UNITED STATES
*****
NUCLEAR WASTE TECHNICAL REVIEW BOARD
*****
FULL BOARD MEETING

Stouffer Concourse Hotel
Meeting Room - James
(Lobby Level)
2399 Jefferson Davis Highway
Arlington, Virginia 22202

Tuesday, July 16, 1991

The above-entitled proceedings commenced at 9:05 o'clock a.m., pursuant to notice, Dr. Don U. Deere, Chairman of the NWTRB, presiding.

PARTICIPANTS:

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John Bartlett, DOE/OCRWM
Carl Gertz, DOE/OCRWM
Dwayne Weigel, GAO
Todd LaPorte, SEAB
R.L. Robertson, TRW Environmental Safety Systems, Inc.
Tom Isaacs, DOE/OCRWM

I N D E X

P R O C E E D I N G S

[9:05 a.m.]

WELCOME and INTRODUCTION

DR. DEERE: Good morning, ladies and gentlemen. I am Don U. Deere, Chairman of the Nuclear Waste Technical Review Board. On behalf of the Board, I would like to welcome you to our third meeting of the full Board for 1991. This is our Summer meeting.

Let me remind you again -- and those of you who are here today for the first time -- that the microphones that you have around the tables here, you first have to press them down until you get the red light, and push it down fairly hard, and when somebody answers you with their mike, you're liable to go off, so if you have a second remark, you must put your light back on again. We had a couple of difficulties with that yesterday.

Also, anyone in the audience that wishes to make a comment should use the microphone that we have there. I think it is on all of the time. You don't have to worry about the red light there.

As most of you know, the Nuclear Waste Technical Review Board was created by Congress in 1987 to act as a source of independent evaluation of the technical and scientific validity of activities undertaken by the Department of Energy as part of its program to manage civilian high level radioactive waste. In the same act that created the Board, Congress directed the DOE to characterize one site at Yucca Mountain, Nevada, for the possible development of a repository for the permanent disposal of the nation's high level radioactive waste.

The Board's seven panels met numerous times throughout the year to look at specific aspects of the DOE program and the full Board meets at least four times per year.

These meetings provide the Board the opportunity to hear from the community of individuals involved with various high level radioactive waste management issues. The meetings are the Board's primary forum for information gathering and sharing. Our twice yearly reports to the U.S. Congress and the Secretary of Energy contain observations and recommendations that are in large part based on information the Board has obtained from these meetings. That is why we are especially looking forward to the next two days, during which we will hear presentations on a variety of important subjects from individuals with unique knowledge of the civilian radioactive waste management program.

Today we will hear about the research priorities and budget allocations for the coming year of the Office of Civilian Radioactive Waste Management and the Yucca Mountain Site Characterization Project Office.

These presentations will be followed by an overview of the OCRWM program from the perspective of the General Accounting Office.

Following that we will be briefed on the DOE M&O contract, and later we will hear from the DOE about efforts in other countries to develop repositories for high level waste.

Tomorrow we look forward to briefings by representatives from the Environmental Protection Agency and the Nuclear Regulatory Commission on the standard and regulations relating to the disposal of high level radioactive waste.

Tomorrow afternoon we will hear an historical review of how the DOE site selection criteria were developed, followed by an update on the DOE's efforts to evaluate early site suitability.

We have a very full agenda, so forthwith I will introduce our first presenter, Dr. John Bartlett, Director of DOE's Office of Civilian Radioactive Waste Management.

He is responsible for the development of the nation's waste disposal program for spent

nuclear fuel and high level radioactive waste. Previously Dr. Bartlett directed energy and environment activities for the Analytical Sciences Corporation. This work included *extensive effort on high level radioactive waste programs. Previously Dr. Bartlett worked with Battelle Pacific Northwest Laboratories, where he was Manager of System Studies in the Nuclear Waste Technology Office.

He has also served on the faculty of the Chemical Engineering Department at the University of Rochester and as a Design Engineer at Knolls Atomic Power Laboratory.

He was a Presidential Exchange Executive assigned to the Bureau of Standards and a Fulbright Professor of Nuclear Engineering at Istanbul Technical University.

The Board has invited Dr. Bartlett to tell us about the OCRWM program priorities and budget allocations for the coming year.

Thank you very much, Dr. Bartlett, for coming.

DISCUSSION OF OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (OCRWM) PROGRAM PRIORITIES AND BUDGET

[Slide.]

DR. BARTLETT: Thank you very much, Dr. Deere.

Good morning to the Board and all of you in attendance. It's a real pleasure to be with you and before you again. We last did this back in January. I am very pleased to have this opportunity to give you essentially an update on the status and priorities within the civilian radioactive waste program.

Without further ado, let me indicate to you in the first viewgraph what I'll be talking about today.

[Slide.]

DR. BARTLETT: I would like to briefly summarize for you the current program status and you will hear in some detail from other speakers, as you have heard already in fact, some of the more detailed information concerning program activities at present.

You heard yesterday for example about the exploratory studies facility and the MSIS activities. You'll be hearing more in detail from Carl Gertz about the Yucca Mountain program at this point.

I will describe the policy and strategy foundations for our priorities, what the current program priorities are, and what some of the issues associated with our priorities and budgets are.

What I will do is emphasize the technical program priorities activities and issues and the operative words here and "overview" and "technical." There are other things that we could talk about, but I do want to emphasize today in broad overview the technical aspects of the program, the priorities and the strategic foundations for those.

As I proceed, what I would like to try to do is paint a picture for you with four broad themes.

First of all, we do have a well-defined mission and a strategy for achieving it.

Secondly, we have the usual management challenges of trying to allocate Scarce resources to numerous activities.

Thirdly, we try to decisions and findings and actions based as much as possible on information, and what I am saying there is we try to build a data base as opposed to a risk based or high uncertainty based foundation for principal program decisions. This has a lot to do with

the kinds of investments we make in acquisition of information for the program.

Finally, the point I would make is that the program's activities and plans are in fact still evolving and they reflect our attention to both progress and the need for flexibility in a program such as this.

[Slide.]

DR. BARTLETT: Let me talk first about geologic disposal. Last week, we started our new surface-based testing activities. For the first time since 1986, the program did surface-disturbing work at Yucca Mountain. We deepened Trench 14. We have put in pits around the volcanic cones and we have started trenching in what's known as the Midway Valley area where we are trying to characterize existing faults as a basis for information concerning location of surface facilities in that region.

Needless to say, this is a major milestone to the program, and you'll hear more about it from Carl Gertz with respect to the activities that are going to derive from that trenching which has been accomplished so far. Basically, the trenching, of course, simply gives the scientific personnel in the program, access to the geology for them now to acquire and interpret the data that we're going to be getting.

Related to that, in terms of our principal activities for the Yucca Mountain program, we are still within the program aiming for a November 1992 start of the portal for the exploratory studies facility. In other words, this is the principal milestone having to do with the underground aspects of characterizing the Yucca Mountain site in parallel and complementary to the surface-based activities just started last week.

We are currently maintaining that objective which is a longstanding objective with respect to the timing that was established as a part of the Secretary's reassessment of the program that is a basis for our activities at present. We are nearing the results of a first-phase effort on evaluation of the site suitability. That's the suitability of the Yucca Mountain site.

This has to do with the fact that in response to comments from the state of Nevada and the Nuclear Regulatory Commission, the utilities, and others, it was recommended to the program several years ago, that program activities focus on evaluating the suitability of the Yucca Mountain site as soon as possible. We have taken that advice to heart and have prioritized and focused the program activities in order to accomplish that goal as soon as possible.

In addition, what we have done of sheer necessity is to start working on the methodology by which we will make that evaluation. This first report, which will be out later this year, will do two things: it will describe something of the methodology and it will present results of a first cut at evaluation of the suitability, based on what we know to date.

So, it will give the world an indication of what our current knowledge base is, what our current interpretation of that knowledge base is, and how we expect to proceed with respect to making the evaluation of suitability of the Yucca Mountain site.

Closely related to that objective of making these determinations as soon as possible, we are also working on the strategy for technical issue closure; closure of specific issues such as volcanism, such as the Szymanski Theory and things of this type. We are developing the methodology and the mechanisms by which we will accumulate, interpret and document information for purposes of closing these specific issues.

Another thing that's recently been accomplished is, we have established what I consider to be a new and improved foundation for our work with respect to the engineered barrier system and the waste package design program. What we are trying to do here is establish, as much as

possible, a systems-based and a first principles-based approach to this program so that we have as much consistency as possible within the program and as much attention as necessary to the interactions between the design features of the elements of the engineered barrier system and the properties of the geologic medium within which it will reside.

So, we're trying to bring all those things together so that we have a well-rationalized effort in terms of the content of that particular part of our program.

[Slide.]

DR. BARTLETT: Moving on to monitored retrieval storage -- and I presume they're in the same order as what I've got here. In the MRS activity, the first statement is very important. The basis for our planning and our activities with respect to the monitored retrieval storage facility is an assumption and expectation that the negotiator will successfully accomplish an arrangement with the host for the first MRS by the end of calendar 1992. That is a planning base and that kind of result will enable us, with the rest of our planning related to pre-disposal activities, to begin spent fuel receipt in 1998. Now, that particular milestone has a quality associated with it. At the end of calendar 1992, there are three basic situations that might exist; other than that, the agreement is already in place.

If it's not in place, we might have a situation where the agreement is imminent and things are looking good, we might have a situation where we're not making any progress at all and things are looking bad, and it also might be sort of neutral or in between. The status and the quality associated with the situation at that time is as important as the date itself.

At present, our planning allows us to accommodate some flexibility around that, but I would emphasize -- and I'll emphasize again later -- that one of our principal elements or goals associated with our mission is to begin spent fuel receipt in 1998; in other words, to implement the Secretary's goal.

As a result of that objective, what we are doing right now is actively working on all of the generic work that we can that can be accomplished without specific site selection. There's quite a bit, actually, that can be done and this is ongoing at present.

I would comment with respect to the negotiator's efforts to site the MRS, that you may be aware of or may recall that the negotiator put out about a month or so ago, essentially the letter of invitation for expression of interest to all of the governors of the states and the leaders of the Indian tribes, et cetera, and that he has, in fact, received responsible expressions of interest from a number of those entities at this point.

He is responding to them as appropriate. That is his responsibility. Our responsibility is to respond to his requests for assistance from the Department. Our assistance takes the form of providing technical information: what is an MRS, what it would look like, what the alternatives are, what the characteristics are, et cetera. So, essentially we are in a support role to the negotiator and do everything we can to respond expeditiously and effectively for his requests for assistance.

[Slide.]

DR. BARTLETT: Moving on to the transportation aspects of the program.

This, like the waste package and engineer barrier system of the program, has been under consideration for significant revision to make sure it meets our goals, specifically the goal of having a transportation system and all of its infrastructure and elements ready to go by 1998. And what we have is a situation where at present we are anticipating essentially a two-phased program wherein we will begin operation of the system in 1998 with existing technology, such as for casks, et cetera, and we will have a longer-range R&D oriented program for future

advanced cask designs and things of that type.

So we will have, as I said, basically, this two-phase approach, and the existing technology operation characteristics would last, we estimate, for about five years, and then we could begin to phase in the second generation technology such as advanced casks.

Closely associated with that is not just the technology and the hardware and equipment, but also the operation framework for the transportation system, which is vitally important.

The regulatory framework is under consideration for revision somewhat under the Department of Transportation, so we have to be responsive to and recognizing those changes and the impacts they would have on our program.

We are tasked by the Nuclear Waste Policy Act as amended to provide assistance to emergency response. We are doing that.

I am looking into opportunities for privatization as much as possible to make the system operate as cost-effectively and using existing capabilities as much as possible, and we are also addressing the risk issues associated with transportation, all aspects of that.

[Slide.]

DR. BARTLETT: Sort of a carryover on the predisposal aspects of the program: spent fuel receipt.

I have elevated this to a category of effort parallel to that for transportation and the MRS, because it's equally as important. The specifics of knowing what fuel is where, what we will take when, and being able to actually make the transfers using the technology is vitally important.

And so we have an extensive effort to make sure that we have all of our protocols, technologies, and capabilities to begin spent fuel receipt in 1998. And in doing this, what we have been doing is making highly specific inventories of the spent fuel, where it is by reactor, and also working with the utilities in terms of the protocols for the order of receipt.

We will be following what is called the OFF, or Oldest Fuel First protocol. That does not mean that the reactors which have the oldest fuel will give us their oldest fuel. It also does not necessarily mean that those reactors will be the first ones to transfer fuel, because there may be opportunities and benefits to market transfers of rights, if you will, in order to accommodate the interests of the various utilities.

The important thing here is that we will be working actively and effectively, I hope, with the utilities together to establish the database of the inventory, the protocols, and the exact specifics of the spent fuel receipt. And this goes down to the level of determining exactly what the geometry for transfer out of the pool into a cask, for example, at the reactors.

The interesting thing about it, as you might imagine, no two are alike. That adds to the challenges.

With regard to program operations, we have had under development for the calendar year so far and beyond, back into last fall, development of our Draft Mission Plan Amendment, the Mission Plan Amendment, which will be coming out in draft, hopefully in about two weeks.

As a follow-on, then, to issuance of the draft for public comment, we will be conducting during the fall a fourth Strategic Principles Workshop, and I mention that because I think most of you are aware of the fact that we have had three already as a foundation for the content of the Draft Mission Plan Amendment, wherein we gathered together representatives of the various interested and affected parties in the program, asked their help in developing the strategic principles and foundations which we will use to make future decisions and tradeoff studies and the like for the program.

They were very helpful indeed, and the Draft Mission Plan Amendment, as you will see, it is substantially better and substantially different from what we went in with, and we hope, needless to say, that it's been responsive to their inputs and our needs to operate the program, and that will be made available, as I said, about two weeks from now, we anticipate, and then we will bring together these people who helped frame it with these previous strategic principles workshops to get their opinion on how well we did, and that will be part of the comment/response procedure, and then we hope to go final with the Mission Plan Amendment around the end of the year.

And let me emphasize what this thing is. I have called it the Constitution for the program. I believe there is one milestone chart in the entire thing. It is not a prescriptive or a program plan. It is a mission plan. It is a broad description of generally, strategically how we expect to meet the goals of this program and accommodate the needs for flexibility and the many uncertainties that face the program at any given time.

So you will see and I hope find beneficial that kind of approach as reflected in this document.

As part of that process, we have under active consideration at any time now in our formalizing, if you will, consideration of the various contingencies and options for the program that might come up. For example, questions like: What if Yucca Mountain is not suitable? And what if the negotiators are not successful in siting the MRS in a timely fashion? We are beginning to formalize and investigate those various options.

I might say at this point that we don't anticipate that we will be doing great documentation of those exercises, because it is not within our charter at this point. We have a very specific and narrowly defined mission from the Congress right now, and that is to accept spent fuel and to dispose of spent fuel and to develop the system in between, and we have some very specific milestones on that, and we have no charter from Congress to make extensive evaluations and considerations of alternatives to the mission that has been set forth by Congress, except under the rubric of prudent management. And that's exactly what we're doing.

[Slide.]

DR. BARTLETT: Let me move now into the policy and strategy foundations for the priorities for the program, first, taking a look at the pre-disposal aspects of the program and the strategic foundations for the technical part of our program. It's absolutely crucial that with the pre-disposal aspects, we fully integrate the plans and activities to meet that goal of beginning spent fuel receipt in 1998.

In doing that, part of the strategy is taking advantage of existing conditions and technologies; in other words, the KISS Principle. We're going to keep it simple and we're going to use what's there right now. Very frankly, that's what we must do in order to be able to meet that goal. Because of the time lines associated with the development of new technologies, they just would not allow us to meet that goal, so we will accomplish it with this strategy.

We will seek to privatize, as I've already indicated, because I think that can introduce operational cost efficiencies to the system. There's a fully developed capability, for example, with respect to transport of hazardous materials within the economic community of the United States and to the extent possible, we want to take advantage of it.

Again, part of the strategy, as I indicated, is that we will work closely with the utilities and the negotiator. This is -- that's a significant statement of strategy because the alternative is to be arbitrary and capricious with respect to the utilities, and I don't think that will work at all, so we're establishing a very active working relationship and partnership to meet our mutual

goals.

With respect to disposal, the strategic foundations start off with, as I have already indicated, the objective of evaluating site suitability at Yucca Mountain as soon as possible. As part of that -- and there's some distinction here between closing technical issues and evaluating site suitability. They're obviously related, but there are some things associated with site suitability that reach outside the more conventional technical issues such as volcanism.

But basically, in association with the objective to evaluate site suitability as soon as possible, also we're seeking to close technical issues as soon as possible. What that means is that we are focusing the technical activities so that we acquire and interpret the data effectively in order to achieve this issue closure consistent with the strategy and objective to do it in a timely fashion.

We will be emphasizing, as a result, site data acquisition in the near term. What that means is, programmatically, we're not emphasizing repository design, for example, and we're not pouring tons of money into waste package design and engineered barrier system design, although I'll come back to that later.

The emphasis, within constrained budgets and our priorities, is, as indicated here, to acquire the data needed for the evaluation of site suitability as soon as possible. I've already indicated and I emphasize here again, that our approach to the engineered barrier system design and waste package design will be to base that on first principles as much as possible. That's what's evolving into what I would consider new and mature program approach to the engineered barrier system and waste package.

In fact, last January, I called it before you, the "Thermodynamic Repository." We try to minimize free energy through our design approach and through our use of materials, et cetera. That's the kind of foundation that I have in mind for that aspect of the program.

[Slide.]

DR. BARTLETT: Moving on to the strategic foundations for management, as I indicated up front, part of our strategy is to, in fact, acquire as much of the technical database for management decisions as reasonable. Now, what we're dealing with here is cost/benefit tradeoffs and investments of time, money and technical effort to get the technical database for decisions up to a level where I would characterize it as the residual uncertainty as a basis for decision is at a low and acceptable level as opposed to shooting from the hip, if you will.

So, one of the things we have to do strategically for the program is to determine just where that curve is going with respect to reducing uncertainty through acquisition of data and making timely decisions with a mix of professional judgment, management judgment and the information database that we have as a basis for a decision.

We will be basing our major decisions on what I hope will be comprehensive and highly robust tradeoff evaluations. I'll talk more later about what some of those tradeoffs are that we deal with in a management sense for the program. I've mentioned one of them before; the tradeoff between whether or not you put hot or cool fuel in the repository. This has major impacts on the amounts and timing of storage before disposal, et cetera.

It's these global, the major decisions for the program that I'm referencing and talking about here. I previously mentioned that we will, as an element of strategy, take initiatives in regulatory compliance. What this means is that we're not playing a game of "Mama, May I?" with respect to regulatory compliance, but we will put proposed approaches to demonstrate means for demonstrating compliance on the table to get NRC's reaction, rather than waiting for them to act.

We will, of course, be very active in responding to opportunities for comment on proposed new regulations or changes in existing regulations such as the pending action with respect to the EPA's 40 CFR 191 regulations which are open for comment. The Department and our office participates actively in such opportunities.

The principal focus here on the initiatives, however, I point out to you, is to take the initiatives with respect to the demonstration of compliance with the regulatory standards as they exist at any given time, and when we have to do this, to actually bring into the picture, our thoughts on the means, and to develop and apply those thoughts in interactions with the Nuclear Regulatory Commission as we finally come down to rulemakings with respect to demonstration of compliance.

I would remind you that there has been no effort to date, specifically, really moving toward means for demonstrating compliance with the post-closure requirements of 10 CFR Part 60. That is, in a sense, awaiting internal exercises with regard to the NRC's evaluation of the current structure and content of Part 60 and progress with respect to finalization of Part 191. But in our strategic planning, looking ahead, we're anticipating the opportunities and needs for the targets of demonstration of compliance and also the means.

As I mentioned, I do want to talk a little bit about the strategic principles and their application in decision-making.

What I'm referring to here specifically is the strategic principles which are in some ways the focal point and the content of the Draft Mission Plan Amendment, or the mission plan amendment as it will finally appear.

We've gone to a lot of trouble to establish this framework of strategic principles, and they're not sterile, and we're not going to abandon them. They are, in fact, going to be the basis for these major decisions. And so I simply want to indicate here that they will be a working basis for progress in the program with respect to its major decisions.

The reference there, as I say, is to the Mission Plan Amendment and its citation of the strategic principles which the program will use.

[Slide.]

DR. BARTLETT: Current program priorities.

Pre-disposal. Provide all essential support to the negotiator for MRS siting. I've already stated that that's what we're doing. The important distinction that's being made here is the fact that the Department is, as a matter of strategy and decision, looking to the negotiator to provide the MRS siting.

The alternative is that the Department is doing the siting. But the decision that's been taken by the Secretary and supported by me in our operations is to give the lead responsibility for siting to the negotiator and to provide the support.

And then, of course, as I've already indicated, but I want to emphasize is, we need to assure, as a priority item, that we will have available in 1998 to begin spent fuel receipt all the essential equipment, logistics, and operating capabilities, so that we can pick up spent fuel at the priority reactors, move it, transfer it as necessary, and deposit it at the MRS.

With respect to disposal, the current program priorities are, as I've already indicated, to acquire and interpret the data that we need for site suitability evaluation, and to apply those data as products of the program in technical reports addressing questions of issue closure, and ultimately, of course, a finding on the suitability of the site. That's a long way down the line.

We are also, as a priority item, developing these foundations for the focused EBS program, and of course, linking that to our progress with respect to the surface-based testing and

the development of the exploratory studies facility, and the use of that facility to acquire the data which would then become the basis for some of the activities within the repository design and the engineered barrier system design activities. They're highly interactive, as I'm sure you're aware.

[Slide.]

DR. BARTLETT: With respect to management -- and then I'll start to move into some of the budget issues -- the priority is to provide MRS transportation and logistics budgets needed to begin spent fuel receipt in 1998.

Now, what I'm really saying there is, we have established, as a budget priority for the program, to fund all the activities associated with the goal of beginning spent fuel receipt in 1998, as necessary to achieve that goal.

In other words, we will provide foundation funding for those activities, and then, in an era and climate of scarce resources, one way of looking at it -- and I have to say it this way, Carl -- is, the leftover money goes to the activities associated with the disposal program. We have established as a near-term goal objective, to be funded as necessary, the activities associated with meeting the 1998 goal. That's a budget priority. It's a foundation funding, if you will, to the program.

We are, however, with the funds applied to Yucca Mountain, trying to optimize as well as possible the disposal program budget allocations in order to meet this goal of evaluating site suitability as soon as possible.

What this involves is the distribution of funds for the disposal program between surface-based activities, development of the exploratory studies facility, and development of the engineered barrier system designs.

So this is where we get into some of these significant tradeoff studies. What is the best allocation of the monies available to that purpose in order to meet the goal of site suitability evaluation?

And of course, and this is not a trivial statement, we seek program budgets from the Congress that are needed to meet the Secretary's goals.

And let me state, and I'll be emphasizing that again, the difference between what we believe is the necessary funding to the program to achieve the Secretary's goals for the program, particularly with respect to the disposal program, the evaluation and implementation of the disposal at the Yucca Mountain site as necessary, is significant.

The difference between what we think is necessary and what, in the current era of fiscal constraint within the Federal Government we are at present operating on, is going to have a significant impact on their actual rate of progress.

So we continue to seek the funds we would need to achieve the goals, but, very frankly, we, like many other programs in the Federal Government at this point, because of the limits established by the budget summit and the general limits on availability funds, do not anticipate that we will receive the kinds of fundings we would need for essentially an unconstrained and full-bore program.

So this is why it is very important to us in a management sense to deal effectively with the constrained resources, as well as we can, in terms of these tradeoffs in the allocations to our various program activities.

So this decision that I've indicated in the priority to focus on, and provide sufficient funding for, the 1998 goal for beginning spent fuel receipt, and then to deal with the tradeoffs in optimization of the monies that are available as we finally get them from Congress with respect

to the disposal program, are very important fundamental budgeting and programmatic strategies that we're applying. And I anticipate that they will continue, because the Federal Government is not going to have all sorts of new money, as we well know.

[Slide.]

DR. BARTLETT: Current issues associated with the priorities and budgets.

Obviously one is, as I've just essentially given you a discussion, is the basis for the rate of progress that we can make with respect to the MRS site and the design selection.

That is partly our issue; it is partly, and in large measure, because of the strategy that's being followed, the negotiator's issue. We are, as I indicated, and I'll emphasize again, making sure that we can meet our aspect of it with respect to the technology and the support the negotiator needs. The progress that a negotiator can make depends in large measure on what kind of response he gets and the effectiveness of interaction with the potential host for the MRS site.

The timing and amount of transportation system funding needed to meet the objectives.

Basically, the issue here is assuring that we can have onboard in timely fashion enough casks for transport of the spent fuel from the reactors to the MRS, and that we have sufficient funding applied to the infrastructure and the support systems to operate the transportation system, and, of course, that funding is sufficient to actually construct and operate the MRS, ultimately.

But the focus here is on the transportation, coming back to that again. It's to make sure that I have given enough funds to transportation to make sure we have the hardware to operate the system, basically.

Another issue, which I've already discussed at some length, is the question of the relative contributions of the surface-based and the underground data to the site suitability evaluation.

Each of these aspects of data acquisition has an assigned mission, and there's a total scope of activities defined for site suitability evaluation to both surface-based testing and to underground testing. The question is, which things do you do first, and which ones do you close on first in order to meet the objective of site suitability evaluation as opposed to acquiring additional data in support of the license application? And I hope the difference is distinct there.

There's a certain body of information from both sources that will be needed to determine whether or not the site is suitable. There's an incremental and additional body of information, again from both sources, that will be needed as a basis for the license application, as a basis for design of the engineered barrier system, et cetera, that can be, in principle, therefore, deferred, and acquired after we have made a determination of whether or not the site is suitable.

