderstandings or being misinformed or the result of uneducated deductions. It comes from clearly stated information that the Department of Energy widely disseminated for many years, and then to graduate from that originally stated definition of site characterization to the current plan for a total system performance assessment as seen by an already skeptical community as a double cross. It directly feeds into the long existing public distrust and lack of confidence, both in the Yucca Mountain project and also in DOE itself.

In fact, this change in site evaluation was mentioned at a recent public hearing on the guidelines changes, and the commentary said that we were led to believe that if the site flunked earthquakes, it would fail. She was saying that probably TSPA was more in line for a high school student than it was for a repository evaluation, that we had always thought that if it flunked earthquakes or flunked some other important thing, it would fail. But now we find it can pass in other engineering areas and wind up with a passing grade point average, and it will graduate.
This can be tolerated with high school or college students. They may turn out to be lousy employees, but they won't be a real threat to society. Not so with the nuclear waste repository.

In the case of TSPA versus the existing guidelines, there seems to be a weird sort of circular and flawed logic in play. A revision of the guidelines leads to doing a TSPA, and TSPA then requires a change in the guidelines. And this sort of thing has been going around in a circle as we've listened to the rationale for the guidelines change.

All that I've said so far is to explain that here in Nevada, and elsewhere I'm sure, the public feels deceived and manipulated. They express angry opposition and adamant disapproval about this project, not because they don't understand, but because they understand very well what's happening and what's continuing to happen.

So as to the subject of this session of the meeting, the transparency of TSPA-1997, it's not difficult to explain in layman's terms what a TSPA is and what it's for. It's a document that describes the ability of Yucca Mountain with a lot of engineering assistance to contain high-level nuclear waste through predictions made by computer models. But you wouldn't know that from reading all or part of any of the previous TSPAs.

The 1996 program plan states that TSPA will
evaluate the possible range of performance caused by uncertainty. I think this is another weird statement or an application of weird logic. Performance is what it's going to be. What varies are the predictions about the performance due to the huge range of uncertainty in understanding the natural conditions at Yucca Mountain. And it is the uncertainty factor that's made the previous TSPAs so difficult to decipher. The document that was produced in 1995 is so muddled and mired down in the consideration of and attempts to bound uncertainties, that it's really quite incomprehensible.

Considering the level of uncertainty that existed when that document was published, the whole exercise was premature. It may well be that it's premature to prepare a TSPA in 1997. In any case, it could be understandable to both the technical experts and the public if a clear description was given about the known conditions at Yucca Mountain from verified data collection, and then the uncertainties can be described and a range of predictions can be made with the computer models. But the results will not and should not be accepted by the public or the experts as reliable rationale for confidence. They are guesses, no more and no less.

If, as the 1996 program plan states, an important objective of performance assessment modeling is to identify
the significance of the current uncertainty in processes, models and parameters, then the TSPA can be useful. But for it to be of value, it must be used to understand what is not known rather than as a basis for confidence in predictions of repository performance. The TSPA should be a tool and not a product. However, just the opposite is occurring.

The Technical Review Board, this Board, has been saying since it came into existence that DOE should be using performance assessment to help guide decisions on what site characterization work needs to be done in order to replace the uncertainty. The Department has begun work on a viability assessment that will be completed in 1998. The center piece of that is the TSPA-1997. Many of us fear that the viability assessment will be misinterpreted and misused as a site suitability document, and that's--that's come up here, and that phrase has been used.

It will consist of four parts. There's the repository and waste package design, license application plan, repository cost and schedule, estimates and the TSPA. The TSPA will probably dictate part of the design decisions, as well as cost and schedule determinations. And in addition, it could become the part of the viability assessment that provides the illusion that there's enough reliable data in existence to determine suitability.

So the necessity for TSPA to be transparent, and
especially to be put into its proper context, is not only important for the public audience, but even more so for the decision makers. If, in fact, it becomes a product rather than a tool, it will not just circumvent and conceal the need to do additional vital scientific investigation at the site, but it will also provide the ultimate seal of approval.

In the case of the student who failed some important classes, but manages to slip through with a barely passing grade point average, that graduate can be trained later on the job or most likely will wind up taking work that's less demanding and has less responsibility.

Similarly, we're used to accepting engineering fixes and even failures. We can all think of things that "just never worked out or turned out the way that we thought that they would."

The world is full of examples, and, unfortunately, there are many such examples in existing DOE waste sites that are now clean-up sites.

This project promised to be a departure from that, and, in fact, as we all know, the model for this one is do it right the first time.

Concerned citizens have believed for a long time that the program at Yucca Mountain is geared toward and aimed at building repository rather than conducting a research product. The way in which this TSPA is done and written can make or break that argument. If it's written properly so
that it is understandable with clear descriptions of the
areas and levels of uncertainty, it will both show the public
and the decision makers where the next site--next steps in
site characterization should be.

However, if the uncertainties are disguised as
manageable weaknesses that result in layers of assumption
that ultimately create the illusion of confidence and
accuracy, it will be the same as the previous TSPAs. It
won't be understandable or transparent, and it will cancel
necessary site characterization and prove that the skeptics
are right.

My assignment was to talk about TSPA, and there are
other sessions that are going to deal with repository siting
guidelines, but I find it impossible to talk about those two
topics separately, especially now when the guidelines are
proposed to be abandoned in favor of TSPA.

According to the Nuclear Waste Policy Act, there
should be strict guidelines, probably even more restrictive
than the current ones. A continuing series of TSPAs would
then be done to enable both the decision makers and the
public to see if new data showed that the guidelines could be
met. It's likely that with the new streamline program, this
could be the final TSPA, and it alone would serve to
determine site suitability and/or license ability, which
would violate the intent of the Act.
In the conclusion of the 1995 TSPA, there's a discussion of eight significant questions regarding the flux and flow of water through the engineered and natural barriers of Yucca Mountain and resulting release of radionuclides to the environment and to individuals who may extract water from the aquifer. It ends by saying, "Information on the distribution, the amount and rate of water movement through the various scales relevant to the prediction of post-closure performance remains the key need to enhance the representativeness of future iterations of TSPA."

Since this document was completed, we've learned that water moves through the mountain to the repository level much faster than was ever predicted when it was written. There's no doubt that a few years from now many of the assumptions used in TSPA-1997 will have to be changed.

A major remaining unknown, due to lack of data, is what will be the acceptable thermal load. The current deception has little to do with the waste isolation capability. It is instead based on repository capacity needs. This uncertainty won't be made clear in TSPA-1997. It must be clearly understandable to people that big changes in predicted performance may be made in the future, and this is part and parcel of being transparent.

Thank you.

WONG: Thank you. Questions from the Board? Jared
COHON: Thank you for your presentation. I found it very valuable and thought provoking.

It seems to me that there's an essential fundamental question, one that I'd like to focus on to see if we could get you to say something about.

It cannot be avoided that a decision about suitability will have to be made without all of the information anybody would like to have to make that decision; that is, it's in the nature of this problem that we will never have sufficient data to be absolutely confident or absolutely certain about the outcome. This is a classic case of decision making under risk, and that can't be changed unless, of course, we waited 10,000 years to make the decision.

That being the case, I wonder if you could see yourself being comfortable with a bigger role for TSPA than the one that you circumscribed for it; that is, TSPA is a tool which--that I completely agree with, I think that's exactly right--but more than just a tool to identify what we don't know, but rather as a tool to quantify our level of confidence, which I think one could claim is kind of the flip side of quantifying what you don't know. Do you see my point?

TREICHEL: Yes.
COHON: And could you see yourself, given all that you know about this project and all that you've been through with it, could you see yourself accepting that role for TSPA?

TREICHEL: Speaking in terms of just being a part of Nevada's residence, part of the community, no, I don't think so because you've got special problems with this situation, and that's why it was so interesting to listen to the French representatives here. You've got a population that did not volunteer, a population that doesn't have a compelling need to see nuclear waste go in the ground. You've got a situation where--and I was interested in hearing the presentation on risk where the problem hasn't even been defined.

And I don't--I'm not buying this sense of urgency. I'm not saying that you leave it sitting in a pool for 10,000 years, but an awful lot has happened in the last 50 and 100 years, and when the suggestion was made about making a video or a story board, this would be the stuff in probably 20 years of the atomic cafe or the AEC training films that we watch now, and, you know, think how could they have possibly thought--there's so much in this that's changing, and it's relatively new, and it's incredibly important.

So when you look at--you've got 50 years really of investment and experience in this technology, and you're looking out 10,000 years to take your best shot. People here
1 will not buy that.
2     COHON: Thanks.
3     WONG: Other questions from the Board? Questions from Board staff?
4     TREICHEL: I knocked them out.
5     WONG: Questions from the community?
6     Thank you, Judy.
7     WONG: We promised Abe time to complete his presentation, and so, Abe, I would like you to complete it.
8     VAN LUIK: We will hear from Claudia Newberry at the DOE first, and after that we will hear from Rally Barnard of the performance assessment staff at Sandia National Laboratory. And, Rally, you will need a microphone before you speak.
9     This was Abe Van Luik.
10    NEWBERY: Okay. Well, I'll start. Some of you may know me as the person who coordinates meetings with the NWTRB staff, but I have a real job, too, and this is part of it.
11    About a year ago our project manager came to me, and he said he wanted to know where all the data was on the program, and I said it was transparent to me. It was in these big notebooks. We had a listing of it. And he said, "No, that's not what I mean, and it's not transparent."
12    So this is the table of contents that I've developed, or had people develop for him, to try and find out where all the data on the program was. And about three or
four months ago, we did kind of a right-angle turn and said, you know, this is a great idea for how to put together information for a license application, and TSPA is part of that. Let's take a look at how we can use Web technology, the stuff that everybody surfs the Net on, and you stick your CD ROM in your computer and look at the whole encyclopedia on; let's try and use that for a license application so people can walk through and see our thought processes in developing a license application.

So what I want to do is walk through one of those little lines through here. It won't be the performance assessment one because the environmental one, it turns out, has a lot more of the stuff that I would like to show.

So this is not the real Net, but a fake version of it, and I'm going to go over here to the environment section and take a look at it. And what I get is a short table of contents of the various things that are in the environmental program, and for this type of demonstration, I'm going to go to meteorology, I'm going to call it Met, and their quality data, and up comes a site under construction, as all these always are, and it provides a brief description of the field programs for environmental programs; who uses the information, the size of their database, the purpose of it. So this is a very high level summary type thing that might be accessible to the public and understandable to them.
Now, if we want to go down another level and say, well, whoa, 100 megabytes of Met data, let's see what's there, you can click on it, and it will take you down to a discussion of the actual Net field programs. And again, there's a brief description, and it says here that the Met program has nine sites at Yucca Mountain. Well, that's interesting. Here's a map that shows where those nine sites are. Now you've got it in context. If you want to go through that and take a look, you can see the Exile Hill and the various sites in that area. And then you can go back and say, well, that was okay.

It says each program is controlled by plans and procedures. What are those plans and procedures? If I want to know, I can click on it, and here's the controlling documents, and these are study plans. Again, I've provided at this site, at this stage, a brief abstract that explains what that study plan is.

But what if you really want to see the study plan? What I can do is this has taken us to something called RISweb, which is the Records Information System. It's an index of every record that was ever created on the Yucca Mountain project. And we've gone to the particular one that's the study plan for the meteorology program, and you can find out what type of record it is, the date of that record, various information, and then if you really want to
1 see the study plan itself, we have imaged or are in the
2 process of imaging all of our records.
3 And this is the actual table of contents as it was
4 printed out for that study plan, and each page would be in
5 there. That's part of something that's required for the
6 licensing support system. They require both the image and
7 ASCII text so you could download it and import it, a lawyer
8 could, into his argument.

9 I'm going to go back up again, and down here, site
10 information, histories of each site. And what you have here
11 is a list of the nine meteorological study sites, and this is
12 Site 1. It's a brief description of it. Not only do I have
13 a description of it, but if I scroll down, and you can see
14 more than just the tower, you can take a look at that site.
15 This is a hard copy image, but you could also put in a video
16 tape if you wanted to, and you can see the site in relation
17 to its surroundings. So it gives you a better idea of where
18 you are collecting data and what it might look like.

19 Now, you might want to know the exact location, so
20 we've provided the coordinates and UTMs and state plank
21 coordinates and latitude and longitude. Again, if you're
22 interested in the data itself, it says they were collected at
23 this site. Here's a list of the data variables that were
24 collected at the site, and this is transparent to a
25 meteorologist, 60 MS--MWS, but not to me, and it describes it
as wind speed measured at the 60 meter level. That gives us all a little better understanding. But what exactly were they measuring? This is the calculation method they used. So you can step down on through and understand at whatever level you choose the information that's provided.

This shows that they collected data, and in a minute I will show you a record of that data.

We're going to go back on up, and we looked at most of this, but it also says that some reports were produced, and this is a summary report for all the data that was collected from December, '85, to December, '91.

I'm going to go to one particular input from that, and this is a data tracking number. It keeps an index. This is part of the indexing system for the actual data that was collected on the site. So you can see the description of the data. It was the Met data for September through August, '89, who collected the data, when it was submitted, what governing plan controlled it, whether or not it was qualified; that is, collected under a quality assurance program, how it was acquired; parameters, what exactly it is that you're looking at with this data set, the location where the data was collected, starting and ending periods. And this is the records accession number so that you could go into the records program and pull out a picture of that data, or at this point, you could actually connect into our technical
database and pull up the actual data. It doesn't do that here, but it could.

So with that kind of an idea, what we thought we'd do is start a program, and we're doing two prototypes. One is, we will take a document that already exists and put it into this hypertext version so we can connect to the actual records down through the data so the people can follow down our thought processes.

One of the key points here is that you can't just put in the information that supports your point of view. You can't just reference the good stuff. What you have to talk about is everything that you knew about at the time, what you discounted and what you used, and make sure you keep references to all of that so that other reviewers can take a look at what you didn't use and decide for themselves whether or not that was appropriate.

The other thing we're going to try and do is take a document that we are now writing and see how it works to write in hypertext. Does it make sense? A lot of people don't think linearly, and they're not automatically putting in these links as they're going along, but they need to go back through. So what works best for the people involved?

And in discussions with the NRC, the other one point I want to make is, they've asked that--well, one person has asked that for our first prototype, the existing
document, we do this with something they've already reviewed and then ship them the hypertext version and see what they think about it, whether or not they find this an easier way to review a document. And, of course, once we publish documents and most of this information is available to the public, we can put it on Web sites and make it generally available.

And that's my demo.

WONG: Don, let's let them go through.

BARNARD: There, that's not bad. I'm Rally Barnard from Sandia Labs, and I have been helping to develop the PAWDS, the performance assessment working data set. And the reason this came about was that after TSPA-93 when we were writing the report, which described in more detail the hydrologic, in particular, data that we used, we discovered that we were not really comfortable with the degree of traceability, to use our favorite word of the day, of these data.

Sometimes the assumptions that we had made were not clear. Sometimes we weren't quite happy making sure that we knew what we used, how we could relate that to the original data and so forth.

So we set about to come up with a scheme where we would have very good traceability in both directions for any data that we used. By both directions I mean if you start with raw data and you use a prescribed method of analyzing
1 those data, you will come up with the same answer every time
2 you use the same raw data.
3 Conversely, if you are given a result, for example,
4 a probability distribution function of hydrologic data, and
5 you are told the method that is used, you can back up and
6 figure out which raw data those came from.
7 So with that, let's take a look through the
8 performance assessment working data set. This one is also a
9 Web browser application, and in hopes that the people in the
10 back of the room can read it, I made the type a lot bigger
11 than it is on your normal screen. But we cover the purpose
12 of this, properties information and parameters; in other
13 words, the raw data and the final product.
14 So looking at the properties, we have four
15 categories here. We have matrix properties, fracture
16 properties, bulk properties, and then the codes that we use
17 to determine them.
18 Again, because this is just a demo, we'll move
19 through and see what we can look at here.
20 Under matrix, we have bulk density, porosity and
21 saturated hydrologic conductivity, as well as the Van
22 Genuchten water retention parameters.
23 Let's look at porosity, and throughout this, there
24 is an attempt to provide two sources of information. The
25 first source of information is for the people who think they
know what they're doing and just want to zip right down to the data. They have a defined path to get there. But for those--the attorney types of this world who want to know where those data come from, we attempt to provide documentation which is going to tell them where those data come from, and it always tracks with the actual data so that that information should always be available.

So let me illustrate this by bringing up the document which describes information on the matrix porosity. Slow computer. The matrix porosity data for the 10 hydrologic units that are used are listed in the PAWD sources; for example, SEPDB. The SEPDB, in case there aren't any old-timers in the room, is one of the earlier databases that the project set up, and those are the ones--this is from TSPA-93 that we captured and included in here. This happens to be a link in this document to the SEPDB data. So by clicking on that, we bring up SEPDB data characterized either as being in boreholes and surface samples. So we'll look at SEPDB source data for matrix porosity. And now you can see that it is done according to the different boreholes that are available.

So we'll look at one of them. Okay, now you're finally down to the real data. For example, this is Hole UE 25 a 1. Here you have the depth and here you have the porosity value, but most importantly, for the sake--
1 standpoint of traceability, over here in the column on the 
2 right is the PAN, the PA number. And if you notice, it 
3 happens in all these samples that the PA number is the same 
4 for every data record. However, it doesn't need to be, and 
5 these are hot links so that if you click on that, you 
6 discover that PA data--PAN No. 2, which is the one we looked 
7 at here, the source is Flint and Flint, 1990, and it refers 
8 to these two boreholes. 
9 What's Flint and Flint, 1990? There's the source 
10 document, a citation of the source document, including the 
11 NNA number, the record accession number that the project has 
12 used. 
13 Okay. One more thing. That essentially is an 
14 illustration of the traceability. If we look at parameters, 
15 we can talk a little bit about the clarity of what we present 
16 or the transparency. And so here we have some set DB 
17 porosity data. 
18 Now, the first thing I want to say, and I think we 
19 all understand it, is that clarity is strictly in the eye of 
20 the beholder. But what we can do is attempt to present the 
21 information in as many ways as possible so that somewhere, 
22 somehow, sometime, somebody's going to understand what we're 
23 doing. 
24 So what I have here is a table, which is kind of 
25 tricked up for the purpose of this display because the TCW
values in that unit, the Tiva Canyon are done in green, and the PTN are done in blue, and we'll get a little farther down here. And here are the TSW units, are done in red.

And again, we have a link here, a hypertext link, that will allow us to see these data have been collected from possibly many different boreholes. So this could be, for example, all the information on the Topopah Springs welded porosity data.

And so, for example, over here, we have descriptive statistics of porosity, and over here, most importantly, we have a graphic representation of what we have.

And although this looks like just a simple visual of this, as an aside comment I'd like to point out that when we were talking with experts about what they felt a proper PDF, probability distribution function, should be for properties such as this, we found that presenting them with a graphic representation was highly effective at having them say, gosh, you know, I think this looks okay, but I really think, for example, it would be better if it had a longer tail on the high side.

So although this may look like a simpleminded presentation, a graphical presentation, it has turned out to be very useful because we are able to quantify, redo this graph, for example, to make it satisfy the experts' perceived notion of what it like, and then we have numbers which allow
us to use this PDF and have it fairly well obey the experts' notion of what it should like.

So that's it. Thank you.

WONG: All right. I thank both of you for that presentation. I know that Don has one question, but I have orders, and those orders are to end this session.

LANGMUIR: It's a short question.

WONG: Okay, short question.

LANGMUIR: This question is for anybody up there I think. I'm enthusiastic and intrigued by what you're doing. A lot of us are aware, also, that there are National Lab Web pages through which you can get access to National Lab data and reports and download the reports, in fact. And I wondered if you had thought in this effort to hyper-link yourself to those interfaces so one could get complete information from the lab sources as well. Are you going to try to duplicate what's available through those sources?

BARNARD: No, I didn't have time to mention. Right now what you see is available only to Sandia analysts, PA analysts. But by the time TSPA/VA comes around, this will be fully available on the entire Internet and people in Israel, if they want to get this information, can use it.

WONG: All right. Thank you.

I'd like to thank all of the speakers for this morning's session. They've done a very good job, and they've
made my job easy. So thank you all.

Lunch will go from one hour from this point in time.