So what we need to do is first focus on the data we need from surface-based and underground testing for site suitability evaluation, and then look at the distribution between those in order to meet that goal.

Cost-benefit of sustaining the present ESF schedule -- I mentioned that the schedule which we have at present is aimed at starting the portal for the facility in November of 1992. That is a major visible milestone for the program.

To do so, what happens is that the development of the design and the activities associated with achieving that particular objective frankly eat a lot of money, comparatively. It means that there's money not available for surface-based testing, if in fact we continue to support and fund these activities to meet that goal.

It may be beneficial to the program to slip that schedule somewhat in order to do more with respect to surface-based testing and other activities associated with the Yucca Mountain

evaluation. This is one of the contingencies and one of the trade-off evaluations that we have in process at the present and it's certainly a current issue.

The potential impact of the permit's availability on Yucca Mountain progress and activities -- as you know, we started our new surface-based activity, trenching activities, last week as a result of the fact that we now have the air quality permit. Today there is a hearing, a procedural hearing associated with the underground injection permit.

Tomorrow there is a hearing before the District Court Judge concerning his future role in administering and overseeing the implementation of his order for the state of Nevada to process the permits as expeditiously as possible.

On September 24 there will be a procedural hearing associated with the water appropriation permit which we have pending before the state of Nevada.

How these will proceed remains to be seen. The water appropriation permit is the key issue which may have an impact on our pacing and progress of the program activities. We'll simply have to see how that goes, but there is a potential impact of the timing of availability or non-availability of the water appropriation permit on our rate of progress in the program and again this is a contingency item which we examined from a management point of view.

One of the magnitudes of resources required to develop and implement an appropriate EBS program and closely related to the appropriateness is the timing of the activities associated with this and the timing in association with the principal objective for the disposal part of the program of evaluating site suitability as soon as possible.

The evaluation of site suitability will generate data that is highly relevant to the engineer barrier system and it will be used to that purpose, but again I emphasize that the principal focus is on site suitability evaluation and we will be looking at this trade-off and again there is an issue associated with how much up-front money, if you will, we put into the EBS program as opposed to making maximum advantage of the spinoff utilization of the data from the site suitability evaluation.

Then of course there is the question of impacts and priorities on schedules if the budgets are constrained. It is public knowledge that the fiscal 1992 budget which was put before Congress came out of the House of Representatives at the mark, as we call it. We had requested $305 million and the House responded by appropriating or proposing $305 million. The Senate proposed a budget somewhat less than that, about $10 million less than that or so. Of course those two budgets will be going to conference and out of that will come some reconciliation from the Congress as to what our budget will be.

If we turn out with a budget in 1992 of $300 million, let's say for round numbers, that will be approximately a 10 percent reduction from our current expenditure rates, so our plans for the future will have to deal with that and our activities relating to the 1993 budget are just getting under way within the Department and I can't say anything about that at this time. That just remains to be seen.

[Slide.]

DR. BARTLETT: In general, our budget strategy is, and I emphasize again, that we seek the funds that we need to meet the Secretary's goals and those principal goals, the driving force for our operations, are to start the spent fuel receipt in 1998 and start disposal in 2010, very well-known goals at this point.

Again, strategically we are taking the approach to do everything we can to meet that 1998 goal and to recognize and deal with the flexibility and the internal milestones in our progress toward the disposal goal.

With respect to the allocations of the funds that we actually get, again I am emphasizing we'll fund the MRS in transportation aspects of the program for 1998 as a baseline activity if you will. We will of course meet our basic management and support obligations, which are considerable to this program because we have so many external interactions that are vitally important to the program. We must accomplish those.

Then, what's left over, so to speak, is the subject of these allocation trade-off studies which I have indicated here. At this point in my discussion, there is nothing new here. It's just a reiteration of the things that we constantly have under consideration as the management trade-offs for the program -- the pace of the ESF and the distribution of activities between the underground studies and the surface based studies and how those two contribute to our objectives of the closing technical issues and evaluating site suitabilities as soon as possible and how all of that interacts with the waste package design.

We have a lot of fun doing all of this, as you might imagine and take our responsibilities to do this very seriously and that in summary is essentially where we are at in a management sense for the program.

I thank you for your attention and I'll be glad to take any questions you might have.

DR. DEERE: Thank you. Members from the Board?

DR. CARTER: John, I wonder if I could ask you a few questions about the MRS as far as the schedule, and I guess the thing that I'm interested in are the constraints that are on the program, what flexibility might be there in terms of negotiation and so forth.

I can imagine that a whole state or whatever might want to put some requirements of their own on this sort of thing. I just wonder if you could address those sorts of things.

DR. BARTLETT: The host state will have a lot of input to the terms and conditions of the agreement that's finally achieved and in fact that is one of the major objectives of the approach that a negotiator is using, is to offer opportunity and a menu of factors that the host state might wish to consider as the basis for the negotiated agreement that finally arrives.

He does have a considerable list and he will be coming out in the Fall in about two months with more details on the kinds of things that are essentially open game for the negotiation process and to be written into the agreement in terms of responsibilities and opportunities to the host.

It is a very flexible process and it is designed to provide a basis for the host to be interested, so that the MRS itself is essentially embedded in a much larger framework of socio-economic opportunity for the state, preserving safety, et cetera, so it is intended to be a very comprehensive opportunity for the host state.

One specific aspect of that, Mel, is that we have four basic designs for an MRS that we indicate to the host state are available. In essence, they can pick the design. It's sort of like we have a Sears catalogue of alternatives and we'll also custom design it if you prefer in some other fashion and so they can have considerable impact and input into the specific design that can be used.

DR. CARTER: Well, can they, for example, impact the amount of time that waste could be in the MRS, for example?

DR. BARTLETT: I would think that is one of the possibilities.

DR. CARTER: The amounts of fuel and so forth, these kinds of things.

DR. BARTLETT: The same concept that we'll be using through the negotiator has been already applied in Switzerland and the Swiss negotiated and the Swiss federal government basically or the Swiss program on behalf of the federal government -- I guess the federal

government blessed it -- negotiated an agreement with the Canton, which will host their MRS, which in essence says that the local government, Canton government, has the opportunity to veto the operation and remove it if it is unsatisfactory after a certain period of time. That appears to be a consideration that is of significance to the potential host and is certainly one that would be available here.

DR. CARTER: Thank you.

DR. DEERE: Additional questions from the Board?

DR. PRICE: Dr. Bartlett, what is the status or your concept or view of onsite storage? You've mentioned the importance of the 1998 acceptance of fuel and the presumption of the MRS being available or some way to accept the fuel.

How does onsite storage fit into this? Is it a contingency, in your view, if the bad case exists, or how do you see that?

DR. BARTLETT: You mean at the reactors?

DR. PRICE: Yes.

DR. BARTLETT: Continuing onsite storage at the reactors?

DR. PRICE: Yes.

DR. BARTLETT: Just to give you an idea of the numbers involved, it's not so much a contingency as it is a continuing way of life for the circumstances.

By 1998, there will be about 20,000 -- no, there's currently about 20,000 metric tons in storage. By the turn of the century, there will be about 40,000 metric tons if the reactors continue to operate the way they are. So in 1990, maybe mid-30s, something like that, total inventory at the various reactors around the country at present.

We anticipate taking the fuel at a rate on the order of 500 metric tons per year for approximately the first five years until we can kick the second-generation technology in. So we're not exactly a wholesale emptying of the materials that are in storage at the reactors. And some of the reactors, of course, have circumstances where by that time they will have significant problems with their capability for storage, unless they take action such as adding onsite storage through dry storage or whatever technologies they might choose to use.

And one of the things we're trying to address in this interaction with the utilities is precisely that question. Given the fact that we will not be able to just wheel up to a reactor and take everything that's a problem to them, if you will, because we have the OFF protocol; we have a limited capability within the numbers of casks available and things of that type, is to develop an optimum operating circumstance such that even though a certain reactor might stand very high in the queue with respect to its rights to transport spent fuel, they might not need to, whereas others might.

Now we also have to anticipate that there might be some reactors, even with an optimum operation like that, that we simply can't get to and are going to have to build onsite additional storage capability, probably dry, in addition to what they have in their pools at present. And that's a problem for them, for us, for the system, if you will, something that would have to be done if we run into that circumstance.

DR. PRICE: Another little different question. You used the phrase "minimize free energy in the repository". Could you expand on that a little bit?

DR. BARTLETT: Basically -- I could get into a long discussion with Ellis on this, I think -- basically the concept is, as we select the materials that might be used within the engineered barrier system, they will be next to each other, interacting with the material that's there -- in other words, the geology and the water conditions within that geology -- that you

select the materials such that the potential and propensity for corrosion is minimized, because the potential for interaction between these materials for chemical reaction, corrosion, is minimized as a result of minimizing free energy differences between the materials. It's the fundamental science behind corrosion, if you will.

That's a very short statement of it. You can correct me, please, Ellis, if I'm wrong. But conceptually that's the idea: to select the materials for maximum compatibility to minimize degradation potential. Let me try saying it that way. And, of course, providing defense-in-depth, longevity, all those other challenges that are associated with the design.

DR. DEERE: Are there other questions from Board members at this time?

[No response.]

DR. DEERE: I would like to ask one, then.

Could we go back to the overhead, please?

[Slide.]

I guess about the whole program is right there in those last five lines that you have.

DR. BARTLETT: Yes, at least that part of it.

DR. DEERE: On these trade-off study results. And I'd just like to make some comments and perhaps elicit some response from you.

The first two are certainly interrelated. The pace -- this is in the last five in the tradeoff studies.

DR. BARTLETT: Yes.

DR. DEERE: The pace of the exploratory studies facility obviously is related to the surface-based testing, because you have to know what the stratigraphy is to a much greater detail than we know at present before you can really end up going where you want to go with the ramps. So there has to be a certain amount done. So there is this phasing which is necessary.

But by the same token, the surface-based testing is going to be time-consuming, and a lot of the information that is going to be required for your fourth bullet there, the progress and the site suitability evaluation, I think the Board feels is not going to come from only the exploratory studies facility, but primarily from the -- I mean from the surface-based testing, but from the underground exploration and testing.

So to get an early feel for site suitability, you've got to get underground early. Therefore, we would put up resistance, I would think, in your mind against a slippage of the shaft start date.

DR. BARTLETT: So do I. The question is how long and why, and how does that -- and what are the impacts of logistics and total funding levels on a potential slip in the exploratory studies facility.

Let me give you an idea. As it stands, we might be able to sustain a reasonable surface-based testing program; hit the start of portal in November of 1992; construct the portal, which is a drill-and-blast operation, as you know, and line it; and then stop for a year, because we don't have the funds to extend it, to procure the tunnel boring machines, to provide the electric power that the activities would require, et cetera.

And so we would have a hiatus, a gap in the progress and utilization. In fact, we wouldn't really be started in the use of the underground facility if we had to take that kind of an approach, and it might be better if our funding opportunities do start to ramp up, and they're just about at the nadir right now, to defer for perhaps six months the start of that portal activity, so we can get all our ducks in a row, all of the support logistics and the sufficient funding and some progress in surface-based testing, which has lower cost rates once it's going -- and perhaps Carl can address this in more detail -- in order to make effective continuous use of the underground

facility once we start it.

So it's that kind of a tradeoff that we're considering. Yes, I certainly want to start it as soon as possible.

DR. DEERE: I think in continuation of that, rather than going full bore with the two ramps, even though they may be off-phased by a period of six months or so, it might be better to take one well down in, one tunnel boring machine, not two tunnel boring machines or four. But it seems to me like it's very important to get the scientists underground and into where they can really see some of the geological structures at depth.

I would rather see not a dephasing in my assessment at the moment, a dephasing where you don't really get started, but to get started in a slower fashion, but continuous, so that you're getting down to where we have to go without stopping.

DR. BARTLETT: And getting data out.

DR. DEERE: Oh, exactly.

DR. BARTLETT: And as you've heard me say, the facility itself is the holster for the gun, which is the data acquisition program, and it just provides the access, just like the trenches provide the access to the geologic features at the surface. And the question is: What's the best approach to the utilization of that holster for actual data acquisition? And that also depends on which kinds of data, what is our rate at which we can produce the data and make contributions to the specifics of information as a basis for site suitability evaluation.

You're exactly right.

DR. DEERE: And I think that a lot of the information that you're going to develop that can be very important will be just what you look at with the world's greatest instrument -- your eye -- and seeing the nature of some of the faults and seeing the continuity of some of the joints, which will allow the testing program to be optimized, but it's hard to optimize until we get underground, and it's very difficult to do just with surface-based testing, to get the kind of information that I think would be of value.

The other interrelation on that chart, it seems to me, is the surface-based testing and exploratory studies with the EBS and waste package design. But then I question: Don't we know enough now about the environment, the rock type, the fact that there is going to be some drips of water here and there, that we have a certain pH, that we have a certain chemical content of the water, that there aren't great surprises?

There will be refinements of those values that come out, but isn't enough known now that you can still do meaningful tests of the EBS, as it fits into your budget restraints and other things, because I have heard the comment -- and I think you've made it on a couple of occasions -- that it's really better to put off the EBS, because we need to get the rock information so we can go ahead?

And that's always sort of raised a little question in my mind. Is it that important? We're not really expecting that we're going to hit basalt when we get to that depth.

I think we have a pretty good handle on what we can expect in terms of the groundwater and the rock environment.

A question.

DR. BARTLETT: I think, yes, I would agree with you that the present information is sound enough to start an EBS testing program, for example, that's not wasted. It's certainly not complete, but it's not wasted. The question is, what scope and when, in comparison with the other activities that we have at issue before the program right now, especially within this framework that we're going to fund the MRS, going to fund transportation. We need visible

results and visible progress. We're trying to hit that EBS, which, as I said, gobbles a lot of money, comparatively, out of the total that's available in this arena. And it's a tradeoff analysis.

What I want to do is sustain a sound, frankly somewhat limited in the face of everything else, and sufficient starting fundamental program in the EBS arena, to make sure that we don't get behind the power curve, and that what we're doing makes sense, both in terms of content, and maintaining the personnel resources and laboratory capabilities to operate that system.

My basic strategy at present is to keep that relatively constrained in order to make some significant progress with the database for the site evaluation, and to spin into that.

But I will not take it under what I would call critical funding. I think that's absolutely essential. We would lose too much.

DR. DEERE: Thank you. And I might ask Don Langmuir if he would comment on what we know about the environment around the EBS. Do you agree that the statements that I had were correct?

DR. LANGMUIR: We have a general sense of what's down there, but I don't think we know enough about what would happen under the thermal gradients induced by the disposal of the waste. I don't think we have a full-enough sense yet of the chemistries that would occur after that disposal process and through time shortly thereafter.

DR. DEERE: Yes.

DR. CANTLON: You didn't mention in your coverage interactions with other countries' investments in these same technologies.

Would you address U.S. participation in joint efforts which might extend our funds through sharing costs, and so on?

DR. BARTLETT: We are leveraging that all we can, and Tom Isaacs is going to give you the full story on that a little later. We're very intimately interacting with the world community.

DR. DEERE: Yes, Dennis.

DR. PRICE: One more quick one.

To what extent, in your perception, is the cask procurement program that you see a need for in order to get a fleet on-line for 1998 going to be linked to and dictate the engineered barrier system alternatives?

DR. BARTLETT: That is a good question.

This is the big system linkage in the tradeoff studies where we really need this robust and effective and insightful system tradeoff analysis.

You'll find this addressed at some length in the draft mission plan amendment. Let me try and characterize the options for you.

One possibility is that we use what's been called the "plain vanilla" cask. The existing technology for limited quantities in the given cask to pick up the spent fuel, everything that's off the shelf right now, to pick up the fuel in 1998, take it to an MRS, and perhaps just park it there, in that particular cask.

And so what you're doing is, you're using casks, because you're building the inventory of casks that are stored at the MRS. There is later an opportunity to transfer from that cask to another cask. But certainly you cannot use that cask for disposal.

When you start asking the question, what are the opportunities for combinations -- transport, storage, and disposal -- and start looking at the potential for, for example, a tri-purpose cask, could you get such a critter licensed by the NRC? And could it be cost-effective to the system? How about a dual-purpose cask at the back end of the system, where you've gone from

store to dispose, and it's designed to that purpose?

These are the kinds of options that we're looking at right now, for the long range, as part of the R&D program, and they will get very serious considerations as the strategic options for operating the system.

What I'm trying to indicate by mentioning whether the NRC license them, for example, is that in looking at those options, you have to be very considerate of the factors that are out there on the boundaries with respect to the regulatory constraints, and that the licensing of a dual-purpose or a tri-purpose cask is quite possibly the driving factor in terms of feasibility. And it also potentially has an impact on the specifics of the design of the underground facility.

DR. PRICE: But in the process of procurement, you may minimize your ability to look at those alternatives, and whatever the tradeoffs are. Is that a correct statement?

DR. BARTLETT: Well, the procurement for the 1998 start frankly doesn't look at that at all. It's looking at where can I get enough casks to operate at a 500-MTU transport rate, transfer rate, for a few years, while I'm developing the R&D program.

And so we'll really have an inventory in a two-characteristic system by the time we're done, because we do have advanced casks under development, as you know, when we start thinking about these other system alternatives, such as alternative dual-purpose or tri-purpose casks, and that's very long-range.

So the procurement for the casks to begin receipt in 1998 will be very focused to that purpose, looking at what exists right now, and what we can buy in timely fashion through manufacturing and the procurement process and everything else, to have an available inventory that's operational and serves the purpose for the first few years of receipt.

And in parallel, we'll have the longer-range activity considering some of these tradeoffs.

DR. DEERE: I would like to open the questioning now to those in the audience who may have a question.

MR. CALLEN: John, Ron Callen from the National Association of Regulatory Utility Commissioners.

Could you give us some round-number percentages? In your last slide there, you had allocation of funds available, and you had essentially three tasks -- MRS, basic management, and then a series.

Can you give us some numbers? Once the MRS program might be up and running, what percentage of the total budget would be given to each of those three tasks?

DR. BARTLETT: Let me write, and then I'll work it out for you in real time, Ron. Very rough, of course.

[Pause.]

DR. BARTLETT: Twenty percent to the MRS pre-disposal; 15 percent to management; and the remainder to the disposal program, in round numbers.

MR. CALLEN: Thank you.

DR. DEERE: Are there any questions from our Board consultants or professional staff?

[No response.]

DR. DEERE: All right. I think we'll take a break now. We're scheduled to go back at 10:45, so why don't we make that 10:40, to give us a running start? But if we can keep John here, some of you might be able to gather around him while he's drinking coffee and have additional questions asked.

Back at 10:40. Thank you, John.

[Brief recess.]

DR. DEERE: We will reconvene, please.

I wish to announce that copies of yesterday's papers are on the table here inside this room, at the corner, and these are available for those of you who would like to get them.

Our next speaker is Mr. Carl Gertz. He is the OCRWM Associate Director for Geologic Disposal and has been Project Manager for the Yucca Mountain Site Characterization Project Office since 1987.

Before joining the Project Office staff, Mr. Gertz managed Nuclear Programs at DOE's Idaho Operations Office. He also has worked for the Boeing Company on missile site development, installation and construction management.

Mr. Gertz will provide an overview of the Project office research and budget priorities.

Thank you for joining us today. Carl.

PRESENTATION OF YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT OFFICE STATUS AND RESEARCH PROJECT PRIORITIES

[Slide.]

MR. GERTZ: Thanks a lot, Don. Once again, I appreciate being here, appreciate the opportunity of talking to the Board. As you pointed out, I am going to try to provide a broad perspective of what we're doing across the Project. We have many interactions with you all throughout the year. Many of them are focused on specific technical issues.

I thought it was important to communicate with you about what the entire staff of Yucca Mountain is doing to put things in perspective so as we deal with you you'll understand that.

In effect, I am going to talk about in 1991 what our priorities are. You have been involved in many of those priorities and I'll discuss some of those.

I thought it important that you need to know our '91 activities. I am going to highlight them and go through them pretty fast, but there are a lot of things going on and I believe it is essential that you are aware of those. Then we'll talk about it and take off where John talked about our '92 priorities, give you expectations of where we are heading as a Project in '92 including funding levels for different aspects of it as we see them today, recognizing things go on.

In talking about our '91 activities, I'll also talk about our recent surface disturbing activities at Yucca Mountain last week and enhance that a little bit.

With that, we are ready to go.

[Slide.]

MR. GERTZ: Let me now just briefly run through our '91 priorities.

Our first priority was to be ready to start new surface-based activities at Midway Valley and Calcite Silica, trench 14. We did complete our readiness in January of '91 and, in fact, work started on July 8, and I'll talk more about that later. But I wanted to say that was one of our priorities and was accomplished. John alluded to it and I won't talk much more about it, but we have employed the site suitability methodology and then later tomorrow we have a presentation and we'll give you an update on that.

We continue on TRB and NRC interactions. They are ongoing. They are extensive. I'll talk more about that as we get into it.

We continue our non-surface disturbing activities. We're doing lots of things out there -- that is, monitoring. We didn't necessarily need permits to do them.

[Slide.]

MR. GERTZ: We did complete this year -- it was a priority -- four ongoing tasks. I want to point out these are priorities that John and I set in October of 1990, so it's a list of priorities. I haven't changed them. It's the list we set back in October, but we worked on a test prioritization task. That's been completed. I believe we provided you the documentation of that.

The Exploratory Studies Facility alternatives that we talked about some yesterday, that has been completed. The Calico Hills Risk/Benefit Analysis was complete and we put together alternate license applications strategies, an atlas report, kind of brainstorming -- although done through elicitation activity -- to provide John some opportunities for different strategies as the program moves forward over the years, to think about them.

We did start ESF design. In fact, we started our design studies in February and we updated you continually on that one. Two of the areas that we started are surface activities on calcite-silica and volcanism, in progress.

[Slide.]

MR. GERTZ: Dwight and his people talked a lot yesterday about the management improvement strategies. We have supported that with extensive Project personnel in the FRA process in the functional analysis. We are working on other things: TQM and decision analysis activities.

We are continuing extensive records management activity. We continue to do our study plans. One thing we didn't do is prototype drilling and last October I would have liked to do some more prototype drilling at Apache Leap. As the year progressed I didn't think that was a priority, and, although I'll talk about it later, we are in Utah this week running production tests of the equipment. It is not per se prototype drilling.

We did initiate some waste package studies which were a rather low level of effort, but we did initiate it, so that summarizes where we were in '91 in our priorities.

[Slide.]

MR. GERTZ: Now I am going to talk about the activities, not only the priorities but the activities across the program.

[Slide.]

MR. GERTZ: I guess one of our most important activities was on July 8th at 3:20 we did start new surface-based work. It's a small but significant step which we believe is the first step. It marks the beginning of the comprehensive scientific investigations to determine whether Yucca Mountain is suitable or not. It's a small but significant step along those lines.

[Slide.]

MR. GERTZ: We actually, as John pointed out, worked in three areas last week.

We worked trenching at Midway Valley to study the existing and potential faults in the area. I'll show you on the map.

We did deepen Trench 14 from the existing 10 or 12 feet to about 20 feet, and we got underway with some volcanism work, volcanism work that we were ready to go with a year ago with Bruce Crowe's activities but now that we have the permit we were able to get out at Lathrop Wells and do that.

Some of you may not have been to the site for awhile so I want to talk about -- this is the southwest portion of the Nevada test site.

[Slide.]

MR. GERTZ: We now are using our own gate at Lathrop Wells for most of the excess. Our support facilities including the sample management facility are right here and the green area you see is the area of Nevada test site that in effect Yucca Mountain Project is responsible for. It's about 85 square miles.

Activities we did is up here at Exile Hill. I'll mark it over here. Trench 14 is just on this side of Exile Hill and further up the north end of Exile Hill into Midway Valley was Duane Gibson's activity.

Bruce Crowe's activity was down here at Lathrop Wells on the cinder cones.

Yucca Mountain Repository conceptual outline, footprint is showing here. I would like you to note that this is Well J-13. It's a well that we've asked the state for a water appropriation for and to do this surface based activities we were unable to use that well or for that matter any appropriated water in Nevada, so we hauled it from down here at Death Valley Junction, about 45 miles.

[Slide.]

MR. GERTZ: This depicts our getting started, pulling the water out of a pond at Death Valley Junction. We brought it from the Death Valley Junction Water Company.

[Slide.]

MR. GERTZ: We then trucked it across the state line, into Nevada, put it in a set of storage tanks so that we could use it -- these storage tanks are located approximately a half mile from J-13 -- so that we had it ready to use for our activities.

[Slide.]

MR. GERTZ: What allowed us to get moving on with our activities was the issuance by the state of a surface disturbance permit. We could dig trenches, drill holes, build roads, but we had to control water as part of the conditions to that permit and since we didn't have a water permit, we had to go out of the state to obtain a source of water. At least that's the only place we could find it.

This is initially getting under way, deepening Trench 14.

[Slide.]

MR. GERTZ: This is another view from the other side looking toward the west in Trench 14. It's a piece of equipment that we use to break up the bottom of the trench, just a bulldozer, front-end loader cleaning out the trench after the pavement breaker has gone to work.

[Slide.]

MR. GERTZ: This is a view of the veins before we deepened it. You've all seen it and that's about where it was. We've gone ten feet further, deeper than that location.

[Slide.]

MR. GERTZ: The photo I have shows only about four feet deeper into here and we're starting to clean it off. I don't have an updated photo as it went any deeper. But, as a matter of information, the veins did start to narrow significantly. Does it close the issue based on this investigation? Certainly not. There's lots of debate still about the origin of those mineral deposits. But it provides data for more sampling, provides opportunity for people to look in that fault, Beau Ridge Fault, and the mineral deposits in that fault a little more.

[Slide.]

MR. GERTZ: Additionally, we went further North along the Beau Ridge Fault and excavated another trench. We call it Trench A. It was one of our first, initial trenches. This is Duane Gibson. That's his area of expertise for Trench 14. It was Zell Peterman and John Stuckless, the PIs. And in here we're once again looking at the Beau Ridge Fault, looking (1) for

any mineral deposits, but also looking for any offsets because in the Midway Valley area will be our initial sighting of the ramp, the North portal, but also potential surface facilities.

[Slide.]

MR. GERTZ: Down here, at Lathrop Wells, Cinder Cones, Bruce Crowe got underway and dug six soil pits in order for, to obtain samples to try to date the Lathrop Wells volcanic activity and provide more information for his investigations.

[Slide.]

MR. GERTZ: In summary, let me just talk about what we did in July and what we would be doing if we excavated. In essence, we are about complete with our excavations at both of those, both Trench A and Trench 14, we will continue to sample. We'll log what we see on the wall and we'll plan for the rest of the year if we can plan some funds for possibly some additional trenching at Midway Valley.

Our environmental field programs, of course, are ongoing in that area, pre-activity surveys if we do more trenching. We'll have to do Bruce Crowe's volcanism studies, in essence, were completed at Lathrop Wells. We'll see if there are some more things we can do this year. We are hauling and storing water.

Water is necessary to keep down the dust. That's essentially the need for the water, to keep down the dust to be in compliance with our air permit. And we're operating, of course, the sample management facility and a site office. And that's just a short list of things that are focused around this area and activities that occurred last week and this week.

I don't want to give you false expectations. If you go out there in August, you probably don't see any bulldozers working, you don't see anything like that because we've completed our work for this year. And why? Because there are some uncertainties. Why aren't we progressing along?

One of the uncertainties, as I pointed out, was that we had to haul water for 45 miles. We had applied for a permit. The permit's in process, but let me -- I'd like to put things in perspective. Our water is approximately two percent of an annual use of one local mine. It's also 2/10,000ths of a percent of a recent Las Vegas request for rural water. So we're not really asking for a lot of water, but still, we must go through the process of obtaining that permit.

Another uncertainty is that it's not only the State action on this water permit, but State action on future permits. For point of information, on this water permit we received from the State just yesterday a request of what to provide in the way of information for our September 24 hearing and it talked about all the well in the Southern/Southwestern Nevada and the Yucca Mountain area and California. It's asking for a lot of information -- 22 pages with it. Unprecedented requests for information for a water permit application but we'll work through the system and see how it goes. But we're uncertain.

The other thing is, there is a limited budget, as John talked about, and what can we do or what can't we do because when you take some money to do field work, you take it away from other parts of the program, and I'll talk about that.

[Slide.]

MR. GERTZ: Let's talk about our outlook for this type of activity. We're going to continue the process to obtain additional permits. The hearing on water permit is September 24. We couldn't continue to haul water for 45 miles for a comprehensive site characterization program. We'll work on other permits; they'll be requested as needed. If we get the water permit, though, we essentially have some permits in place to do quite a bit of new surface-based work.

But most importantly, the Department is committed to pursue new legislation through Congress to assure scientific investigation can proceed without interruption, without interruption from political maneuvering, without interruption from political posturing. We want to get the science started and we want it to continue unimpeded. Until we get new legislation, we're always at risk to either new State administration or a new State view on the project. So, I want to underline that. Although we're doing limited work, we believe it's absolutely essential for this program over ten years to get on with the science and to that, we're going to need new legislation. We don't want the scientific legislation to be interrupted.

[Slide.]

MR GERTZ: With that, that kind of updates you on where we stand on the recent activities. And let me tell you, that was a milestone for all of us.

I'm going to go over this chart. It's our breakdown structure. But getting the work done at Midway Valley represented work of maybe 600, 700 people -- maybe even all 1,000, 1,200 people in the project. We implemented over two hundred procedures. I talked to you yesterday, we had some changes. We ran a field change board. We made five changes Monday before work started because of different things we found. We were able to implement a comprehensive procedural program and we were able to get it done. Only in a limited way but it really served to us on the project as an example that we got the right infrastructure.

The issue is, we have an infrastructure to support maybe a $400 million program and we're only able to do very limited field work due to -- one had been due to permitting restraints and that still exists because we don't have water; two, because of some limited budget. So, we have the infrastructure and we're ready to go. The infrastructure is sometimes represented by this entire work breakdown structure. What I just talked about were activities under 1.2.3. site, Geology and Hydrology.

I'd like to point out that our program starts across a work breakdown structure with systems -- that's 1.2.1. That involves performance assessment critical to all activities; it involves requirements development; and it involves technical data information, things like the geologic information system.

1.2.2 is our waste package. We've talked some about that and I'll talk more about it.

1.2.3 is site and the elements under site, the investigation of the site.

1.2.4 is repository design. Right now, that's very limited to just what interfaces with the ESF.

1.2.5 is regulatory licensing, institutional outreach. Also, all our environmental programs are under 1.2.5.

1.2.6 is the exploratory shaft facility, design and construct.

1.2.7 is test facilities and the activities that we need to support what's going on in area 25.

1.2.8 is land acquisition. Even though we have 70,000 of right-of-way we still are doing some tests in California, some tests outside that right-of-way that we have to go through BLM for reservation.

1.2.9 is our project management activities which includes quality assurance, which includes paying the rent, G&A, General Administrative activities.

And then 1.2.10 is our assistance to the States and counties. Later on in the presentation I'll show you our budgets for '90, '91 and '92 in those areas.

But this is how we manage the budget. This represents about 50 accounts. The level before this is another 100 accounts and below that is another approximately 100 accounts. We

schedule work, we budget work and we report against that monthly. And that is a comprehensive management system and that's how we laid out the work for the project and that's how we schedule. I think it's very important.

Last year, we were facing more budget cuts with Congress because they weren't sure that we could manage the money we had. We were able to go to some Congressional staff and point out how this system worked and I think may have saved us a $30- or $40 million budget cut, the fact that we had this system in place and operating and could demonstrate it.

[Slide.]

MR. GERTZ: I am pleased with that, and I just want to go through what's in the system. I'm not going to go numerically. I'm going to go a little more logically as the site work is proceeding.

The first one I'm going to -- you see they're color-coded -- is about 1.2.3. I'm not going to talk a lot, but I'm going to hit some of the points.

We call 1.2.3 Site. 1.2.3.1 is Management and Integration. All across, our work breakdown structure. These are our kind of miscellaneous collection accounts. We call them management and integration because we wanted to separate the technical management from the principal investigator work. So this is kind of the technical management of that and other things, such as in 1.2.1, the early site suitability work is being collected in this cost account.

What you'll see on here is -- this is T&MSS, technical and management support services contractor, predominantly SAIC, Los Alamos, USGS, the primary contributors to these activities.

But this is essentially site suitability and the geophysical logging system.

[Slide.]

MR. GERTZ: We then move on to geology, talking about getting volcanology prerequisites done, talking about studying stratigraphy, new surface disturbance activities at Trench 14, seismic network, 52-station seismic network, and importantly issue closure.

As I said, I'm going to go through this to just kind of give you an idea of what we're doing across the project, because when we start to say let's emphasize this or emphasize that, it's at the expense of something else you see up here.

[Slide.]

MR. GERTZ: Hydrology. We're doing surface runoff studies. We're doing non-surface disturbing monitoring of infiltration in the unsaturated zone, Alan Flint's work. I know you heard a lot about this the other day in Denver.

We're doing saturated zone monitoring, modeling of regional flow, fracture network monitoring at the Lawrence Berkeley Lab, groundwater geochemistry by the USGS.

Gaseous flow studies. The mountain is breathing. We know that. We need to understand how it breathes.

We're going to be working and you saw -- I didn't point out, but on my previous chart, we hope to put some boreholes next to a hydrologic research facility in Area 25, and we're going to put some holes right there, so Joe Russo can go down the holes, work out instrumentation so he understands how his instrumentation is going to work, so when we get on Yucca Mountain, we'll be ready.

[Slide.]

MR. GERTZ: Support issue closure once again in calcite silica by those organizations, and REECO and Raytheon support the hydrology program. REECO is our constructor, so to speak. REECO provides the craft to do things like running workover rates.

[Slide.]

MR. GERTZ: We're working over some of the holes. This we're able to do without surface disturbing permits. But I just wanted to point a couple of things we're doing.

[Slide.]

MR. GERTZ: This is more workover type rigs where we replaced the lining in one of the holes out there. We're continuing to do things like this as money allows.

[Slide.]

MR. GERTZ: Let me switch now to geochemistry. The geochemistry program, of course, is run for us by Los Alamos. They're doing their modeling. They're doing transport experiments. We need to understand how the radionuclides will react and be transported through the zeolitic environment below Yucca Mountain. Solubility measurements for the radionuclides.

Sorption tasks. I know you all participated in a workshop with us on radionuclide sorption, one of the activities that we're doing, and computer modeling.

[Slide.]

MR. GERTZ: Drilling. This is our category for collecting some of the drilling costs and developing drilling activities.

Ongoing non-surface disturbing activity, you saw some of the pictures. Borehole monitoring, workovers on some of the wells, maintenance of borehole instrumentation -- maintenance, not development of it.

Architect engineer activities associated with new surface disturbance. When we did a new trench at Midway Valley, we had to have the architect engineer design it, make sure we had it safe, in order so we had a facility for a scientist to go in and do their work.

This account operates the sample management facility. We had 367 requests for core samples for scoping studies that we honored last year, 367 requests for different PIs looking at previous core to help them understand where they're going to go in the future.

And this account developed the LM300 drill. It's not in Utah. We are working at a mine in Utah this week, as I speak today.

[Slide.]

MR. GERTZ: We're developing a pipehandling system, so we can operate this more efficiently and safely because the pipe is pretty heavy, and we hope to move this down to the Yucca Mountain area later this month -- later August, I should say, or September. However, once we move it down there, we don't really have money to operate it under current priorities right now. It will be down there and ready to go when the time comes.

[Slide.]

MR. GERTZ: Also still in site -- I want to remind you we're still here -- we need to understand long-term activities such as climatology and meteorology, and we're doing those kinds of modeling. Some of it's going to have to be cut back. Global climate modeling and some of our regional modeling activities will be cut back in future years, but we're doing some, and we are trying to understand the natural resource potential at Yucca Mountain. That's being done by the USGS and Los Alamos, and mineral studies are going on as well as hydrocarbon potential.

[Slide.]

MR. GERTZ: Let me now just move to our next priority, as we see it, 1.2.6. You heard a lot about it yesterday, so I won't talk about it.

But first of all 1.2.6.1, that is, once again. our collection account for miscellaneous

activities where we look at the alternatives study, prepare our design summary report, do things that are miscellaneous in support of ESF design, not lines on paper. The next accounts, then, talk about lines on paper.

[Slide.]

MR. GERTZ: For site prep, 44 drawings; for surface prep, 46 drawings. We haven't changed our nomenclature from "first shaft" to "first access." This is the old nomenclature, as we have not made the official commitment, and John won't make that decision until the end of September to pick up on a two-ramp concept. But for the north access, the first access, we talk about drawings and trade studies. We went over those yesterday. I won't spend any time on it.

[Slide.]

MR. GERTZ: For the south access, we talked about drawings and trade studies for subsurface, underground in the ESF area. Once again, we have trade studies and drawings and specifications. That's essentially what we do in each of those accounts -- trade studies, drawings, specs.

[Slide.]

MR. GERTZ: For operations, though, we're looking at our integrated data system. We want to be able, when we go underground, for the principal investigators to plug the data right in from their test, and it goes into an integrated data system a state-of-the-art assimilation of data that will be available to all scientists on the program.

[Slide.]

MR. GERTZ: You saw this yesterday. I want to emphasize once again the early part is the "red," the North side. That's our first design packages, our first construction packages.

I want to emphasize that we're looking at procurement for future TBM activity after we do the portal. We're looking to procure it in some kind cost-type contract in general that would, say, give us a hole in the ground, give us a technical proposal for providing us a hole in the ground. And then we'll sequence that, depending on funding.

Don, I know you alluded to you just do the North, and wait a while before you would do the blue and the South. Certainly that's an option.

[Slide.]

MR. GERTZ: Let me then move on to 1.2.7, which is what we call test facilities, that supports the activity that's going on out there, whether it's working on an ESF, or whether it's working on the 1.2.3. site stuff. But that's the field management activities.

And I guess I can't say much more than that it works. We implemented it last week. We had a field management system and a team consistent with the upper-level requirements. We have facilities out there in Area 25. We have a construction coordination function.

This will be, in effect, our base camp, if you want to use it in construction terms, Area 25, and we have to develop, sure we have a sound base camp, and we have to do the healthy and safety things that are required, the OSHA safety things, which includes a safety program.

[Slide.]

MR. GERTZ: In the area of new facilities, whether we're working on the hydrologic lab or the sample management facility, we want to make sure those buildings conform to existing codes.

They were built 20 and 30 years ago for the nuclear propulsion program. We've renovated them. We have to make sure they're safe for the people working in them.

In addition to that, we're designing other facilities for expansion of the field program, and we do field engineering and inspection.

[Slide.]

MR. GERTZ: We operate Area 25 facilities 85 square miles, that area in blue. We take care of, and there's 10 buildings in that area right now. We're responsible. We're, in effect, the landlord for that area. We operate our field operations center, which is the focus of the field activities. Direct services are provided. We have health and safety, food service, fire protection, and transportation. The kind of things you need to do when you're out there in the field.

[Slide.]

MR. GERTZ: In addition to that, there's warehousing and storage, landfill, utilities, electric, sewer, radio, telephones. The miscellaneous things. Surveying, non-destructive examination, whatever the scientists, engineers, constructors need.

[Slide.]

MR. GERTZ: Let me now move on to 1.2.5.

It's partially a field activity also, because it involves our environmental program. 1.2.5 is a very important activity for us, across our work breakdown structure.

Firstly, in management integration, we integrate it all, and it provides some of the things like what go on today at these meetings.

[Slide.]

MR. GERTZ: Let's talk about licensing.

In licensing, we lump our interactions. With the NRC, we anticipated 24. With the Waste Technical Review Board, we anticipated 20 meetings. ACNW, National Academy of Science, and others. EEI has had two major interactions of three days each with us, out on site. Everybody, in essence, on the project supports that.

Also, we do study plan reviews in this cost accounting. We work on issue convergence. We want to figure out how to close the issues. The science is developed in the other counts. The regulatory aspect of putting that together, calcite/silica, volcanism is developed in this account.

This supports site suitability from a licensing point of view. Site characterization plan comments, we're still working on that. We had over between four and five thousand comments on the SCP.

The only comments outstanding are those to the state for -- we've responded to the near-term activities. We need to respond to them for the entire set of comments. We will have those comments out shortly, before the end of September. But we are working on 2,000 comments right there.

And we continue to do our technical data management plan. Our TRIMS system I'll talk just a little bit about. And, each six months we issue an update on the site characterization progress. Not a small task. A major task to update, in accordance with the law, for the site characterization program, what has been accomplished and what changes may be forthcoming.

[Slide.]

MR. GERTZ: Briefly, I will just talk about TRIMS, because it's our method that we have in place for tying the data that we're collecting to the long-term goal where we're going.

We're going for a license application, if we find Yucca Mountain suitable. To do that, we need a set of licensing documents and technical documents to support that.

What the TRIMS system does is tie the technical data that we need into technical documents, and tracks it.

We have another system called PARATRAC, which tracks the parameters that we need to develop technical reports.

So this is part of the systems in place, working, and being maintained.

[Slide.]

MR. GERTZ: I want to just now move very briefly to interactions.

We have, of course, continued to have interactions with the NRC. They are our regulator. At this point in the process, we're not a license applicant. But certainly, we are almost a license applicant, and we have lots of interactions with them, and I support it. It's a meeting of the minds. We're able to understand where the scientists and engineers are coming from on each side of the issues, and we're able to focus issues. And that's the number of meetings we've had over the years with the NRC.

In 1989, we started some major interactions with you-all, with the Waste Technical Review Board. We're predicting maybe 17. When we started the year, we thought maybe 20 interactions. This, no doubt, consumes a lot of resources. I've talked about that. But I think it's essential for developing public trust and credibility.

I particularly would like to commend maybe Congress and the Board. I thought when Congress established the '87 Amendments Act and said study only Yucca Mountain, and then created the Waste Technical Review Board, it provided me, as a project manager, with another element in public trust and credibility, saying gee, don't trust me, let's trust the NRC, let's look at the Board, let's look at other oversight entities.

So I think it's a key aspect of the program, and Congress had good foresight, I think, in creating that.

[Slide.]

MR. GERTZ: But, these activities do cost a little bit. We anticipate per month we have about three major meetings, be it with the NRC or the Waste Technical Review Board.

And just as an aside, so people are aware, I know the meeting in Denver was one of our more extensive ones, with 28 presentations, but certainly not our most extensive. We have some meetings that may double the resources. But that's a man-year and a half.

If you wanted to ask me a number for our interactions that we devote to the Board and to the NRC and other people, I would think it might be somewhere between $5 million to $10 million a year spent on collecting data, presenting the data, assimilating, creating data for certain reports.

But I think it's absolutely essential, part of the program. It should be. It's part of licensing. It's part of what the law says. So it's not at all I'm complaining about that. I think that's essential. But I'd like to identify it's just another thing that we have to do in the scientific study of Yucca Mountain.

[Slide.]

MR. GERTZ: Let me talk about, in the blue area, in regulatory and institutional, talk about environmental compliance, which is right here.

We develop annual reports.

We do environmental monitoring and mitigation progress reports.

We have to make sure we are handing hazardous materials property in accordance with RCRA and CERCLA, just like anyone else.

We have to maintain a requirements tracking system, and environmental surveillance program. We want to make sure we're doing what we say we're doing.

[Slide.]

MR. GERTZ: Our environmental program is important. The Department of Energy is now in the process of establishing sound environmental programs across the complex. We

fortunately had a head start on it. I think we may have one of the best environmental compliance, environmental regulatory programs in the Department. And I think it's paying dividends for us.

Before we start any work, whether it is at Trench 14 or anywhere, we have to do a pre-activity survey, both archaeological and flora and fauna investigations.

We have received a non-jeopardy opinion from the Fish & Wildlife, so we can move forward despite having Desert Tortoises in the area. But we have to conduct the studies we promised that we would do to keep that opinion in force.

We want to understand, should Yucca Mountain not be suitable, or should we abandon the hole, how can we reclaim the area properly?

We do data recovery in the archaeological area. We have, in fact, moved roads, moved facilities, because of archaeological finds, so to speak.

We want to know what's going on out there, and we maintain an inventory of the artifacts. It's maintained by the University of Nevada System Desert Research Institute.

We continue to collect small mammals for our monitoring. Those of you who have been out to the mountain recently have seen our little tents where we trap them. We do far-field radiological sampling.

We do air-quality particulate monitoring. That's in compliance with our air quality permit that we just received.

And we develop topical reports.

[Slide.]

MR. GERTZ: We look at population centers and wind patterns for future activity when it comes to predicting radionuclide release. We look at field plans for soils, consultation with the National Park Service.

The National Park Service, by the way, did protest our water application, the J-13 water application. They also did withdraw that protest, by formal letter, providing the state engineer incorporates a monitoring plan that we and the National Park Service agree on.

So they have a letter on record that protested us. They have a letter that says we withdraw that protest, providing you, state engineer, incorporate the monitoring plan that the National Park Service and DOE have agreed upon.

This is relative to any effect our withdrawal may have on the pupfish in the Ash Meadows area.

We have ongoing interactions with Native Americans. We have National Historic Preservation Act activities to comply with.

These are all commitments. It's the groundwork, the infrastructure for the program, whether we're doing five trenches or 50 trenches and four big drill rigs, we still need to do all these kind of things.

[Slide.]

MR. GERTZ: More activity on our water resources. This is for quantity and quality, not for hydrology, for radionuclide release, but this is for use, for environmental-type use.

As I said, we do work with the Native Americans, and we still continue to work our reclamation plan.

Two other areas in blue.

Transportation. The project office is responsible for within-Nevada transportation.

We've produced, and right now some of the counties involved are reviewing, a comprehensive conceptual design of an alternate rail route.

We in fact wanted to emphasize three routes. We've not discarded any of the 13 or so that we've looked at, but we've emphasized three. And one of them has resulted in a comprehensive conceptual design. I'll talk a little bit more about that after this.

Local government has worked well with us in that activity, and we're continuing transportation risk assessment studies.

By law, we have to conduct a socioeconomic program. We have to understand any effects the project may be having on the socioeconomics of the area.

And we're committed to provide a payment to the county, equivalent to taxes. That's part of the law. We're developing the methodology for that. But we do owe Nye County some money. No doubt about it.

In effect, we, through the taxation process, we owe the state and Nye County some money. It's called payment equal to taxes.

[Slide.]

MR. GERTZ: Let me just briefly go over the rail activities that we talked about.

Yucca Mountain being down here, with no rail within 91 miles of it, we looked at several routes. And of three that we focused on was one from Caliente, one from Carlin from the North, and one from Jean from the South.

And by the way, the Jean route connects to the Santa Fe, so all routes would eliminate rail transportation essentially through Las Vegas, if we so choose.

We put together a comprehensive conceptual design, drawings, everything, of this route. However, we are not doing any more in this area, because as a Project Manager I thought we had other priorities, both in 1991 and 1992.

Eventually, when the program is up and running again, we'll probably do a Jean route and a Carlin route, to the same amount of detail.

You know, tough times require tough decisions. It's one of the activities that I certainly would have liked to continue. But I just want to point out to you, there are always tradeoffs, and we are continually making tradeoffs around the project.

DR. CARTER: Carl, could I ask you one question -- MR. GERTZ: Sure.

DR. CARTER: -- about that last slide?

I wonder, I thought at one time there was going to be a proposed rail link from somewhere around, oh, Nellis Air Force Base --

MR. GERTZ: Yes.

DR. CARTER: -- or just North of there, to the site.

MR. GERTZ: Yes.

DR. CARTER: Yes?

MR. GERTZ: Yes.

In our review of the 13 routes, we thought the land access problems with that -- it goes through a wildlife reserve; it goes close to the Nellis Air Base; it goes close to the test site. And Las Vegas is expanding at the rate of 4,000 people a month. Much of that expansion is in the Northwest area. We believe the land-use routes, the land-use problems, challenges, were just too difficult with that particular route right now.

But you're right. Our EA, I think, in '86 shows that as the route, which, once again, just shows that the program is evolving. We no longer think that's the most viable.

It has not been excluded, but it's not one we chose for study at this time, no.

DR. CARTER: Okay. Thank you.

MR. GERTZ: Sure.

[Slide.]

MR. GERTZ: Also in 1.2.5, 1.2.5.7, down here we talk about communications and outreach.

It's a very important part of our program. I'd like to introduce Bea Riley, who has helped John and I today in this presentation, and manages that program for the project, for SAIC.

But we do lots of things. We run an information office in Beatty, and in Las Vegas. Over 6,000 people have been to our Las Vegas information office. It's been open a little over a year.

We conduct update meetings across the state. Every six months we go to the North, to Nye County, and to the Las Vegas area, and we have a consultant ask the public what they would like to hear from us. That's six meetings a year. And we try to communicate with the public or the state as to the status of the project, and whatever else they would like to hear from us.

One of our most effective things has been tours. We advertised in the paper, said how would you like to see Yucca Mountain? We had 1200 responses in ten days. We're taken about 900 people to the mountain in the last four months.

We have a monthly tour. It has been very successful.

We have an ongoing speakers' program, 145 presentations locally over the last year.

We go to every state fair, every industrial exhibit, wherever they'll have us, in order to try to communicate information about the project and the program. We have products that we use for that.

And, this year, many of the things we've had to do in this program, as a result of optimizing resources, have been somewhat unpopular.

We had a Climax mine where actually we had spent fuel put in underground, for three years, in the early '80s. We used to take people up there to show them, firsthand, here is a repository, albeit for three years only. And we have since taken the fuel out. It came from Turkey Point. We did lots of experiments up there.

But we had to close that, for cost purposes. It was costing $1 million a year, and providing no scientific information to the program.

But we've recreated that in a model form at the information office, and we're going to be opening that later in July. We invite you to stop by the info office to see this new exhibit, at that time.

Another thing, that's not in this area, but I'll allude to later, that we had to close, was G-tunnel. Much like some of the foreign countries, we had a nice research facility in G-tunnel, where we could do work in tuff. And we did experiments there.

But, because of priorities and because of costs of ventilation system, and because our partners in the test program were moving out of G-tunnel, and we would have had to pick up the entire housekeeping cost, it didn't seem to be cost-effective to continue work at that time.

But let me just go over some of the things.

[Slide.]

MR. GERTZ: There's our information office. If you haven't been there, please stop by. Las Vegas, anytime. It's open seven days a week.

[Slide.]

MR. GERTZ: That's the inside of it. It's a museum-like setting. We're proud of it.

We're particularly proud because some people come in and say gee, are you for or against the project, after we go through it. So we're trying to provide an unbiased view for the citizens.

[Slide.]

MR. GERTZ: This is our update meeting. When I talk about going to the public, we do that in an open forum, but then, most importantly, we found the public wants to talk to the individual scientists.

So, around the room we'll have 12 or 14 areas for exhibits, where specialists will talk to the public, one on one, specialists like John Czarnecki. I think maybe he talked to you in Denver about his program. He was talking about hydrology and geology there.

And that's kind of how we try to interact. We've found one-on-one with the public has been most effective in communicating.

[Slide.]