(Whereupon, a luncheon recess was taken.)
COHON: Good afternoon. I hope everybody noticed that there is a Marquis outside, and it says on it, "Welcome NWTRB." And I believe it's the first time in this Board's history that we made it to the big lights. I liked it. This afternoon we turn our attention to transportation. Board member John Arendt will be the chair for this afternoon's session. John?

ARENDT: Good afternoon. If you'd all just look at your agendas, and we're starting at 2 o'clock rather than 1:30, so just add roughly 30 minutes to each of the agenda items, and we'll be about on track. I was looking for our three other new Board members, but I guess they haven't gotten back yet. So I'm John Arendt, and I'm Chair of the Board's panel on transportational systems. This entire afternoon will be devoted to the important subject of transportation, specifically on the issue of how spent fuel will be moved from the individual reactor sites to a centralized storage facility, if such a facility is mandated by Congress. We will first hear from the Department of Energy on an update of the approach that it will use to accomplish
this, mainly the so-called market-driven or private sector initiative.

We will then obtain from both the state of Nevada and the affected units of local governments their respective views and concerns about transportation.

After a break, we will have a round table at which these issues will be explored further. The afternoon speakers will then be joined by a number of other participants.

As is our practice at these Board meetings, time will be provided at the end of the afternoon for a public comment.

Tom McGowan has asked to make some comments, and in order to meet with his schedule, we will schedule him right after--or right before the break. So he will be--he will be heard at that appropriate time.

We have a full schedule ahead of us, so let's get started. Our first speaker this afternoon is Dwight Shelor. He is the Deputy Associate Director for Waste Acceptance, Storage and Transportation at DOE. He will give us the update on the DOE transportation program.

Dwight?

SHELOR: I'll just test this very quickly.

In the interest of trying to keep us on schedule, this is going to be a real interesting experiment. I notice
some of the Board members haven't returned, neither have my transparencies. So it's going to be a little difficult. However, I hope that you were able to obtain copies of my presentation. So I'm going to start, and if my transparencies return, then I'll get back to that so that we won't lose a lot of time because I have a lot of material that I would like to cover.

This afternoon--here they are now. I will provide an overview of our approach to transportation services acquisition, what we planned, and describe the relationship between the transportation services in a federal facility, or an interim storage facility if one is designated, and obviously to try and provide insight into the objectives and some of the rationale that we have used in development of this approach.

Okay. Now, we're back at it. Very good. I think it's important to, first of all, summarize the Department's overall goals and privatization, obviously to sharpen the mission focus, which it does very nicely, improve the quality of performance and improve long-term cost effectiveness, and I'd like to emphasize, while maintaining environment, safety and health excellence.

I think it's also important to have at least a working definition of what privatization is. The one that we
have used or are using at the present time is the substitution that whole or in part of private market mechanisms and entities for one of more of the traditional government roles of developer, financier, builder, owner and operator.

In the Office of Civilian Radioactive Waste Management, two major goals in our overall mission. One is obviously to maintain the momentum at the Yucca Mountain site characterization activities, and secondly, to develop and implement a market-driven approach that relies on the private sector for waste acceptance and transportation services.

With respect to the federal facility, if the Congress and the Administration cannot come to an agreement on an interim storage facility, this is the approach that we would propose for transporting commercial spent nuclear fuel to the repository. Obviously, if there is general policy direction to implement an interim storage facility operation, this would be used at that federal facility.

Our objective in developing this approach, we're to come up with a practical and implementable approach that uses the private industry to the maximum possible extent, provide flexibility for innovative approaches in carrying out this function, minimize the OCRWM involvement, and rely on utility cooperation and participation, and not least important, to rely on performance-based contracts with the private
industry.

So our philosophy, then, is, first of all, keep it simple, keep it focused, adhere to the spirit of privatization, provide a good deal for the government, and make it attractive to the industry and to the utilities, or our customers.

The situation then comes down to the fact that the Department currently has contracts, as described in 10 CFR 961, with primarily the nuclear utilities, the owners and generators of spent nuclear fuel and high-level waste. That contract has two parts to it, obviously. If you'll remember back to the old contract law, the contract calls for the Department to accept and dispose of their spent fuel, and in exchange for that, they pay a fee, and that fee has been paid into the Nuclear Waste Foundation.

Now, what we're proposing to do in this approach is to contract through competitive contracts with the private industry to essentially accept and transport this spent fuel as required by the standard contract to a federal facility, whether it be an interim storage facility or a repository. Very quickly, major functions that the contractors would be performing would be, first of all, to service the purchasers of the standard contract per the OCRWM waste acceptance schedule, purchase or lease transportation casks and equipment, accept the spent nuclear fuel as an agent of
OCRWM, transport the spent fuel to a federal facility using applicable NRC, Department of Transportation and selected DOE regulations, using standard commercial nuclear practices. The contractor and the carrier would select the routes and provide notification to the appropriate people, and to perform intermodal transport as necessary. This is pretty much a start-to-finish operation. They would accept it, the spent fuel, at the current storage facilities and deliver it to a federal facility. And in addition, at least in the initial contract period, to provide compatible storage systems for use at the federal facility.

For purposes of contract definition, we have laid it out in basically three phases, A, B and C. Phase A is pretty much preparing the business plans and the management plans. Phase B is to establish the capability and essentially mobilize their resources and the equipment, get ready to transport. Phase C, then, is actual operations.

In this, our infamous home plate diagram that we use to examine the interfaces of the RSA contractors with the rest of the world, including DOE products delivered to the states and tribes, products delivered to the federal facility, equipment and services acquired by a regional servicing agent, I've neglected to answer that, and the NRC Department of Transportation interface, and products and data provided by the purchasers of the standard contract.
I think it's also vitally important that we recognize and understand what these performance requirements are. As we know, in the draft RFP, performance requirements will be and are consistent with the NRC and DOT regulations. These regulations provide for the protection of the public health and safety and the environments, and the contractors, hopefully, will base their fixed price bids for these services on those requirements.

I point out that at the present time with the current national emphasis on reducing the role, size and cost of government operations, there must be a broad consensus or support for any initiatives that go beyond those specifically outlined in the regulations.

And furthermore, and justification will be required for those to pursue specific actions above and beyond those required in the regulations and for us to seek the necessary budget authority to fund those activities.

Since we have--I've leaped ahead a couple of times, but we're proposing to divide the country into four geographical regions. These four regions currently correspond to the four NRC regions that have been established by NRC. In these, we would anticipate having a single regional servicing agent for each region to pick up, will accept and transport spent nuclear fuel from the plants in that region to the federal facility.
I want to emphasize and point out to you at this point that I have not told you where that federal facility is yet because we don't know.

Major milestones. I think, one, we have to look at two things together--actually, it's three--1998. We have talked about the Yucca Mountain viability assessment being available. We are doing some contingency planning on an interim storage facility and also looking at how we could arrange the transportation activities to be consistent in the event that an interim storage facility was sited in this time frame.

This chart is not meant to depict any fixed time schedules, but only to put things in a perspective relative to each other.

Again, this is a busy chart. Again, I'd like to point out that Phase A we would anticipate lasting about one year where the contractors would put together their plans. Phase B would actually then have about an eight-year period, and it would overlap Phase C, wherein Phase B they continue their management and planning, the mobilization, acquisition of hardware and the initial storage stems. Phase C then would be--we're proposing a five-year period for that contract. Longer periods are more--probably more cost effective. At the same time predicting or making fixed price bids for periods longer than five years is very difficult.
So we settled on a five-year period. Obviously, if one were to look at the rates that were proposed in S-1936 and the last Congress where they started out at 1,200 metric tons per year, increasing over a five-year period to 3,000 metric tons per year, this activity would repeat itself for a period of three to four decades.

Let's talk for a moment about our risk-sharing objectives. And when we set up a privatization concept of this type, what we want to do is to allocate the risk between the financial, regulatory, performance and operations so that DOE and its contractors can have a reasonable balance of risk.

Again, we want to minimize DOE's involvement in a regulatory environment, and as normal, the Price-Anderson indemnification would be passed on to the regional servicing agents.

This period that we've gone through in the government in the last couple of years is kind of a re-inventing government contract reform. In the past, the government essentially was self-insured and assumed virtually all of the risk. There was very little risk allocated to the contractors.

This contract we would anticipate would be fixed price, privately financed, and this is a major deviation from the standard M&O type contracts that the Department has where
DOE pays all the costs and assumes essentially all the risk.

In our approach, we're essentially proposing that we cost share Phase A where we would pay for the Phase A deliverables, but we would not pay the full cost. Phase B, we would not make any payments, and the contractors, then, would only recover their costs in the prices that they would bid for the delivery of the spent nuclear fuel. For example, they would be paid in terms of dollars per metric ton spent fuel delivered.

In the draft RFP, which was essentially noticed on December 27th, you can look in Section H.8, Special Contract Requirements of the draft RFP, to see how we're beginning to manage and allocate risk.

In the draft RFP, I think you can—if you go through the clauses in detail, you can begin to see how we are beginning to balance the risk that the contractors would take versus what the government normally had been taking.

For example, in economic price adjustment, it does provide the contractor with some inflation protection, and that would be a DOE risk. And then in more quantities, we would establish minimum orders so the contractor would have some basis to recover his costs. That's a DOE risk.

Permits and applications, we would anticipate that the contractor would be responsible for obtaining and being
1 in full compliance with all of the requirements, state, federal and local, and that would be a contractor risk.

Insurance and indemnification, the contractor would be required to maintain insurance and indemnify the DOE against claims arising from non-nuclear incidents. It's a contractor risk.

Termination for convenience settlement, as in any government operation, there is a clause where the government can terminate for its convenience. We would provide for and make the contractor whole in terms of his accrued cost to that point, and that would be a DOE risk.

Performance guarantee, we talked about this for some time. Originally, we talked about performance bonds. We felt that a performance guarantee by a parent corporation would be more satisfactory than performance bond in this particular case.

With respect to interim storage contingency planning, we would anticipate at this time—in fact, our contingency plans are for the if an interim storage is designated by policy direction, that we would implement that in two phases, where the Phase I basically for the first two to three years would accept only canistered spent nuclear fuel, and then as Phase II became operational, we would begin to accept uncanistered spent fuel.

To summarize this, we believe that this approach
1 does, in fact, maximize the use of private sector and private
2 industry capability, provides a focus period for the regional
3 servicing agent utility cooperation. I didn't go into it,
4 but I might point out here that we are anticipating that
5 prior to implementation of this contract period, that the
6 regional servicing agent and the utilities would come to some
7 agreement as to the location of the spent fuel to be picked
8 up and the allocations and the rates to take care of the
9 partial cask problem and brokering the vellication rights
10 prior to commencement of operations.
11
12 This approach does allow RSAs the flexibility to
13 purchase or lease different casks to meet the needs in that
14 particular region. And when we say purchase or lease the
15 different casks, this essentially is the reusable
16 transportation overpack, if you will. And the interesting
17 part about this approach, when the contractor goes to the
18 private sector markets to raise capital for this and make the
19 investment, then they will be responsible for this. They
20 will have to make their normal business decisions as to what
21 is the salvage value and the potential follow-on use and all
22 of the other business decisions involved with a capital
23 investment.
24
25 And, obviously, this does minimize the OCRWM
26 involvement. I think it maximizes the use of the private
27 market forces. When these entities go out into the capital
formation market to finance this particular activity, they will have very close oversight by the lenders, and probably closer oversight than the government normally gives a contract of this type.

Finally, this is a procurement of services, not necessary equipment, except for the storage modules, and we would intend to monitor progress and performance, but we will not be involved directly in telling the contractors what to do.

Did I go fast enough? Okay. Thank you very much.

ARENDT: Dwight, I have several questions, and I'm wondering, are you going to be furnishing--this is Arendt, the Nuclear Board.

Are you going to be furnishing a specification or some kind of information for the RSAs to get on? I'm concerned about uniformity and standardization, and how are you going to--how are you going to assure or at least bring about that there will be some form of standardization?

SHELOR: It's our expectation in this initial five-year period that not knowing for sure when it's going to start, but in the initial five-year period, it's our intentions to allow for the maximum involvement of the current nuclear industry vendors. There are several different technologies that have been approved, certified by the Nuclear Regulatory Commission for dry storage. Many of the utilities that we
will be servicing in this period already have dry storage installations. We want to take advantage of those technologies that are currently in place and that can be implemented with very little change.

For example, in the first initial or Phase I, that we would anticipate using canister spent fuel. Virtually any dry storage installation that had already implemented in a dual purpose canister that's certified for transportation can be used. We would not have to develop a new design and have it certified.

I think the way we're going to phase in, as the receipt facility develops a capability for handling uncanistered spent fuel, then we can begin to standardize the storage canister or disposal canister for uncanistered spent fuel, and at that time, we will have a single standard.

ARENDT: Okay. I'm thinking now about standardization of quality assurance plans, emergency preparedness activities, emergency response, the outreach activities.

SHELOR: Okay.

ARENDT: Are you going to just leave it up to each of the RSAs to develop their own--their routing, for example? I could see that there would be four different approaches at quality assurance, for example, four different approaches to routing, within the regulations.

SHELOR: Okay. Let me address those individually. I
1 think quality assurance is a very important aspect. Don
2 Horton is probably here. I was at one time the director of
3 the Office of Quality Assurance in OCRWM, so it's very near
4 and dear to me, and I think it's very important.
5
6 The recent statements by the Nuclear Regulatory
7 Commission to both the nuclear industry vendors and to the
8 users, the utilities themselves, they have put the industry
9 essentially on notice that the NRC does require approved
10 quality assurance programs for vendors and for the utilities,
11 obviously, in their operation. The Nuclear Regulatory
12 Commission has stated that if a utility intends to use a
13 vendor's product on his site, that he has a QA oversight
14 responsibility of that vendor. We're going to apply that
15 same philosophy to the RSA contractors. If we have four RSA
16 contractors, their QA programs will be approved by us, and we
17 will do QA oversight of each one of them according to our
18 current program.
19
20 In addition, if it turns out that some of this
21 equipment may be used by a utility in this operation, which
22 it will be because the utilities are responsible for loading
23 the canister, then they have an oversight responsibility for
24 that QA program on the vendors, also.
25
26 So the QA is an important aspect, and it will be--
27 it doesn't have to be identical, but it will be uniformly
28 implemented according to approved plans.
ARENDT: How about financial risk? As a scenario, let's assume that the RSA in Region 1 provides information. He's planning, say, to transport X number of tons of uranium and RSA. In Region 2, plans to transport, say 500, and it turns out—and they base their price, their unit price, on those numbers, and it turns out that they only, say, are able to transport half for one reason or another. How are they able to recoup that money? It looks to me like there's a risk there that I wonder whether the people will be willing to accept it.

SHELOR: No, we didn't think they would. That's why we included it in the special clauses, a minimum or a quantity.

ARENDT: I see.

SHELOR: So it will be a minimum ore that they would base their prices on.

ARENDT: Okay. One other question. There are a number of people who feel that if an interim storage area were to be established next week somewhere in the U.S., that we could start transporting spent fuel immediately and maybe even transport sizable quantity, and I wonder if you could give us a feel for how much—assuming the casks that are currently available, how much spent fuel could be transported, say in three or four years, approximately?

SHELOR: It would be small.

ARENDT: Two hundred tons? Less than 200 tons?
SHELOR: Okay. You're testing my memory. Assuming that I won't be held to it, I think it's in the order of a couple of hundred tons over a two or three-year period.

ARENDT: A very small quantity?

SHELOR: A very small quantity, yes.

ARENDT: Okay. And the only way to get that up to some sizable quantity, you'd have to have a tremendous effort in building casks in the total infrastructure, which these days, I'm not sure you could bring something like that about.

SHELOR: I think you have to have--you have to put the market forces to work. You have to have--and this is why we call this a market-driven approach because other than the relatively small quantities that are being transported today, there's no real market. If we receive policy direction to transport to a federal facility, that will create the market, and then we can put the market forces to work.

Our comments that we received last summer on the draft statement of work at the pre-solicitation conference in July, we specifically asked the industry if this was asking too much of them, and they came back emphatically saying, no, it's not. You give us an order, and we'll put it together. We'll supply the equipment.

ARENDT: My last question: The navy has a great deal of experience in transporting spent fuel to INEL very safely, without incident, and that's been going on for some 20 odd
1 years. EM has got experience within DOE. How are you
2 utilizing that experience, or will you be utilizing that
3 experience?
4       SHELOR: We'll be utilizing it to a certain degree.
5 First of all, we work very closely with EM and the navy and
6 the Transportation External Coordination Working Group, what
7 we met in Charleston, South Carolina, two weeks ago, and,
8 also, we have their other cooperative groups that we fund
9 jointly with EM to provide information and education to many
10 of the parties that will be involved in the eventual
11 transportation.
12       I think that the experience that EM has had,
13 particularly the navy relative to their working with the
14 railroad industry, which I can't comment on too much now
15 because there's a lawsuit that they're talking about, is in
16 the process now. We work closely with the navy and the EM
17 people.
18       The EM people are in a transition mode right now.
19 They're reorganizing. They're--it's my understanding they're
20 giving serious consideration to privatizing certain of those
21 functions, also.
22       ARENDT: Okay. Questions from the Board? Don?
23       LANGMUIR: I'm just interested as a potential investor,
24 which I'm likely to be. But you're asking some companies to
25 wait a long time to get their money back?
SHELOR: Yes.

LANGMUIR: In other words, there's going to be a lot of capital investment in this program within each group, with one year here, eight years there, five years there. How many years into this program do you anticipate that these contracts will have recovered their cost and be looking at profit?

SHELOR: They would basically--there would be about a three-year waiting period where they accumulate cost before they begin to receive payments, and their cost recovery, then, would have to take place over a five-year period.

We've talked about that. We have some capital investment advisors. We have talked with them. This is not unusual. The industry is confident and comfortable with that. As a matter of fact, in the Hanford tank privatization contracts that were let this past fall for the vitrification of the high-level waste in Hanford, that period there is about nine years before they recover the cost. So it appears to be a reasonable time period.

And one thing I didn't point out and I'd like to take this opportunity now, it's a little bit of a risk, but I think the Federal Register Notice should be out today or tomorrow, indicating that we planned a pre-solicitation conference where we can describe and receive additional comments and offer more explanations. It will be on February
ARENDT: I do have another question on system integration or coordination. And I assume that DOE is not going to do much, or OCRWM is not going to do much in regard to system integration, as I understand it. One way that one could do this is to have a contractor who would be responsible for system integration and coordination and then have four subs underneath who would be responsible—who would be for the RSA activity. How are you going to coordinate or integrate these activities?

SHELOR: Okay. That's a very, very good question, and it was an approach that we seriously considered because we could have easily done this using an M&O contractor, basically giving him the responsibility for subcontracting. We felt, however, that it was important to make this a DOE procurement because that puts us directly in charge, not so much in control, but it puts us in charge of these contracts and the contract terms and the contract administration.

What we plan to do is two things: We're going to utilize our federal staff more. When you have an M&O contractor, many times all they do is look at what the M&O contractor is doing.

In this approach, we're going to use our federal staff to essentially do the contract management, and they
1 will assisted by our M&O contractor.
2 ARENDT: Did you do any kind of cost benefit analysis in
3 determining what approach you should use?
4 SHELOR: It's very difficult to do. It's a good
5 question, and I wish I had a definitive answer. But when you
6 sit down and look at this in terms of what should it cost if
7 all the contracts were cost reimbursable versus what should
8 it cost if they're fixed price--now, typically, on a fixed
9 price contract, you're going to pay a little more, and you
10 run a risk of major changes in a fixed price contract. This
11 usually opens the contract up to re-price it when you make
12 major changes. That's why we feel it's important to talk to
13 as many people as we can now, get as many comments as we can
14 to help us define this contract before we put it on the
15 street.
16 But the tradeoffs come in if it truly is a fixed
17 price performance-type contract and the requirements are
18 sufficiently well known for them to make reasonable fixed
19 price estimates. I believe that will be our lowest cost
20 because if it's cost reimbursable, then you probably have
21 another layer of management in there, which begins to
22 accumulate quite rapidly.
23 ARENDT: Other questions from the Board?
24 COHON: Cohon, Board.
25 Have you thought about using the contracts to
1 convey incentives to the RSAs other than cost incentives,
2 like a safety incentive?
3 ARENDT: At the present time, no. Let me explain why.
4 The Department is responsible for implementing and operating
5 a system to perform these functions. The Department of
6 Transportation and the Nuclear Regulatory Commission have the
7 responsibility for the public health and safety. They
8 promulgate regulations and standards and certify equipment
9 designs and operations. We will be in full compliance with
10 those regulations and standards. I don't believe there is a
11 safety issue that we would have to address.
12 COHON: Yeah, and I think you're probably right, but I
13 think you'd be wrong if you proceed in that way because I
14 believe there's a large perceived safety issue by the public.
15 Furthermore, it's humans who are going to handle the waste
16 and humans who are going to drive the trucks or conduct the
17 trains, and accidents will happen. I mean, when you think
18 about it, all the shipments are going to happen over decades.
19 There are going to be accidents. And all it takes is one
20 serious one, even with no radioactive release, and that's why
21 I think--I know that's what's behind your statement there's
22 not a safety problem.
23 But even without a release when that accident or
24 accidents happen, it's going to shake public confidence in
25 the system.
So it just seems to me that given the--what I would hope would be perceived as an overriding federal interest in being as close to risk-free as possible, that you would think about, since you're being very creative here in using the private sector in this way, you would think about private sector incentives, the sort the private sector responds to, to go beyond compliance so that the companies see tremendous economic gain for every hour they go without having that accident.

And I think you would be missing a great opportunity here to do something really interesting and really important if the DOE stance was, well, that's DOT's and NRC's responsibility, and the real risk is zero or close to zero because both things get in our way of achieving what is the goal.

SHELOR: I agree with you, and certainly that's an extremely important approach, and we can accommodate that. And I suspect that we probably will before we go final, as that particular incentive in terms of a monetary incentive for accident-free performance is a critical part.

BULLEN: Bullen, Board designee.

How many current utilities have dual-purpose casks and could ship?

SHELOR: Right now, one.

BULLEN: Okay. And if you talk to the utilities, are
they interested in shipping stuff that's already in dry cask storage, or are they interested in clearing out their spent fuel pools?

SHELOR: They want to clear out their pools first.

BULLEN: So the answer to this is that you really want to ship uncanisterized spent fuel because the stuff that's in dry storage isn't a problem for them? That's not what's limiting their operation, and that's not what they're screaming to get out? They want to clear out their spent fuel pools so they could--

SHELOR: That's correct.

BULLEN: Okay.

SHELOR: You know, we're not going to tell them--

BULLEN: No, I understand.

SHELOR: --what spent fuel that we want or what they have to give us, but I suspect that when they have an allocation, they're going to want to get more space in their operating pools put where it's possible.

BULLEN: So my next question was, who buys the canister that you ship in if it's a dual purpose? Is it the utility that buys it, and then you take it and ship it away, or do you buy them the canister and they ship?

SHELOR: The RSA contractor would provide the canister to the utility.

BULLEN: Okay. But they're responsible for the loading?
SHELOR: Yes.

BULLEN: Okay. And then I guess the question is already asked, but you'd expect it would take a long time for this to come on line?

SHELOR: No, I'm not trying--but I believe that that capability could be put in place and mobilized by the time we had a federal facility ready to receive it.

BULLEN: Okay. But further down the road then you're going to have to repackage all the stuff that's already in dry cask storage?

SHELOR: Quite possibly, particularly if it's store only.

BULLEN: Yes.

SHELOR: Yeah, that's correct.

BULLEN: Thanks.

ARENDT: Don Langmuir?

LANGMUIR: Just a more general question from a non-expert.

Looking at the servicing regions account, which is probably incorrect, but qualitatively, it looks as if you have eight facilities and no reactors in the southwest region and 32 reactors in one facility in the southeast region. The regions are much different in size, as well as in facilities they have. This is Overhead 14. And I just wondered what--I would assume you had to deal with each region rather...
differently in terms of your expectations of the regions and what they might be trying to do and how they might accomplish it, and given the differences in the locations at which the fuel exists in the form of the fuel.

SHELOR: That's correct. We're going to shift most of that burden to the regional servicing agent because there is a mix in each region. Some of them are--and, in fact, Morris is not even an operating reactor. It's a storage facility. But there will be a mix of PWRs and BWRs, different types of plants in each region, as well as the location.

Part of your question, I have some back-up slides, a little more detail in Region 1. This information, by the way, is in the draft request for proposals. If you look at Region 1 and go down through the purchasers, what the reactors are, and then if you use the 1,200--1,200, 2,000 rates that were in the S-1936 last year at the higher rates, you would get in Region 1 550, 360, 830. Anyway, over a five-year period, it would be around 3,000 metric tons from that region, and that would be a mix of PWRs and BWRs.

Region 2, without going through all of it, at the same time goes up to about 2,500 metric tons.

Region 3, over that same five-year period, is about 2,660.

The biggest deviation is in Region 4, it drops down to just under 1,000.
Now, if you'll look at the next five-year increment using the same allocation, oldest fuel first, Region 4 then comes up.

So the regions are not--are reasonably well balanced in terms of total quantities over a five-year period.

WONG: Any other questions? Staff?

CHU: Yeah, this is Woody Chu on the staff.

On the dual purpose canister question, Dwight, since they are of such capacity, you are envisioning then pretty much rail carrier at the--one of the interim storage facility, right?

SHELOR: I would think, and we use that as an opportunity to say--and I'm sure we'll get some comments on it. But in the draft RFP, we have not provided either a requirement or an incentive to maximize rail cask shipments, and I think we'll get some comments on that.

It's my feeling, and I was probably the one responsible for it, that if you go to a competitive base with multiple contractors competing and are able to maintain that competitive base over a period of several decades, that the cost or the price competition will drive the--yeah, anyway, I believe the cost competition will drive the RSA contractors to the largest possible capacity on each shipment.

CHU: Yeah, but incentive aside, if your assumption is
that Phase I at the federal facility will be only--during
Phase I rather, that the federal facility will only be
accepting canister fuel, you're saying that you're only going
to be carrying canister fuel; is that right?
SHELOR: All right. Well, we could say that, Woody, but
I think that we might be infringing on the flexibility that
we tried to leave to these contractors. If these contractors
can work out a deal, however they do it, to take a facility
like Ginna, which is a trump site--
CHU: Right.
SHELOR: --and ship that to another utility and
consolidate it in large canisters that can be shipped on
rail, that's an idea.
CHU: Okay.
SHELOR: It would significantly reduce the number of
truck shipments.
CHU: Okay. Following that, when the shipment--well,
once it's in transit, sort of in line haul, then it is in
rail. That's what you're envisioning because the federal
facility is taking only canister fuel.
SHELOR: In the first--
CHU: In the first two years.
SHELOR: In the first two years, that's correct.
CHU: And if the federal facility does not have rail
access as some candidate facility does not have, then you
will have to go into heavy haul?

SHELOR: That's correct.

CHU: And the transfer facility will be the responsibility for the vendor that the RSAs--

SHELOR: We haven't really gotten into that, but in terms of our contingency planning, in some cases I could envision where the transfer facility from rail to heavy haul at some terminus could, in fact, be a contractor-operated facility. It's simply providing a service of transferring the cask from rail to heavy haul.

CHU: Well, it will be more than just transfer. It will be actually breaking the contents from the larger capacity canister into smaller capacity truck cask?

SHELOR: No.

CHU: No?

SHELOR: No.

CHU: Oh, heavy haul, okay.

SHELOR: If you go with heavy haul--

CHU: Very heavy haul.

SHELOR: --and my definition that that's--you know, there could even be a few-day storage at that site. But that storage is incidental to transportation. The package itself containing the canistered or uncanistered spent fuel would not be opened.

CHU: Okay. And a quick follow-up on the risk question
when you said there is a minimum order. In other words, the RSA is required to build up a capability to carry so much. If that market doesn't develop for whatever reason, then what he will be at risk for is what is required minus whatever the minimum is?

SHELOR: That's correct, but I don't believe he would ever ramp up to the maximum before the minimum quantities kicked in.

WONG: One last question, Mike Carroll?

CARROLL: Mike Carroll from the Board staff. Based on your presentation last week or the week before in Charleston at the Technology Working Group, I think it's safe to say that the one thing that really didn't go over too well was privatizing the institutional responsibilities, routing and that sort of thing. And I was wondering whether based on that or other comments you've had, there's some possibility that you may pull that out of the privatization plan or that's pretty well in there?

SHELOR: I won't speculate on the possibilities right now, but our comment period on the draft RFP doesn't end 'till March 31st. There's been some request, verbal request, from the people to extend that comment period, which I'm sure we will.

How we would address that, let me turn it around a little bit. What we're proposing to do is to have the RSA
contractor implement the DOT NRC regulations, which basically says that the RSA contractor is going to contract with a carrier. It may be a railroad or it may be a trucking company. They, then, go to the DOT regulations on routing and look it up, and basically if the state has a preferred alternative to the routes that are currently approved by DOT, if we talk about truck routes, it's basically an interstate highway system or a State-designated alternative. The State has the right to say don't take it on that route, we'd rather have you take it on this one.

Now, there is a requirement once that route's been selected to essentially notify the Nuclear Regulatory Commission, and the Nuclear Regulatory Commission approves that route based on criteria that have been established for safeguards. They don't approve the route based on what the route is, but only for safeguards.

Now, what more do we need to do?

COHON: Coordinate.

SHELOR: Coordinate, certainly. The RSA contractor would coordinate with a state or local community--

COHON: No, no, no, let me interrupt. What I mean is what if RSA's 1, 2 and 3 all want to ship through St. Louis, which is not unlikely?

SHELOR: Not unlikely.

COHON: So the State of Missouri is sitting there
wondering what the heck is going on. They've got one company after another approaching them about routes, and they want to know, you know, is the federal program here? Where does it come together? Where is it coordinated so that there's a realization here that the three--four, I'm sorry, RSAs might, in fact, be better off working together in certain cases or avoiding each other in other cases.

SHELOR: Yeah.

COHON: There's this cumulative effect of two or three or four companies, each acting independently, that you have to worry about.

SHELOR: Okay. That's a good point, and I'm not trying to weasel, but I think the reasonable and appropriate form to address that in its global context is the Environmental Impact Statement. Before this material moves, there will be a requirement to fully comply with the National Environmental Policy Act, which we will. If, as I mentioned earlier, there is no policy direction for federal interim storage and that eventually we take this to a repository, wherever that it is, there will be an Environmental Impact Statement for that repository before anything is shipped. Same way if there is an interim storage facility, there will be an environmental impact statement for an interim storage facility in which the transportation, national transportation impacts, will be evaluated. And I think that's a very good form because that
--that gets us out with scoping hearings and gets the public involved.

ARENDT: Dwight, I thank you very much.

SHELOR: Okay. Thank you.

ARENDT: We'll continue now. All right.

MCGOWAN: Tom McGowan. Mr. Dwight, in my opinion, legal requirements are a minimum, not a maximum, nothing--the minimums as a matter of responsible discretion, and that covers a lot of ground.

There are multiple flaws in the transportation plan. I saw that right out in front. The performance base line is essentially left to the initiative and integrity of the field of carrier contractors, rather than being prior established by DOE, and in the worst case scenario, notwithstanding prior establishment by DOE.

Now, No. 2, the transportation paradigm is tri-elemental, where DOE's responsibility is linked to the point of departure and the point of destination receipt, but advocates responsibility to the discretion of the carrier on route between the two, notwithstanding Albuquerque headquarter communication and both DOT and State Department of Transportation oversights.

Also, there is no demonstrated, as insured effective guarantee that first on the scene local response to emergencies will perform as anticipated, although we wish
them well.

And finally, DOE audit and compliance monitoring at transport departure points is cursory at best and predominantly reliant upon the honor system, which does not involve a high degree of public confidence and total quality assurance, creates the perception of the economic expediency based educational responsibility in avoidance of liability. There are tradeoffs here. You can save a dollar, but it may cost you ten to do it at some point.

Thank you.

ARENDT: Thank you very much.

The next speaker was to have been Bob Loux, Director of the Nuclear Waste Project Office. Unfortunately, Bob, or Mr. Loux, won't be here because of a sudden death in his family. So we will turn immediately to Mr. Halstead who will make the presentation.

HALSTEAD: Let's see if my Super Bowl announcing voice can come through to you.

This is the fourth time in six months that Dwight and I have discussed the Department of Energy's privatization proposal in a public meeting. I thought it might really spice things up if I offered to give Dwight's presentation today and he offered to give you my critique. But, unfortunately, I have a little heavier burden than Dwight today because I'm trying to catch you up on the work that the
State has done in the area of transportation risk and impact assessment, and I was surprised when I looked back and realized it had been six-and-a-half years since we briefed the Board on our work in these areas in a full and formal way. Obviously, we've had many informal discussions at your meetings.

So I'm delighted to have this opportunity to be here. Having just watched the Super Bowl in a small town in Wisconsin with my mother-in-law, who's a very enthusiastic Packers fan, I guess I'll try to put some of the burden that I have in perspective. On the one hand, of course, there was jubilation throughout the upper Midwest over the Packers victory, and my condolences to the Patriots fans here.

And immediately on the accomplishment of this great sports victory, you all of a sudden heard Packer fans complaining that the coach should be fired because he didn't find a way to get Jim McMahon to back up the quarterback in the game. And maybe to show you how this can be taken in its extreme, yesterday, the day after the Super Bowl, the Milwaukee Journal ran a headline that said, and I'm quoting, "Half time Lacked Substance," peculiar to think what kind of substance they expected, and I'm sure that I will not be as entertaining as the Super Bowl half time. I will try and share with you some substance in these four critical areas relating to transportation risks and impacts.
The way I structured my talk today is to try and break these topics into four mini presentations of eight to ten minutes each. I've given you in the handout much more detail, of course, than I intend to speak about. Alice will remember some of the exchanges that Woody and I have had, and I remember when I talked to Woody about preparing, he said, "Bob, remember your tendencies." So I'm going to try and put about four hours of material into a shorter presentation, and I provided these handouts hoping they will perhaps inspire you to ask me some tough questions. And if you don't ask me tough questions, that will be just fine.

Rail and highway access to Yucca Mountain is our first topic. Secondly, we'll talk about the outlook for shipments to repository or a storage facility. Third, we'll talk about unresolved safety issues. Finally, I hope to spend a fair amount of time elaborating for you the large number of recommendations that the State has made over the last half dozen years to the Department of Energy on virtually all aspects of their transportation program, we're not shy, including the privatization proposal, but certainly not limited to the privatization proposal, firstly.

Transportation access. Many of the problems that the Department of Energy is confronted in developing the transportation program for Yucca Mountain reflect the peculiarities of this site from the standpoint of
1 transportation access. I want to review for you DOE's
2 initial plan for transportation to Yucca Mountain, their
3 current plans and some perspectives that the state has.
4 This is the approach--this is the map really from
5 the 1986 environmental assessment that the Department
6 prepared, and initially, the Department's plan was to build a
7 rail spur from Dike Siding in north Las Vegas. That was the
8 most direct, arguably easiest and cheapest rail spur, except
9 for land use conflicts in the north Las Vegas area, and for
10 highway shipments, the Department proposed to use the
11 existing interstate, I-15 into US-95 connecting at a
12 notorious, locally notorious intersection, called the
13 Spaghetti Bowl in downtown Las Vegas.
14 Now, I won't belabor you with all the details, but
15 the bottom line is from the very beginning, anybody who read
16 all the DOE transportation documents, and actually, I think
17 they did a very good job in 1986, the evidence is clear that
18 Yucca Mountain was selected for a repository site in spite of
19 and not because of its transportation conditions. It is
20 clearly on all the key measures that DOE evaluated the worst
21 of all the sites in terms of ease and cost of transportation
22 access.
23 In addition to some more generic issues, cost of
24 construction, distance from the load center of the current
25 storage locations, there is one unique potentially adverse
condition here that was identified by DOE, and that was the proximity of the rail spur to the bombing ranges used out of the Indian Springs Air Base, and really, this is a situation that applies to almost all of the highway and rail access routes because of the number of flight corridors, the activities that occur at the Nellis Ranges, and indeed the connections between the naval operations out of Fallon, as well as the Air Force operations out of Nellis.

For many years when we would go to a meeting with DOE, Katy Grassmeyer (phonetic) or Paul Standish (phonetic) or Bill Andrews or someone would have a slide up, and they'd have a target date for the promised report on the military aircraft overflight issue that was going to resolve the risks potentially of a cask being struck with military explosives. I mean, the kind of materials that aircraft delivered and knockout tanks and bunkers and so forth. And I suppose we've let them off the hook easily, but I do want to make a point that this is one of the types of unique risk and impact issues we have with the site. It has not been resolved, this issue of military aircraft overflights.

After discussions with us and discussions with local government and Indian Tribe representatives and the public, discussions with their own consultants, the Department of Energy evolves some different approaches to highway and rail access.
In the highway area, they decided to look at the alternative routes that the State had identified under a direction from the State Legislature. So there are a number of routes that are identified that would avoid shipments through the Spaghetti Bowl in downtown Las Vegas. Unfortunately, as we'll see, most of them involve some other safety tradeoffs.

The route that has often been considered the most likely to be designated for truck shipments coming in from the east is the so-called B Route coming down from I-80 in Utah, Wendover, taking U.S. 93, U.S. 6, U.S. 95 across the center of the state.

The so-called A Route that goes through the northern Las Vegas suburbs I think probably would be the lowest priority of these options.

Other options are the so-called back door route that would come off of I-15 at Barstow and come through Death Valley Junction up to Amargosa Valley.

And then many of you drove State Highway 160. The most recent communication by the Nevada DOT to the California Highway Patrol is, if they don't cooperate with us in finding a way to make this route usable, we might designate I-60, and that would possibly lead to the rerouting of the majority of truck shipments across country on I-40 to Barstow, picking up I-15, coming back to Nevada taking I-60. Any of you who have
driven that road know it's certainly not an optimal route. That's State Route 160, pardon me.

Again, there are a great many issues that are cross-cutting for highway and rail access. We expect to address most of these issues in the Environmental Impact Statement, as well as in transportation program meetings. The risk and impact tradeoffs really come down to this: Do you use the better quality interstate highways that have better safety design features through highly populated areas in spite of their traffic congestion or do you use two-lane federal highways characterized by short shoulders or no shoulders, sharp curves, steep graves through mountain passes with a history of bad weather conditions, in many cases through environmentally sensitive areas?

At the current time, four rail routes are under consideration. My understanding is that DOE is going ahead with these studies even though they understand that Congress may impose some other path on them, but the current plan is to develop rail access. The legislation that's been considered over the last couple of sessions of Congress in some cases precluded building a rail spur, in other cases encouraged, and in other cases it was too confusing to figure out whether heavy haul transportation was a short term stop gap measure until a rail spur was constructed or whether the Department would actually be precluded from it.
The key issue here is that the short routes go through either Las Vegas or through very difficult mountainous terrain between the place where we're standing now and the Union Pacific mainline, or whether you look at longer, more circuitous routes, 300 or more miles in length; in some cases, perhaps costing a billing dollars to construct.

These routes briefly are primarily off of the Union Pacific mainline through southern Nevada, Jean. The Dike Siding option is very similar to the modified Valley option, the Caliente option here, and the Carlin option is really a series or really a very broad corridor series of potential routes that could come down from the north.

The State has not taken a formal position on which of these routes would be a preferred route. Frankly, that's premature, given the lack of information we have, and secondly, there are some legal issues about whether we could advocate for a route without giving up some of our legal oversight rights.

Nonetheless, we have encouraged the Department to give a higher priority to studying routes that would come in from the northern Union Pacific line because it would be virtually impossible for shipments to that spur to be routed through downtown Las Vegas. Any of the spurs off of the southern line, as we'll see in a minute, could put a large
1 number of shipments through Las Vegas.
2 My understanding is that there have been some local
3 discussions in the last couple weeks with people in the
4 Pahrump area about the possibility of a rail line coming
5 through this community.
6 Again, the tradeoffs are similar. Here I would
7 call your attention to the issue, not only a human issue of
8 impacts on Las Vegas, but Native American land claims and
9 cultural resources are going to be a much bigger issue than I
10 think most people have considered when it comes to actually
11 getting approvals for rail corridors in rural areas. You
12 know, most of the river valleys that allow you to get lesser
13 grades are places that were neat places to live hundreds of
14 thousands of years ago, and they are filled both with
15 actively used cultural sites, and in many cases archeological
16 sites that are waiting to be discovered. Many
17 environmentally sensitive areas are there also.
18 The limited economic development opportunities are
19 a factor here as well. There aren't a lot of economic
20 development benefits that would offset the impacts on land
21 use; for example, fencing open range or having to force both
22 range animals and migratory big game animals to use
23 underpasses under a rail route that will have to be secured
24 both for safety and safeguards purposes.
25 The Air Force overflights are a generic concern for
all of the rail routes.