MR. GERTZ: I would like to put this up, referring to the tours. It has been quite surprising to me. But since we're investing in the tours -- 40, 50, 60 of our staff volunteer their sundays to go out and talk to the public -- I was wondering what the public thought about it. So I had asked the staff to do a survey.

Of the over 800 people who filled out the survey -- and I'm not talking about, now, tours of industry or tours of university students, or focused scientific groups, because we do lots of those.

This is the public that called up and said we'd like to see Yucca Mountain -- 90 percent of those people, after viewing the mountain, talking to the staff, said we believe DOE should study Yucca Mountain.

I found that to be quite surprising, in light of other surveys. I'm not claiming this is a scientific survey. All this is is a survey of those people who have been to the mountain and talked to the staff, and what they think about it.

Seven percent of those people were undecided. Three percent said do not conduct the studies, no matter what.

Interesting, though. Before the tour of that group, almost 300 were undecided or opposed. Eighty-four percent of the people changed their mind, positively, after viewing the mountain itself, and talking to the staff.

So we are going to try to continue the tours. I don't know if we can get all one million Nevadans to the mountain, but we're going to try to get as many as we can; and we're going to increase our advertising in September. We skipped August, because it's going to be a little hot.

In fact, next Friday, we have another one of the tours coming up. Yes, this Friday. The day after tomorrow.

[Slide.]

MR. GERTZ: Let me move on now. I'm moving across the program. I talked very briefly, a very small part of the program is land acquisition. We have our right-of-way. We have land withdrawn. We're okay in almost all areas, but still we have to continually look at some of right-of-way reservations, and with our initial withdrawal, we also had a mineral evaluation that was conducted by the State of Nevada, and they want to now look at some of our core. They did a mineral evaluation, the state geologists from above-ground observations. They now want to look at the core, and they'll be looking at some of the core and seeing if they can come to any determination in their view about the mineral potential at Yucca Mountain.

[Slide.]

MR. GERTZ: Let me now move to 1.2.2. John talked a little bit about this. It says "waste package", but it's certainly more than that. It's waste package; it's near-field environment; it's waste form testing. In other words, what's our source term -- glass, spent fuel?

Many of those of us who deal in nuclear reactors are familiar with source terms. Well,

this is the category that talks about waste form.

So it's more than just designing a waste package. It's more about the environment.

Once again, in 1.2.1, that's our cost collection, but it provides the specification for high-level waste glass. It maintains our waste package plan, our waste package strategy. It's developed by Lawrence Livermore. It kind of lays out what we're going to do in the program in awhile over the next few years.

[Slide.]

In this area, we go down to 1.2.2, we want to complete, as best we know, a near-field environmental report. I know Don said there is some uncertainty about what's in the near-field. Well, this is trying to tie down all we know at this time. We still believe we certainly have to go underground to find out a lot more.

But, Don, as you point out, this may provide us some basis for any future design. At least we'll have it all together. We want to study the mineralogy, geochemistry, and hydrology, particularly hydrology in the near-field environment, which is these both bullets.

[Slide.]

MR. GERTZ: From that, we move into the waste form and materials testing. We're doing some minor amount of container materials testing. We're maintaining our thermodynamic code, EQ36. We're doing ongoing testing and modeling of high-level waste glass.

[Slide.]

MR. GERTZ: In addition to that, we want to move a little further in the waste package area, so we want to look at criteria for defining and selecting concepts, 1.2.4 here. This is kind of our program for the future. Let's look at some concepts.

It's resulted as a result of another interaction with you all, what we believe was a very successful engineered barrier system concepts workshop. It kind of lays out the plan for the future, maybe not as aggressive as many of us would like, but it does lay out the plan.

[Slide.]

MR. GERTZ: From 1.2.2, which is the gray area, let's move over to the repository. Certainly we're not designing a repository at this time. We're only doing site characterization. However, there are repository interfaces. The regulations require us to assure any exploratory facilities we do would be compatible with the repository. So we are doing a minor amount of repository work, but mostly in support of the ESF work, and part of that, of course, is once again in our .1 account, 1.2.4.1 -- management and integration support, ESF alternatives, the management of the ESF alternatives, a major undertaking by the Sandia Corporation for us over the last couple of years.

[Slide.]

MR. GERTZ: Because we want to know a little bit about what's going on underground, and the underground ESF activities essentially come from the repository cost account, we have looked at methods for excavation investigations. We're working on study plans for a heated block experiment, for rock mass strength testing, in situ design verification, the kind of study plans that are in the ESP, and we're just continuing with them.

[Slide.]

MR. GERTZ: Some of the things that we're not doing that we had some good programs going, but due to constraints we closed out our robotics study. We don't need robotics certainly for exploratory -- for site characterization. We did have some studies going for future repository design, though.

We are doing code development for some of the thermal/mechanical loads that will be

created in the repository, and you need to know that now when you're designing an ESF, because if the ESF becomes part of the repository, although it won't have any thermal loads for 10 or 20 years, you have to design it for the thermal loads it will take once we load the repository.

Once again, analytical support for ESF, we are trying to continually look at the thermal load in the repository -- cold fuel, hot fuel, what difference does it make, what capability does it makes. Some studies are continuing and going on in that area.

[Slide.]

MR. GERTZ: Development and testing: mechanical properties that we need to know that are provided to the designer. We stopped some large block tests. We were going to do some large block laboratory tests.

I talked about G-tunnel. We're finalizing now some of the reports from the original work we did in G-tunnel two years and before, and we are working still with the School of Mines looking at some excavator studies, so that we maybe have some information to provide our ESF constructor when the time comes.

[Slide.]

MR. GERTZ: In facilities, we had done a fairly comprehensive design by Bechtel as part of the SCP. It's about a 12-volume, 10-volume repository design.

[Slide.]

MR. GERTZ: It's part of the SCP, but we've closed out the Bechtel contracts, and we do provide support, though, to the ESF designers for both ramps, subsurface excavation, and underground surface systems. It's based on what we learn at the repository conceptual design.

[Slide.]

MR. GERTZ: We are also working, a very small amount of activity, on sealing. As I said, I'm going to keep this chart up when I show you the budget, because you'll get an idea of what money is being spent across the work breakdown structure, but we are looking at sealing. It's essential that we know how to seal not only boreholes, but also repository openings, and we don't want to terminate that activity totally at this time.

[Slide.]

MR. GERTZ: Let me now move to 1.2.1, Systems, as we call it. As I said, it includes performance assessment and technical data, as well as systems requirements.

1.2.1.1 is our management account. It supports management systems improvement. The support that almost all of the participants have provided has been charged to this account.

We've been working on a Q-list, a requirement of the regulations: Develop a list of quality activities list. To support it, we have a Quality Review Board that assures our application and grading of quality is consistent across the program.

[Slide.]

MR. GERTZ: In systems engineering, we have a project systems engineering plan that flows down from the program plan. We have a baseline. We have to do our formal reviews. We have interface controlling configuration management.

We have a suite of requirements documents that we're using right now in the studies, in the ESF studies. Now, these requirements documents were not developed as a result of a FRA-type approach of functional analysis.

It was more of a product requirements approach, issues hierarchy, maybe, if you will, in the SC

P. We think the MSS is going to be a good system to check and make sure we have everything and fill in any holes.

It's a more systematic approach, but this was not developed without some thought at the time.

I think we just evolved a better way of tying the requirements all together, but we are maintaining using those documents, and we do whatever systems studies we need to do at this stage of the game, systems studies within the project.

[Slide.]

MR. GERTZ: Waste-management system, total lifecycle cost, it's a requirement program to continue to predict the total lifecycle cost, be it the life of the repository, site characterization, waste package, container costs, etcetera.

So, we continue to support that, maintenance of plans and procedures. I told we had over 200 plans that we implemented, procedures, I should say, that we implemented to pull up our work last week, to get that underway.

One day last -- one month last fall, we had 50,000 procedures that we into our document control system in a month.

We operate in a regulatory regime that is comprehensive, and we do have field change control. As I pointed out, that was operable and worked last week.

[Slide.]

MR. GERTZ: In this cost account, we also do technical database management. We have a technical database dictionary. We have a site engineered property database. We have a computerized geological information system run by EG&G.

All this is available to the scientists and engineers, and here's where we tie it all together. We provide input in support of site characterization.

We have what we also call a reference information base, lots of data that are put in there for everyone to use, to pick out of, procedures we have to implement in support of our database management, our technical database management, and we have lots of technical data in the system.

It's backlogged. We have to try to cut that down.

[Slide.]

MR. GERTZ: Let me move on now to performance assessment.

Performance assessment is used across the program. In many areas it's used, but it's charged to this particular account.

We're developing our methodology. No doubt about it. We're developing our long-term performance-assessment model, total systems and code modeling, and we're doing model validation and code verification as we evolve the models that we have in the program.

We're continuing to evolve, to verify -- to validate and then to verify.

[Slide.]

MR. GERTZ: PA, as I said, is done to support, right now, on the project, some of our near-term activities. PA is being used by the ESF task force. The alternative was used by them. It's used in site-characterization issue resolution. It's used in test prioritization.

Early site-suitability evaluation is using PA, and some natural analog studies are being tied into PA. So, we think PA is one of our important technical drivers to the project.

[Slide.]

MR. GERTZ: Let me now go into what we call 1.2.9. It's called Project Management but includes lots of things besides project management; includes the hotel costs, so to speak, for keeping the program moving, rent and things.

Let me just talk about what's in 2.9.1.

First of all, this we call project management at the participants. This is what we call our TPO management, whether it's Les Jardine or Larry Hayes or Tom Blejwas. It's people like that and their staffs that charge to this account, the technical, top-level technical management. The 1.2.1 is the lower-level technical management.

It integrates project management with the QA activities. It provides management support. It supports the Quality Review Board.

[Slide.]

MR. GERTZ: When we go to 1.2.9.1, we add administrative services, graphics, reproduction, all the things that are necessary, office services, rent, rent to the Valley Bank Center for all the people, telephone services, operating our library, operating -- not only do we do Yucca Mountain project tours, we also contribute to the Nevada Test Site tour program.

[Slide.]

MR. GERTZ: Other things that are necessary to the program: operate and maintain a motor-pool fleet in the Las Vegas area, provide security services across the program.

Unusual as it may be, peer-review activities are charged to this account. The assimilation of peer-review activities are charged to it.

Computer-support services, central records, local records, training all goes on in this account.

When I say "this account," I mean probably each of our participants, in fact, develop and operate a cost and schedule system. They all have an account for that. They all manage their own activities.

[Slide.]

MR. GERTZ: That's how we, in effect, manage the program, and it's a good one to bring this up on, because this our project control system. Project Control comes out of Project Management, its structure and the reporting relationships behind our work breakdown structure.

Monthly, I get a report and my managers get more- detailed reports that go through the cost we've spent each month and our accomplishments down to the fourth level or below that, fifth level or sixth level, about how we stand in cost and schedule on each of the activities that we had planned for the year.

So, this is the account and activities that supports that system: progress and performance reports, financial analysis.

Because we're constantly looking at different budgets, last year we did something like 50-plus budget exercises: If you get this amount, what do you do? It requires a fairly comprehensive evaluation. It's just not off the top of our heads.

[Slide.]

MR. GERTZ: 1.2.9 also is Quality Assurance.

Although Don Horton reports to John Bartlett and manages all the quality-assurance activity directly, the activities his staff does at Yucca Mountain does come out of the Yucca Mountain budget, and it's the normal things you do in quality assurance: QA audits -- we have a major audit of each organization every year.

It includes internal audits and surveillances at the participants, some of the grading process, the things necessary to run a comprehensive quality-assurance program, because we are, in effect, developing data that would be used for licensing in the future, and we have to do it right, and we have to do it in complete compliance to procedures, and keep track of it, keep track of the audit findings, do normal quality-control inspection, and we've just started to implement a comprehensive quality-concerns program.

If anybody has a concern, they will have an 800 number to call. It will be investigated by independent investigators. We want people to share any problems they have, any concerns with us.

I think, John, you're going to probably kick this off at Headquarters next week or this week -- I'm not sure. Tomorrow. Okay. That's how close it is. Next week, we'll do it out at the project. So, that's a real-time activity.

[Slide.]

MR. GERTZ: I want to switch now, just a little bit, to talk about '91. I'm still going to leave this up, because this is still our work breakdown structure and how we've made accounting.

You know, people can argue -- there's all kinds of ways to do work breakdown structures and accounts. This may not be the most perfect way, but it happens to be one that we're using.

Before I go into '92, though, I want to talk a little bit about '91, because even though it looks like we're doing a lot, there are lots of things we weren't able to do in '91. We had to cut back some of our testing in spent fuel and waste glass.

Some of our, in effect, source term testing had to be cut back.

I would love to have an offsite prototype facility somewhere, now that we have permits and, possibly, water appropriation, maybe one in Fran Ridge or Busted Butte, where the scientists go in and optimize their procedures before they get into the Yucca Mountain block.

We also have looked in Colorado in some tuff for a facility, but we weren't able to use that -- bring that up on the priority list.

I would like to look at a second rail spur, and we would like to have done some more prototype drilling, but there are constantly trade offs that go across all the participants.

Both the TPOs and my division directors, we sit almost every other week and talk about what do we do, where do we sort out our priorities, what's best for us in the next month?

[Slide.]

MR. GERTZ: Here is a chart that ties numbers to these things. What you see down here is 1.2.1, .2, .3, .4, etcetera, through 1.2.9, which is broken out into four areas: management, administration, project control, and quality assurance. And 1.2.10 is our assistance to the State and counties.

It looks a little high in this year, because there was 16 million appropriated, 9 million carried over, and there was 4 1/2 million set aside for any LSS support to the University of Nevada Licensing Support System, University of Nevada system here.

There's 18 million in both current bills in front of Congress right now.

Now, although this is the numbers you see up there, numbers are constantly changing. This one has gone to about 9.0 in our latest discussions.

The question still remains, though, does the bottom number change to make up for that 9.0 -- John and I are conducting discussions about that -- or does it come out of somewhere else?

I need to point out some activities, just so -- as I say, I don't anyone to have false expectations.

In the site area, we are decreasing our activities. We are continuing to emphasize ESF; you see it increasing. Most other areas are talking about decreases.

When you see a budget from 172 to 148, you're talking about a 15-percent decrease in 1,100 or 1,200 staff. You're talking 200 people that are on the project today that won't be here on the project if this current spread is in effect.

So, I just want you to be aware of that, that we are making lots of tradeoffs about how we do our work, but the program, in this area, is not expanding at this time.

We hope, with the receipt of permits or with the receipt of new legislation that will assure Congress that we can move in unimpeded, that will -- future years will provide us some more funding, and as John points out, he's talking about the '93 budget that's being worked on right now.

That's the problem with the Federal system sometimes, is you're always two years behind. John's working on '93 now, which will eventually go to Congress a year from now, and we don't use '93 money until a year and a half from now, almost two years from now.

So, that's the realities of the situation. Although lots of good things are going on at Yucca Mountain, I don't want to leave anyone with the impression that it's peaches and cream. It certainly is not, right now, in the future.

We want to do some site-disturbing work. We want to focus on some things, but the money is somewhat limited to do that.

[Slide.]

MR. GERTZ: I want to point out -- here's how the project had been spending money, '89, '90, '91, you saw that. When we had a baseline, '89, when we predicted what we might need in '90 for '92, we predicted we thought we'd need a $350 million program.

Things have changed in '92. You saw where Congress is coming down.

They're coming down about 160, 170 for the program, but that's what we thought we needed to conduct a broad-based -- having three or four drill rigs going, getting TBMs ordered, being ready to go with a broad-based program.

For many reasons, we don't have a broad-based program right now. Hopefully, we'll narrow that gap in future years, as things become more settled, as we can identify that we are on the mountain working, but that's the problem we deal with every day on the project.

[Slide.]

MR. GERTZ: Let me talk now about, with that 160 million, where we're going in '92, what you expect to see out of this maybe 148.

We're going to work on early site-suitability activities. We're going to continue that. John has identified that as a priority. Certainly, I agree with that.

We're going to do some minimal surface-based testing, and I do mean minimal. We may do some more Midway Valley trenching and volcanic investigations, relatively few of them, though.

We do ongoing work. We don't want to lose any irretrievable data. We will begin our Title II in October '91, resulting site prep in '92, resulting in portal start in November of '92, but we don't have a bunch of money to look at major construction contracts right now.

[Slide.]

MR. GERTZ: We're going to provide environmental support as necessary. Whatever you've got to do, we've got certain commitments with environmental laws, programmatic agreements that we have to maintain.

We do performance assessment to support all our project priorities, a very limited amount of performance assessment, but we will be doing it.

We'll continue to implement our quality-assurance program. We're not going to back off on quality.

[Slide.]

MR. GERTZ: We're going to continue to implement a minimal waste-package program, and we think nine is about a minimal waste-package/EBS/near-field environment waste form.

Continue implementation of a project control system: It's absolutely necessary to

maintain confidence of the people we have to report to, be it the IG, be it the GAO, be it Congress, be it the utilities, that we know where the money is going, what it's being used for, and we know that may be down to $30,000 or $40,000 increments, and it's scheduled for the year. So, we're going to continue that.

We have to maintain infrastructure, facilities, rent. We want to be able to go when the time comes.

We're going to reduce just a little bit our institutional outreach program. We're going to continue tours.

We're going to continue some other things, but we're not going to do some of the things that I'd like to do, and that's true, maybe, in a lot of areas, but it's also true there, and our repository activities will be reduced, just what interfaces with the ESF.

So, that's kind of where we're heading in '92.

[Slide.]

MR. GERTZ: It's a rough road to the top of Yucca Mountain. If you haven't taken it for a while, you ought to look at it. Figuratively and literally, it's a rough road sometimes.

[Slide.]

MR. GERTZ: We have some challenges. I want to point out some of those. We have, I believe, still adamant State opposition.

We have intense media attention. Everything we do is essentially in a fishbowl. In the Sunday paper, there were four stories about the program, in the Sunday's paper, one way or another.

It is complex science. Ten-thousand-year models are not easy to relate to the public. It's complex science to the scientists sometimes, too, I think.

We have uncertain budget. I think you have been able to see that. We have to live with it, but I will tell you, I do want to take my hats off to the scientists and engineers: They have really accepted this challenge.

This is a non-problem on the program anymore, working with the QA program.

We've had some workshops Larry Hayes has led in the scientific community, and the QA professionals are coming together, and I think they're reaching a meeting of minds, and really, I'm almost ready to take that off, except I just want to remind people that's still a challenge, but that's there, and Robby will talk about the role of M&O.

The M&O is coming on. Some of the roles of some of the contractors are uncertain in the future, and we've got to definitize what that is so we can move on.

[Slide.]

MR. GERTZ: In summary, if we're going to demonstrate, as a group, Federal resolve, we, DOE, need some assistance. We can't do this ourselves.

We need litigation or legislation. I personally believe, if the program is going to move forward without interruption, we need legislation to separate the scientific investigation from any -- from the political process, but we need that.

But even if we're on the mountain working, we still need more help, because what good is it to have permits, et cetera, unless we have the proper funds, which are in the next two checks, to support a sound program?

Because without all three checks, the repository program will become stalled. There is no doubt about that. It will become stalled without those three checks.

If the repository program becomes stalled, we won't be addressing an environmental problem that exists today, what to do with the spent fuel. And just as an aside to that, for those

people who believe -- and the National Energy Strategy supports -- future nuclear power may depend upon progress in disposal.

Studying Yucca Mountain, the Yucca Mountain project, would be progress in disposal.

So, with that, I'll take any questions you might have, and I appreciate you sitting through all this, because I wanted to take an opportunity to broad-brush and show you the entire program, so that when you're talking to our scientists or engineers you know there's other things behind the scenes going on that is also being done on the program, and I'll take any questions you might have.

DR. DEERE: Thank you very much, Carl, it was certainly a very interesting overview. I would like to open it up to questions from Board members.

DR. CANTLON: John Cantlon. Carl, you mentioned that there is a little bit of a data backlog. What roughly are we talking about, six months, two years?

MR. GERTZ: John, I don't know off-hand, and I don't have anybody on my staff -- it's not two years. But there is a backlog of getting records into the system. They're available at some of the local records centers, and people can go to the local records center and get them -- to get them in the central records facility, they haven't been that transition made.

We're trying to keep our commitment within 45 days of doing a QA on our data, making sure the data doesn't have any anomalies in it -- any out and out errors in it -- making it available to anybody who wants it. So, our commitment is to try to do that in 45 days. That doesn't necessarily though mean it's in the central records facility. That's what I'm trying to talk about, is making that transfer. That transfer just hasn't been a priority for us right now.

DR. DOMENICO: Pat Domenico.

Two questions. Is the water supply, in the valley in which you are trying to get, is that water supply fully appropriated, number one, and number two, what quantities have you asked for?

MR. GERTZ: The quantities we've asked for, over seven years or so is about 420 acre feet.

DR. DOMENICO: Per year, or is that the total volume?

MR. GERTZ: Total for seven years. As I've said, that's about two percent of what a local mine has asked for. We have done a chart about all the mines in the area, and we are a very minimal request. In the valley, as we see it, it's a Federal valley, so there was no, in effect appropriated water; it's all unappropriated, in our view. Therefore, it's not the view necessarily -- as I said, the state has acted as an intervenor in this. It's quite an unusual position for the state, because we have a state engineer adjudicating our request, and the state acting as an intervenor, which they originally came in in support of the National Park Service. The National Park Service though has withdrawn their protest that the state remains an intervenor in the actions. A lot of that will be discussed. I'll gladly give you a copy of what they're looking at -- their request to us just yesterday for data.

DR. DOMENICO: One more point. Is that part of the Amargosa System? Do they consider that part of the Amargosa System?

MR. GERTZ: No. But, the state has asked us and the state engineers agree that we have to look at the entire system. It's about eight water basins. It includes areas in California that they had on here, China Ranch, Tecopa and Shoesini, California areas, including the Ash Meadow groundwater, the Furnace Creek Ranch, and the Oasis Valley and the Alkaline Flats.

So, the one basin that is identified in the state map, when we went to our prehearing, the state engineer said, no, you have to look at more than the one basin you're looking at. You've got

to look at the entire picture.

DR. ALLEN: Clarance Allen. It's not clear to me to what degree the present slow pace of field work, as related to the lack of funding or the lack of permits. If you were able to get these permits tomorrow, do you have funds to move ahead in all sorts of ways you are not now able to do?

MR. GERTZ: If I were able to get the water permit tomorrow, I don't have funds to move forward in all sorts of ways. I don't have funds to run an LM300 around the clock. Now, we may relook at these priorities and say, "Gee, is there something in this list? '91 is about spent, we are about committed in '91; but '92, are there some changes I want to make to do field work?" That's been a discussion -- a long, hard discussions going on with Dave Dobson, with Larry Hayes, with the people in the project.

Up till now, we have been prevented by not having a surface disturbance permit. I thought it would be wise to start some scientific investigations, albeit expensive to haul water; it costs $70,000 to haul water for a couple of weeks' activities from California, to buy it and haul it. I thought that would be important, to start to the work, to let the scientists get some new data on important issues that we are looking at, calcite/silica, Midway Valley and volcanism.

But, next year, if I had a water permit, so therefore I could get water very cheaply -- right now, it's not in the cards, in the current allocation. It's a tough job for John, because he only has so much money to distribute in what he gives me. Then I only have so much money to distribute. Do I want to start taking apart the infrastructure, which may lead to lots of things crumbling down. So, I think that's the trade off.

DR. ALLEN: One further question. You state, in your '91 plans, support closure of the volcanism issue and the calcite/silica issue. Does this mean you realistically hope to have all the evidence this year, that will support either one at the site, or licensing?

MR. GERTZ: At the beginning of the year, we'd hoped to get most of it together. I don't know if the issue is ever closed until you go to licensing. But certainly, you can get a narrowing of the scientific minds, and say this is about all the data we're going to get for a while on this, or that we may ever get and will not get much smarter. Now, can we agree on something, or can we not agree?

Both Bruce and John Stuckless believe they can put together some documents, topical reports or whatever that will state the case. We would then attempt to talk with the NRC, with you all in those areas, and say are we getting close to closing the issue?

Early in the year, as I said, it was one of our priorities. We thought we'd get there. The reports are being written, but we probably won't reach the step we would like to have reached this year.

DR. DEERE: Dr. North.

DR. NORTH: This is Warner North. Two questions. The first is, would you comment on the relationship between the management system improvement strategy which we heard about yesterday afternoon, and the TRIM and PARATRAC systems and the activities that are related to those?

MR. GERTZ: Yes. Those people -- and I haven't been following it in detail. But to the best of my knowledge, Warner, those people who worked under management's improvement system, have used PARATRAC and TRIM to help them come up with their list because it was available in there and it certainly captured what was on the books today. So, I think they've used that extensively in developing what Mike Duffy presented yesterday. I know my people working on those teams have used them.

DR. NORTH: The second question is with respect to performance assessment. Can we expect that by the end of this year we are going to see a completed top-down performance assessment for Yucca Mountain?

MR. GERTZ: Total systems performance assessment by the end of this year. I need to ask -- Dave Dobson is not here, nor is Russ Dyer. Tom is working on it. I know Sandia is working it -- Tom Blejwas, I'll see what he says, and I'll tell you what my answer is going to be.

MR. BLEJWAS: This is Tom Blejwas from Sandia. We are planning to do a total system assessment for Yucca Mountain by the end of this year. Whether it will be as complete as everyone would like is still not clear. We will not be able to include, clearly, every scenario that everybody would think is important, but we do intend to include as many of the most important scenarios that we can in this total system assessment.

DR. NORTH: We have recommended an iterative approach in this area, and we hope that those issues that you can't get into this year's will be addresed in subsequent iterations of performance assessment.

MR. BLEJWAS: That's the intention, to keep iterating.