I just want to show the location of particularly
the Moapa River Reservation, the Las Vegas Colony, the
Duckwater Reservation, the various colonies and reservations,
including Pyramid Lake on the northern half, and also to
remind you that the Western Shoshone National Council does
claim a very large portion of central Nevada under the
Treaty of Ruby Valley, and that also will potentially pose
some concerns in terms of securing title to those lands.

This is a map that shows some of the heavy routes
that DOE is studying. A heavy haul intermodal facility at
Caliente, of course, has been considered. If State roads are
used, those shipments could come along a circuitous route
around the test site or they could come down into the north
Las Vegas suburbs.

There have been some--there's been some
consideration of putting an intermodal facility in Las Vegas,
north Las Vegas, or west of Las Vegas, and the road that many
of you may have heard about across the test site that was
proposed in one version of the legislation, to come across
this area.

The heavy haul issues are, again, similar to risk
and impact tradeoffs to others. I would go to one issue,
which is cost. Many people are promoting heavy haul
transport for cost reasons, and the Department of Energy has
come up with some numbers that make the life cycle cost of the heavy haul operation at somewhere in the neighborhood of 150 to 180 million dollars look pretty good compared to a billion dollar rail spur. I personally believe those numbers are way low. There is an assumption that many of these highways through high mountain passes will simply need to have extra resurfacing.

In our opinion, and in the discussions we've had with the Nevada Department of Transportation, I believe there are many stretches, in some cases stretches--well, you know, coming through the initial leg out of Caliente, for example, where I could certainly easily imagine somewhere in the neighborhood of 12 to 15 miles of an additional lane being required, and at Hancock Summit and at Coyote Summit similar concerns.

So I really think that we have a burden, as well as the Department, to look very critically at these heavy haul costs before Congress, you know, charges ahead with this idea.

Well, that's pretty good. I'm only four-and-a-half minutes over where I was supposed to be on the first section. Let me turn quickly to my second topic, and then I want to show you a few transparencies that actually illustrate some of these route conditions.

Because of our uncertainty about the transportation
impacts that are route specific, we have over the last few years commissioned a series of reports developed by Planning Information Corporation in Denver with some input from other contractors to provide us our own working estimates of the best case and the worst case, if you will, of what the transportation logistics might look like, both with specific routes and specific shipment numbers.

And without going into too many of the details, we've looked at two scenarios, the current plan, a repository at Yucca Mountain, which we assume would be almost a 90 per cent rail, 10 per cent truck scenario, new high capacity casks, a rail spur, and we've estimated the shipments looking at the actual capabilities at the 80 shipping sites around the country.

And this is, in our opinion, a credible best case. Now, there are some scenarios that try to get the modal mix up to as high as 95 or 96 per cent rail. In our opinion, those are overly optimistic. And again, there are many reasons we could talk about this. We think this 90 per cent, more or less rail, 10 per cent truck, is an appropriate target to shoot for, and it has been the informal, and on some occasions pretty formal policy objective of the Department's transportation program for most of the time that I've been familiar with it, and I've been working on these things since 1978 to maximize the use of truck.
A credible worst case shipment scenario would occur with early shipments to an interim storage facility according to the provisions of the legislation that have been proposed.

Now, note, we're not saying it would be 100 per cent truck. We're saying that when we look site by site, it looks to us like 35 per cent of the spent fuel would come by truck and 65 per cent by rail. If we assume current cask designs and intermodal transfer at Caliente, we get a much larger number of shipments and much greater shipment impacts. In parentheses here, I've given the lower numbers if we assume the high capacity truck casks like the GA-4 and the GA-9 are used.

The point here is that you get somewhere from a threefold to a fivefold increase in the number of shipments, if you have this early start-up and you operate under a system that does not attempt to maximize shipments by rail.

We've also looked at cross-country routing from two standpoints: One, the standpoint of shortest, quickest routes consistent with the regulations for highway, shipments according to the preferred practices of the railroads minimizing the number of carrier interchanges for rail routing. And if we assume what we would consider something like a market-driven approach to routing, the route maps look like this. The major highway corridors are I-80 and I-70, the major rail corridor is the Union Pacific with two of
their main lines from Kansas City and Chicago carrying the majority of shipments.

We've also looked at what might happen if there were prescribed routing, routing, for example, by a DOE contractor that wanted to minimize the number of affected states, minimize the winter weather disruptions of shipments through I-80 and I-70 through the Rockies. We've also tried to consider the impacts of the recent rail mergers, particularly the Union Pacific, Southern Pacific and the Burlington Northern/Santa Fe in the west, and, of course, I'm sure many of you may own stock in Con Rail, maybe watching the debate over whether the Norfolk Southern or CSX will acquire that system.

In a merged rail environment, we believe there will be an incentive both for the carriers and for contractors under a DOE privatization system to look at some different options, and these we think--originally when we did this, we were primarily looking at the Burlington Northern Santa Fe route out of Kansas City, and now that we've studied this some more, we also think that the so-called Sunset Route from El Paso to Los Angeles would look like a very strong alternate choice.

And then we've tried to look at what the impacts of these different routing approaches would be in Nevada so that we can make our impact assessment as location and route
specific as possible.

And under the market-driven approach, we see heavy shipments on Las Vegas coming in from the west, heavy impacts on Caliente coming in from the east, and under the southern routing approaches, we see the possibility of very heavy impacts on the Las Vegas metropolitan area.

Without getting too far afield, one of the tasks we gave our consultants was to actually look at who owns the spots on the queue to ship under the existing utility contracts, look at their modal capabilities and see how they would ship. And so we actually have plotted out what the first three years of operations might look like, and when you put these reactor sites and these batches of fuel that own the early shipping routes, assuming 1,200 MTU of fuel is shipped in the first year, which anyone, of course, who seriously knows, knows that this is only a theoretical capability. You know, I would agree with Dwight that certainly we're talking about no more than a couple of hundred MTU in the first year, and I would argue even a smaller number of, frankly, largely symbolic shipments.

But nonetheless, this is what the route map for the first year would look like, and one of the things that is immediately apparent is that from the beginning of shipments to an interim storage facility, you have almost 40 states and many Indian tribes and hundreds of local governments...
involved. So those institutional burdens are going to be very great at the beginning of the program.

This is a terrible slide. I don't mean to make it look grainier and scarier. This looks great in a slide. This is the Spaghetti Bowl in downtown Las Vegas.

This is the area around Tropicana on the strip where the New York/New York development is, and right here is where I-15 and Union Pacific Mainline are well within a one-mile corridor if an evacuation were necessary, not to mention Highway--and this is what Gridlock looks like on I-15 Labor Day two years ago.

And this is the Union Pacific Mainline in downtown. This is the Union Plaza Hotel here. If you're ever in there watching an ice show, you'll be real aware of how close you are to the main rail link between Salt Lake City and Los Angeles.

Now, what are the options? This is a pretty typical stretch. I think this is White Horse--this is a downgrade from White Horse Summit on U.S. 93, and you see what a twisting U.S. highway in central Nevada looks like, and that's pretty typical. Actually, the DOT guys could be proud of this. This is typical of what it looks like just after it's been resurfaced. I hate to say it doesn't always look quite this good.

One of the issues along these proposed alternative
routes will be that towns grew up along these highways, and
if we were to try to designate this route, U.S. 6 through--
will be a concern, as it's part of the main street of the
town--of the city.

And again, I don't mean to make this slide look
worse than it is. If you saw it in slide, it would still be
pretty scary. This is U.S. 6 at Current Summit during, you
know, a pretty typical winter storm.

Before we go on to this, one of the reasons that we
may appear at the State level to be vacillating on this
question of route designation is simply this: We know that
alternate route designation, every state where it's occurred
that I know of, it's been a highly political event, and it
has generally involved the export of risks from politically
powerful urban areas to less politically powerful rural
areas.

The lawsuit in Mexico that held the city of Santa
Fe liable for property damages resulting from lower property
valuations as a result of perceived risk is a development
that many of our friends in the rural areas have thought
about.

And so in addition to the technical issues, when
you designate the kind of route alternatives that we're
talking about here, like 360 miles of U.S. highway to
substitute for an interstate connection, there's going to be
a very rigorous burden of proof. It may indeed involve into
a full inconsistency hearing before the U.S. Department of
Transportation.

I certainly believe it is conceivable that the
American Trucking Association or one of the contractors who
wins a bid from DOE, if given a free hand, might decide to
challenge the State's right to designate a rural alternative
through Las Vegas, or they may challenge us on the technical
documentation that under Appendix A of Docket HM-164, we're
required to prove with data and analyses that routes are
safer than another.

So this whole issue of designating routes that
avoid Las Vegas is much more complicated than it appears at
first.

This is one of those great mountain passes, Hancock
Summit on State Route 375, and this is the route that the
heavy haul trucks would take from Caliente.

If you'll pardon me if I take just a sip of water
here.

We could spend a lot of time talking about
unresolved safety issues. We've documented these concerns in
a number of our reports. We've probably given the best
summary of them in the comments that we submitted to the
Department of Energy on their draft scoping notice for the
Yucca Mountain EIS, and I'm sorry, I was not able to bring
1 copies of that with me today, but I will as a follow-up to
2 this meeting provide you with a copy of that chapter on
3 transportation, as well as a copy of the Planning Information
4 Corporation Report that we just discussed.
5 I want to move very quickly through these issues
6 because it's very easy to get bogged down in these, and it's
7 certainly not because I don't think we have some serious
8 arguments here, but I want to end up not so much by talking
9 about the problems, but by talking about the solutions that
10 we've recommended to DOE.
11 In the area of the relevance of the nuclear
12 industry's past safety record, some of the key issues are the
13 potential increase in the amount of waste and the number of
14 shipments. Over the last 30 years or so of nuclear industry
15 operations, we basically shipped about 3,000 MTUs of fuel and
16 about 27 or 2,800 shipments. There are different definitions
17 of what constitutes a shipment. And it's one of the ironies
18 of this whole issue that no one can agree on how to define a
19 shipment for database purposes. That's one of the reasons I
20 didn't take the time to actually flush out the numbers here.
21 We're in the process of doing this now because some new NRC
22 data has come out.
23 The key issues here are the past record of the
24 industry has been good in terms of not having severe
25 accidents. It's been so-so in terms of having of what we'll
call routine accidents relative to the number of shipment miles. Basically, their accident rate is somewhere between about 0.6 and 3.0 accidents per million miles traveled, which is about the same as what you expect for big commercial trucks, and for rail shipments, it's much higher. Of course, you have a much larger amount of fuel moving at a time, but it's surprising high. It's about 10 accidents--if you actually make a calculation, it's about 10 accidents per million miles traveled.

Now, in the future there are going to be lots more shipments, and in the future, there are going to be different characteristics. On average, both the rail and truck shipments are going to be four times longer than in the past, and we think DOE has not paid enough attention to the opportunities for equipment failure and human factors, that the sheer increase in distance and hours, and indeed the implications for work rules on the railroads, and perhaps the way that drivers will have to be spelled and platooned.

Another issue, which is frankly a pretty recent issue, has to do with the financial pressures on the nuclear utilities and on DOE, for different reasons. For the utilities, it's deregulation. The implication when I first started working as an energy planner in 1978, I worked on the implementation rules for PERPA (phonetic) that allowed independent power producers to compete with the utilities.
Nobody appreciated what breaking the monopoly, regulated monopoly, financial stability of the nuclear utilities might mean for their attitude towards spending dollars on extra regulatory safety enhancements. At DOE, clearly the pressure is coming from the Congress, and we're even seeing this in areas where DOE has previously agreed to some very, very strong safety enhancements.

Radiation exposures from routine operations. We're going to move through numbers. It really comes down to this: There are small exposures that are likely for the workers who are engaged in transportation, people who are for some reason in proximity to a cask when it's refueling or in a repair situation, or most significantly, in the so-called Gridlock incident, which members of this Board, frankly, pushed this issue with DOE back in 1990, where DOE acknowledged that in a transportation Gridlock situation, members of the public could receive doses in the range of 40 millirem.

Now, I pick up that much extra exposure every month. My physiological and psychological reaction to that, however, might be quite different, as I fly around in a lot of airplanes. And one of the issues here is the way that we deal with these low-level radiation exposure risks. Frankly, the State's approach for the most part has been to go along with the mainstream view of most health physics experts and
basically argue that these routine exposures are not so significant. We've recently been challenged by a radiation health effects working group that's been put together for our agency to take another look here, and also to look at the perceived risk issues that are a result of these routine exposures.

Let's shoot all the way down here. Third issue: Probability and severity of transportation accidents. This discussion almost always hinges in any technical forum on how you feel about a study prepared for the Nuclear Regulatory Commission at Lawrence Livermore Lab, referred to in shorthand as the Modal Study. The long and the short of it is we've prepared detailed critiques of the Modal Study. We would argue that this is a major area of uncertainty, and in particular, we feel it is inappropriate for representatives either of DOE or the industry of the NRC to stand in front of the public and give a precise numerical estimate that says, yeah, probability of an accident that could breach a cask happening every year is $10^{-7}$, to give the implication that these precise quantitative risk estimates really will stand scrutiny, based either on review of the models, the data or the sensitivity analyses.

Let's move on.

Cask performance in severe accidents. The analysis that has been used for the most part by DOE and by the State
of Nevada was prepared in 1985 by Roger's Engineering Associates, and it basically looks at a high speed rail impact followed by a long duration, high-temperature fire that results in a small fraction of 1 per cent release of cask contents. Of greatest concern, the less than 1 per cent of the Cobalt 60 and the Cesium 134 and 137, and the modeling that was done. And we've looked at this using some different models, suggested the potential for contaminating a 42-square mile area to an extent that would involve a 460-day clean-up effort and a $620 million in 1985 dollar cost.

The reason I put this up is this: We're not sure that this is the worst imaginable, the most credible accident. We don't have the resources right now to do these calculations on our own. We've raised this issue in the EIS forum, arguing with DOE this is the kind of analysis we expect to see from them.

Another area has to do with cask performance in the event of a successful terrorist attack. Again, some of the issues are the same and some are different. And a terrorist attack, for example, unlike a large fire, you wouldn't expect a large plume that would provide an atmospheric transport mechanism for fine particles of fuel.

What's interesting about the sabotage issue, however, it's one of the few places where DOE actually sponsored a full scale test at Sandia in the early '80s, and
the results of that test showed that terrorists using a military explosive could cause massive damage to the fuel inside a cask, as well as creating a pathway, and basically cause a 1 per cent release of cask contents.

In analyzing these results, the Nuclear Regulatory Commission focused solely on the very small aerosol, respirable aerosol that would be released, and really ignored the larger implication of five to twenty or thirty pounds of spent fuel being distributed over the blast zone, perhaps 100 meters in radius. And that's an area where the State is also developing a whole range of approaches both to looking at the studies that were done for the NRC and also looking at other scenarios that look at more recent concerns, like the use of armor-piercing weapons.

Actually, I was going to tell you a lot about the fight that we're going to have with the NRC over the issues, but we're going to publish that very shortly. So I want to turn to the last set of--yes, the last set of issues I want to bring to you.

We've made a lot of recommendations to DOE. I would argue if they had taken our advice, Dwight and I could be here giving each other's presentations today.

Let me, first of all, show you how we've approached the risk assessment issue. We've argued that a comprehensive risk assessment approach that looks at consequence analysis,
1 as well as probabilistic analysis, is key, and we've also
2 argued that the EIS ought not to be just a process of jumping
3 over some NEPA hurdles, but you ought to look at this as an
4 opportunity to develop a living risk management plan for your
5 project that would be used for the life of the project.
6 To this end, we've commissioned some work,
7 particularly at the risk assessment study program at Clark
8 University, to actually lay out the methodology for doing
9 comprehensive risk assessment, and we've also put it in a
10 much less academic approach. This is a handout that I gave
11 at the last EIS scoping meeting. And by the way, I want--you
12 know, we don't often have our opinions say, you know, many
13 good things about the Department of Energy. I really thought
14 that while there were issues that could have been done much
15 better in terms of more meetings in Nevada, the Department of
16 Energy did a fairly credible scoping job and allowed lots of
17 material to be put into the record, like our concerns. And
18 so I'm hoping now that as work on the EIS picks up, that they
19 will actually go back and look at these issues.
20 This is a way of summarizing issues for the lay
21 public. These are the 10 questions that that risk assessment
22 should answer in plain language.
23 We've made many recommendations regarding rail
24 transport. The bottom line to us, rail is the mode of
25 choice. We want to see a reduction in the number of
shipments, the use of dedicated trains in large capacity dual-purpose casks. We want to see dedicated trains operating under AAR-approved protocols, and we want to see the normal institutional relationships that we've argued for addressed as early as possible.

We've argued for full scale testing of shipping casks and also argued that it has to be part of a larger process that involves a re-examination of the adequacy of the NRC cask performance standards, and in addition to regulatory testing, I think there is a need to at least evaluate the potential benefits of randomly selecting a production model cask and testing it as well.

The State of Nevada has worked very closely with the Western Governors Association. Indeed, we've co-chaired their WIPP Transportation Technical Advisory Group for most of the last five years to jointly develop a set of transportation safety protocols for truck shipments of waste to the New Mexico facility. I've given here some of the general concerns. The next slide shows some of the specific things. We've basically looked at all the nuts and bolts issues from carrier selection, emergency response equipment, how to do inspections, down to developing program evaluation measures to make sure that we're spending federal money wisely.

That, I believe, is the best example of where
there's been cooperation between states and DOE, and we would argue that this model, which uses regional organizations like the Western Governor's Association of the southern states' Energy Board is a much better model than an open-ended privatization approach.

Regarding implementation of the requirements in the Nuclear Waste Policy Amendments Act for financial assistance to states to provide training both for accident prevention and for response to accidents, we are sadly disappointed with the approach that the Department is taking here. They've argued that they don't have to implement this program through rule-making. They argued that they don't have to find an adequate amount of money to actually meet the needs. They just have to figure what reasonable amount of dollars they can get from Congress and then come up with a fair allocation process. And, indeed, we're constantly struggling with them over issues like whether they should restrict our ability to buy radiation detection equipment or clean-up equipment to 10 per cent of our allowable grant. And for the life of us, we cannot understand why state emergency management organizations should be micro-managed on issues like that.

And so then when we turn to some of the detailed issues that we've raised, again, we've tried to lay out for DOE the nuts and bolts of how a technically safe
transportation program can be built, and do it in a way so that it's not only technically safe, but so that it's perceived by the public as being safe.

Finally, privatization. I guess the saddest thing I have to report is that I don't see any evidence at any of the issues that the State of Nevada or other stakeholders have raised with DOE that have actually been considered so far. In fact, you know, when you're reading RFP language, it's often confusing, and one of the key issues between Nevada and DOE is this regional approach. And when I finally saw the draft RFP, the provision for regionalization was written so quirkily, that I called my boss and said, "Hey, I think we won one," and I was really deflated when I brought that question up with Dwight and he said, "No, we haven't changed our approach. We are looking to break the country into four regions and have at least two contractors, that no contractor would have more than two regions.

So process wise, I would argue that DOE defeated a lot of the good work that they've done through their regional organizations, through the transportation coordination group, through the transportation external coordination working group by unilaterally laying these ideas, that it would have been much better if they had come to us and said, you know, we're under all this pressure from Congress to come up with privatization. How should we approach this in a way that
would be acceptable to all the stakeholders?

It's sad to me that after almost 20 years of locking horns over this and thinking we've made some progress on process--and I'm not blaming Dwight. It was probably the legal department because they're usually the folks who make those decisions as to how you will put forward the language, particular with federal procurement, which is a very difficult issue.

So I am sensitive to the constraints they operate in, but they missed a big opportunity here.

In terms of specific issues, maybe the single most important problem here is what DOE doesn't want to tell the contractors to do. We don't have any problem with telling the contractors we're going to set performance standards. We want to see you maximize the use of rail. We want to minimize the number of truck shipments. That's the approach that we think. If you take an open-ended, market-driven approach, we're very concerned that not only will there be a large number of shipments by truck, but that when we look at the coordination problems, that raises both real safety and perceived risk and public acceptance issues.