MR. GERTZ: I think we're consistent with your approach. But we are -- I was going to say, yes, we're going to have one produced by the end of this year. That's what I've told them to do, and I think that we're going to get one done.

DR. NORTH: We look forward to it.

MR. GERTZ: We hope it gets more detailed as -- so do I. We hope it gets more detailed as the years move on. I think that's what you --

DR. DOMENICO: Carl, Domenico again. Do you have a time table in mind for declaring whether the site is suitable or not?

MR. GERTZ: We looked at many different areas of 960, and that is our site-suitability evaluation, and I don't know if we're going to declare it suitable.

What we're going to say is we have looked at these areas and we see no reason not to continue site characterization, and we're going to do that periodically. We're going to initially do it here in the near term, and then we'll do it periodically afterwards.

John, you may want to add to that, because certainly it's one of your priorities in what your thoughts are.

DR. BARTLETT: Let me first comment, Pat, that the proper statement, I think, is to make a finding about whether or not the site is suitable, and the issue is the rate at which we can proceed in terms of ability to reduce the uncertainty to a stage where we are confident in the full scope of findings, and since we're looking at the question, finding whether or not the site as a whole is suitable, we have yet, in my mind, to determine which of the various areas that bear on suitability -- for example, hydrology or rock mechanics or existence of extractable or valuable minerals, etcetera -- would be the pacing item.

Frankly, I guess it's hydrology.

Our ability to characterize sufficiently the hydrologic characteristics and respond to the NRC's 1,000-year travel time thing is probably the pacing item for the program, and I hesitate, at this point, very much, to say or even to set a target as to when we might make that determination.

Assuming that nothing is found along the way that's a show-stopper, which, of course, would put us in the position of making a determination very quickly, I just can't guess at this stage.

It's part of our approach of maintaining the flexibility and responsiveness to the results as we find them and adapting the program.

All I can say is we will continue to maintain the strategy of focus on that objective.

MR. DOMENICO: One more point: Do you think it will have to come, necessarily, after the Calico Hills study? Do you think you have to go underground, certainly, and do you think that assessment may come after the Calico Hills?

DR. BARTLETT: My present thinking is yes. Going underground is absolutely essential, and I think that characterizing the Calico Hills -- which, of course, is the primary barrier, geologic barrier, to the water table -- is really critical to nailing down the issue.

MR. GERTZ: I think all the scientists would agree, Pat, with you on that for the program, that we've got to get the underground data, and it will be a while before we can make the site-suitability determination required by the Waste Policy Act.

DR. BARTLETT: I wonder if I might add another comment on that.

One of the issues I have asked Carl to start looking at is essentially the rate at which we can turn data. We acquire it. We'll go in the field, and the scientists will hack off a piece of rock, and they'll go in the laboratory and obtain the data on isotopics or whatever.

Then it has to go through this process of being archived, interpreted, documented, and applied to the program purpose: What do we do next, as we advance the information?

And so, I talk in terms of what's the time constant for the advancement of data in the program?

How fast can we go through this process so that there is significant acquisition of impact and impact of the data on the trajectory of the program's progress in each of the scientific areas?

And frankly, I have a suspicion that time constant is more or less on the order of two years, especially in the hydrologic area, where we had to put down boreholes, wait for equilibration, things of this type, where that will pace.

We're still working on what that reality turns out to be.

DR. DEERE: I would like to open the floor, then, to questions from the audience.

Bill Barnard, Executive Director, Nuclear Waste, Technical Review Board.

DR. BARNARD: Carl, you mentioned that you have applied for a permit for a 420-acre feet of water over seven years.

If Yucca Mountain is found suitable for repository development, how much water are you going to need for that construction and development? Do you have any idea?

MR. GERTZ: We have an idea, but I don't have it at hand right now. So, we'll take an action to get it to you. We don't believe that, once again, it's a significant amount, even at that stage.

Certainly, it is not for operations, because it's not a water-dependent operation. We want to keep water out of the repository if at all possible.

DR. BARNARD: I've got a second question.

On your graph that shows your projected budgets, you had a baseline budget of $350 million. I guess that was a wish budget? That's what you'd like to have?

MR. GERTZ: Yes. But let me say that was put together two years ago, thinking we will have permits, here's the situation. That's right.

DR. BARNARD: So, that level of funding would be required if you were going to be continuing with surface characterization and underground activities?

MR. GERTZ: Yes, certainly.

DR. BARNARD: Okay.

MR. GERTZ: That allows maybe three drill rigs to be working around the clock, big ones; three or four smaller drill rigs working infiltration holes or volcanic holes and involves the

start of the acquisition of construction activities for ESF.

DR. BARNARD: If you were funded at that level, how long would it take you to complete the characterization of the site, do you think?

MR. GERTZ: That's consistent with the schedule that the Secretary put together in '89 that says 2001 would be our license application date.

DR. BARNARD: So about 10 years.

MR. GERTZ: That's correct.

DR. BARNARD: Okay.

MR. GERTZ: And it's not that level for 10 years. Our baseline increases and decreases. It's probably a little more as we go through some of the more intensive years.

DR. BARNARD: So, the average is probably a little more than 350?

MR. GERTZ: Absolutely. Yes, sir.

DR. BARNARD: Yes. Okay. Thank you.

MR. FRISHMAN: Steve Frishman, State of Nevada.

I think I need to clarify a few things about the water issue without debating the water issue.

First of all, the sub-basin where J-13 -- well J-13 is located is considered to be a contributing groundwater basin to the Amargosa groundwater basin.

Amargosa Basin is fully appropriated, and the Amargosa Basin is further controlled by a mid-1970s lawsuit that set a measured water level in Devil's Hole in Ash Meadows.

So, there is a concern on the part of the National Park Service for the protection of that habitat and protection of endangered species at Devil's Hole. That was the basis of their protest.

The State of Nevada did not join the National Park Service's protest. The State of Nevada filed a separate protest, and the information that is requested is not unprecedented.

The information that has been requested is the hydrologic information that we know and that the water engineer, who is the adjudicator in this situation, has agreed must go into a central information base in order to carry forward the evidentiary hearing regarding the Department of Energy's application.

There is nothing unprecedented about it, nothing unusual about it. It is the process that is established by the person who adjudicates the water rights of the state.

The Department of Energy was recognized by the state engineer as being the holder of probably most of the hydrologic data for that area in one or more of its files, and the effort was for the engineer and the State and the National Park Service and the Department of Energy to all have a common database on which the water rights can be adjudicated.

So, I think Carl has painted a picture that, once more, could be interpreted, for purposes of Capitol Hill, as obstructionism.

In fact, we are only carrying out a legitimate process, and it is the same process that is carried out whenever there are contested water rights in the state.

MR. GERTZ: Steve, did you ask for that data from Bond Gold when they had their water permit in that detail?

MR. FRISHMAN: The state asked for some data from Bond Gold --

MR. GERTZ: This kind of level of detail.

MR. FRISHMAN: The state operated on that. We did not protest that permit application, we protested this one.

MR. GERTZ: Okay.

MR. FRISHMAN: And we're also dealing with a different consequence of water

withdrawal, because we're in a different part of the basin.

MR. GERTZ: This is not the debate of that, Steve.

MR. FRISHMAN: No.

MR. GERTZ: We'll certainly be debating that in front of the state engineer on September 24th.

MR. FRISHMAN: The other thing, just to point out -- the other thing that's kind of interesting is, given the construction of a Nuclear Waste Policy Act, we should have had all of what we asked for already, only that it has not been forwarded to us in many cases. So, this is one more vehicle that we are exercising, not only under our rights having to do with water appropriation; it's under our rights of consultation, under the Nuclear Waste Policy Act, where we have pretty well fallen off the face of the earth, if you'll notice.

MR. GERTZ: Yes. I don't intend to debate with you in this format, Steve. Much of the data you've asked for comes from California. Whatever we have, we are certainly going to provide.

DR. DEERE: Thank you, Steve, for your comments. Are there other comments from the audience?

[No response.]

DR. DEERE: Carl, do you have anything else?

MR. GERTZ: I have one closing comment, Don. I think I made the point, but once again, I want to go over the point for you all, so you know how our scientists and engineers are involved in some of these decisions -- decisions as to which category or priorities this money goes in is not based -- is not my decision alone. The Dave Dobsons, the Les Jadines, the Tom Blejwases, the people -- the TPOs are involved in it, along with the scientists on my staff. When we put more money in waste package, we recognize we have to take it from somewhere else. What effect does that have on the program? I want to give you the assurance that this is a rather agonizing process that goes on, with full involvement of those people responsible for the scientific program. We take money from PA, you know. What does that do to the PA program? Where can we get money from? So, it goes on almost monthly.

DR. DEERE: Thank you, and I appreciate that. Perhaps we are a little bit more aware of the difficulty with the allocation when funds are limited.

I would like to declare this session closed. We will start this afternoon, perhaps at 1:15. Thank you.

[Whereupon, at 12:17 o'clock p.m. the above-entitled meeting was recessed for lunch, to reconvene at 1:15 o'clock p.m. this same day.]

AFTERNOON SESSION

[1:17 p.m.]

DR. DEERE: Good afternoon.

At this time, I am pleased to welcome Mr. Dwayne Weigel, who is Assistant Director of Energy Issues at the U.S. General Accounting Office.

Mr. Weigel has stepped in for Mr. Victor Rezendes, who is unable to be with us today.

At the GAO, Mr. Weigel is primarily involved with the energy issues, including Federal nuclear waste disposal programs, the Waste Isolation Pilot Plant program, and low-level radioactive waste disposal programs.

He has 23 years of experience as an evaluator with the GAO, 17 of which have been spent reviewing nuclear energy programs, DOE, and NRC activities.

Mr. Weigel has worked for the past four years on radioactive waste disposal issues. He will comment on the OCRWM activities based on past and current GAO involvement with the program.

We have also invited Mr. Weigel to suggest any technical or scientific issues or topics for study that the GAO feels should be considered by the Board as part of the Board's evaluation of the Civilian Radioactive Waste Management program.

Mr. Weigel, we look forward to your comments.

DISCUSSION OF OCRWM PROGRAM

[Slide.]

MR. WEIGEL: Thank you very much.

That last charge is a rather tall order for a bunch of accountants, but we'll see what we can do.

I'm Dwayne Weigel with GAO, and I'd like to introduce Dick Renzi, who is with me, works for me. He is going to be handling these flip-charts for me.

I'm just going to talk a little bit about the General Accounting Office, in general, just to make sure that everyone knows who we are, what we are, and then I'll go right into a discussion of our work on the nuclear waste program.

As Dr. Deere said, we also get involved with the Department of Energy's WIPP project and other nuclear waste issues besides the civilian program, but the civilian program is the bulk of my work.

[Slide.]

MR. WEIGEL: In talking about GAO, I'll just describe a little bit about the characteristics of the office and what we're all about, and when I get to our work on the nuclear waste program, I'd like to talk about some of our previous work, a little bit about our ongoing work, and then a little bit about some of the issues that we think are out there for the near future.

[Slide.]

MR. WEIGEL: There's two things I'd like to mention about GAO, in general, and that is the independence of the agency. We're a legislative branch of Government, like OTA, CBO, and CRS.

Our boss, the Comptroller General, is appointed for a single 15-year term. He may not succeed himself, and he can only be removed by impeachment, and the purpose of this method of appointment of the Comptroller General is to try to make the office as independent as possible.

[Slide.]

MR. WEIGEL: Anybody following the current budget debates on Capitol Hill may be

aware that there is some question up there now about the independence of GAO, but that's not something I want to go into here, today.

The structure: We organize our work around a few major divisions.

We have a defense division, and the division that we are in is kind of a resources division, and then we organize around issues, energy being one of them, and in GAO, my boss, Victor Rezendes, is responsible for all the energy work, and that basically includes looking at DOE's management, in general, its contracting practices, this type of thing, nuclear weapons production issues, environmental restoration, this type of thing, and energy supply and demand issues, energy research and development, and then energy and environmental issues, of which nuclear waste is just one part.

[Slide.]

MR. WEIGEL: With that, I'd like to get into a little bit about the mission of GAO. Our basic mission is to support Congress, and what that means, really, is to assist Congress in its responsibilities, oversee Federal programs and Federal agencies.

In addition, saving money. We look for ways to spend money more efficiently and to stop what we consider to be wasteful uses of funds.

And third, improve Federal programs, basically looking at how well programs are working to achieve their intended objective and see if we can improve the effectiveness of them.

And lastly, sound financial management, we get into prevention of fraud and abuse and accountability-type issues.

[Slide.]

MR. WEIGEL: So, now I'd like to talk about our work on nuclear waste program, and I'll start with some of the history of the work.

Actually, GAO's work in the nuclear waste area predates the Nuclear Waste Policy Act. It goes back into the '60s, the late '60s, in the defense high-level waste area, really.

But with the passage of the Nuclear Waste Policy Act, as probably most of you are aware, we are required to do a report each year on the Office of Civilian Radioactive Waste Management, and about a year, year-and-a-half into the Act, the Senate Energy Committee Ranking Minority Member and Chairman asked us to do quarterly reports on the program.

[Slide.]

MR. WEIGEL: There's very intense interest early in the program on keeping on top of progress being made, because there are, as you know, a number of statutory milestones in the program set out.

So, I think that leads me to what I call the five themes of our work to date or, at least, areas in which we have tended to concentrate, the first being the program schedule.

In our early annual reports, they were basically devoted to describing a variety of activities that were underway in the Department in order to get the program off the ground, you know, the first repository, second repository, the MRS program, financing, a lot of issues treated in those reports, and they were oriented, in part, to looking at the progress in meeting the statutory milestones and describing some of the reasons for delays and, in some cases, predicting future delays.

[Slide.]

MR. WEIGEL: Another thing, from the beginning of our work, has been costs and financing. One of the subjects we talked about in the very first annual report we issued in January of 1985, was we talked about ways that the department could speed up the collection of revenues.

Cost estimates and revenues have been a constant theme. In 1987, we issued two reports, one discussing why the estimates of the cost of characterizing the sites was going up so dramatically. That report was used by the Senate Energy Committee in the legislation that eventually became the 1987 amendments to the Act.

One of the other financing -- cost and financing points that we made, back in that year was convincing the Department that it should change the basis on which it projected the waste to be produced in the program, as well as the revenues to be collected -- basically going from what then they called their reference case, to the no new orders, or essentially basing it on the number of plants that are out there today, rather than assuming the construction of more plants. What this did was make the fee adequacy analyses a little bit more conservative, by cutting back on the revenues.

On that latter subject, we also have issued a couple of reports dealing with the way that the Department of Energy evaluates the adequacy of the fee. In 1988 we recommended that they use a realistic inflation rate in estimating the adequacy of the fee over the long-term. In a 1990 report, the fifth of our annual reports, we actually recommended that Congress change the Nuclear Waste Policy Act to authorize the Secretary of Energy to index the rate of inflation -- index the waste fee to the rate of inflation.

At the time we issued the report, the Department was in agreement, but it subsequently changed it's mind, and now opposes that. So, that's a matter that we're going to be dealing with again in the near future.

Another financing issue we've dealt with is we've looked at the method the Department selected to allocate the costs of the program, between the civilian and the defense components. Basically we agree with the method that they selected.

[Slide.]

MR. WEIGEL: Contingency plan. Several of our reports have touched on the need for more contingency planning. There are just two I would like to mention.

In October '88, in a report, we suggested that it might be wise to -- early, during site characterization at Yucca Mountain, try and attempt to quantify how much waste that it would hold because by -- because of the uncertainty over new plants, the amount of waste that is expected to be generated by current plants, the 70,000 metric ton statutory ceiling on waste that would go in Yucca Mountain at present, we felt like it would be important to know whether Yucca Mountain could serve as the single repository, at least for this generation of nuclear plants or not. So, I think that's an issue we'll get to later that is perhaps deserving of more attention.

In our last annual report dealing with the methods that the Department uses to estimate program costs, we suggested they do more in estimating costs and presenting in their life cycle cost reports, cases of -- contingency cases dealing with the possibility of finding Yucca Mountain unsuitable or an extensive delay in completing site characterization, as well as more -- a more realistic allowance for real cost growth in the program.

[Slide.]

MR. WEIGEL: Monitored retrievable storage. We've been involved in that for a long time too. Back in September of '85, we pointed out that there may be a great deal of competition for personnel and finances between an MRS and a repository -- DOE trying to develop both at the same time.

In 1986 we issued some fact sheets just kind of outlining the advantages and disadvantages of an MRS, addressing the estimated costs at that time and, at that time, views of utilities about the MRS program.

In 1987 we issued a report with some recommendations in it, testified in the hearings that summer. Our basic point was that we didn't feel like, in its MRS proposal, the Department had adequately justified the MRS. Subsequent to that, the Department did issue an appendix, or an addendum to its MRS proposal, that pretty much addressed the kinds of things that we felt it needed. That was in November of 1987.

[Slide.]

MR. WEIGEL: Informing the public. I think the point I would like to make here is that, particularly with the quarterly reports that we've issued over time which, by the way, by mutual agreement with the Senate Energy Committee, we have stopped issuing. They do serve a purpose of providing a way to inform the public that it is somebody besides the Department. Our reports tend to be short and written for the lay person, and I think, to some extent, have dealt with some rather timely subjects along the way.

Initially, they, like our first few quarterlies, tended to address progress in problems over time. We had sections showing the balances of the Nuclear Waste Fund, the status of litigation. But, over time, and particularly, after the '87 amendments, when the program began to focus more on the single site at Yucca Mountain, we started dealing more and more with particular issues. Two that come to mind is quality assurance, was one that we've discussed in several quarterlies, as well as the issue of the EPA standards and the adequacy of those standards, in one of our quarterlies.

I think GAO reports -- because they're written more for the lay person, and we take a lot of technical information and are very careful to try and put it in layman's language, we can reach a lot of people that might be more reluctant to wade through some of the more technically written documents. I think we also serve as something of a break, if you will, on what I would call DOE's official optimism, at times, about how much it is going to get done and this type of thing. I think we tend to look at these things maybe a little more realistically sometimes.

[Slide.]

MR. WEIGEL: I would briefly like to just talk about some of our ongoing work.

We're looking at interim storage alternatives, basically, the advantages and disadvantages of an MRS, as opposed to expansion of at-reactor storage.

We're addressing how much storage will be needed, safety and transportation issues, and basically the prospects for an MRS facility in the near future, and the extent to which DOE's planning -- doing contingency planning, in case that doesn't come about. That's -- since these are projects that are really still underway, there's not too much more than what I tell you now that I can say about them. We are in a process of processing a report on that particular subject.

[Slide.]

MR. WEIGEL: Cask development. I think that the basic question we are looking at there is whether DOE is really moving too fast or not. Do they have all the information -- or did they have all the information they needed to design the casks? Will they need it in the 1998-2000 timeframe?

[Slide.]

MR. WEIGEL: Status of Yucca Mountain Project: we are looking at the kinds of things that DOE has been doing in the field for the last year or two to prepare for new work.

We're trying to discuss some of these studies that are underway, like prioritization of work, to explain what the purpose of these are for the future site characterization and how they will shape the work that DOE does, and then -- I hope we get it out in time -- some of the potential impediments to site characterization, like the permit issue, and so, we'll have to stay

close to that one and see what happens.

[Slide.]

MR. WEIGEL: On Yucca Mountain Project expenditures, basically we have spent some time in the past gathering information on how the program's funded, as Mr. Gertz showed you in some of the slides before, where the monies are being spent, in general, but we really haven't, up to this point, tried to go down and look and see what are the workers in the field, the laboratory, whatever, exactly how is some of this money being spent.

Now, that's a tall order, because, as you know, there are many contractors, many locations. I don't have anywhere near enough people to do that on a comprehensive basis.

So, we basically are going to start with Lawrence Livermore, simply because it's close to home to the people that are doing the work for me in my San Francisco office, and we're going to go take a look and see just -- not only how the money is being spent but how effective the controls are to make sure that what DOE is getting is what DOE wants, basically, and that's very early. That's the job we just started recently.

[Slide.]

MR. WEIGEL: I don't think I have anything -- looking to the future -- anything really new. I have read the Review Board's reports. I have looked at some of the studies that DOE has prepared recently and documents related to those are underway.

So, I think I am going to just close by stressing that, clearly, the suitability of Yucca Mountain is obviously where the priority for this Board needs to be.

[Slide.]

MR. WEIGEL: I guess that's no surprise, but the prioritization of work, the work DOE is doing in studying that issue, developing the method for early site suitability determination, performance assessments, I have heard all of these referred to today, and you know, I think, from our vantage point, these clearly are very important.

The one other comment I'd like to make on that that I think the Board should be particularly attuned to is I have noticed, in some of your semi-annual reports, you've talked about the need for DOE to get independent experts involved in this program, and I would second that, but I think I would go just a little bit farther in the sense of saying one of the things I think that DOE and the Board and GAO, we should all be looking to is ways for the Department of Energy to be more open, if you will, particularly early in the planning for key pieces of work, to get people in on the approaches as opposed to just commenting on the results.

I think that's an area where there is probably room for improvement.

[Slide.]

MR. WEIGEL: We still think the issue of the capacity of Yucca Mountain is important. I know there is a lot of talk about a resurrection of the nuclear program in this country, of plant life extension, and I don't deny that.

Certainly, there is a lot of uncertainty in those areas, too, and I think it would be wise -- and I don't know to what extent the new design of the exploratory shaft facility and this type of thing might accommodate that, but I guess we still see a need to address this issue fairly early on.

[Slide.]

MR. WEIGEL: Lastly, repository standards, I'm going to put in a pitch for WIPP here.

We think this is a very important issue that really needs to be resolved. I've heard a lot of talk about iterative performance assessments.

I realize that it's only when you get to the licensing process that you really have to meet these EPA standards in the NRC regulations, and I'm certainly not a scientist, I'm not an expert

in this area, but it would seem to me that, to really do these iterative performance assessments properly, you really have to know what the standards are you're trying to meet, and it seems like -- my impression is that, as time goes on, the standards become, perhaps, less certain, not more certain.

As time goes on, more and more people are expressing their dissatisfaction with what EPA had in 1985.

We picked up on this when the NRC staff began to raise concerns, and I think the one point I wanted to make about that is that, in the EPA standards, the probabilistic containment standard is right there in the 1985 standard.

NRC went through a similar experience in developing reactor safety goals, in which they initially had two, I think, quantitative proposed standards and two qualitative, and eventually, they decided that they could not support the use of quantitative standards in their safety goals.

So, they subordinated those to the qualitative standards, and it seems to me like there is kind of an inconsistency there, and again, I'm not an expert.

I don't know which way it should go, but I do know what happened at NRC, and that's something that ought to be looked at, I think. Are we setting ourselves up for failure by having that quantitative standard in the regulations, and then if it can't be met, it's in the standard?

I know there's some qualifying language in there, but I think that's an issue that would be subject to heavy adjudication.

I mentioned WIPP. You know, the reality is that DOE needs these standards for WIPP even more than they need it for Yucca Mountain, and so, I think it's an issue that really needs to be addressed and resolved as quickly as possible, but we also need good standards, too.

That concludes my presentation. I will be happy to take any questions.

DR. DEERE: Thank you very much for those comments, Mr. Weigel.

Are there questions from the Board?

DR. LANGMUIR: Mr. Weigel, Don Langmuir.

I'm just wondering what kind of access you have to technical expertise, scientist/engineer types, in your deliberations and evaluations of these programs.

MR. WEIGEL: Most of us -- few of us are scientists. I don't have anybody on my staff that's a scientist. We have a nuclear engineer who works primarily on defense, nuclear defense issues, in our energy group.

That's a question that's often asked of us, and I think the best way -- you know, our basic approach is to talk to a lot of people.

When we don't understand something, we go to a source that we believe will give us a good answer. We'll go to another source and ask the same question and get another answer.

It's not hard to find issues, because you have to do a lot of reading, basically. I think, you know, we don't discover issues. We only pick up on issues that others raise and develop them.

But I don't find it to be a problem in the sense that -- I mean, many days, I wish, I guess, I was a chemist or geologist or whatever, but you know, you just wade your way through it. Maybe that adds to the time it takes us to get our work done. That's the price we pay.

In GAO, typically -- I am atypical. I have been in the nuclear energy area for a long time, but typically, four or five years in one particular area, and people tend to move, either by choice or by choice of the office, into different issues.

So, for most of us, you know, we're what you'd call generalists, and we have to learn the subject each time we move.

DR. DEERE: Any questions from Board, staff or consultants?

DR. FABRYCKY: You mentioned life cycle costing as being particular appropriate to a project of this nature. Are there other newer approaches to costing, that you're also looking into?

MR. WEIGEL: No, sir.

DR. FABRYCKY: Does the long, long life cycle of this program in any way worry you, vis-a-vis life cycle costing methodology?

MR. WEIGEL: Obviously it presents problems, but I mean, one has to do the best one can. I guess there -- I'm not too familiar with the details. But there have been proposals to use something of a probabilistic or risk-based -- I don't know enough about that to say I like that or, you know, compared to what DOE does or not.

I think our view, having spent a considerable amount of time looking at what DOE does in the life cycle cost area, is that they do a reasonable job, given the uncertainties of trying to project a hundred years. Certainly they have been improving in the quality of those estimates. We are still prodding them a little bit, I think, particularly on the revenue side of it -- on the fee assessment side. I think we are not totally satisfied there. In the area of estimating the life cycle cost, I think there has been marked improvement, over the years, in that.

DR. DEERE: Are there questions from the audience?

MR. FRISHMAN: Steve Frishman, State of Nevada.