Uncertainty about state oversight rights is another issue. This is a difficult one to explain shortly, but in both the '82 and '87 federal legislation, there are all kinds of provisions that require DOE to do things, develop
transportation plans, work with the states, and a lot of the
state oversight role has evolved from programmatic provisions
and is not embedded in regulations. And we're afraid if you
go to this privatization approach, our influence could well
be minimal.

The regional approach to contracting. I hate to
pick on you on this, Dwight, but I asked, I said, look, what
if one vendor clearly submits a superior proposal for each of
the four regions? How are you going to deal with that?" He
looked me in the eye, and he said, "We would have to repeat
the procurement."

Well, first of all, that's not an efficient way to
do business, and secondly, it tells me that this notion of
trying to keep cost competitiveness alive is more important
than excellence. I don't think that's a standard that DOE is
going to want defend in public meetings in Pahrump or Kansas
City or Chicago or Denver, along the transportation
corridors.

Coordination in the real sense is a big concern
because the RFP only applies to the civilian spent fuel
shipments. Also coming to the repository will be thousands
of shipments of DOE-owned spent fuels, DOE-owned high level
waste, so-called miscellaneous waste requiring geologic
disposal. At the same time, DOE will also be operating other
shipping campaigns through the EM program, in particular tens
of thousands of truck shipments to the WIPP facility in New 
Mexico, in many cases using the same corridors, the same 
routes through the same states. They haven't thought through 
all the coordination issues. Perhaps when we write our 
comments, we'll persuade them.

Finally, there are many unresolved issues, safety 
issues, Yucca Mountain access issues, and we're concerned 
that instead of trying to work those out with the states, and 
particularly with the state of Nevada, DOE intends to throw 
this to contractors. We think that would be a big mistake 
for all the bad feelings, for all the adversarial 
relationship that exists between the State of Nevada and DOE.
The State of Nevada has separated our concerns about 
repository siting from our concerns about transportation.
Absolutely, we're not doing anything to help DOE get a 
repository license for Yucca Mountain.

But transportation is the area where we believe 
we're most likely to be adversely affected by this project. 
So it would be stupid for us not to consider the possibility 
we're going to get stuck with the repository, so we're trying 
very hard to participate in the development of the 
transportation program as it applies to the privatization 
approach and as it applies to the other areas I've talked to 
you about.

I apologize for going over that extra 10 minutes.
I very much appreciate this opportunity, and I hope from now on out that we won't go so long without spending more of this kind of time in each other's company.

Thank you.

ARENDT: A couple comments. One is, it doesn't have any relation to what we're here for, but had I known you were a Packer fan, I would have brought you my Chiefs hat.

Now, you have presented a great deal of information that's going to require a great deal of thought on our part in evaluation of it. You run over much, much, much material. And I don't have any real questions, and I don't really have any responses, except that I will see myself that we will evaluate what you have presented.

Are there any other questions? Yes, Dan Bullen.

BULLEN: Dan Bullen, Board designee.

First, I'd like to thank you because we did get a lot of information, and I found out that the train that carries the waste is going to go about 20 blocks from my house, which doesn't bother me, by the way, but I think you should notice that.

The second thing that I want to ask you is that, you know, I'm very interested in your risk assessment, and I want to know if the State of Nevada has done the same type of risk assessment for hazardous waste materials and hazardous materials that are shipped through the country, and if they
have, are those data kind of available, and if they haven't, when are they going to do it?

HALSTEAD: Well, that's a real good question, and that's a fair question. My argument, and I've been involved not only with nuclear waste transportation for a lot of the last two decades, but involved a lot with one slice of the HAZMAT industry, petroleum, particularly petroleum fuels. I think it's about time we start regulating everyone else to the standards that we've attempted to regulate radioactive materials. And I think that's, in fact, what you see happening.

For example, in the HMTUSA, Hazardous Materials Transportation Uniform Safety Act of 1990, which has promulgated rules for the routing of the most highway hazardous categories, you know, inhalable toxics, for example, that are basically modeled on the processes that were developed in HM-164 for routing nuclear materials, I think the real problem here, frankly--well, actually there are two problems. One is lack of funding at the State level. We've had difficulty in this state, as other states have had, levying fees on private industry in those areas where we haven't been preempted by federal regulation to actually have independent funding that work.

And secondly, we've both had interagency overlap at our own state and local level, and it's compounded by federal
pre-emption.

For example, I'm not sure how--well, let me give you an example to show you what we've tried to do. The state of Nevada's Public Service Commission is responsible for regulating rail shipments of hazardous materials, and there's a famous inconsistency ruling where we tried to argue that carriers should not be allowed to leave boxcars of Class A and B explosives on sitings without some security, like a fence around them or guards. And we got preempted at the federal level for trying to develop those types of safety regulations.

But I think many people do have a double standard. They want to be harder on nuclear materials and other HAZMAT, and I think what you're seeing, particularly with things like the petroleum tank car study that was mandated in the HMTUSA, you're seeing a move in the opposite direction, to take the strict approach and apply it to everything else.

BULLEN: I just applaud your efforts, and I just would like to see them extrapolated because, you know, the safer, the better for the entire nation.

ARENDT: Are there any other questions? If not, thank you very much.

HALSTEAD: Again, thank you for the opportunity to be here.

ARENDT: The next speaker--I've lost him for a moment,
but I'll find him--Brad Mettam.

METTAM: You only lost my name. I was still here.

As you said, my name is Brad Mettam. I represent Inyo County, which is a California County, and is one of the 10 counties that were and are still considered the effective units of local government.

We were asked to come and present the local perspective on the privatization issue, and we have involved three of the counties that still have programs involving Yucca Mountain in place. As you may know, there was no funding in the last two years for local government involvement, so there were just a few of us still hanging on.

We'd like to talk a little bit about--am I loud enough back there? Okay. That's strange, I can't hear me.

Okay. We'd like to talk a little bit about what we see that is potentially wrong with the RFP, key elements of a process that might work, and the benefits of using such a process. We consider our views to be representative of local governments virtually anywhere, although what you find here are local governments that have gotten expertise on the issues and have retained that, at least for awhile.

We don't see privatization by itself as being the problem. If you look across what's going on at Yucca Mountain right now, you'll see that most of the people working there are already contractors. You know, this is not
a DOE intensive operation. If all the DOE people went away,
most of the workers would still be there.

The problem really isn't privatization. The
problem is that you're privatizing the transportation policy,
as well as transportation operations.

In our view, the privatization of transportation
policy decisions, along with the transportation operations,
is just not going to work. The RFP in its current form
leaves most of the major decisions in the hand fixed-price
contractors, without providing any policy direction.

In any privatization effort, we see that the agency
must provide the policy direction to the contractor at the
onset. If you don't do that, then you have some real
problems.

Some of the areas where you have to provide policy
would include interim storage options, whether you be on site
or off; mode and cask choices, you know, do you go by rail,
do you go by highway, what size cask do you use, do you go
with existing cask or not? Clearly, to us, a campaign of
this magnitude--in a campaign of this magnitude, regulatory
minimal compliance is not sufficient, especially in the area
of routing.

We also feel that interaction with local government
is not appropriate to be done in the hands of several varied
contractors, and we'll talk about that in a moment.
As we see it, the current proposal does not identify optimal interim storage or transportation strategies, it does not allow the development of an efficient national routing plan, and it does not demonstrably minimize risk.

We feel that it's important that you not rely on minimal regulatory compliance to create a safe program. And, in fact, as we'll talk a little later, other programs, both within the Department and in the industry, have not relied on minimum regulatory compliance.

The regionalization, the breaking the country up into regions and not requiring or not really coordinating that effort, means that decisions will be made by fixed-price contractors, based almost entirely upon minimum regulatory compliance. It also means that corridor states, counties and local communities will be required to deal with up to four different RSAs.

If you take the diagram that Dwight showed earlier and you start drawing on that diagram the transportation routes, you realize that there are a lot of communities along those corridors that are going to be dealing, as was mentioned by the chairman, with many different RSAs, with different policies, different methods of interacting. All of those things that are not defined in the RFP will be developed independently by each of the RSAs.
A few of the implementation realities of what we see as a 40-year national transportation campaign, you're going to be starting from 80 counties. You are going to cross at least 800 counties, and that's using the MPC base case, which is likely not to be the actual transportation case.

In each of those counties, you're going to be interacting with the local populous, and you're going to be interacting with local officials. Those people exert influence at both state and federal levels. In essence, what we're saying there is, if you do not develop a policy, you will find a policy developed for you, and I don't think that's the approach you want to take.

You have to develop a campaign that will be acceptable, or at least tolerable, by answering some very specific questions. The question of modal choice, why are you shipping it that way? Why, in this instance, for example, are you using truck and in another instance you're using rail? Why are you shipping it through our community? How did you develop the routing strategies? And is there a safer way to ship it?

You will also have to make certain that the local emergency management and emergency response community considers itself trained and prepared and is willing to say so to its own constituents.
You should note that in the RFP, DOE has retained the 180C provisions as something of their own responsibility, which means that in addition to dealing with up to four different RSAs, you're going to have another layer, potentially--certainly not closely coordinated with the RSA work, that we'll have to deal with as well.

We think that other programs and other shipping campaigns have either recognized this problem from the outset or have learned it as they developed. I note a few of them on the slide there.

Some of the key lessons that we think are learned there, and this is not by any means an exclusive list, is that a negotiated decision process is more likely to engage the stakeholders. Early route selection narrows the field of impacted parties and allows focused efforts, that state and local jurisdictions know their own transportation systems best, and finally, that perceived problems are still problems.

We think that DOE must develop a system that demonstrably reduces both risk and uncertainty, and that the only way to effectively do that is a systems approach. You have to address such issues as interim storage strategies, both on-site storage and off, mode selection and modal mix, a priority in the reduction of the number of shipments, a national route selection process, and the potential to
1 consolidate routes across the country, practical public
2 safety protocols, such as bad weather protocols around the
3 routes.
4     We feel that there are key policy issues that need
5 to be resolved and that stakeholder involvement prior to
6 tasking a contractor is required.
7     Jim Williams, who is representing Nye County, will
8 talk a little bit about what that process might be, and then
9 later we'll have Clark County.
10     Jim?
11 WILLIAMS: I'm Jim Williams, and my role in this little
12 tag team we have organized here is to try to answer the--or
13 provide an answer to the question if the current process
14 won't work in our opinion, what process might?
15 And our answer in basic terms is that a process
16 that might work is one that provides convincing answers to
17 the kinds of questions that Brad raised; have the risks been
18 minimized? Is there a safer way? Why are you shipping this
19 way? Why shipping at this time? Why shipping through my
20 community? Have all interests been heard; have they been
21 considered? And it provides those answers to the key
22 stakeholders in the process, including utilities, including
23 DOE, including host state and corridor communities, state
24 commissions and others.
25 Our perspective on this is the perspective of a
corridor community. It could be those that are represented here today, or it could be 800 or so others across the nation. We are also, in these communities, are anticipating some decisions regarding transportation. They will consider a significant momentous of local import and need a context in which to make those decisions. It's difficult to operate without that.

We're also aware that the state of Nevada would observe that locating centralized storage in Nevada has been illegal for a decade or more, and there's no necessary reason to assume that such a facility would be up the road from here. And we've noted the NWTRB's position that centralized storage is needed, but perhaps not now.

So what sort of process might provide these convincing answers to the questions? And our notion there, and this is for discussion, but our answer to that question is a systems planning process at a sequence of decision levels, each of which is designed to provide a useful context for the next decision level, each involving major stakeholders participating under ground rules negotiated.

For discussion, we've identified four sequential levels. One is a set of national policy guidelines. A second is the specification of those four particular sites, and for corridor communities across the nation. That might set the context, a useful context, for the identification of
transportation corridors in the host state, which in turn might provide a useful context for transportation decisions in the host state corridor and site communities--and requires a credible information basis, which is somewhat more systematic, somewhat more detailed, somewhat more comprehensive and more interactive than what has been provided here for.

I'll go through and explain a little bit about what we mean about the information basis and then address the decision process.

The topics in the information basis include a lot of particulars, cast loading limitations at the various sites, site infrastructure limitations, interim storage options, the dual cask issues that we were discussing, shipment mode options, acceptance and so forth.

Some of these are features of reactors, some are features of pools with vast storage facilities, and others are features of the reactor sites.

The implications, and this is the next one, Fred, --thank you--all right--are numerous. They have to do with the inventory. This is beyond pool capacity of the site, the inventory that needs to be stored after reactors shut down, the cost of this both for the Nuclear Waste Fund and to individual rate bases, the implications of certain cost adjustment processes that might be identified, the number of
shipments, the kind of material that Bob Halstead was talking about of a particular type on particular route segments at particular time periods, and the management emergency response aspects of all of this.

The information sharing is among the--in our concept, is among the stakeholders at any particular decision level. Those stakeholders would define a manageable number of scenarios; out of myriad alternative assumptions, a manageable set of scenarios, which could be--which would include all the topics, all the implications and would be updated with some regularity.

And stakeholders might use the same process to develop scenarios of their particular interest, all of which would be shared in hard copy and electronic form and with feedback from the participants and stakeholders in the process, be they utilities or corridor communities, that builds a robust national database to manage such a campaign.

The status of all this, and on the topics, much of that data exists. Not all is updated, not all is validated. On the implications, there have been studies, such as the state study that have developed much of this, but there are portions that have not been developed.

On the sharing, there's the technical external committee that DOE has formed and sponsored. It's a major organizational resource, but it has not been used for nitty-
gritty negotiation of decision processes.

Now, we'll get to the next one. And on the decision levels, these are the decision levels that we've thrown out for discussion, each of which is designed in our view to provide the context for the next in the process. The whole process, we feel, requires a convener, a convener that identifies the policy assumptions and variables at each decision level, that identifies and invites stakeholders to that level, that conceives and designs the ground rules that are—that think through the basic issues that need to be resolved at one level in order to provide a useful context for the next, that moves that process at an appropriate strategic pace from one decision level to the next, and that oversees the procedural fairness of the entire enterprise.

Each of the several decision levels, we've mentioned four, would itself have a convener. It could be the overall convener or it could be another convener identified for a particular process, whose meeting it would be. Each would have its own group, appropriate group of stakeholders, necessary and appropriate to that level of decision. They would negotiate their decision ground rules and specify their issues to be resolved and their agenda and schedule for which to resolve it.

We think, and have no contentions otherwise, that
the process would be pretty tough and pretty tricky, and
would require some very effective people who had a certain
degree of authority and a willingness to try on this.

We've looked in, you know, very rough terms at the
basic direct cost over the next three years of a process like
we've identified, and it adds up to about seven-and-a-half
million dollars. We've compared that with another extremely
rough estimate of a more adversarial process, which includes
the Phase A of the proposed privatization at about five
million and a series of interventions by utilities and state
commission, perhaps by corridor states and localities,
perhaps by the host state, perhaps by the host state
localities. And our observation is that a systematic
decision process needs only a small amount of money to be
worth it just in dollar terms, not considering the political
terms and the schedule terms.

So now Bart is going to talk about what the
substantive benefits might be.

DI BARTOLO: My name is Russell di Bartolo. Jim
referred to me as Bart because that's what most people do.

Inyo County is in California here. Jim has just
represented Nye County, and here's Clark County. So we
pretty much cover the southern part of Nevada and a fairly
good portion of the southeastern part of California.

I am an Oakland Raider fan, formerly a Buffalo Bill
fan, so this leaves me with the mop-up operation.

I would like to very much validate what has been said already by my colleagues in the county, and also especially by Dr. Stern in the first presentation, which I believe took place yesterday morning, or at least it seems that way. I think it was Sunday.

What I would like to do, just to reiterate before our roundtable discussion, what the potential benefits would be of a system planning or decision process, and even though they are showing up on the slide, I just want to say what it will do primarily for the counties, it would help increase certainty about the program. That is certainty about policy, certainty about management and operations, and certainties about institutional interactions especially.

We know we have seen a lot of changes, a lot of back sliding without a comprehensive noticeable obvious policy with regard to transportation. We've seen some back sliding, for example, with regard to changing the priorities for minimization of shipments by using rail. It's been thrown in the hands--it's been thrown into the privatization program. But we do feel that if the process that Jim provided or described, outlined, would be put into effect, DOE, in fact, because of the buy-in and the cooperation of the stakeholders, would have a very efficient interim storage transportation system, and the Nuclear Waste Fund monies
1 would be spent on steps or programs that would work because
2 they would be if not acceptable, at least tolerable.
3 DOE would have a basis for its privatization
4 procurement process that, again, is acceptable or at least
5 tolerated.
6 Utilities would benefit because they would have
7 more certainty or commitment with regard to scheduling. They
8 would have--in the process we would have already talked about
9 the cost for utilities after the 1998 date and after the
10 reactor is shut down because that's all part of the plan.
11 Primarily, though, we are very interested in
12 minimizing the number of corridor states or communities that
13 would be affected in the national routing plan. We would get
14 answers--we would be more certain about how or whether the
15 risks had been minimized. In fact, one of the notes that I
16 wrote the earlier presenter had to do with a definition of
17 risk. What we find, for example, is that the scientists,
18 technicians and so on define risk in the long term, latent
19 cancer fatalities, for example, where people in the
20 communities define risks as current and hazards in the near
21 future; how can this affect us now?
22 So there's a little bit of a disconnect with regard
23 to what we even mean by risk.
24 We had discussed in the communities and state the
25 whole idea of how the term risk or the concept of risk fits
1 into the whole idea of impact. We tend to look at impacts 2 and consequences because that's what we can see and feel. 3 So we have taken up very enthusiastically the 4 critique and commentary on any EIS that comes out because 5 that begins to tell us what it is that the Department of 6 Energy is thinking about when they are dealing with risk 7 and/or impact. 8 So I think that a process, as Jim described, would 9 help us with those definitions, and it's very, very important 10 to us. 11 One of the things we know that would decrease risk 12 and impact is the minimization of shipments. Given that the 13 route plans are made and acceptable or tolerated, we then 14 know where to provide the resources with regard to public 15 safety, emergency management training, infrastructure 16 improvement and so on, and would be able, no doubt, to reduce 17 costs. 18 The fact is that no matter what the costs are, if 19 it turns out that shipments would be made on roads, say 20 highway, through our community, even--whether or not we have 21 funding for emergency management, emergency preparedness, 22 training, infrastructure improvements, we have to do it 23 anyway. So there is a problem in some cases with unfunded 24 mandates for local communities in the state, and that's 25 something that's very serious to us. So the cost impact to
the local government is very important.

And if you would go to the last slide, Fred? I mentioned already that we feel that given a process as described, we would either maintain or establish a clear delineation of roles and responsibilities among and between governmental agencies, utilities and other stakeholders. Sometimes that disappears. It appears to be disappearing again with the privatization issue. We're not sure where we stand again with regard to the institutional interaction. That's a very important point for us.

Given early identification of highway or rail routes, we would be very--it would be very, very good for us so that we can do our planning with regard to protecting the public, which is a mandate of a local government.

And another thing that we need--that I sort of alluded when I was talking about definition of risk has to do with the idea of developing a common frame of reference, without going into detail, and possibly we may talk about in the roundtable, we have begun to talk again about a common process or acceptable process within U.S. DOT guidelines, with DOE proactive activity to deal with the process for identifying routes. How far along that's going to go, I'm not sure. But we are beginning again to talk about common processes, common databases, common frame of reference for any of our analyses or actions, and I think it's most
important.

And given all this with regard to routing and database, we then will have a framework. We will have an identifiable framework that we could hang on to. Right now, the target keeps moving.

I thank you for your attention.

ARENDT: Thank you, Bart.

And with that, I'll open it up for questions, and if you direct them to me, I'll probably deflect them to one of the others.

Any questions from the Board?

COHON: Cohon, Board.

First, I want to compliment you on the excellent set of presentations. I'm from a part of the country where it's a rare event for three counties from the same state, let alone from two states, to cooperate on anything, let alone something that's complex and potentially contentious as this.

I have a suggestion that I hope you'll follow up and discuss during the roundtable, and no need to comment on it now. In fact, I guess I prefer you don't even react to it now, but rather chew on it.

The process you propose is a very top-down process that looks a lot like the kind of big government, we're from Washington, Carson City, Sacramento, and we're here to help you approach, which some of us don't really object to. But,
1 you know, it's kind of the times, and we're trying to find
2 other ways.
3 The key points, it seems to me, are a) that the
4 criteria by which things like routes will be determined may
5 not include your interests, and likely won't because, as you
6 pointed out, it's based on a private company's push to
7 maximize profit within a compliance framework, but compliance
8 does not minimize--so point one is criteria.
9 The second point you made is coordination. We need
10 a systems approach here. You made some very good points
11 about other forms of waste shipments that haven't been taken
12 into account in other waste coordination. That, too, there's
13 no evidence that the private approach that DOE is discussing
14 is going to achieve that.
15 But the question then becomes how do we achieve
16 those two things, or better criteria and a better
17 coordination, and whether it's necessary to go to such a
18 hierarchical process of the sort that you developed. I
19 wonder if there's some middle ground here that has more of
20 the--to the private sector post-modern approach to government
21 feel about it that DOE is trying to achieve and still
22 accomplishing what you're trying to do. And I think there may
23 be something there and think this could be an interesting
24 creative roundtable.
25 METTAM: Thank you. And I think what I'll do is task
Jim to do that at the roundtable.

ARENDT: Other questions? Staff?

Well, that concludes this portion of the program, and I thank you very much.

COHON: We're going to break in about five minutes and 30 seconds. I have a 30-second thing to do first, Mr. McGowan.

I told you about three of our new members, but I couldn't show you them because they were in the ESF earlier today. To show you what kind of troopers they are, as well as the staff along with them, and I see other people similarly dressed, they're back here attending a meeting, which I think is marvelous. It shows their spirit and enthusiasm.

I would now like to show you these people, as well as introduce them.

The deal is, when I call your name, you have to stand up and turn around so people can see you.

Norman Christensen, he's the guy from Duke, you remember. By the way, I have to explain the new members. We had a little tiff earlier about applause, and we've all agreed there will be no more applause at any of our meetings forever. Welcome, Norm.

Florie Caporuscio, he's the guy from Infermatics in New Mexico. Welcome Florie.
And Debra Knopman, now running a policy center, former Deputy Assistant, Secretary of Interior, staff hydrologist at the GS, et cetera. Welcome, we're delighted to have you. Our full compliment. It's nice to see you all sitting there.

The other business before our break is, as was mentioned earlier, there will be a public comment period, and it's on our agenda, and we will get to it, and we will stay here as long as we have to and accommodate all who want to speak.

However, to accommodate Tom McGowan's schedule, which doesn't allow him to stay here for the public comment period, we've invited him to speak for no more than five minutes, and he has sworn at least three times, and even shook my hand on it, that he would limit his comments to five minutes.

MCGOWAN: As the Baptist minster said, I couldn't say hello in five minutes or less than an hour, but thank you very much. My name is Tom McGowan, and thank you for your kind consideration, and I promise to cut out the part about criminal conspiracy. We'll just stop just short of underground auto catalytic criticality. So just enough to raise the juices.

It's rudimentary that the whole is equal to the sum of the parts, not—to some, but not all of the parts, and
hence, any expediently contrived composite study comprised of intentionally minimal, selectively limited, incremental addressed of certain preferred tangible geophysical components, with the exclusion of all others, and is expediently coupled with any intentionally minimal, selectively limited, incremental addressed in simulation of other preferred components, via stochastic and thereas unreliable, hypothetical, statistical, probabilistic modeling, inevitably obtains as the board of any extent of independently verifiable, as of insured and during the valid and reliable scientific certainty whatsoever. But rather, the hole is, indeed, equal to the sum of its parts, and not to anything else or ever anything less.

Consequently, notwithstanding the expedient claim of study context as an evolving process, contingent upon the accumulation and selective correlation of preferring scientific data derived from an unspecified series of sequential iterations of said composite and geophysical components and hypothetical simulations, none of which is realistically foreseeable as insured invariably scientifically valid and reliable and enduring thereas in perpetuity; a purportedly total system performance assessment, the void of real time concurrent inclusion and the address of the entirety of intrinsic and externally pertinent—thereas further securely constrained as a limited
1 incremental finite micro-cosmic temporal, instant specific
2 and site specific, special aerial context, in contrast to the
3 vastly greater encompassing macro-cosmic, spatial, aerial
4 domain and vastly greater and enduring term of the geologic
5 time scale continuum, is not only scientifically impossible
6 to achieve and thereas fraudulent in extreme, and I cleaned
7 that up. But also obtains as the classic paradigm of the
8 intentional absence of personal and professional integrity
9 and scientific objectivity, particularly as guys in the
10 dammingly transparent armor of those masquerading as
11 unavoidably and expediently--being forgivably uniformed, were
12 nevertheless persistent, starkly arrogant defiance of the
13 fact that essentially and ultimately unity is plural, to the
14 best of my understanding.
15 Since the term viability is both indicative and
16 securely contingent upon the--capability of an entity or
17 system to obtain and sustain invariably in context as wholly
18 independent of any and all external stimuli, impetus and
19 interactive and no interim active phenomenal whatsoever, is
20 scientifically impossible for an underground permanent
21 repository facility to either obtain or invariably--sustain
22 as independent of a contiguously encompassing host geologic
23 and hydrogeologic domain and of the series of concentric and
24 sequentially greater encompassing host domains, respectively
25 comprised of planetary solar systematic, galactic and
universal context.

Notwithstanding any extent of--agenda driven--subjective agenda driven, I beg your pardon, unscientific as being the rationale--implications and interim act of consequences of however currently configured is potentially divergent and seemingly innocuous, geophysical and hydrolgeologic phenomena are nevertheless subject to egregious perturbations in the instance of an artificially-induced thermal loading impediment, whose--may readily accelerate the cooling intrusion and emerge in process and make sure the premature release of migratory transport of toxic radionuclides via an expanding wake impact in both the surficial biosphere and subsurface ecological root systems, as well as the groundwater and downslope human accessible environment, encompassing and impacting all burrowing and tunneling vertebrates and invertebrates and--micro-organisms inclusively, hence and total obtains the scientifically and technologically insuperable over any substantially enduring term, and for the simple reason that not the however fervent postulations of the DOE OCRWM--but irrefutably, change is ordered universal constant, as is abundantly having to do all but the certifiably comatose and as a scientifically observable from the micro-cosmic, sub-nuclear scale to the macro-cosmic universal scale inclusively. Therefore, it's axiomatic. Please don't cry, just a song, that the
underground geophysical domain is naturally ordered as in the
state of variable dynamic flux, ongoing and continuum from
inception to eventual cessation, currently projected to occur
in approximately four-and-a-half to five billion years
henceforth, which not incidentally coincides with the initial
active half-life term of duration of Uranium 238--I said
initial. There's about 10 more.

Consequently and scientifically and technologically
impossible to guarantee the safe, secure and intrusion or
disposal of toxic radioactive, high-level nuclear waste and
spent nuclear fuel in an underground permanent repository via
any combination of waste isolation whatsoever, and any
combination of natural--bearers whatsoever, over any enduring
term whatsoever, and on the basis of any hybrid compositive,
historical, scientific evidence and hypothetical statistical
problems of modeling whatsoever, and our expediency based
inherently fraudulent, total system performance assessment
and viability assessment whatsoever, and as invariably
insured securely subject to institutional control over any
substantially enduring term whatsoever, reliant upon the
persistence of any man-made law and are sovereign
jurisdiction whatsoever, either at Yucca Mountain, Nevada, or
elsewhere nationally, or anywhere within the terrestrial,
geophysical domain. And this is my final 10 seconds, or
yours, one or the other.
Therefore, in reiteration, don't star it and eject into the human accessible environment. Simply eliminate it completely and permanently from the terrestrial geophysical domain.

Mr. Chairman, there are a few seconds remaining. You've been very, very kind. I respectfully request that the chairman provide you unequivocal real time response on the public record to the following question. Precisely, what is it that the leading scientific technological and academic minds of our time do not fully understand about the fundamental difference between right and wrong? It's quite that simple. Thank you once again, all of you.

COHON: Thank you, Mr. McGowan. I just want to know when it is you wrote that, Mr. McGowan. I mean, you've been participating in this meeting all along. Thank you very much.

We will adjourn now for a break until a quarter to 5:00 by that clock.

(Whereupon, a break was taken.)

COHON: Would the roundtable participants, please come to the front and take their seats.

We're missing Mr. di Bartolo and Mr. Mettam.

ARENDT: Well, welcome back. It's about 10 minutes to 5:00. We were supposed to start at 4:30, so we have--we're 20 minutes late, and we're due to finish at 5:30. So why
1 don't we just assume that everybody wants to stay until the 2 end, and so we'll continue the roundtable to around 6 o'clock 3 or maybe 10 minutes to 6:00, something on that order.  
4 We'll now continue our discussion of the  
5 transportation in a more informal roundtable format. Our  
6 earlier speakers are now being joined by a number of other  
7 guests with an interest in this subject. They will start  
8 this part of the session by giving us their views in a brief  
9 five-minute opening statement.  
10 We will begin first, however, by going around and  
11 let our new guests introduce themselves. And as far as I  
12 know, the only new guest we have is Fred Millar. Would you  
13 please--  
14 MILLAR: I'm Fred Millar with the Nuclear Waste Citizens  
15 Coalition.  
16 FRONCZAK: And I'm Bob Fronczak with the Association of  
17 American Railroads.  
18 ARENDT: And we will now hear the opening statements,  
19 and we'll begin with you, Bob. Do you want to start?  
20 FRONCZAK: That's fine.  
21 My name is Bob Fronczak. I'm Executive Director of  
22 Environmental Affairs for the Association of American  
23 Railroads, and we represent the Class I railroads, people  
24 like Union Pacific, Santa Fe, CSX, Co Rrail, the railroads  
25 that are going to be shipping spent nuclear fuel over the
I, like Bob, have about four hours of material to present in about five minutes, so I'll be as brief as I can. If I could have the first slide, please? And if you think it's late, my watch says 8 o'clock, and I've got a flight to catch back to Washington tonight.

I'd like to just briefly cover our objectives and talk a little bit about background, although I'm going to breeze by most of that in the essence of time; talk about railroad operating trends and this whole risk management approach, and we feel that there's several opportunities technologically to address risk. And we think that's addressable through the cask, the cask and car as a unit, and the cask in the car in the train carrying spent nuclear fuel. Then I'll have a few brief conclusions.

Our objective is safe and efficient transportation of spent nuclear fuel by rail, and I would argue that currently it's safe, and I'm not quite sure that it's efficient right now. And as I mentioned, we feel that it's a three-component system, including the cask--the cask and the car and the train. Once again, goals are efficiency and safety, and in order to achieve that, we need a common understanding of the issues involved.

Just a brief background, and Bob already mentioned this. Depending on which estimate you look at, up to 90 per
1 cent of spent nuclear fuel has been estimated to be shipped
2 by rail in the future, and that's going to mean about 400
3 casks; once again, depending on what type of cask is
4 involved.
5          Now, to put that in perspective--and if I could
6 have the next slide--that is a very small amount of business
7 for the rail industry. Our largest carload commodity that we
8 track is coal, and that's in the 25 per cent range. The
9 smallest commodity that we track is freight for the
10 shipments. I think that's 1 per cent. Spent nuclear fuel is
11 estimated to be .0017 per cent. So it doesn't really matter
12 if 50 per cent or 90 per cent of it is shipped by rail. It's
13 still a minuscule amount by carload.
14          If you look at that from a revenue standpoint,
15 because hazardous materials have a little bit higher revenue
16 than other materials, coal is still our largest commodity by
17 revenue, but a smaller percentage. And the smallest material
18 or commodity that we track is metallic ores at 1.2 per cent,
19 I believe, and spent nuclear fuel, I believe that's .068 per
20 cent, is our projected revenue, and that's using some of the
21 costs of the three-mile island shipping campaign. And
22 freight rail rates at least have gone from that time. I just
23 kept it a flat projection.
24          As far as railroad operating trends, trains are
25 longer and heavier than they've ever been. Freight cars are
1 also heavier than they've ever been. A typical freight car
2 when NRC standards were first developed was probably 70 tons.
3 We're consistently running 100 tons now. Some of the unit
4 trains that we run are up to 125 tons, the unit coal trains.
5 And the car that we're looking at here, you're looking at,
6 at least what I've seen on the drawing board, 200 tons.
7 In addition, traffic density is also increased.
8 The freight rail network is working harder than it ever has
9 been in the past, moving more freight with less--at less cost
10 than we ever have.
11 Once again, we feel that in order to achieve safe
12 and efficient transportation, in an incident-free
13 transportation system you have to look at the car, the cask
14 and the train as a unit.
15 We feel that from the car design standpoint, that
16 you need to minimize the possibility of a derailment to the
17 extent possible, and there's a bunch of ways you can do that.
18 The other thing we think is you ought to be able to limit
19 the damage to the cask in the event of a derailment. In
20 order to do that, you need to look at the cask and the car as
21 a system.
22 The Peace Keeper-Rail Garrison project was an
23 example of using best available technology to the extent
24 possible to prevent that heavy piece of equipment from
25 derailing in rail transport. So we think it's very possible
that we can do it with spent nuclear fuel shipments.

In addition, we feel that there's going to be a sufficient volume of spent nuclear fuel shipped in the future to make a dedicated fleet of vehicles readily available and doable.

As far as car design goes, once again, we feel that there are things you can do to reduce the risk of a derailment. Some of those things are premium suspension components. This car is going to be heavy enough that it will require a three-axle truck; in other words, three wheels under each side of the car, and there are--there is articulated truck technology in use on locomotives today. We feel that ought to be employed in this system.

We also think that we need to analyze the car design for derailment modes. As far as the privatization effort goes, at least in the MPC/RFP there was mention of the car having to meet AAR interchange, freight car design standards, and what's called Chapter 11 testing to prove that that rail car meets those standards. We feel that that ought to be incorporated in the privatization effort. We don't think that just regular meeting DOT standards is enough. We have 150 years of rail operating experience, and we feel that some of that experience ought to be employed in the design of the system.

Things like program maintenance ought to be
1 considered. I can't read that from here. Oh, yeah, we need
2 to minimize the probability of a derailment to the extent
3 possible. I think Bob mentioned in the past, or earlier,
4 that if we have a derailment involving spent nuclear fuel, no
5 matter if the car ruptures or not, it's going to be
6 potentially a very major incident, and from our standpoint,
7 we're concerned about how long our track is going to be out
8 of service because every time you have one section of track
9 out of service, it affects the entire rail transportation
10 network.
11 And, also, we feel that there are some things that
12 you can do to the car that incorporates protection of the
13 cask, things like double shelf couplers where the cars don't
14 come detached from each other so that you minimize the
15 potential for cars crashing on top of each other, for the
16 couplers impinging on the side of the cask, those types of
17 things.
18 As far as the train design goes, we feel that you
19 don't want to just throw in a very heavy specialized design
20 cask and car in any old freight train, which is the way at
21 least we're forced to handle some shipments today or we're
22 asked to handle some shipments today, that it ought to be
23 designed as a unit train or dedicated train. Once again,
24 that would be mixing a fairly high-tech car that you don't
25 want to derail in with freight cars that have been in service
for 50-some years.

It minimizes train handling force, as I've already talked about, you know, the fact that you don't want to really mix a 200-ton load in with fairly light loads, 100-ton to 70-ton loads.

We feel that buffer cars ought to be designed as part of the train and be of similar weight at least in train handling characteristics.

Having a dedicated train allows you to also utilize electronic braking technology, which is readily available or currently available in the rail industry. In the past--I mean, all freight trains today run on pretty much air brakes, which requires a signal of air to travel from the locomotive to the end of the train. It takes quite a while for that to happen, and it can take up to a mile to stop a freight train, a long freight train today. With electronic brakes, the brakes are applied throughout the train instantaneously, reducing the stopping distance significantly.

And we also feel that a dedicated train allows the use of defect detection equipment, things like wheel bearing --hot wheel bearings, brake failure, coupler failure. That all can be monitored throughout the train on the locomotive, and if we use satellite tracking technology, that could be satellite transmitted back to some central location.

We feel that, once again, the dedicater or unit
train concepts would minimize the amount of time in transportation and make that transportation system more efficient and effective. Currently, a car switched through a rail classification yard could take several hours, up to several day to switch through the yard. We don't think we want these cars standing in rail yards for that amount of time. It will offer high-priority scheduling. You can bypass the classification yards. A short train would allow for faster accelerating and quicker stopping.

And once again, armed escorts, I don't think we want the armed escorts in major metropolitan areas spending days in freight classification yards.

Hopefully, I've raised some questions in the audience and we can address them later. I guess what I'd like to say is we need to understand what the cask is capable of so that we can design a transportation system as far as what the train looks like, what the cask and the car looks like and what sort of operating restrictions we may need to undertake.

And once again, the system needs to operate as a system.

I thank you, and I went over my time limit. I apologize.

ARENDT: Dwight, do you want to make some comments?

SHELOR: Yes, I would. Not in addition to my
presentation, but just as a follow-up, one thing I was
remising earlier, and that was talking about the relationship
of this so-called Section 180C to the transportation services
effort and the potential for an interim storage facility or
repository.

I just want to point out that in the Section 180C
where we were required to provide funding to states, tribes,
so that they could in turn ensure that safe normal
transportation and emergency response awareness training was
available to the affected local communities and states, we've
gone through a process in terms of the policies and
procedures on that. We've issued a draft. We've gotten
several really good comments. We're in a process now of
considering all of those comments, even to the point now
where we're considering issuing another draft on the policy
and procedures for that.

I think the comments were very good. I think we'll
always have a problem recognizing the absolute amount that
any one state or tribe would receive, but I think the
process, based on the comments, could be definitely improved.

And I also just wanted to note the fact that Bob
Halstead and I do talk to each other. We're very good
friends. I think Bob has pointed out some things. I hope
that many of the things that he's pointed out can be
addressed in the comments on the draft RFP and accommodated.
Lastly, and maybe to encourage a panel discussion, I'd like to say that the concepts presented by the gentlemen from the counties is a concept that we had talked about. I believe, and I think I would like to see some discussion on a very difficult part, and that's who is the coordinator and which is the key to that type of process taking place.

It has to be at, unfortunately, in my view, probably a high level, but it has to be done by someone who can make a commitment. It's the--making commitments of funding activities is the key to that whole process, and the challenge to us is hopefully to have that process take place before we issue an RFP for a service contract on a fixed price so that we can tell them what the policy direction is and be able to implement it in a structured manner.

ARENDT: Fred Millar?

MILLAR: I'm Fred Millar, and I'm the Washington Coordinator of the Nuclear Waste Citizens Coalition. I don't have any slides, but I'd like to be able to see everybody I'm talking to here.

One of the things we've been mainly doing is trying to fight off S-1936 and the other bills that would ship all kinds of spent value out for a parking lot, basically is the way we call it, and we only very narrowly escaped those bills being passed in the last Congress, and now there's another one that's been introduced this time. S104 has already been
brought to the Senate and is on a real fast track to move. So there's a kind of a baseline issue I wanted to chat with Board members about, and this comes from talking with some of you, and that has to do with kind of a threshold question, and that has to do with some of you may be under the impression that the court case against DOE has settled the question of whether DOE has to start transporting spent fuel in a big hurry starting in 1998 as by their contract. I mean, I had a Senate aide of a very key Senator last week tell me, "That court case settles things. You know, now we know DOE has got to start shipping waste to an interim storage site in Nevada." Well, the court case doesn't say that. The AP story says that, however. The Associated Press story does say that that should happen, but that's not the way the court case came down. The court case does say that DOE has to compensate the utilities for breaking their contracts in 1998. The court case defines "disposing of waste" in broad and vague terms, but it's very clear that it could include such things as DOE, instead of taking trucks to the reactor sites, they could take bags of money to the reactor sites and say, we are going to pay you for on-site storage as a way of compensating you for our breaking the contract.

Now, I'm not recommending that or advocating that. I'm just saying that it is a misperception to think that
this court case has settled all this, and I hope that--I
mean, I just thought that some Board members might find it
useful to have that sort of clarified. The Board clearly--I
mean, the Court clearly quoted the current law that says DOE
does not have to take title to the waste until a repository
is operating.

So DOE could conceivably pay the utilities out of the waste fund for on-site storage while not taking title to the waste.

Okay. So I just want to try to make clear that that's sort of a current legal situation from the Court point of view.

Now, at the risk of trying to tell Board people more that you should be doing, I think it's fair to review a little bit about the transportation side of things in this way: As we have learned, in the act that sets up the Board's responsibilities--I'm indebted to the staff people for helping me with this analysis--there's only two examples that are given of what the Board might be doing. One is analyzing site characterization, and two, is analyzing transportation.