Dwayne, I think we heard this morning a pretty clear picture of some reprogramming going on in terms of emphasis on surface-based testing versus beginning the underground exploratory facility. I think it's -- we understand where the Board is on thinking about that. Both Carl and John presented it as sort of a trade-off type analysis, based on limited funds. Are you going to be looking into the mechanisms of this trade-off, especially given the fact that the -- the State of Nevada's comments about the unsuitability of the site have never been substantively responded to.

It seems that there's a factor in the trade-off, very expensive underground work, versus less expensive surface work that maybe ought to be analyzed. Are you planning to look into this?

MR. WEIGEL: I think that's probably a subject that would be of interest ot us. I think I should also add that it wouldn't be for us to try and say which is better or this type of thing.

What we would be interested in is the process -- the management process that the Department goes through to make those kinds of decisions; including, for example, getting people outside the program involved -- getting this Board involved, interactions with NRC, interactions with the State of Nevada, and coming to closure on comments from the State of Nevada.

We would be very much interested in that process. We would not be looking to say anything about which way they should go or this type of thing.

MR. FRISHMAN: That's exactly what I was hoping to hear. Thank you.

DR. DEERE: Are there other comments from the audience?

[No response.]

DR. DEERE: Are there any comments from the front table?

[No response.]

DR. DEERE: Thank you very much.

MR. WEIGEL: I appreciate the invitation.

DR. DEERE: Our next speaker is Todd R. LaPorte, Professor of Political Science at the University of California, at Berkeley, where he formerly served as Associate Director of the

University's Institute of Government Studies. Professor LaPorte was a member of the National Academy of Science's Panel on the agenda for research on human factors in commercial nuclear power plant operations. He also served on the Academy's Board on Radioactive Waste Management. He is currently Chair of the Secretary of Energy's Advisory Board Task Force on Civilian Radioactive Waste Management.

Professor LaPorte, it's a pleasure to have you with us today and we're very interested in hearing about your new committee.

BRIEFING ON SECRETARY OF ENERGY ADVISORY BOARD (SEAB)
TASK FORCE ON CIVILIAN RADIOACTIVlide.]

MR. LaPORTE: Thank you. It's a pleasure to be with you this afternoon. I am going to be bringing to you a report, sort of an in-progress report of -- I think the range of areas that you rarely encounter, because they're not technical. These are really non-technical issues. Although in my world of organizational studies, we think of them as technical.

What I'll be talking about today is one of the task forces that has been impaneled by the Secretary of Energy Advisory Board, after negotiations and discussion with him and with the other members of that Board. The Board provides the Secretary with advice on long-range issues of a variety of sorts and serves as a principal mechanism for long-range planning and analysis within the Department.

[Slide.]

MR. LaPORTE: You may know that the Board had an office that supports both the Board and has an important long-range planning integration and consideration function. The Board is not designed to resolve any kind of contemporary issues confronting the Department, rather, we take a longer view. We function mainly through task forces, working groups, composed of members of the Board and particularly or especially appointed outside experts in these various groups.

The task force I'll be talking about today was one of the first ones that the Board thought was of importance. We have been working our way since mid-winter, when the Senior Staff Director, Dan Metlay, called on board.

[Slide.]

MR. LaPORTE: The way we're understanding the questions of radioactive waste management has to do with the institutional matrix within which these activities are carried forward. The perspective really is founded on this particular assumption, that the resolution of the radioactive waste management issues are as much institutional as they are technical now.

One of the important elements in resolving institutional matters has to do with a lack of public trust and confidence in the Department. This has been repeatedly identified as a major obstacle, both in a whole range of areas, all the way from citing environmental disputes and so forth.

There needs to be, we feel, a way of understanding the basis for public mistrust or distrust, and also, in evaluating the approaches for ensuring that the Department merits trust and confidence as it carries out its various programs. So, what we've done is to essentially take that as our major focus for the next year.

[Slide.]

MR. LaPORTE: The task force is made up of 11 of us. We tried to find individuals that had at least two of the following characteristics. I think, on the handouts, you have the members of the task force. I won't go down them, but you can see who they are. I think this is available

for the public. On the way out, you'll see a stack of these handouts.

We wanted to get people who could cover quite a wide range of acquaintance and expertise. Obviously, nuclear waste management and regulations was one. The second one was experience in running organizations where high reliability in operations is a requisite demand. I mean, we needed people who have operational experience in managing hazardous systems, large-scale ones.

We also need people who have experience in the Federal, state levels, with regard to particular regulatory and environmental experience. We could have added, at that level, another government level, and that's the Indian Nations themselves. You'll see, on the list, we have -- they're represented as well.

Finally, since this has to do with institutional design, we needed people who have experience in organization, theory and design, particularly with regard to these kinds of organizations. I should hasten to say that the people on the list that you have before you, we don't think of them as representatives, in an official way, of the various communities that they have experience in. We wanted people who were able, who thought well and flexibly, and who were acquainted with various communities.

So that -- sometimes we have gotten questions about the degree to which these people are or are not official representatives of their communities, and we wanted to make sure that you understand how we think about them.

We held our first meeting in May. You have the agenda, I think, in your handouts as well. That was a vigorous meeting with considerable candor. We found it very useful. I think several of you, in this room, were there at the time. I think one of the important aspects of what we're doing, and I'll return to this later on, is that the task force, itself, has its own challenge in trust and confidence.

While we're impaneled by the body of the Department of Energy, we are concerned that -- and in fact the Department is the focus of our interest, in regard to the public perception of its activities -- we have our own need to demonstrate processes where outsiders will have confidence in our own activities.

I welcome the chance to speak with you in that spirit. We're not very far down the way. As you see, we hope to be through with at least our major preliminary report in the spring of next year.

[Slide.]

MR. LA PORTE: Let's go to the next viewgraph, and you will see the analytical agenda that we have set for ourselves.

We felt that we need to identify the factors which affect the level of trust and confidence that the public has in departmental activities.

We're thinking about this now not so much only with regard to the Department of Energy but governmental institutions, in general, as well as departments like the Department of Energy, and then finally, we will be interested in the specifics, if one can tease them out, with regard to the nuclear waste program itself.

Secondly, we're concerned -- we haven't come very far on this second one because of the stage we're in, but we're concerned with evaluating or assessing the effectiveness of various kinds of financial, organizational, legal, and regulatory arrangements in promoting a sense of confidence, of trustworthiness, if you will.

Let me say a word about this. This poses a very interesting challenge to any kind of study like this. Let me see if I can sort of pinpoint what we think of as a major source of that

challenge.

We know that the particular aspects or properties of disposing of radioactive waste in the nuclear industry pose a very long-term lag in the discovery of failure, if it occurs.

You have both immediate problems in transportation, potentially, but the long lag or the long timelines here present a situation where most of the accountability or accountability processes we are familiar with in public service have a limited impact.

Most of those accountability processes assume that you can discover failure or success in a hurry, that you have relatively immediate feedback with regard to failure.

This is the case where, if failure occurs, in a certain aspect, it was very far in the distance, and I want to come back to that, but it poses a particularly interesting problem as we evaluate the kinds of mechanisms that are now available.

Thirdly, we want to consider the effects on other programmatic objectives that the waste management systems have, such as cost, how rapidly acceptance of waste can be accomplished as we consider these different alternative arrangements.

Finally, we are charged with providing the Secretary with recommendations about potential changes and guidance about how one might implement these recommendations.

Maybe this is a useful juncture to add that the problem of trust and confidence within the Department arose because of the questions of civilian radioactive waste management, but as we begin to look at this more fully and as the Secretary talked with us about the situation, it was clear that this also applies to the defense waste programs and other areas of the management of hazardous materials.

This is not a problem that's limited simply to one program within the Department. It's much more Department-wide. We have been challenged to think more broadly than simply the civilian program.

[Slide.]

MR. LA PORTE: The next viewgraph gives you a sense of the perspectives that we're taking in more detail, and it picks up the point that I was making earlier, the long timelines involved.

Because there are such extremely long time horizons in this activity, both in geologic time -- but if you think about it as a social scientist, it's in social or political time, several decades out, and we know that there are many more decades with regard to the management operation of this, that puts it in kind of infinite social or political time with regard to the way these processes work in our system of Government.

Because of these long timelines, a variety of institutions, we feel, have to merit public trust and confidence, as well as the particular program that initiated the study, and so, what we have included here is that policymaking organizations are part of this mix, particularly with regard to constancy of overall goals and objectives.

Secondly, the technical design and development organizations are also objects of these -- of our concerns, particularly with regard to the validity and accuracy of causal information or causal knowledge about the processes involved, the physical processes involved, as a basis for credible technical design.

The third item here has to do with the operating organizations themselves. As the technical designs are carried out by either government agencies or contractors, they represent, themselves, an important element of the -- of maintaining credibility in these areas.

I could have added -- and we did in our thinking about operating organizations -- we have included, but let me call out, regulatory oversight, as well. That's another element of the mix

that will be interested in examining.

Finally, our recommendations, as they emerge over the next little while, will try to take into account the variety of institutions I have just called on.

You can see, as we go here, that the range of -- as we get into this with regard to the matrix of institutions, organizations, and relationships involved, it kind of goes out like this, and we see no way of paring the problem down at this point to something a little less sweeping.

[Slide.]

MR. LA PORTE: Let me turn to the next slide.

I only have two more viewgraphs to present. What I will do is to go down the list of the activities that have been set in train since we began about six months ago, how are we executing, so far, the perspective and the tasks or the challenges that we have set ourselves?

One of the things we discovered relatively early on is that there has been a lot of talk about public trust and confidence as an important element in American public governmental institutions and their relationship with the public and in communities.

But there has been surprisingly little systematic examination of what that really means, and we were confronted, right away, with, as we began to see, it's very spotty.

Very little has been done in a systematic way, and that made us concerned at several levels.

So, what we have done, as you see, is to ask the National Academy of Science -- the acronym stands for the Council on Behavioral and Social Science Education -- to convene a several-day workshop that asked the question: What do we do from social science about relations between institutions, between groups and organizations, between individuals and organizations with regard to those conditions which, if they exist, simulate a kind of -- or reinforce a sense of confidence, a sense of trustworthiness?

And we have asked them to think about it at least in two -- at least against two, you might say, variables.

One of them is: do these conditions of trustworthiness change as a consequence or a function of the seriousness of the failure? As the seriousness of the failure is perceived to grow from merely important to probably catastrophic, do those conditions change?

We've also asked them to think, as sort of the second dimension, with regard to the timelines I talked about earlier.

As the length of time to the discovery of failure grows from short, weeks, months, perhaps a year, to many generations, does that, in fact, add a particular kind of demand on the organizations involved?

They have just begun their work. We finally got the resources through the procurement process to facilitate both these panels, and so far, the response of the academic community has been very good with regard to the importance of the area.

I think all of us have been a little shocked at how little there is to be discovered from the literature, but we hope, by September, to have the results of their initial deliberations.

What we did also was to go to the National Academy of Public Administration for quite a different purpose. They have, as many of you know -- their membership represents some of the most able and long-experienced in state and federal agencies and government. We asked them to put on essentially a parallel workshop which will go on about the same time, to tease out what the best practices are, in two ways.

The best practices that we have identified over time with regard to the management or the operations of hazardous systems -- this is without regard to the nuclear waste program itself, just

hazardous systems. We've also asked them to do the same thing for a kind of assay evaluation of those processes that are intended to assure trust and confidence in programs.

We already know that there's been a series of attempts on the part of the Federal Government and some on the state level to engage in various kinds of public participation processes. We do not have a good review of the effectiveness of these various processes and we hope that they can begin to give us some insights into them. The Joint Workshop, the third point there, is an attempt to bring the whole taskforce together with representatives from both of these workshops to essentially look at and discuss the difference between -- or the distance, if there is any, between the kind of social scientifically derived conditions against those practices we now have in place and know how to do.

The hope is that the distance between what we can do and what we need to do is not too great, or if it is great, to identify what the character of the gaps are. That's the second step in that particular process. The National Academy of Public Administration has had the same vigorous response, I think, in their response to this. Neither of these groups, I would say, have an enthusiastic response.

The problem is a very tough one and to take it on at all is to be a little daunted as you really begin to see what the properties of the problem are. What I'm trying to suggest in the way I'm framing my description to you is, we are not a problem-solving group. We're trying to identify and ventilate the characteristics of the situation.

In a lot of ways, we're doing some of the same things that this group has done. I've followed your evolution with some interest. We have, in part, a similar function and, indeed, some of the things that you're doing in risk analysis, I suspect, have some resonance with the kinds of things that will issue from our work.

[Slide.]

MR. LaPORTE: The last viewgraph is some of the other things that are happening which we're doing within the taskforce staff and calling on the civilian program to assist us. Dan Metlay, who, as I said before, is the senior staff director of the task force will be working up a series of case studies from within the Department's own experience, both asking the question; are there some good examples of operational activities that increase public trust and confidence? What were they like? What were the problems in doing that?

Are there other kinds of experiences which had the reverse effect; which drove down the sense of trust or confidence the public might have had in the Department and in that program? That's just beginning and we hope to choose those cases in a way which will represent different types, failures, successes, situations where things were turned around from a not particularly good situation to one that is much improved. Those cases will support the other work that you've already heard about.

We're doing two other things which we think are important to get a take on the problem. One of them is something that from an engineering point of view is not necessarily very important or done very often. That is to try to think about the system as it's fully deployed and to try to characterize the activities that that system isn't carrying out or engaged in.

This means -- and we've asked OCRWM staff to assist us in this to give us a sense of what it would be like if you had a system fully in place. Actually, we have two different stages. We have a little bit of time for -- I didn't know I'd have that -- that you would allocate as much time as you have to this, so I've rushed across some of this and I'd be happy to answer questions about it in a minute.

What we wanted to do was to get and idea of what the system was like as you go to the

MRS level. Just descriptively, what happens? What about transportation? What's the interactivity -- just what's the scale of things, just descriptively.

Then the next step is as you move from MRS to a fully deployed, open repository; what's that like? Then, what about the end of it? What are the activities and the institutions likely to be necessary to simply do the task as technically designed? In a way, it's a kind of industrial estimation problem of just what will it take? We don't care so much about the number of tons of concrete, but we do find the activity with rail transport, with truck transport, what the distribution of the system would be like, were the thing to be fully deployed and, say, that the Yucca Mountain facility proves itself to be suitable; what would that be like?

In some sense, that's the system that is the object of trustworthiness or distrust. Right now, there's no sense for -- there's no really clear sense of what we're talking about when we talk about the future in operational terms. What we will do when we get this done, I think, will be to try to then look at what --- if that's the system, the spare operation system, what does that mean with regard to the implications for regulatory activities, too?

You will remember that I talked about the importance of the regulators and the operators with regard to this. We see right away, as you begin to describe it a little bit, the implications for federal and state regulations. Those are organizations as well. Their credibility and veracity will be an important part of the total trust and confidence in that system in the future.

Finally, -- at least finally in terms of this viewgraph -- I have a couple of other things to share with you about what we're going to be doing to create a kind of policy map in terms of the present situation. What are the sets of constraints, regulatory, legal, perhaps Departmental administrative constraints that now confront the program and the Department?

We need to be able to specify, given what recommendations we are likely to be coming forth with -- to what degree can the Department, on its own, carry these out? To what degree will there be required legislation that -- legislation or change of executive policy outside the Department, over which it has no control?

If it turns out that much of what can be done can be done within the Department on its own volition, that's an interesting outcome. However, if it turns out that there is a substantial number of things that the Department has no control over, yet is asked to do things as if it could do those things without major change in legislation or federal policy, then we need to know those things and so does the Department.

Right now, we're beginning with this and we don't have a good map on it yet, but we're working with members of the Department to construct it.

Here are a couple of other things that we have already done and I will just tell you quickly about them.

We have already had an academic colleague who's an expert in perceptions of public trust of government generally do a paper -- he's almost through with it, he'll be through in a month or so -- on what we can say with regard to public trust and confidence data in the public's opinion surveys with regard to public institutions not just at the Congressional or governmental level but at the Department level.

What can we say with regard to that? We have asked another research colleague to do the same thing with regard to the literature, management and organization.

Is there literature that already addresses this question? In fact, I know what the answer to that is -- no. That's why I started the way I did when I did. We have a sort of surprising gap in systematic and serious reflection on this.

Let me end by returning to the question of our own, the Task Force's own, processes. I

said before that we need to, we feel we need to act in a way which people, where individuals outside and groups feel we have sort of acted out the trust and confidence process ourselves. That means that we need to be as transparent and as open to outside views along the way as we can be.

You see that reflected in the agenda of our first meeting. What you do not see there is, in that agenda, was our declared intention to go to the state of Nevada to talk with them in the Fall about their concerns along these matters. Then along the way as we go through our process a little bit more and this is now sort of a promise for next year, to meet with the variety of stake-holding communities, and there are quite a considerable number, and as you know certainly the Native American community is one and going back to the state of Nevada is another and to talk with the operators, that is, the people who might operate this and the utilities who are involved, industrial contractors themselves, people from the environmental community who have expressed strong interest in these kinds of things, and indeed the regulatory community, people who in a variety of regulatory agencies that find a requirement to pay attention to these matters.

We intend to broaden our -- once we have something to ask about -- to return to the communities who expressed interest and talk to them about the kind of implications of the recommendations and things that we are hitting on.

Again, it's been a pleasure to come back this afternoon and talk with you about something other than you often talk about and as a person who teaches in the area of technology and politics, this is a rear pleasure for me to talk to you rather than the other way around.

I'd be happy to answer your questions now.

DR. DEERE: Thank you very much, Profession LaPorte.

We are open for questions. The Board? Warner?

DR. NORTH: I wonder if you'd like to comment a little bit more on the relations between the activities underway, Slide 1 and Slide 2.

In particular, I am struck by the fact that case studies within DOE might not include all of the interesting and relevant history with other federal agencies, and it's been my experience as a participant in a few of them, that National Academy Workshops on very broad topics often lack the sense of focus that case studies can provide. I would think some focus on experience within the federal agencies that have responsibilities for issues like aircraft safety, maritime safety and the like, as that has evolved over many decades, might be a very interesting bed of experience to ask the social scientists to try to summarize and similarly from the National Academy of Public Administration. Those people have been dealing with public trust in the context of safety issues for some time. They should have some interesting experiences to share.

MR. LaPORTE: That's a very acute comment. In our conversations with the National Academy of Public Administration a couple of days ago that specific thing was raised and they were already able to just in a short conversation begin to spot several examples of exactly what you are talking about.

We have asked them specifically to help us identify those kinds of cases that we can examine a little more carefully.

You'll notice that the way we termed those two academies as "workshops," not as studies, and our resources don't allow, nor does the time allow, in this stage for the kind of depth descriptions that need to be done to tease out from what often are complex situations.

Those of you know Chick Perrow's book, "The Normal Accidents," he redoes that. I think you know about that, where he tries to take exactly these sorts of things. It turns out to be some of my work is related to this as well. Much more complex to describe than the outsider

appreciates, so what you've asked is a very important source of information, but we can't extract it so quickly at the level of resources we now have.

I wouldn't be surprised if we fasten on those kinds of questions as second steps in this, but the National Academy of Science people are -- you used the word "diffuse." They are more abstract and a lot of them will not have the kind of experience in the cases you're referring to draw on them very well and I wish there was some way to bring the two groups together in a more sustained fashion than we can this time.

DR. NORTH: Have you done an inventory to see what other federal agencies have done on this particular issue? In other words, have there been studies for example within the department of transportation that have focused on similar questions to the ones that you are considering?

MR. LaPORTE: The trust and confidence, you mean?

DR. NORTH: Yes. We -- let's put it this way. We have not asked the question have other Departments done it, but we have asked the question has anything been done in any kind of organization that focuses on the trust and confidence question. Let me just expand that a little bit more.

"Trust and confidence" -- that language really comes from legal language. We think of it as in addition credibility, legitimacy, trustworthiness. There's a lot fo ways of saying this and we tried, we really looked at the literature hard, all sorts of literature, and I guess I am sort of surprised to discover that there is almost nothing that focuses on these kinds of questions in a systematic or even story-telling way.

There are a lot of stories about why -- I mean a lot of stories one can tell and we do about why you shouldn't trust each other or agencies, but in terms of the conditions that produce it, how that gets turned around or the other sort, the successes, is simply -- it's a stunning hole in the literature of all sorts, so that answer to that question is "nada."

It's probably -- we haven't looked at it but the answer I suspect will be -- we sort of already know it's zero, because they have looked in that direction as well as other ones.

I think I am being responsive to your question.

DR. NORTH: Yes. I am just wondering if we broaden the question a little bit, there have been numerous examples in the history of this country where there has been a lack of public trust and confidence in a public agency, and if we view it maybe as a problem of looking at history and institutions, it may be that there are some parallels that would be very interesting but they are not the obvious questions.

MR. LaPORTE: I take your point. We hope to discover whether there is any assistance in written history. There is a lot of assistance in story-telling. Well, I'll go back and I could just repeat what I said because it really is remarkable. If any of you can think of examples, of other ways that you think would be useful for us to pursue later on, we'd be delighted to have a note to that effect or at the break if we're still here talk with you about it.

DR. DEERE: Has either one of the workshops been held as yet or are they about to be?

MR. LaPORTE: No. Both workshops will be held in September. There's a time frame. It's middle to late September. Then the joint workshop or the joint meeting will be held some time in mid-winter. We aren't sure exactly when that is going to be.

DR. CANTLON: John Cantlon. You have focused on an attempt to inventory or to assess cases where the public trust been eroded or failed to develop. Do you have any interest or intent to follow up on a prescriptive approach?

So what? What do you do about it? Are any of your people interested in working

strategies to address the problem?

MR. LaPORTE: Oh, yes. That is really what we have been asked in the latter part -- that's the recommendations part.

I think the Secretary would be very disappointed if we didn't take that on but we're right now in the stage of trying to understand the more subtle dimensions of the situation.

Let me just say a little bit more about the -- this is more of a personal response to the question.

There's a lot of assistance of a kind of off-the-top-of-one's-head approach. Things have to be transparent. We have to have lots of public participation, absolutely true. true.

What we are interested in is not just the necessary conditions but the sufficient conditions, because it's not clear to us that if you have complete public participation that that will do it, that then the whole series of subsequent questions arise.

Once we discover what is going on in organizations one would like to think that the more you sample an organization, the more confidence you have in it.

We know that is not always the case, so there's a lot of other things as well that -- you sort of thing of it in terms of a design question which is I guess the intent of your question.

We are very much interested in that.

Another aspect of that is that what we also understand is that changes of the sort we may have to consider may not be able to be carried out within the Department on its own.

That's why this policy map, as I was calling it, is important to know what kinds of constraints actually confront the agency that are imposed upon it by outsiders, outside and prior legal requirements of a variety of sorts.

DR. CANTLON: It isn't just Federal agencies that have trouble with public trust. Corporations deal with it daily. There is a whole science and economic sector out there that deals with public relations, image-building. Is the group looking at that literature at all?

MR. LA PORTE: Yes.

The way you framed it, the way you characterized it -- not framed it, characterized it -- has the seeds of its own problems. We think of public relations as image rather than substance, and we have a situation here where image isn't good enough.

We'll have to probably deal with substance, too. So, that's in our minds, as well.

DR. CANTLON: But good, solid public relations is grounded in reality, not in images.

MR. LA PORTE: Yes.

DR. CANTLON: Images are so evanescent, they have very little value.

DR. DEERE: Yes, Dr. Allen.

DR. ALLEN: It seems to me it would be instructive to look rather carefully at the experience of the states or groups of states in the low-level waste siting, why some have been more successful than others and what lessons one can possibly draw from that.

I don't know why some have been more successful than others, but it seems like it would be an interesting area to look at here.

MR. LA PORTE: Yes. I appreciate that. We have thought about that. It's on our list of things to begin to look at.

You're beginning to share with me and us the problem that goes out like that, and it's not a short-term -- it's neither a short-term analytical problem nor a short-term institutional change problem.

The half-life is not as long as the half-life of the material you're dealing with, but it's long.

DR. DEERE: Are there comments?

DR. PRICE: One quick question: Did you have any trouble in coming to consensus or have you any consensus on operational definitions of trust and confidence that will enable you to measure something or determine whether or not it's been attained?

MR. LA PORTE: That's a very good question. Not yet, no.

We have not -- that problem or that issue has been raised, but we haven't fought with ourselves enough to -- well, I don't think that -- my sense of it is -- maybe this is the hope of any chairman -- that, when we do this, it will not be too difficult to begin to get at least a linguistic consensus.

You have an interesting qualifier there, and that has to do with measurement. That's a much more difficult problem.

The reason it's a difficult problem, one of the reasons, is that we don't know these things very well yet. Different groups have different indicators of what trustfulness is about, and in fact, they have different wishes with regard to what it is they want confidence about.

So, there's not a lot of consensus out there in the world about what the properties are of the organizations that we're dealing with which need to be considered. We're finding those out, and it's another complexifier.

But that's a very good question, and I would suppose that -- I know it will come up within our own group, because it's -- how that will come out I haven't got the foggiest idea yet.

MR. FRISHMAN: Steve Frishman from Nevada.

The Secretary is already implementing a program right now that has, at least as one of its purposes and one of its many purposes, the improvement of confidence in the Department and the whole nuclear establishment that exists, and that's his education program.

Are you going to try to take a look that in terms of maybe trying to forecast or evaluate, in a forecasting way, the potential value of this relative to dealing with the whole question of confidence?

MR. LA PORTE: Let me see if I can state it.

If I understand what you're saying, are we going to try to look at the educational initiatives with regard to, if they were successful, what it would mean with regard to longer-term trust and confidence? Is that a fair way of characterizing what you asked?

MR. FRISHMAN: I think even stepping back one step and trying to evaluate whether they might even be successful, because in the nuclear area, in spite of what, maybe, many people in this room would like to believe, we have enough experience now to know that the more you educate people, the less they like it.