Well, let me point out that as far as I can tell, the vast majority of the Board members have been chosen for their site characterization expertise, and as far as I know, there's maybe only one that has sort of been chosen specifically for transportation expertise. And I think it's
fair to say that the transportation side of things has been
very neglected up 'till now, and I think that there's a
reason for that. And the reason is that I think the Board
has sort of systematically, but in a non-scientific way,
accepted the assumption that the risks in transportation are
negligible.

Now, Lord knows that's what the NRC says and the
DOE says and the utilities say, but it's not a very good
posture for the Board to say, as they do in their most recent
report, that numerous analyses say that the risks are
negligible, right? The fact is that there's been no Board--
there's been no Board review of the major technical documents
on transportation, the Modal Study, NUREG 170, any of those
things. You all haven't reviewed any of those things, and so
you're sort of in the position of not having very much
traceability or transparency about this, okay, to use some
terms from the earlier discussion today. I mean, the Board
is not in a very strong position about saying we are giving a
technical review to the technical issues of risk.

Now, I'm not talking about institutional stuff and
perceptions and all that, but in your most recent report, you
just blow this off. You say there aren't any technical
issues. There's no safety risk. It's all perception of
risk. Well, I mean, if you want to say that, I think you
ought to show it, right? I mean, I think you ought to have
1 to defend your blowing off of that whole thing and your
2 acceptance of what I would call the establishment's framework
3 for all of that.
4       Now, I mean, just to give an example from one of
5 your--in your recent report, you said, for example, there's
6 been no serious accident over the decades in the United
7 States where radioactive waste has been shipped. There's
8 been no serious accident, as if that was a significant
9 statement. The fact is, there's only been 2,400 shipments.
10 I mean, ask Mr. Fronczak, is that a pitiful small number of
11 shipments or what compared to the amount of hazardous
12 materials that he ships? It is a pitiful, small database,
13 and if you did a statistical analysis, how many serious
14 accidents would you expect to occur in 2,400 shipments in the
15 United States? I mean, probably not one, right?
16       And so the fact is, there's no significant database
17 here. Having no accidents in 2,400 shipments is no help.
18 There's been no accident that tested the integrity of the
19 casks. I mean, the most serious accident was where a truck
20 rolled into a ditch and the cask, you know, slid along in a
21 ditch. I mean, that is hardly running broadside into a
22 bridge or anything that would test the cask integrity.
23       Another example just of sort of maybe unbuttressed
24 assertions, is that in the report, the Board asserts that
25 they believe that a centralized storage facility could really
enhance the operations of the repository system. I mean, you go on for about four pages about how you believe this and you believe that, about how, you know, a centralized storage facility could help. You don't cite a single source. I mean, you haven't cited a single story that you've looked at. You haven't reviewed, as far as I can tell, any serious discussion about that. In fact, it's kind of a nice idea, but, you know, it doesn't--I mean, you don't show that you've actually looked at this in any technical context of logistics, or whatever.

So just for what that's worth. That's just another traceability and transparency problem.

You know, the shipment of nuclear waste in the United States is being held up by the utilities and DOE. It's something that ought to go on as routine. It ought to be just a routine part of the system. In fact, as Mr. Fronczak knows well, the railroads fought vividly against that nuclear establishment for years about trying to require special train service and so forth, instead of making it just routine, and they lost. I mean, the nuclear industry and the utilities have won the principle that they can ship radioactive spent fuel trucks through Manhattan. They can ship anytime of day or almost any route and with no dedicated trains, et cetera. They want it just to be routine. They want it mixed in with any old cargo, and the principle is,
1 once we put it in the cask, it is safe.
2 Okay. So I don't think that's going to be
3 politically sustainable. I don't think that the fact that
4 DOE has not chosen except the safest routes is going to be
5 politically sustainable. And so I think that what we're
6 faced with is the choice of whether we're going to have to
7 look at transportation of radioactive waste as more of a kind
8 of an emergency situation requiring unit trains and special
9 train treatment and so forth. I mean, that is the cutting
10 edge question that I think the country faces about
11 radioactive materials transportation.
12 And in my mind, there's two main bases to this
13 question. One is the technical studies that have been done,
14 which I've just referred to and which I wish you'd at least
15 express your position on whether you ought to review them or
16 not, and secondly, there's the propaganda films, you know,
17 the crash test films and all that. I mean, you all haven't
18 also done any studies on what would be a respectful set of
19 crash tests; you know, what would be--I mean, what can those
20 crash test films show us besides wonderful visuals. You
21 know, sometimes I wonder whether the next set of crash test
22 films are not going to be sort of holograms that some high-
23 tech company produces.
24 The fact is that those are technical questions that
25 I'm not worried about. I think that the two bases that we
have for public acceptance of radioactive waste transportation are the technical studies and the propaganda films. And in both of those cases, there are technical issues which a Board that was really serious about transportation could be looking at. The State of Nevada has done studies on those issues, and I refer some of those studies to your attention. And just for what it's worth, I mean I think a vigorous discussion about that might be useful in your transportation committee.

ARENDT: Thank you, Fred.

Bob Halstead?

HALSTEAD: Well, I've already had a lot of time, and I just want to add a few things that I don't normally get to talk about that have to do with transportation safety, risk analysis and so forth.

One is, I am amazed that after now going on more than 19 years of working with these issues, I find myself debating the same issues with people, and how little resolution there have been on certain issues. Like, for example, it seems to me to be the absolute common sense notion that spent nuclear fuel in rail commerce should be shipped in dedicated trains.

And even when I discussed this issue with people from the Nuclear Energy Institute or the Nuclear Electric Utilities, even the ones who in their own operations would
never think of shipping any other way are opposed to a
requirement or a policy objective that says DOE will ship
this way. And I have to say, I've still not figured out what
the reasons are except that recently I had this discussion
with one of the Nuclear Energy Institute guys that said,
well, you know, the problem is if we require the use of
dedicated trains, the railroads are going to railroad us on
tariffs. They're going to charge us 400 percent of cost.
So one of the issues that I'm kind of bewildered
about how to resolve are safety issues where an operational
fix seems obvious. In my opinion, the costs are reasonable
and can be controlled through the long term contracts, and
yet, you know, we continually debate dedicated trains. And
then if you don't assume dedicated trains, I have to consider
much more horrendous types of worst case accident situations
that if we were strictly talking about shipments in dedicated
trains.

I also share the concern about transportation risk
assessment, particularly probabilistic risk assessment in
which the risks are so marginalized that transportation risk
then doesn't become a useful determinate in making policy
decisions, or within risk management decisions, if you assume
that the risks of rail and highway transportation are equal.
I think it tends to--the way that we do probabilistic risk
assessment tends to obscure rather than help the way risk
assessment should be used in risk management.

And the example I'm always drawn to--this is not just a problem in dealing with the nuclear industry and with DOE and the NRC, but when you get really experienced state emergency management and safety inspectors together and you talk to them--well, you know, when we start this mix shipment, for the first couple of years, we're going to have to inspect every shipment and do everything just right, and then once the public gets calmed down, we can back off and we won't have to spend that money and do that.

And then I remember, you know, it wasn't until about the 8,000th shipment out of Alaska that the Exxon Valdez disaster occurred, and this phenomena that Freudenburg has--that's jargon, and I don't know if I'll get--but the phrase is the "organizational atrophy of vigilance," that the longer you're successful with something, you start to get rid of things. So with the Alaskan oil tanker shipments, because they had been so successful, they eliminated all the redundant safety programs, the radars, the things that would have contained that accident. And so that's a concern to me.

Finally, the issue of how we address human factors in system design, and particularly in the early stages of equipment design troubles me. DOE and General Atomics have gone very far, for example, in designing a new generation of high-capacity trucks casks, and in order to get a fourfold
1 increase in capacity, they've made all kinds of, in my
2 opinion, safety tradeoffs, which they wouldn't have needed if
3 they had been willing to settle for a threefold increase in
4 capacity.
5 In order to keep within the legal weight limits,
6 for example, they have done things like go to one fuel tank
7 instead of two fuel tanks, not thinking about how that
8 increases the number of stop times for refuelings, increases
9 the risk of getting on and off the interstate, or haven't
10 looked at--although they are looking at some of the other
11 issues I'm pleased to say, like, for example, the use of the
12 cab-over-engine tractor and the way that the additional
13 fatigue and noise may be a safety factor for drivers on very
14 long hauls. And many of these truck drives are going to be--
15 some of the reactors, if they come--I mean, if this fuel
16 comes to Nevada, some of the reactors they have to ship by
17 truck are the ones maybe like Turkey Point that are farthest
18 away. We actually have a 3,000-mile truck journey. So, you
19 know, the drivers have been on the road maybe for 80 hours by
20 the time they get on those mountain passes through Nevada.
21 So they're really, and I'm not just faulting DOE
22 for this, but the general issue of how we do a systems
23 analysis of human factors early enough in systems planning
24 that we can address those issues and make tradeoffs when
25 we're designing equipment, I think down the road would save--
and some of these issues are so esoteric. You know, I'd have
to spend an hour probably talking about the truck cask and
rig design to make those points.

But thanks for the opportunity to add a few other
issues in there.

ARENDT: Thank you. Bart?

DI BARTOLO: Thank you. I would like to mention just a
couple of things. I'll be very quick. We would like in
Clark County to have the Department of Energy recognize its
power; that is, in the last few years with the Western
Governor's Association, the Western Interstate Energy Board,
and most recently two weeks ago at the Transportation
External Coordination Working Group, we talked in a routing
subcommittee about a cooperative process for route
identification. We used to call it route designation
selection, but in deference to the Department of Energy, we
call it route identification.

And those guidelines, those net process would be--
very simply would be based upon U.S. DOT guidelines that have
been established for hazardous materials shipments and
highway route control quantities.

And if Jozette Booth, DOE, or someone on your
committee would be able to--your Board would be able to--you
should be able to get those minutes within the next couple of
weeks. Is that right, Jozette?
BOOTH: Yes.

DI BARTOLO: I think that would be very important for you to look at because the second part of that would be that we have proposed that the Department of Energy, through contracting or other means, should be able to direct carriers to use the routes that have been chosen through that process. We think that would be a significant step in the process. It would be a significant way that we, as stakeholders, would be able to provide meaningful input.

With regard to meaningful input, I'd like to also talk about route--route selection is very important to us because under current regulation, all highway shipments to Yucca Mountain and rail shipments to Yucca Mountain, if there were a line, would come through the Las Vegas Valley.

Well, I know that does affect a lot of other cities, especially with regard to rail, but the fact is that our economy in southern Nevada and Nevada as a whole has to do with gambling. That supports us. In any one day, we have 200,000 or so visitors in this town or in this area.

Interstate 15 travels within a quarter to a half mile--the rail and Interstate 15 are within a half mile of the Las Vegas strip. In and of itself, that is no big deal, but the fact is that maybe--here is where perceived risk may come in. I would like to say that the way that our decision makers work is that they will take a look at what the
scientists call the first stage risk assessment, and that is hazards analysis.
What I have found in my experience, in our experience in Clark County and other jurisdictions is that once a comparison is made among perceived and calculated hazards or noticeable hazards, that the decision or negotiations begin from that point. And I would like to point out that here's where perceived risk can be used as inputs, where the idea of perceived risk has been very difficult, how do you quantify it and so on. But it could be used as an input factor to any decision, especially with regard to hazards analysis.

One example is that the City of North Las Vegas, this does not have to do with high-level nuclear waste, but it had to do with shipments that were going to the Nevada test site, shipments that were sponsored by the Department of Energy. They did hazards assessment along Craig Road. They approached the Department of Energy, said, this is what we think: We think that you shouldn't use this road for these reasons, and they pointed out a number of hazards, like the number of schoolchildren in the area at any given time, a pipeline, hazardous materials, et cetera, et cetera, things that were important to the local community.

And, you know, the Department of Energy changed its mind. However, they changed its mind because they did not at
that point have a policy. Then they went through the Spaghetti Bowl, which is exactly where we don't want them, but they did make a change in their routing. It was sort of a shortcut that took them across the Valley. But the fact is that this is how we make decisions. We would like input with regard to the process that is used for risk assessment, so that the risk assessment results are meaningful to us.

AREN DT: Okay. Thank you very much.

METTAM: I'd like to make just two quick comments. One is in response to a question from a Board designee about the hazardous materials and whether or not similar studies have been done.

Under HMTUSA a lot of local governments have done flow studies of hazardous materials, and I'm not certain if that information is available in any one place, but there were grants provided through the local emergency planning committees to do those types of studies. So there is information out there on other hazardous materials flows.

The other comment I'd like to make is in response to Dwight's comment. We did think long and hard about who should be the convener, and, in fact, an earlier iteration of our presentation had a lot more detail on how that process would work, and we felt that we were perhaps being too
1 strict--prescriptive at that time, and that perhaps it would
2 just bog us down on the details. But in those, we suggested
3 that it would be potentially either the Office of the
4 President or of the Vice President, and we specifically
5 excluded the Department of Energy who is in essence an
6 advocate in this process and would not then be a convener--in
7 the image of a convener as an honest broker.
8
9 Thank you.
10 ARENDT: Jim?
11 WILLIAMS: I'll try to do a part of an answer to your
12 question, that the process that we were discussing seems top-
13 down and doesn't fit the current mode of distrust in the
14 government, especially the federal government.
15
16 I think our motivation here is to suggest some kind
17 of an alternative to a process that we think is about to be
18 embarked upon in Phase A privatization plus Senate Bill 1936
19 for shipment. That won't work, and it will cause a lot of
20 cost in money and in time and in acrimony. And we don't have
21 a position against privatization of Phases B and C of the
22 proposed process.
23
24 Now, I think that any such process that we--such as
25 we were trying to suggest the various outlines of would
26 need, you know, some substantial and some very--a joint kind
27 of strategic thinking about, you know, what really needs to
28 be decided at what level by whom to set an appropriate sort
of sequence of decisions in which the decisions at subsequent level can build on and work in the context of those that go before.

I think that it's in--that if that were done, and I don't claim that we have done that, that there would be--there is in the nature of this problem certain levels of decision that involved--that need to look at the overall system, including interim storage on site and off in combination with transportation on an integrated basis and certain policies. And the NWTRB has made judgments on that matter and so forth. They need to be resolved among the stakeholders in this process before the site-by-site decision at sites could really be done, before utilities can make the investments that they need to make to make rail possible, for example, and so forth and so on.

So part of my answer is I think that in the nature of the decision, that there are certain portions of this that need to be made on the whole systems level to provide the context for portions that occur further down the system.

Now, that's the decision levels, not necessarily the stakeholders and the process that are involved in those levels. And so it would be contrary to our proposal to conceive the first level decision being made by let's say DOE in collaboration with the utility industry.

And the same thing with regard to the guidelines in
which those decision levels would be worked out. It would not be the current process. It would be something significantly, we thought, from the current process.

ARENDT: Okay. Before I make some summary comments of this session and the afternoon session, I'd like to ask the Board, the staff, the audience, do you have any particular question that you'd like to pose to the panel or even pose that ought to be looked at?

Yes, John.

MCKETTA: My name is McKetta from the Board.

Bob Fronczak, I don't know anything about real chemical--but if you thought you were making alcohol or let's say I had a small refinery, 50,000 barrel a day refinery, and I'm using sweet crude, and if somebody offered me 10 times more to add five barrels of sour crude, I just would turn them away. Why in the hell would you look for a job where you're going to make 0.06 per cent more a month? If you would play it right, I think these guys may come on their hands and knees and beg you to make 2 per cent--

FRONCZAK: I wish that were the case. Unfortunately, there's something that we call common carriers, and as common carriers, we are required to transport materials that are offered to us, as long as those materials are offered in--

MCKETTA: But they said you're going to do this on a bid basis; isn't that what I heard from you guys?
FRONCZAK: I think that the privatization effort has the potential to resolve a lot of the issues. But it only has the potential to resolve issues if we are a partner in the process and we're able to be a part of the contract. If the contractors in providing the system design and build that system without our input and without a contract and then just say, okay, here it is, guys, you're going to haul it for a tariff rate, we're going to have a lot of problems with that.

ARENDT: I thought you were going to talk about all the hydrogen fluoride and chlorine that the railroads transport around the U.S. or all the gasoline that's transported on the highways.

Are there any other comments?

I want to thank you, all the people that participated in this session, all the comments that were provided by the audience, the staff, the Board. You have made some very good points. You've indicated some areas that need to be looked at, and although I don't have a specific action to recommend at this time, but I will say that what I look forward to doing, though, is to either convene a workshop or some kind of a panel where we will have you people as representatives on there, and we'll have a real roundtable, and we'll provide the experts that will hopefully answer maybe some of the questions that you've raised.

Fred, the question that I--let me ask you about the
2,400. I didn't get that. Was that 2,400 of what?
FRONCZAK: It was 2,400 shipments of spent fuel in the
United States over a 30-year period.
ARENDT: Okay. Now, I think in the regard, there are
many thousands more shipments of radioactive materials in
Type B packages that I think get factored into this, and we
must not forget about that.
The safety of the transport of radioactive
materials is in the package, is in the testing of the
package, and I won't say any more about it than that. But
that's what I plan on doing, is to get with other members of
the Board and staff, and we will convene. I would prefer a
workshop where we really get in and talk about the risks and
answer the type of questions that you raise. It's our job to
make sure--at least to help to make sure that the public
understands that--I don't say that we've got a risk-free
transportation effort, but my own views are that we're fairly
close to that because of all of the engineering and all the
integrity that goes into the testing of Type B packages and
so forth.
I know there is a question of quarter-scale testing
versus full-scale testing. I personally was involved with
that 20 years ago, I think. The question was asked, well,
you know, why do we--in fact, I even asked it; why full-scale
testing or why quarter-scale testing? I don't know that we
1 really got a--I think there's a response, but we need to let
2 the experts tell us what that is.
3
4 So again, I thank you all very much, and you'll be
5 hearing something from us I suppose within the next few
6 months.
7
8 COHON: Let me add my thanks on behalf of the whole
9 Board for this excellent afternoon session. My thanks to
10 John Arendt for doing such a good job of chairing it and to
11 John and his staff for most simply validated organizing. It
12 was excellent, and I think, as John indicated, there's a
13 great deal of follow-up for the Board to think about. I
14 think we clearly have a role that we can play here and need
15 to play.
16
17 Two housekeeping announcements for the Board
18 members, both new and old, incoming and outgoing, current and
19 designated, whatever you call yourself. You have to check
20 out of the hotel tomorrow. This road show moves to Las Vegas
21 tomorrow for tomorrow night. So you've got to check out and
22 check out before you come to tomorrow's meeting. Check-out
23 time is 11:00 at the Saddle West. So you're advised to check
24 out before you depart for the meeting tomorrow.
25
26 Oh, let me point out that if you have no incidental
27 expenses on your room bill, you can just check out by
28 checking at the front desk and leaving the key on the T.V.
29 Those are their instructions. If you do have incidental
expenses, you've got to settle up at the desk.

Vehicles; you should, unless something's happened in the interim, go in the vehicle that you came in in the first place. No? Yeah? Yes. That's a good idea, okay. Don't change vehicles whatever you do. So tomorrow morning you make arrangements with your driver and the appropriate vehicle, get bags in it before you come here and then come here.

Okay. These are the kinds of important things that chairs have to deal with.

We now come to part of every one of our meetings, which is very important to the Board, and that's the public comment period. This is a chance for members of the public to come in on any aspect of the Nuclear Waste Program, not just things that we've covered today, and for the Board to hear this.

We've had four people sign up in advance for this period. As I call your name, please come to the microphone in the middle aisle there. Even though I've called your name, I'd like you to identify yourself again for the record, indicate any institutional affiliation that's relevant that you care to, and then if you could limit your comments to no more than five minutes, if possible, that would be appreciated.

Sally Devlin.
DEVLIN: Thank you, Mr. Chairman. My name is Sally Devlin. I'm a professional stakeholder. I've been visiting with the Boards, telling them good jokes--good jokes, guys--for over three-and-a-half years. I have attended every DOE, DOT, DOD, you name it, and were there. And I do want to say something. Two of our town board members were here to greet you. They never got the opportunity. Charles Grondin (phonetic) and Gary Hess (phonetic) will be here tomorrow, and they're new, and they're very interested in this process. I don't think anybody from our County Commission Board is here.