But that's just -- that's what the surveys show, unfortunately, but that's where it is.

MR. LA PORTE: I guess the short answer to your question is, in any formal sense, we will not ask the question of what about the present program changes in education with regard to the Department?

Those are not very clear-cut about what they actually mean, in substantive terms.

Now, the longer answer is insofar as public education is an element, among others, that is either necessary or not, depending on the way the analysis is going, yes, you bet, we will.

If it turns out that that becomes an important, more general view, the education hopefully is specified a little more clearly than we have just talked about, sure.

MR. FRISHMAN: All right. Well, I ask it only because, you know, education always comes up or has always come up in the last 15, 20 years as being the solution to this confidence problem, but if it were, it would have been working already.

MR. LA PORTE: I take your point. I've already talked about necessary and sufficient conditions.

There are a number of things that one can imagine are necessary. Even if you do all those necessary ones, they may not be the ones that turn out to be complete with regard to sufficiency, and that's what we want to have a much better take on.

If you think about it in terms of -- if we're not off base completely with regard to the range of institutions we think need to be the objects -- that is, decisionmaking, policymaking, design, and operating organizations and regulatory -- all four sets had a role to play in one way or another in the way we run things in this country.

So, I suspect what's going to happen is -- well, it's already begun to happen in the way the task force is thinking about it. We need to think about relations, both relations between those institutions, those sectors, as well as just the program itself.

We don't see there is a way of avoiding that, at least at this stage.

DR. DEERE: I will make a comment then.

I have noted, on several projects, that when they're in the beginning stages, where there may be opposition, as tangible successes are met along the way, one can see a change in, I think, the public opinion related to those projects. I am speaking with respect to a major hydro project in New Zealand, which suffered a great number of landslides, or which had the potential to suffer a great number of landslides, and the other is the English Channel Tunnel.

There is a lot of opposition, as you know, in Dover and in Folkston, and a lot of backing for the project on the Calais, France side. But the day that they met, which was November 30th or December 1st, and they had the celebration, where you saw French men drinking beer and English men drinking champagne and singing songs together and their arms around their shoulders, and since then, as each tunnel comes in, a few months later, you can see the project getting more and more positive press and attitudes changing. I believe this is something that exists.

MR. LaPORTE: It certainly does. I mean, you have a situation where, in both of the ones I think that you've mentioned, there was a turnaround. It had to do with demonstrated capacity to carry off the rather remarkable technical promise. I think that we'll see that as part of this dynamics of increasing trust.

The tricky part -- tricky is the wrong word -- the difference between the examples that we've talked about now and the ones that we have here is that success could be demonstrated pretty quickly, and pretty definitively after the major technological work was carried off, the first stages. In radioactive waste management, that doesn't seem so clear, about when you know you've succeeded, or what's success is.

That timeline, that long timeline to feedback keeps cropping up in odd ways, that confound a great deal of our learning from history, where we have to try to think about -- now, this is more of a personal response -- we have to think about the properties of the situation -- the nuclear waste situation, as is presented to organizations that operate in the public -- who are effected, and try to clearly specify those enough, so that historical examples can speak to various aspects. I don't know that we'll find any historical examples that have all the -- in some important way map the particular conditions that you and we are confronting together because of this -- the specific properties of the phenomena.

DR. DEERE: Are there any comments? Yes, Robby.

MR. ROBERTSON: Robby Robertson, TRW.

I know that some social scientists have studied the general perception of the public's trust

and confidence in institutions, be it government or big business, et cetera, and have noted that in the swing from 1950's, a 75/25, roughly, to the times that we have now, in the late '80's, to a complete reversal of that, 25/75.

It appears to me that given that, as a substantive back drop, you have a particularly high noise level against which to judge the specifics of this particular public trust and confidence enterprise.

MR. LaPORTE: I wouldn't call it a noise level, except in a technical, statistical sense. Although, I suppose there is a lot of noise too associated with it. That's right. In a sense that's why, as we approach the question, you can't limit it to a department, a program, because all of us think about institutions in more or less an undifferential notion in our heads, and we think as citizens. We have to work a while to figure out -- get information about specific ones, and then begin to refine it.

I agree with you, that the decline in confidence in institutions, generally, is an important condition that any government or, for that matter, private institution has to understand is part of the background against which they work. It's a drag.

MR. ROBERTSON: It appears to me also that at least some consensus among the social scientists as to what series of events or phenomena led us to this condition might be very useful in judging the specifics as to what remedies might be applied?

MR. LaPORTE: I agree. I think that that's part of what the National Academy of Science group -- we're going to be pointing toward.

DR. DEERE: Are there any comments?

[No response.]

MR. LaPORTE: Thank you. I appreciate being here, and I hope our task force and your activity or your group can continue the conversation.

DR. DEERE: Thank you. We will take a coffee break now, and start again at 3:00 o'clock.

[Brief recess.]

DR. DEERE: May we reconvene, please?

At this time, I would like to introduce Mr. R.L. Robertson, President and General Manager of TRW Environmental Safety Systems, Inc.

Mr. Robertson's primary responsibilities are to direct and set general policy for TRW's management and operating contract for the DOE's Nuclear Waste Management System.

Prior to this assignment, Mr. Robertson was Assistant General Manager of the Systems Division, TRW Systems Integration Group. In the mid-1970s, he played a key role in developing TRW's Washington-based energy engineering business.

He joined TRW after working on several assignments relating to airborne weapons and communications systems with Hughes Aircraft and has worked on both the unmanned and manned space programs and managed all TRW activities at the Kennedy Space Center.

Mr. Robertson will give us an overview of past, ongoing, and planned efforts related to the DOE M&O contract.

Mr. Robertson, thank you for joining us today.

OVERVIEW OF DOE M&O CONTRACT

[Slide.]

MR. ROBERTSON: Thank you.

Most of you know me by Robby, and I suspect that you can all hear me from my general volume.

As you probably are aware, TRW was awarded the contract. It seems eons ago, but in reality, it was the 12th of February, only five months ago.

The contract is a management and operating contract for the Nuclear Waste Management System, the title of which is Systems Engineering Development and Management of this program.

[Slide.]

MR. ROBERTSON: The OCRWM mission, I think, is not something that you are not familiar with.

It is also the mission that we have taken as the contractor, to see to it that we do dispose of the Nation's spent fuel in a manner that protects the health, safety, and the quality of the environment.

[Slide.]

MR. ROBERTSON: Dr. Bartlett, when we first started on this program, sat down with us and laid out a few bullets to delineate the difference between the responsibilities of the DOE government employees and the M&O.

As you are aware, M&O contractors, in a sense, act as surrogates for DOE to execute programs under the management of the DOE employees.

The DOE, as you can see, are to set the program policy, goals, schedules, resource allocations, and to manage us. We will organize those resources, accomplish the work, develop the associated supporting documentation, and provide, hopefully, valuable advice and information.

[Slide.]

MR. ROBERTSON: Our Statement of Work is quite complete. We are responsible for the entire design and analysis of the integrated nuclear waste management system.

We are responsible for the technical direction and integration of the site characterization of Yucca Mountain. If it is suitable, we are to engineer and develop for construction, including Title I, II, and Title III oversight.

We are providing support for the MRS siting, the principle responsibility for that being the negotiator, and we will, in fact, engineer and develop that for construction, the same thing, Title I, conceptual designs, Title I, Title II, and Title III oversight.

We are also responsible for developing the transportation system.

In behalf of DOE, who is, in fact, the license applicant, we are to prepare the license application for NRC. We are to provide the Title III design inspections that I indicated, and we are to integrate the overall work of all program participants.

[Slide.]

MR. ROBERTSON: A little bit about identities, because there is confusion about what is a TESS and what is an M&O and associated subcontractors or partners or teammates of us on here.

TRW Inc. is the parent corporation. TESS is the subsidiary, wholly-owned, which is a component of the Systems Integration Group. I am the President of the subsidiary, and it is the prime contractor for the management and operating contract.

We speak of ourselves as the Nuclear Waste Management System M&O; that is, TRW and its nine teammates, who I will identify in a few minutes, which are right here.

[Slide.]

MR. ROBERTSON: As you can see, we have an array of very qualified teammates who have been in the industry for some time, and we have focused their activities principally in areas in which they have the most to bring to bear.

Fluor Daniel is going to do the surface facility design and development and will also support the design of the MRS, so that we cross-couple that.

Morrison-Knudson will do the underground design; Babcock & Wilcox, the engineered barrier and waste package; Woodward-Clyde, site characterization lead.

Duke Engineering will do the MRS design and also support some of the surface facility for cross-coupling. They also have the lead for us in licensing, outreach, and QA.

INTERA Technologies will lead our performance assessment, and E.R. Johnson will lead the storage and transportation analysis, and J.K. Associates is providing some expertise in the socioeconomic and policy analysis.

RDA is principally focusing on modeling and some system engineering support.

[Slide.]

MR. ROBERTSON: I won't spend much time with this org chart. This is the official one at the moment. It has changed as it has evolved.

In particular, the details under the Site Manager have expanded considerably, was we have defined with Carl and his people our participation in the upcoming program.

The main point that I want to make about this is that we are divided -- this is spoken of as a bicameral organization. There is half of the organization that deals with systems, another half that deals with operations.

This organization defines the baselines, deals with the change, manages all of the interfaces with the external environment that we know are going to change on almost a daily basis, as policy, requirements, and the state of knowledge and technology and the like evolve.

This side of the organization is responsible for taking this set of requirements and executing the program against a baseline, and on a periodic basis, there is one handed over to them for a new baseline to move forward.

The MGDS is the organization under Jim Clark, who, by the way, is with Fluor. You will notice the colored boxes here are TRW personnel, and all of the other management positions are an integrated membership team.

As an example, Bill Griffin here is from Fluor, Jim DuGuld from INTERA, Mary Birch from Duke, Paul McKie from Morrison-Knudson, Paul Childress from B&W, and so forth, and Bill Teer over here from E.R. Johnson Associates, and here, you will notice that my QA manager is Duke.

So, the thing that I want to point out about this chart, really, is that it is bicameral, managing change, executing baselines, and the site providing direct support of all the resources of this project as a TPO for Carl for application of those people onto his project at Yucca Mountain and, further, that we are operating as an integrated team, regardless of -- it's more or less a badge-less organization.

[Slide.]

MR. ROBERTSON: Concept of operations. The M&O is more than just a technical direction, system engineering or management and operations. This is the first M&O for a program. Typically, you have an M&O for a facility. We don't have a facility yet; we're in transit. We will have multiple facilities before it's over with. So, it is an unusual construct.

I mention the bicameral nature of the organization, and I want to point out that we manage ourselves by functional areas. You saw, in the previous chart, that we have an

organization for modeling. That's all modeling: System level, subsystem, scientific or whatever it may be. So, we manage ourselves by functional areas, but we integrate, by program, by project areas.

[Slide.]

MR. ROBERTSON: This chart gives you an indication of DOE's view of how they were going to restructure this program. At one point there were 200 prime contractors on this program. That affords an enormous opportunity for duplication, and stretches the ability of management to deal with these various entities.

The plan calls to bring this down to eight contractors, with the M&O prime role, three national labs principally, the USGS and a number of cooperative agreements. In that context, the M&O operates as a kind of the integrating contractor, in which, for design and development, it does prime work for the ASCONS who are associated by ASCONS -- I mean associate contractors, which are those contractors such as REECO or RSN, or others who are participants on the program. We are responsible for the technical direction of that work.

With regard to the labs and the USGS, as you are aware, contractually, we may not be a technical director. We use the term technology application, but we basically are attempting to technically manage the activities that are associated here to give direction overall, to the program. Leaving the labs and the USGS in their principal roles as principal investigators and to take some of the burden off of them of the execution of the day-to-day aspects of the project. We don't want to leave out our responsibilities to assist RW in its relationship with the community.

If you look at the assigned task areas and notice the role that these people have for the program and then the M&O's assigned role -- as an example, the RO is responsible -- it's the policy maker in the overall program direction. We provide technical support to them. AS the M&O, we have some design and development responsibilities, and we function in this one as a prime contractors.

In the associate contractors, they are doing all kinds of things, from construction management to operation of facilities out there. In that case, we're serving as technical directors. In the case of the labs and the USGS, their job is technology development and review. We believe our job is to see to it that that technology is properly applied to this project to assure success.

You'll notice underneath, the MSIS -- those of you who got some view of that last time -- the physical systems involve these two sets of things, for which the M&O is assigned responsibility for system engineering; and the management systems or the programmatic functions, are under the management and integration aspects of it, all feeding into the overall program management system backdrop.

[Slide.]

MR. ROBERTSON: This was the master game plan. We have a 10-year contract with a five-year option. The first phase of this contract will end the end of this month of July, at which point we will move into a 14-month period, known as the ramp-up period, this being the start-up period. This is a cost plus fixed-fee period. We will move into a cost plus award fee, after that period of time, and expect, after that, 20 months or so to begin to get on to a normal profile.

You might note a three-year call out in our contract for a comprehensive evaluation, as a result of a request on the part of the Legal Department at DOE. As you are aware, we did have litigation in getting to this contract. That was inserted in out contract. Obviously, DOE has an opportunity to cancel for cause at anytime, so this doesn't concern us. If we don't pass this

threshold, we're not going to be around anyway. So, this contract is for 10 years, with a five-year option.

[Slide.]

MR. ROBERTSON: This is a notional chart only. Obviously, the total number of full-time equivalent contractors on this program will not remain constant; it will vary with the different loads of activities that occur. This notional chart indicates a general trend of what is expected as this contract evolves.

[Slide.]

MR. ROBERTSON: This is a chart that gives you an indication of where we are now. We are at a little over 350 at the moment. TRW makes up about 60 percent of those at the moment; I think 55 is a more accurate number. I will point out that in this number here are all of the support, finance, secretary support, reprographics, databases, data management and things of that nature. So, generally speaking, when you see these people, as an example for Duke, these are pure engineering people.

[Slide.]

MR. ROBERTSON: In the start-up activities, we've established our facilities in Fairfax, in D.C., Charlotte and Las Vegas. We would expect, over time, for a large number of people to be in place in Las Vegas, supporting the site characterization, and then, ultimately, the design and construction of the facilities.

We do have, at this juncture, in Charlotte, the MRS conceptual design work going on, led by Duke, supported strongly by Fluor.

Once an MRS sight is located, we expect, along with DOE, to move to that site, to provide value-added at that location, for the host state, for the engineering to be completed there.

During this period of time, we focused on familiarization and transition, getting our quality program in place, developed and trained. We have had our QAPD, or our Quality Assurance Program Description Document approved a couple of weeks ago. We are on schedule to have our in-house readiness review in early October, so that we expect to be up to speed and fully operating under our own program by then.

In the meantime, our staff are being trained on both the Yucca Mountain QA Program, as well as the headquarters QA program, so as to be able to go ahead and do some limited quality affecting work.

A specific assignment that we've been involved in are here, one of which was we took advantage of the background and experience that Duke had, and put a team of about 12 of our M&O staff on to assist in an overall QA management assessment of RA, it's kind of an internal self-assessment. We were able to help with that.

As I pointed out, the conceptual design is well underway. We are just now starting up a plan to take over the integration of the performance assessment function. The information management system is under development. This is the -- if you would like, to view this as the precursor to the LSS, the License Support System. This is the DOE system, internally, that will capture that data.

Carl has asked us to take on the role of ESF construction management. We're beginning to gear towards that. We've been heavily involved, as you might suspect, in the MSIS and in the development of the design requirements, both for the ESF and the MRS. Overall, we've been asked to take the lead, under Dwight's management, for the overall program management system improvement. We are heavily involved, at the moment, in assisting in developing the licensing

strategy, which will follow this program.

[Slide.]

MR. ROBERTSON: In our ramp-up plan, we have called for the early transfer from participants of those functions that are associated with program integration and system engineering.

It is absolutely essential that we maintain the critical scientific roles for the national labs in the USGS.

We want them to be able to focus their energies on those things for which they really are outstanding national resources; i.e., principle investigators.

We also want to make sure that, during this portion of transition of the program integration and system engineering, that we capture those people into the M&O that desire to move over to that but bring with them a lot of background and knowledge of the history of this program.

So, we'll be doing this, as you can see, in a very careful process.

I'll point out that we have a major role in implementing the program management system, continuing the MRS design and siting. That MRS conceptual design will be finished in early December.

You may have seen that we have placed a notice for a procurement in which we are looking at off-the-shelf technologies to be assessed, and we've had a response of about 18 companies who believe that they have off-the-shelf storage and/or technical systems that can be applied to this.

Before we finish that MRS conceptual design, we hope to evaluate all of those systems and find those that can be used essentially "off the shelf," without R&D development.

John mentioned yesterday -- John Bartlett -- about -- or I guess it was earlier this morning; it just seems like yesterday -- the evolving transportation system development and acquisition strategy, something that we're very concerned about, to be sure that we meet that 1998 and yet still bring the technology to bear that is necessary in the long term of the program.

Notice that I am going to return many times to this subject of licensing. We are going to focus on licensing.

We want to develop an assertive licensing strategy that deals with NRC as a peer, that brings to the table our positions, and ready to negotiate on a one-on-one basis to drive forward with these things.

We're going to seek phased approval, and Paul and his staff have many issues that are already embedded at a sufficient level technically that we believe we can move forward with those.

We do want an early resolution of those, and as someone pointed out early, you will not ever get total resolution. But at least you can get some agreement as to where you are and you can park that and not spend your energies on it until such time that you get into the final license applications.

A lot of people won't necessarily like this subject, but we believe that the licensing will not only drive the requirements but also constrain the data needs that come out of this program.

[Slide.]

MR. ROBERTSON: Continuing here, we have a major focus on a comprehensive outreach program. This is beyond affairs. This is a focus on getting an integration of the outreach aspects of this program on an equal footing with the engineering process.

This program is more about what is acceptable publicly than it is what is technically

feasible, and we shouldn't lose site of that. There are many, many technically-feasible solutions, but in many cases there are a limited number of publicly-acceptable.

We are going to do some public-acceptance modeling, and we are developing some "accommodation strategies" for the various publics, because there are more than one.

Clearly, we need to transfer the records, information management systems, maintain that long-term corporate memory.

We want an early assumption of the technical direction and integration roles so that we are in a position to influence the site characterization, the top-down performance assessment, the ESF and its design and construction, and the waste package and engineered barrier.

[Slide.]

MR. ROBERTSON: Assumptions guiding the transfer of this work from existing participants is, one, we want to implement the consolidation plan.

We want to cause minimum disruption to the program. We certainly don't want to put at risk any aspects of the scientific or engineering program that is underway.

We want to minimize the duplication, focus that responsibility and accountability, and transfer the integration functions earlier.

I mentioned before maximizing the retention of those people thought to be critical to this program, and obviously, we need to ramp this up at a manageable rate, and if you make this transition employee-sensitive, it will ultimately serve the best interest of the program, and we must conform, obviously, to the guidance that are associated with the budgets.

[Slide.]

MR. ROBERTSON: What is our current focus?

Cultural convergence, not an easy thing; this is different. This is constructive, and M&O is different. This is not a program that has ever been run with an M&O from Headquarters before, even. So, we had a great deal of cultural difference.

Seeking the comfort level of detail at which the DOE managers are able to manage the M&O and allow him the flexibility to execute and implement the program at the detail level is our major challenge, because there is a cultural history of hands-on work for many parts of the customer environment, the DOE environment.

We hope to bring a sensitivity but yet fresh objective views.

We hope to get rapid certification.

I guess that's an incorrect word under our current vernacular, as my QA guy would tell me, but approvals, and we obviously, given the cultural convergence that we're striving for, need to work hard at the concepts of operation and make sure that, as we go through this, that all levels in here understand how we're evolving this program.

Our acceptance into the community and involvement and acceptance there is paramount. Without the support of the EEIs or the USCEAs or, for that matter, the other state agencies and others, we are not going to succeed with this program.

So, we do expect to integrate ourselves into the community and hope for acceptance.

A big effort, obviously, is planning the work of transition to the M&Os, because it's a sensitive issue, it's a contractual issue, it's a people issue, it's a timing issue, it's warm and fuzzy issues of making everybody comfortable and not just trust me, I'm going to take care of it.

So, we are going to work our way through that.

We hope, and I believe, we have demonstrated some early value-added contributions even now, and I will keep putting this up here to remind myself that regardless of what it is, we've always got damage prevention and control, because we're going to stub our toe with this

many players.

[Slide.]

MR. ROBERTSON: Observations: This is a complex, first-of-a-kind project. It is unique in its complexity and dimensions.

Public acceptance dominates. I mentioned that before.

The oversight entities, of which this body is one, are very unusual for a program of this nature. Carl mentioned this morning -- and we have great sympathy for this -- that the intense schedule of meetings that are demanded of the participants in this program is without parallel, I believe.

Unfortunately, some of this results in fire drills dominating strategic planning.

I do believe Tom Isaacs, though, in his mission plan and some of his strategic planning and contingency studies now is beginning to exert some considerable influence on that arena, and we look forward to that.

I think the mission plan is an outstanding document that, if well read and digested, gives one a good understanding of where this program is headed, what it's all about, and what the principle levers are.

It does, indeed, provide for an excellent constitutional base.

I have another observation, which is the RW people are, in fact, competent and hardworking. I am impressed by the quality of the people and the degree of dedication, and in particular, Carl attending staff meetings that start at 9:30, our time, on the phone, his time.

Bureaucracy, though, is a major challenge. I have dealt with a lot of entities in my life as a contractor working with the Government for some 35 years across NASA and DOD and the Navy and DOE, and I have to tell you, without question, DOE is the head of the list.

[Slide.]

MR. ROBERTSON: What are our challenges?

Principally, we need to provide the management systems to be sure that we have integration of the development process, and yield pedigreed data, such data being used by those public policy makers to make public policy decisions with peer-accepted methodologies, data, and design solutions.

We have to anticipate, accommodate, and manage the uncertainties and change. This is a program which we know will change. We are undertaking an attempt to assess the validity of this program, at a point at which the courts have voided two of the major underpinnings by the EPA.

And this is an incredible condition that we find ourselves in to try to manage a program and to do the kinds of work that are required to meet the rigor, and yet have, knowing full well that all of those are going to change.

It's bad enough to be able to try to deal with that. But then to think that we're attempting to forecast twice the recorded history of mankind, what the technologies are going to be, and things of that nature, that might impinge the ability of these radioactive nuclides to migrate to the surface.

It is, in fact, a great deal of uncertainty. We must find a way to harness the capabilities, both within the M&O, and external to the RW program, the nuclear waste management program, and all the expertise, worldwide, and get that expert judgment focused in a way that one can make decisions on this program.

Lastly, we've got to operate in the public eye. Everything we do is ultimately going to be litigated. We will be litigated, and we will be discovered. And those of you who have been

through those know the pain that that can bring about. But that's where we are. And so we intend to operate in that manner.

[Slide.]

MR. ROBERTSON: Lastly, what are our goals? Very simple. Sensitivity, objectivity, credibility, and ultimately, trustworthiness, so that we can bring this program to, we believe, a successful execution.

Thank you.

DR. DEERE: Thank you very much, Robby.

Are there comments?

DR. NORTH: I'd like to take you back two slides to Number 19, Challenges.

MR. ROBERTSON: Yes, sir.

DR. NORTH: You went rather quickly through Point Number 2: "underpin public policy decisions with peer-accepted methodologies, data, and design solutions."

MR. ROBERTSON: Yes, sir.

DR. NORTH: It's my thought that Point Number 4, "focus expert judgment." and "operate in the public eye," Point Number 5, bear directly on that. And I wonder if you could expand your comments a little bit, and tell us more about how the M&O is going to assist in meeting this challenge.

MR. ROBERTSON: Okay. You're correct. As a matter of fact, the very vehicle by which you generally achieve peer-accepted methodologies, data, and/or design solutions is by the involvement of the appropriate recognized expert judgment.

Now, there have been a lot of examples, which I believe are very well-served examples, of how that expert judgment has been used on some such studies as the Calico Hills and on some of the other risk assessment work that's been done.

There are formalities of those kinds of processes that you can carry those through. And clearly, this business of operating in the public eye means that it does put a layer of sensitivity to all the players on it. It also puts a particular challenge on this, because I've heard repeatedly those saying you must bring other people into this program who are not, quote, "tainted" by this program.

And it's a little like saying I got this 46-inch pipeline to construct, but I can't get any support from anybody except sprinkler companies, because otherwise they'll have a conflict-of-interest.

So I think somewhere between that balance, we've got to be able to find a way to couple those kinds of experts from the academic community, but also those who are from the pragmatic real world of I have seen it, I have been there, I have experienced it sort of thing, as well. And so somehow or another we've got to bring that blend.

We do have, in our particular program, we have, in our proposal, we had identified around 20 experts who had agreed to serve, as we called them, peer, but I think that perhaps in the legal application of your use of the word "peer," you know, in the sense of the way it's QA handled -- probably not quite the terminology -- but we had called it our "peer technical review panel" that we would bring together on various subjects to try to bring that particular expert judgment, not meaning that these people substituted themselves for, let's say, the experts that are in Carl's program area, but rather, were one more level of expert, that put one other check and balance on that.

DR. NORTH: We have several times suggested the need to involve more experts from outside of the community, in the peer acceptance process.

Another issue I'd like to raise for further comment is the question of timeliness with respect to operating in the public eye. DOE has been criticized in the past for a "decide, announce, defend," or DAD syndrome. And my understanding is that the management is trying hard to get rid of that.

MR. ROBERTSON: Right.

DR. NORTH: But the question is, how do you do it when you have very complicated analysis and data that has to go through a quality assurance process?

And I think one of the challenges is to be able to provide the methodologies, data, and design solutions underpinning the public policy decisions before those decisions get finalized.