The other thing is that I do want to say to Helen, who after the March meeting in Vegas, was brave enough to come over the hills and peruse Pahrump and see if we were acceptable. And here you are. I can't believe it. Thank you, Helen. We had a great visit.

And thank you, Carrie, and your friend, for providing the food and beverages, and they've done a splendid job. So now I can start my little thing and welcome you as the new chairman.

Everybody knows what I'm going to say. I took off my earmuffs, so you know it's me. But anyway, my feeling is very strong about this stuff, and especially for Ed sitting there avoiding my eyes.

Anyway, if DOE streamlines--it's some Guidelines--
and I'm talking about 10 CRF Part 960, and I did testimony on this, and focuses on the concepts relative only to waste containment, long-term isolation at Yucca Mountain and risk assessment, in my opinion, and this is very serious, it will kill the entire staff of Nevada and its main industry, tourism and gaming, and this has been presented in many a report.

The reason that I say that is some of the Board, and I'm going to reminisce because I'm old and I'm allowed, and I'm going to not iterate, but I'm going to reiterate, something that happened at the San Tropez board meeting when we had the sociological meeting, and this was held because in Brazil, in a city of a million people, somebody ran off with a kilo of Cesium, and people were killed and so on. And the city became a pariah to the country, if you remember that, guys.

And what happened was they wouldn't let them out of the city. They wouldn't bring in stuff. It was a big tourism thing, a manufacturing city, and for many years this went on. And finally now, they have turned what was a tragedy into a tourist attraction.

Now, this is applicable to Las Vegas, and, of course, Reno, and, of course, now that you've seen our beautiful downtown Pahrump. And my feeling is that by something like this, and we're talking transportation and
we're talking risk perception and we're talking all of these
technical things, I was going to talk about the migration of
Neptunium 237, and I've learned all these fancy terms. But
you're talking to the public. You're not talking to someone
who reads like myself.

And my contention has been, as I did at that
sociological meeting, to do just a little real scenario and a
worst case scenario in the transportation, and all I did at
my public comment was stand up and say, "A 95 without any
notification on a two-lane highway, which is a nine hazard,
which I am quoting from the NTS/EIS, there was what is going
usually through Pahrump, and I hope not today because we
didn't have any accident, but liquid cyanide and liquid
nitrogen. And these can make a big hole in the ground and
kill you very dead.

And, of course, there is no FEMA training. There
is no emergency preparedness. There is nothing. So I ran
that little story.

The next one was with the Forest Service who gave
me all their books to read, and they didn't have, like you
guys here, only three alternatives, no action, some action
and full action. They had 11 alternatives. And that was a
lovely presentation because they want everybody to be happy
in Las Vegas with recreation. And I wrote to them, and I
said, "You gave a lovely plan and consideration for the
1 public and their trails and their roads and so on, but may I
2 ask you the question where those Forest Service land and BLM
3 land begin?" And, of course, they said they never thought of
4 that. I said, "What if you had an airplane crash, or one of
5 our DOE--full of hot stuff, what would you do? Of course,
6 they had no answer.
7 And, of course, I'm getting back to my original
8 point and what I have yelled at you guys for three-and-a-half
9 years, and that that is there is no communication. To me,
10 Yucca Mountain is at our Nevada test site. It is part of the
11 1,350 miles of test site. And you don't communicate. How
12 can you say the water from this goes through here because it
13 comes from elsewhere, and I save on the 10-year plan, that Al
14 Ohms is trying to clean up all these sites.
15 I'm just going to read you this: "Privatization of
16 tritium removal and sale. A study was recently completed by
17 NRAM, estimated there is $200 million worth of tritium
18 located on the test site. Why not remove the tritium now so
19 that it's in a concentrated state and removal technology
20 exists? If it's left in the ground for 100 years, it will
21 migrate. How can DOE privatize tritium removal and sale?
22 What procedures can be used?"
23 Now, whether we're talking DOE talking to DOE, we
24 know the tritium has moved, and just where is the guy from
Their water is totally poisoned.

This is reality, and you're not talking about it.

You're no talking about the liquid cyanide running into this.

We're talking about 400,000 pound canisterization and trains
and so on, and you forget the floods that we have here. You
forget that there is no communication between DOD and our
Sheriff's Department saying that high-level waste or any kind
of waste is going through. The new rules for the labels on
the trucks, you can't even see it because there's no
courtesy.

Now you've seen Pahrump. You've seen Beattie. And
I'm not going to yell out any acronyms. I've learned lots of
new ones, I want you to know, but I want you to know I feel
very strongly about this. I do not know how you can look at
Yucca Mountain in isolation without considering everything
else that goes on to the test site. And I include the
military in my yelling at you all because they brought in
double tax. They never informed anybody they were bringing
in better than Class C. I see all these reports from all
over the country, and they say, we're going to clean this up,
we're going to clean that up, and so on, and then they want
to dump the rest of the stuff at NTS.

Well, I resent it. That's 30 miles from my door,
and I am terribly afraid. I'm trying to get declassification
on the regular activity out at the farm. I can't get it. I
I want declassification on the plants. If one of the Farrow's plants are all highly radioactive, ours our, too. Our rabbits are, our plants are.

So I want you to see these things. We are the people who live here, and we are the people who will die here. And I'm scared to death of the stuff that you're talking about. There is no consideration for the population. There is no consideration on the risk perception for our number one industry, and I think it's about time you all got together with everybody that is involved in the test site, and put the signs to the true test. You're not doing it.

That water comes from outside of Yucca Mountain. I could show you the geological faults and fractures and fissures. France has a fit of this. They don't allow anything where there are faults and fractures and fissures and ponds and volcanic action and all the rest of it.

I saw it in my geology course last year. All the figures of risk perception on radiological and biological desks are fellatios because nobody knows why someone gets cancer.

And I'm going to leave you with one other thought, and this came out at the NRAM meeting. Nevada has the highest incidents of cancer in the world, and since we don't know why people get cancer, it only takes one--to affect one cell and then travel and you're dead, maybe not today, but
years from now, and it's a painful death. These things should be considered, and I don't feel that you're doing your job. I'm sorry, but I love you anyway, and I hope you'll come again.

COHON: Thank you, Ms. Devlin.

Hal Rogers?

ROGERS: Hi, I'm Hal Rogers, and most of you have seen me before. I'm co-chairman for the Nuclear Waste Study Committee. We've got 15,000 members more or less in Nevada, with a few members in California and some of the other surrounding states.

I have some comments, I guess, rather than a statement.

When I was with the General Electric Company, we moved quite a few cask loads of spent fuel from Kansas to our independent storage facility in Illinois. These were all moved in IF300 rail casks on special trains, and I didn't know until this afternoon that rule by the railroads had been overturned. I thought they were still going to have to move them on special trains.

When this was planned, when this move was planned, there was a big uproar along the proposed route. As I recall, the route went through three states, and the various county governments and local governments were going to have ordinances to prohibit it going through and so on and so
So they put together a team that included representatives from the railroad, from DOE, from NRC, from the State Governments and from the General Electric Company. And they went in and visited every town along the route. When they got through, there wasn't a single move to prohibit the shipment of that fuel.

They encountered all kinds of interesting things, including one area where the State Government opposed the movement because they said if there's any accident, those fuel pellets will be scattered all over. And it wasn't until they were assured by I don't know how many different people that you can't get the fuel pellets out of the fuel rod after it's been irradiated. It's just an impossible thing.

But these are the kind of things that you can encounter if they don't go through a lot of the integration and coordination that needs to be done along these routes, whatever they may be.

I'll have to once again ask the same question that we've asked before and that we have not yet received a good answer to. To the best of our knowledge, no one, the DOE, the NRC, nor anyone else, has been able to describe from an engineering viewpoint, has been able to describe an accident that would cause a rupture or a release from one of these shipping casks. None of the railroad accidents that have
occurred over the past two years or so have been severe
enough. And once again, before we start hollering about how
hazardous this is, somebody has got to describe an accident,
a good credible accident that would cause the kind of damage
that we're talking about.

Thank you very much.

ARENĐT: Thank you, Mr. Rogers.

Grant Hudlow.

HUDLOW: I'm Grant Hudlow. I'm from Pahrump in Nye
County. I'm a chemical engineer with nuclear engineering
training and experience.

As I understand it, the NTRB is charged with with
writing haired on the technical performance of the DOE.
Maybe that isn't exactly accurate, but it's something along
those lines. So I'd like you to consider that. So far I've
heard you limit your talks to site characterization and
transportation, and there are some other things that you can
be looking at, and the reason you should be looking at them
is DOE has--follows the NRC rules on the transportation on
truck transportation, where they're allowed to expose anybody
within three to six feet or 20 millirems an hour of
radiation. And it doesn't take a rocket scientist to figure
out if you happen to get stuck in traffic in a traffic jam
alongside of one of these for a little more than an hour and
15 minutes, everybody on both sides of the truck has an
illegal dose of radiation because the EPA rules only allow
the public to be exposed to 25 millirems a year.

So you're talking about being negligible risk on
transportation, on the truck transportation anyway. The only
way that I see this being able to skate by is if it takes 20
years for those people who got exposed to die, and the chance
of getting caught with that particular truck or the truck
driver or the DOE or anybody else is very remote.

We see the DOE killing its own people at a pretty
good rate out here at the test site. Where are the facts and
figures on that? They're hidden also, and that's in
violation of both OSHA and EPA laws that require you to keep
track of making people sick and killing them.

The NTRB I think needs to hold DOE's feet to the
fire in these areas.

DOE rules require proven commercial technology
before they do anything. I'd like you to show me a burial
that's proven anything, let alone the seven billion years
that it's going to take before U235 is harmless. I'd like
you to show me a government that's lasted for the seven
billion years to control this burial so that nobody will get
into it. So, obviously, the DOE is violating its own rules
there.

There is proven commercial technology available,
and the NTRB I think should be looking into that. Sally
mentioned one system for cleaning up the test site that looks interesting. There's also classified information that was done in Livermore. They went through the entire periodic table in the '60s and showed how to destroy any kind of radioactivity. There are a quite a number of reactions.

And this is proven commercial technology I said because it's in orbit around the earth right now. The military is using it. That's also classified. So we need to get that stuff declassified to the extent that we can use it to solve this problem.

Once we have that, then we don't need transportation of this stuff anymore. These are small units. They can be put right on site and destroy the radioactivity right there instead of, you know, stacking it up. What do have, 72,000 tons, 126,000 tons? It depends on who you believe, and how much more are we going to have before they start shipping it into Yucca Mountain, and then what are we going to do with it?

And, of course, the DOE does not have the expertise to handle this technology. I've had several DOE officials express some interest in it, asking how it worked and so forth, but they do have procedures of how to handle something when they don't have the technology, and that's, again, where NTRB comes in. It's very simple. You go out and privatize it. You go out and ask for--you put out RFPs. You get the
1 engineers in to show you how it's done. You get the
2 contractors in to build it and do it, and the DOE doesn't
3 have to do anything at all except sit back and watch it done.
4 I do a similar thing with environmental work with
5 solid waste and waste water both, and one of the problems I
6 run into is that the bureaucracy cannot do something like
7 this. They're allowed to, but they won't. So I have to go
8 to the political figures above them and then when the
9 political figures tell them to do it, then they will
10 authorize me to go ahead and handle it for them.
11 The DOE is no different. They will not do
12 something like this because they don't have the expertise.
13 What are they going to use to judge it, and they're not going
14 to do something they can't judge, that they can't even
15 imagine, yet alone do it.
16 So the NTRB in charge in looking over the shoulder
17 of the DOE needs to hold their feet to the fire and get this
18 into the political arena and get it solved.
19 The other thing that's happening is that for the
20 reasons I just mentioned, all of this information seems to
21 fall on deaf ears, especially in the DOE, and so people are
22 looking at the legal remedies. The Attorney General of
23 Nevada spoke the other day and said that she's going to follow
24 suit.
25 One of the problems with that is I was talking to
the nuclear--one of the nuclear lobbyists, and he explained
to me that the fix is already in. The Federal Courts are not
going to stop the nuclear waste from being put in Yucca
Mountain.
So that leaves us with criminal charges, then,
against the various DOE officials that are violating the EPA
and OSHA laws.
COHON: Excuse me. I'm sorry, Mr. Hudlow. It's not
that you brought up criminal charges. It's that time is
getting on. Are you close to wrapping up?
HUDLOW: Yes.
COHON: Okay. Good, thank you. Sorry to interrupt.
HUDLOW: That's all right. The thing I'd like to ask
the NTRB is what is your criminal liability for allowing the
DOE to go unchecked into these areas? We're talking prison
terms of 10 years. We're talking fines of a million dollars.
And I'd like you to consider those things.
Thank you.
COHON: Thank you. Was that your way of saying welcome
to the new Board members?
Thank you, Mr. Hudlow.
Rick Nielson.
NIELSON: Thank you. I'm Rick Nielson. I'm the
Executive Director of Citizen Alert, and I have some just
general comments on the issues covered today, and then I had
A little history about Citizen Alert. We are a grassroots citizen-based organization. We formed in 1975 when the possibility of nuclear waste storage coming to Nevada first arrived on the scene. We also have besides the 2,500 dues-paying members, we have about another 7,500 people that periodically receive information from us.

In that time period, we've had numerous opportunities to "participate" in this process, and that also has provided us with an opportunity to interact with numerous other grassroots groups across the country, and they have similar constituencies and similar make-ups, and many of them are in reactor communities.

And it was my experience that the general consensus among that community is that the public participation is more times than not a matter of a formality than a matter of genuine in the substance of the comments.

In regards to the issues today, I think a lot of concerns were raised in regards to transportation, safety, routing, privatization, the total system performance assessment and the guidelines' revisions. I think Judy Trinkle did a very eloquent job of accurately depicting the general public sentiment for our community, for the community that I represent, and I think a lot of issues were raised about the broader underlying public participation issue, and
particularly in the pre-NEPA level participation, and also the opportunity to comment on policy decisions or like, for example, the program plan or the total system performance assessment prior to the time it arrives in a NEPA document. So it's important for me to convey to you the level of importance that these issues are--you know, the level of priority and concern these issues have in our community, in the public interest community.

And I think I'd like to convey to you also that besides your obvious responsibility as a technical review board, I'd ask you not to lose sight of your responsibility to also make yourself aware of these concerns, these public concerns, in the context of your conduct of business so that you're also--you know, you go beyond the technical aspect of your duty to consider some of the underlying public concerns. And realize that the reason I'm asking you this is because in large part, the number of public people that are lucky enough to be informed about this process usually don't have--aren't informed enough or don't have the level access or are so far removed from, you know, the level of technical information and lack the understanding of that technical information, that they are, for the most part I would say, unable to act in their own best interest, and so that you have an additional responsibility to consider this when you're going about your business.
So those are the comments regarding today's agenda. The other question I had is in response to this document, which is on the back table. In Chapter 3, you talk about suitability and the site suitability determination. And in the note that summarizes the letter sent to OCRWM in December of '94, at the end of your sort of concerns that you lay out, you say that "Given the difficulties associated with proving safe performance over many thousands of years, a site suitability decision would not be ironclad guarantee that the site could also be developed as a repository."

And I was wondering if someone could indicate to me under what kind of scenario, either real or imagined, where we would reach a site suitability determination and then not cite the repository.

COHON: Since all my colleagues are looking at me, I guess they expect me to respond to that. And I will try, and I'm sure they will then jump in and help me or correct me if I'm wrong.

Before I respond, though, let me respond to something that doesn't need a response, but just to underscore something.

You made the point that you requested of the Board that every member incorporate into its activities public involvement. Indeed, that's why we are here, and you can rest assured it won't be the last time we're in this area. I
I won't promise we'll come back to Pahrump, though. If I had a vote, I would vote for it right now. You're such wonderful hosts.

NIELSON: I actually live in Las Vegas.

COHON: Oh, okay. Well, let me try to respond.

The Board has spent a lot of time, as you might imagine, talking about the issue of site suitability, not only the technical—the components to site suitability, which we've talked about in part today and we'll talk about again tomorrow, but just what the term means. What do we mean by suitability, and a recent discussion, of course, is how does that compare to viability? But we'll put that aside for a moment.

I think the best way to explain the context for that note is the following: That when we think about suitability, we recognize that there is a spectrum—continuum is a better way to put it—of, let's say, probabilities or a probability that the site could be suitable, or that the site is suitable.

Suitable, we make great pains to define quite precisely what we mean by suitability and how we hear about it, but I think it says a high probability that the site can provide isolation of the waste from the environment for a long period of time—whoops, I almost got quantitative there—a long period of time.
All right. So that's our definition of suitability. When the time comes when DOE must make its determination and recommend to the President, find a site, suitable or not, what we believe is really happening is at that point—let's put it in a positive way. Suppose DOE has gotten to the point where it feels it knows enough and what it knows is positive enough to support a suitability determination? What they're really saying is, given all the uncertainties that we're dealing with, we as experts and based on with a lot of input from many, many other experts and the public have decided that there's a high probability, an acceptably high probability that the site is suitable. Now, this gets rather confusing because that's a probability on a probability statement? Right? There's an acceptably high probability that the site will with high probability, et cetera, et cetera. So since the suitability determination basically cannot be a crisp moment in time or defined by a clear threshold, above this you're suitable, below this you're not. Because there's always going to be that kind of fuzziness and this continuum, we think of this as a much longer process. Okay. DOE has declared the site to be suitable. That's its determination. Let's say the president accepts
1 that and declares it suitable, and we move ahead. What
2 really happens at that point? Suppose the NRC license--were
3 way out front? What really happens? Well, we are talking
4 then about a decade's long effort to build the repository,
5 deface waste, which itself takes years. All the time what we
6 were very concerned about is that suitability would somehow--
7 a suitability determination would mean that would be the end
8 of science at Yucca Mountain, that we'd stop collecting data.
9 We've declared it suitable. Let's put the waste there. Get
10 it in fast enough, close it up and go home.
11 Because of the uncertainties involved, because of
12 the thousands of years, tens of thousands of years over which
13 this site is supposed to be suitable effective, it always
14 seems reasonable to us that this is going to be an ongoing
15 process, that suitability represents a milestone, but not in
16 any way the end of a process.
17 Now, it seems quite plausible, although maybe
18 unlikely, that DOE could make a suitability determination,
19 but for lots of reasons, given everything I just said about
20 uncertainty especially, the President might decide not to
21 declare it suitable, may decide not to recommend it to the
22 NRC for licensing. It could happen. Indeed, viability
23 anticipates a broader understanding of the site to include
24 the design, to take into account cost issues, for example.
25 All right. How is that? How did I do? It's even
1 more confusing now than when I started. I did all right?
2 Leon said I did okay. Would you applaud?
3 Okay. Are there any other members of the public
4 who would like to speak on the record? Yes? Please identify
5 yourself.
6 Szymanski: My name is Jerry Szymanski. I've been
7 involved with this project for some time. I haven't been
8 speaking for the last five years.
9 Cohen: Excuse me. Just because you did not sign up,
10 could you spell your name?
12 Cohen: Thank you.
13 Szymanski: I was very interested in your comment.
14 First, define what is unsuitable. And in my judgment,
15 clearly unsuitable site is one which offers large probability
16 of life-threatening reasons. Probably everybody would agree
17 with that.
18 The question is, what will we consider in
19 evaluating this. What I would like to share with the Board,
20 as a result of our research over the last five years at Yucca
21 Mountain. I think you members will find it interesting, and
22 that's essentially the purpose of my statement.
23 Cohen: Move back from the mike.
24 Szymanski: What should I do with it?
25 Cohen: Move back a little bit from the mike. No, no,
you're doing fine. You're doing fine. We can hear you.

Oh, I'm sorry.

SZYMANSKI: That's it. There's not much sense to talk about. It's quite an extensive research. There's no sense to summarize this in five minutes. However, what you will say, we are talking about catastrophic life-threatening, not usually fluxes and moistures and things like that. These are silly things.

Thank you.

COHON: Thank you very much for giving us your report.

I don't think I'll ask the question again about other members of the public who might want to comment because tomorrow is another day. We also have a public comment period at the end of tomorrow's session.

With that, I call today's session to a close. We will adjourn. We reconvene tomorrow morning at 8 o'clock here.

(Whereupon, the meeting was adjourned, to reconvene on Wednesday, January 29, 1997, at 8:00 a.m.)