MR. ROBERTSON: I agree with that. I think that there's a real challenge here. And, Carl, you and I talked about this when we were talking about the upcoming design review on the ESF.

One of the things that those of us who have been in the engineering community for a long time are very familiar with is what I call the "rubber room." And that is, you get a deep pile carpet, where the blood doesn't run too much, and you close the doors, and you get all these people in there, and you have at it. And there are no holds barred. And there's no harm, no foul, in the sense of people taking things personally or anything. But you go right to ground truth, without this formality of being too polite.

Now, one of the problems that you get into is that involving the public in that process tends to dampen that. It makes us all be a little more sweet and lovable. So there's a tradeoff somewhere in all of that that has to be made.

I think that we need to strive in that context for a mutual acceptance on the part of those who might be supportive of this program, as well as those who might be adversarial to this program, so that at least we can have a mutual acceptance and technical respect for one another so we can have that kind of rubber room without the ramifications of having it show up the next day in the Las Vegas press.

DR. NORTH: But I think another aspect of that is that the interested and affected parties within the public would like to know what evolved out of that rubber room session: what was the basis for the public policy decision that emerged?

And I'll use an example from our panel meeting the first day of this week on the location of the shaft. What came out of the rubber room session was a set of numbers. And those numbers were presented to us.

It's very hard, either for us or for the people that are attending the meeting and interested in those numbers to see exactly where they came from and what they mean.

Now, when the analysis first comes out, it may be appropriate to give us a quick summary of it. But that needs to be supported by documentation, which indicates what is the basis for the expert judgment that was used in that analysis. To what extent did the experts agree? To what extent did they disagree?

If they disagreed, why did they disagree? What was the extent of the disagreement? How do we interpret the difference between one expert coming up with a five and another expert coming up with a one or a two? That all has to be specified, so that the public has a sense of what is the underpinning for the decision.

MR. ROBERTSON: Right. I agree with you. And this is again a challenge of this program, which is different from some other programs which I'll use, at the risk of getting a little too off to one side.

I generally try to characterize problems into two categories -- Aristotelian and non-

Aristotelian. An Aristotelian problem is, in fact, amenable to an Aristotelian logic. You can, in fact, delegate that to someone to go off and study and bring you alternatives, and as a manager, you can make a decision, and generally be pretty right, by having two or three studies done of it to cross-check one another.

However, non-Aristotelian problems are different. The only way the manager winds up coming to the right conclusion in a judgmental sense is to immerse himself in the process, so that he is subjected to all the nuances of all of that whole process.

Now, that's the difficulty. Many of these are judgmental and non-Aristotelian, and it's very difficult for someone who has sat through that process and digested all of that to then effectively communicate that to the lay public, who perhaps are not technically well-based as well.

That, however, does not remove the requirement for us to strive for what you're talking about to be lucid in our delineation of how we got to that, and not just lay the numbers up there and say I multiplied this times this times this, and it came out this.

DR. NORTH: I think lucid and peer-accepted are two critical terms. If you can show indeed that it is a lucid process, that people can look in and see what was going on, an then that it has been peer-accepted within the community of experts, not just people who work for DOE or a contractor, you will have accomplished a great deal in meeting this challenge.

MR. ROBERTSON: Good. I appreciate that.

DR. DOMENICO: Pat Domenico.

I have a question regarding the proposed interactions. I notice, for example, that one of your subcontractors is in charge of performance assessment at Sandia -- INTERA.

MR. ROBERTSON: INTERA. They have the lead for it. Yes.

DR. DOMENICO: Now, we know Sandia is doing performance assessment. We know EPRI is doing performance assessment.

MR. ROBERTSON: That's correct.

DR. DOMENICO: We have lots of groups doing performance assessment. How do you conceive the -- and you may ask the same question about your modeling group. You said you are going to be in charge of all the models.

MR. ROBERTSON: That's correct.

DR. DOMENICO: And we know the USGS is -- their models all through the program. How do you conceive the interaction then between your subcontractors and either the labs or the USGS?

MR. ROBERTSON: I think I can generalize with both of those, both modelings and PA, because the construct remains the same.

First of all, when I say we're responsible for all models, this does not mean that we're going to develop all the models, doesn't mean we're going to code all the models, doesn't mean that we will maintain all the models; it means that, for this program, it is our responsibility to have determined what models are in play and made some independent judgment of the application of those models and, ultimately, are in a position to do independent validation and verification of those models, so that they may be transferred ultimately into the license support system, as a part of the discovery process, to underpin the license application.

Now, many of those models that will be maintained -- we're not going to get in and develop the fracture flow models, somebody knows how to do that already. We are, in fact, going to take a look at whether there are seven of those going on, and whether the program might be better served with having three or two or whatever that is.

In the case of performance assessment, again, the individual models which are being used for these individual components of the overall performance assessment -- we would expect those principal investigators, who have that expertise in hydrogeology or geochemistry or whatever it may be, to develop those models. Again, it is our responsibility to link those together, lay the framework, which is tied into the licensing strategy, so that we can in fact demonstrate the performance assessment that is necessary and, I believe, to put our arms around the Golder, the EPRI, all of those pieces that have been done out there and integrate them into one.

This early site suitability study that Dr. Younker is going to give you later is, in my opinion, a surrogate for that very thing. We don't have that overall top-level performance assessment model. That study is a snapshot surrogate for that model. We'd like to see all of that captured, brought into some kind of a rigor of program control, if you will, not to constrain things, but rather to bring order to the process.

DR. DOMENICO: So, you would see the role, let's say of INTERA, in this case, to utilize everything that the program has developed, will developed, and more or less be able to duplicate what has been going on or to put it all together so that you do the total performance assessment.

MR. ROBERTSON: That's correct. In the case of the models, in some cases, we may have to develop some of the system models -- you know, the overall system linkage models, they may not exist. We are going through an analysis of those models right now. We certainly are taking a look at everything that's been done so far.

We recognize the challenge that also exists in attempting to reach out and embrace some of the models being developed by some of the European sisters. They have, certainly, models that ought to be looked at. There's a little complication of how you do independent validation and verification of some of those; but still, again, I think we have that as a challenge also.

DR. PRICE: Will TRW do hands-on systems engineering as prime?

MR. ROBERTSON: Yes, sir.

DR. DEERE: Are there other questions from Board members, from staff, consultants? Leon Reiter, staff.

DR. REITER: Leon Reiter, from the professional staff.

Robby, I noticed you put a lot of emphasis on licensing. But the word "site suitability" did not appear. Does that somewhere else fall -- in one of those little -- in your rubric there?

MR. ROBERTSON: Let's see. Site suitability will in fact be satisfied, if you in fact do everything that is necessary to support the licensability of the site. Now, how you declare victory, and when you declare victory is a matter of policy, and your overall licensing and acceptability strategy.

If you go back and think about what suitability is, it is the integral of the whole. Unsuitability, or disqualification is a discreet event against a specific criteria. So, when you say you have now got a suitable site, in my thinking, this is paramount to identifying the site to the President as being the recommended site, which means that within six months, you've got to have the license application submitted. That's my view of it.

DR. REITER: So, in other words, you essentially assume that site suitability is the subset -- almost a subset of licensing or equivalent.

MR. ROBERTSON: I wouldn't say that it is -- because, as you're well aware, 960 and 60 are not the same.

DR. REITER: Right.

MR. ROBERTSON: Certainly, you must use 960 as a checklist, to go through that

process of assuring that anything which would disqualify that site or identify, as a disqualifier, an unsuitability factor, must be evaluated against that checklist.

DR. REITER: So, the group that's doing -- if the DOE calls upon you to help them in site suitability evaluations --

MR. ROBERTSON: Correct.

DR. REITER: -- you're going to look to the people who are concerned with licensing to assist you in licensing-related activity?

MR. ROBERTSON: I'm looking for them to have also laid a strategy or a framework out which will be followed over the entire construct of the program, to provide that data that is necessary to fit the licensing. I do not believe that there is any data that you need, in accordance with 960 that isn't required also, by reasonable management judgement, to satisfy 60. I don't see a conflict in that context.

DR. REITER: Let me just ask you one other question. I think, the way that Pat asked it -- I'd like to just focus in on site characterization. I notice that in your chart, Woodward-Clyde is responsible for that area, and I gather the technical people who are going to carry it out are essentially the USGS and the labs that do the investigations.

MR. ROBERTSON: They will be the principal investigators.

DR. REITER: I have been involved in many reviews where the USGS and the National Labs provide extensive criticism, what Woodward-Clyde did, but never the other way around. Is Woodward-Clyde going to do any direct investigations, trenching or any geological investigations?

MR. ROBERTSON: I think that is a TBD. I think that generally we will be involve though in using the USGS and the National Labs as the principal investigators. That is my view of the construct currently.

DR. REITER: As part of your M&O responsibilities, do you include technical review of what's been done?

MR. ROBERTSON: Absolutely. We will perform the technical -- we will -- I would expect the M&O contractor to be the entity, at DOE's request, that executes the design review at the individual states.

DR. REITER: So, you will be ruling on technical adequacy of USGS or National Lab studies?

MR. ROBERTSON: Certainly. That's what you're paying us for. I mean, anybody can get into a technical debate about any one of the subjects. But, at that level, we certainly are called on.

DR. DEERE: Robby, yesterday we were talking about the Title I and Title II ESF design with presentations by Raytheon. We know that MK is part of your group and they are bringing considerable experience and expertise to this. What will be the interrelationships of how they will continue with the Title I and Title II designs?

MR. ROBERTSON: First of all, a decision was made, which I believe to be a correct one, that they would continue with Raytheon Services to do Title I and Title II and open the Title III inspections on the ESF. The principal driver for that is that the M&O contract was not in place early enough and there was considerable risk that we would not have our QA program in place in time, and be up on the learning curve far enough.

Now, as a construct, they will see that through in that capacity. On the other hand, MK will be responsible for the conceptual design, Title I, Title II and Title III inspections for the underground repository, so that to the extent that that occurs in parallel, they will be paralleling

that.

On the ESF, the M&O has also been asked to step into the role as the construction manager for the ESF. Therefore, MK, as a part of our team, along with Fluor and those others who have that kind of experience, will be in an excellent position to bring that kind of expertise to the problem of the construction of ESF and also bridge whatever is important about the attributes of the ESF as it becomes a permanent part of the underground repository.

DR. DEERE: I would take it that that would include the size of the tunnels, the gradient on the ramps and things such as this, as they might enter into a permanent repository.

MR. ROBERTSON: Yes, sir. I must assure you at the moment that there's very little going on in the way of conceptual design and/or pre-Title II, Title I design on the underground repository itself, as Carl has indicated to you.

DR. DEERE: Yes, I understand.

MR. GERTZ: I want to clarify for the Board -- just clarify that Raytheon is our designer for the ESF. REECO will be our constructor. We are looking at the TRW team to be our construction manager, not letting construction contracts as some construction managers do, but more of an owner's rep to integrate the constructor and the architect-engineer, Raytheon, to assure that those needs are met to provide us services with the people that they have available to them and then to help transition to the repository design.

DR. DEERE: Thank you.

DR. LANGMUIR: Don Langmuir. I have a question related perhaps to Carl Gertz' presentation this morning, as well as your's Robby. There was a table in Carl's presentation showing the amounts of the budget in the Yucca Mountain Project. Is the M&O's budget in addition to this, up to the $300 million, for example, in '92?

MR. ROBERTSON: I don't know the answer to that. There certainly are in the sense that many of the dollars which are in there which were part of the WAS process, the Work Authorization System Process that preceded the establishment of those, carried numbers of people in there for various other contractors.

Some of that work is to transition -- during the transition plan to the M&O, so to that extent, yes, there's some in there, but there are some additional transition budget numbers at the headquarters level. Carl, you can perhaps amplify on that.

MR. GERTZ: Yes, for '91, the TRW team has received some transition dollars separate from the work breakdown structure. For '92, in my budget for '92, that money includes any TRW M&O work that is being done to support the Yucca Mountain Project in that work breakdown structure.

If they're going to help us manage models -- and Dave Dobson is working with the INTERA Team at TRW to do that -- manage PA, I should say -- that money is projected to be included in our budget in '92. I would like to have another added funds for TRW to help me carry out my activities in '92, but, unfortunately, that's not available at this time.

That is true, as Tom points out, across the program. What is going to be done for Dwight Shelor includes whatever the TRW team is going to do for him.

DR. LANGMUIR: So when you make decisions on prioritizing your expenditures, they are as vulnerable as the rest of the program to restraint and restriction having to do with the budget that year?

MR. ROBERTSON: Yes, that is correct.

MR. GERTZ: Our program priorities, as I said, we trade off PA versus surface-based, versus ESF and even the scientists are saying, maybe we ought to be putting more money in

outreach, because that seems to be one of our areas, so those tradeoffs are constantly being discussed. That includes the role of TRW.

DR. DEERE: Questions now from the audience? Excuse me, we have one from our consultant.

DR. FABRYCKY: Robby, on your Slide 15 in the interest of corporate memory indicated there, and Slide 14 also, more specifically, early transfer from participants in the area of system engineering. Could you elaborate upon plans there to transition some of the work that's already been done in the systems engineering area?

MR. ROBERTSON: You mean work being done?

DR. FABRYCKY: Being done.

MR. ROBERTSON: Yes. I think if you look at Carl's work breakdown structure from this morning, you will see many management and integration lines and you will see many contractors showing up on those lines. In particular, in Las Vegas, SAIC has been as the TMSS contractor out there supporting them, providing a number -- a good bit of activity in the system engineering and integration, especially in that period of time when there was a hiatus when this contract was, you know, at contest.

So, in concert with the work statement and the policy emphasis with the M&O contract, that work will be transitioned, just as much of the work that is associated with Weston at headquarters has been a substitute for the M&O there as well. And some of that work will also be transitioned. I suspect that if you looked at it in a careful definition of the words, system engineering and integration, you'll find pieces spread in Livermore and Los Alamos and USGS and Sandia and others where because of the strengths of some peculiarities of individuals and/or pockets of expertise, they picked up some leads of things of that nature.

DR. FABRYCKY: I was thinking principally of the two contractors that we heard from yesterday, Westinghouse and Battelle.

MR. ROBERTSON: Both of those contractors, I believe, are basically phasing off of the program ultimately. Now that does not mean that --

DR. FABRYCKY: Findings will not be lost.

MR. ROBERTSON: Oh, absolutely not. That will be captured. As a matter of fact, my guess is that we will continue some limited consulting through the M&O with them.

DR. FABRYCKY: Thank you.

MR. FRISHMAN: I will only ask one question. I have a lot, but I will only ask one.

MR. ROBERTSON: We'll have to have a beer then.

MR. FRISHMAN: Since Bob Bernero isn't here, I feel sort of compelled to ask what you mean in your discussion on focusing on licensing, what you mean when you say you want to deal with the NRC as a peer when, in fact, their role is defined as regulator?

MR. ROBERTSON: I think as a peer only in the sense of technical peer. They are clearly not our peer in the sense that they are the regulator and we are the surrogate for the licensee. But I believe that we have a responsibility to demonstrate our understanding and our commitment to represent this program in its most favorable technical light as it relates to trying to resolve those issues.

So, to that extent, we shouldn't just take a passive position that says the NRC says so and so and that we just take a passive position with regard to that. We must articulate and put on paper and force resolution of all of these issues. We've got some 16 to 20 issues that have been identified and have been defined by several pages of writeup that have not got resolutions.

I think it's incumbent on us to force resolution with that through every mechanism that

we know how with the NRC, because I think that we -- so when I say a peer, I mean it only in the sense of a technical exchange aspect of the thing, and not taking the view that says, oh, gee, you're the regulator, if you say that this is the way it ought to be, then I guess that's the way it ought to be.

I think that we should take the position that says, we're competent to understand the problem, here is our position, now, as technical peers, let's sit and argue that point. Having done that, then it is clearly up to the NRC to articulate and execute the public policy as a regulator, independent of us.

MR. FRISHMAN: Obviously, you think that there is not a peer relationship right now, by the way you're describing this, but it's unclear in your answer, whether you think that they should be your peer or you should be their peer.

MR. ROBERTSON: That's a little bit like asking the guy who left California to come to Virginia and lowered the IQ in both states.

[Laughter.]

MR. ROBERTSON: I am not sure how to answer that.

MR. FRISHMAN: I used to live in Texas and we had that problem with Louisiana too!

[Laughter.]

MR. ROBERTSON: How true. I don't mean to be facetious about --

MR. FRISHMAN: If you can I'd like to hear you sort of define what this rub is a little bit more. I think it's a very serious one if you're going to be in the middle of it.

MR. ROBERTSON: Yes. I agree with that and it is a sensitive one in the following sense. We are not the license application Applicant. DOE is. But all of those who have had experience and our partners Fluor and Duke have had an enormous amount of experience in licensing of nuclear facilities, they will all tell you that in order to be successful you must in fact develop a mutual respect for each other's positions and you must execute your views with promptness and with dispatch so as to try to bring closure to these things.

Now we have got a more difficult situation in that we have to honor the fact that DOE is in fact the licensee but I believe that my statement is not an indictment. It's just that if we have this many open issues, then I must conclude that somehow or another we haven't forced closure.

Either we haven't gotten ourselves to the right point where we are completely convinced of our positions, or for some reason we are not forcing quite as much closure as we should.

MR. FRISHMAN: Let me follow on this because I think it is a fairly serious issue and maybe even John Linehan might want to get into this discussion a little, I don't know.

MR. ROBERTSON: I have had several discussions with Bob Bernero on the subject.

MR. FRISHMAN: You know, you say you have your list of unresolved issues --

MR. ROBERTSON: No, no, I didn't say "my list." I said DOE has a list --

MR. FRISHMAN: The Department has its list.

MR. ROBERTSON: That's correct.

MR. FRISHMAN: You're here, so now I've got you all together.

MR. ROBERTSON: Oh, okay. Now I'm a member of the community.

MR. FRISHMAN: Somebody paid to print this.

MR. ROBERTSON: Right, you're right.

MR. FRISHMAN: The Department has a list of unresolved issues. Well, the NRC also has a list of what they consider to be unresolved issues --

MR. ROBERTSON: Correct.

MR. FRISHMAN: -- and they're in their own way going through what they believe is

appropriate resolution of some of those; correct? Do those two lists coincide?

MR. ROBERTSON: Some of them do, and as a matter of fact, part of the process of looking at the Regulatory Guide and format content that we are going through right now will in fact help in that process. The annotated outline process we are going through now will further begin to focus that process, so I believe that we are on a correct path at the moment and that we will in fact begin to go towards that path of more of those closures, but as you are well aware, there are a number of issues that I believe we have enough data to close on.

It's just a question of somehow or another finding the right way to put it in a box and let it stay, instead of keep opening it.

MR. FRISHMAN: Well, I am seeing sort of a confusion of which types of issues.

You know, I have been -- throughout the history of this program I have been trying to get somebody to tell me what early resolution of issues really means from the perspective of both the Applicant and the regulator. I am not sure I am going to hear that definition yet today.

MR. ROBERTSON: You may not.

MR. FRISHMAN: I see an apples and oranges type thing going here where you say that there are some areas where you think you have enough data to come to some type of resolution, but you also list out things like seek phased approvals.

Well, phased approvals is the business of the NRC. If you want it, you ask for it. They decide whether they are going to have to go through some kind of a rulemaking procedure to figure out how they can even handle a phased approval approach.

MR. ROBERTSON: Correct, but if I don't ask --

MR. FRISHMAN: But I see a big difference between --

MR. ROBERTSON: Yes, but if I don't ask, I'm certainly not going to get it --

MR. FRISHMAN: That's part of being assertive. You ask, but I see a big difference between that and this area where you say you think you have enough data to come to some kind of early resolution. It was described this morning as "closure," in fact --

MR. ROBERTSON: Right.

MR. FRISHMAN: -- where the Department thinks it has come to closure, so I guess what I am suggesting is --

MR. ROBERTSON: Well, I don't think anybody implied legal closure. I think they were talking about intellectual closure. By "intellectual closure" I mean getting to technical intellectual closure with the counterparts within DOE and NRC. That way it can be set to one side.

It's clear that throughout the licensing process until that application is issued, those things are not going to be closed in the legal sense but at least they can be set aside --

MR. FRISHMAN: Just in having gone through this conversation, you have just redefined what the NRC has been saying all along early resolution of issues might be because it is not a substantive resolution as I have understood it from conversations with the NRC.

MR. ROBERTSON: That's certainly true but it is certainly a lot better to have had 100 of those in a box where we have mutually agreed to the technical words than to come into the license application with that same 100 with disparate technical convergence. That's my only point.

MR. FRISHMAN: Okay, well, I guess --

MR. ROBERTSON: And we would like to have you in that box with us.

[Laughter.]

MR. FRISHMAN: I'll be wearing boots.

[Laughter.]

MR. ROBERTSON: That's certainly good judgment.

MR. FRISHMAN: No, I guess the thing that kind of triggered me was you're back full circle -- you're back to referring to this relationship as a peer relationship, because one of the major things that is the cause of what we heard from Todd earlier and what he's working on and what everybody else is really concerned about in the area of public confidence is when you start trying to describe to the public what a peer relationship with your regulator is, this gets pretty dangerous.

MR. ROBERTSON: Well, but we have a legal system in this country that we are all judged by our peers and that is the context in which I put it.

MR. FRISHMAN: I don't think that the public would take that as an explanation of the relationship between the Department of Energy as Applicant and the regulator.

MR. ROBERTSON: Okay -- then we ought to strive for something that the public will accept.

MR. FRISHMAN: Other than my trying to understand what it is you are thinking about this relationship that may be different from what has been going on already, now I just make the suggestion that you find some other way to describe that relationship.

MR. ROBERTSON: Thank you.

DR. DEERE: Thank you very much.

The next presenter this afternoon is Mr. Thomas Isaacs, Director of Strategic Planning and International Programs for the Office of Civilian Radioactive Waste Management.

Mr. Isaacs manages OCRWM's policy and program, strategic development, contingency planning, risk management and international cooperation.

He has had extensive experience in the technical development and safety of advanced nuclear reactors.

He has had several policy, technical, and management positions with the DOE, the Energy Research and Development Administration, and the Atomic Energy Commission.

He was the Deputy Director of the DOE Office of Safeguards and Security.

Prior to rejoining the DOE in 1984, Mr. Isaacs was the Director of the Instability and Insurgency Center for the Central Intelligence Agency.

Today he will brief us on current activities and future plans relating to waste management in countries with which the DOE interacts. We look forward to your comments, Tom.

BRIEFING ON OCRWM'S INTERNATIONAL ACTIVITIES

[Slide.]

MR. ISAACS: Thank you very much, Don.

It is a pleasure to have the opportunity to talk to all of you today.

Recognizing that I am the only thing now that stands between this group and recess, I'm going to try and keep my remarks rather focused, but I do think that international programs is a very important part of this program, and I do want to give you at least a broad overview of some of the key activities that go on in our program with regard to the international scene and let you know both what we're doing, how we're doing it, and what relevance it might have to the OCRWM program.

[Slide.]

MR. ISAACS: I was delighted to see, in the last TRB report, I might add, references to the fact that the Board has recognized the potential values of international cooperation and looks forward to seeing us continue to explore opportunities that are there.

[Slide.]

MR. ISAACS: What I want to talk about briefly today is reflected in the invitation that I got from the Board.

Namely, I'd like to talk about what kinds of relationships we have in the international waste community -- that is, how do we carry out the international waste program; give you a short description of our international activities -- that is, who are we doing what with and why; and then, lastly, I want to focus on three issues that the Board specifically asked me to comment on, which is what is the international viewpoint on the role of engineered versus natural barriers, the concept of hot versus cold repositories -- that is, thermal loading of the repository -- and the issues with regard to where are other countries in terms of selecting and characterizing potential repository sites.

I might add that I know that I am somewhat going into the lion's den with regard to these last issues. It's not lost on me that the Board has already had some meetings and has future meetings planned, including international participation, on the issues of engineered and natural barriers and on thermal loading, and I certainly don't believe that, in the few minutes that I have here today, that I'm going to be able to resolve any of those issues in great detail for you, but I think I can provide you with at least a snapshot of where other countries are with regard to those issues that might be of some relevance to you.

[Slide.]

MR. ISAACS: Well, why do we have an international program at all? I mean, after all, we are a rather mission-oriented organization. We're funded by the utility ratepayers. We have a set of contracts in place. Does it make sense for us to have an international program?

I think that's something that we ask ourselves all the time, and there is a great deal of discussion about it. I think the answer to that is, unquestionably, yes.

In fact, I'm probably one of the people on the far right wing who would believe that the international program ultimately may be the difference between success and failure in this program, when all is said, when you get to issues such as public trust and confidence and that deriving from such things as independent consensus-building.

Those kinds of things, in a nuclear world, in particular, we're all in it together, a global community, certainly tends to take hold.

We certainly have seen that issues in such far-off places as Chernobyl can have dramatic impacts on the policies and implementation of programs in other countries, and I think the same could be said, to some degree, with regard to the waste program.

So, what are some of the benefits? Well, there is an obvious one of cost-sharing. Anytime that more than one program needs to conduct a set of similar or identical activities, it obviously makes some sense to consider doing it together and sharing some of the costs.

In our case, it also saves a fair amount of time in the development of the kinds of techniques and capabilities that we'll ultimately need.

You've heard today, from Carl and from John Bartlett, that we have some potential difficulties with regard to funding and with regard to full site access. What does that say?

It says that you ought to try and do what you can to leverage the resources that you have and leverage the time that you have to provide the most useful products possible.

Given the lack of funds and lack of access, there are many places and opportunities

where you can do things in an international context that don't require permits, where facilities are already in existence, where you can cost-share and gain the expertise and gain the perspective and deal with your technical peers in a way that allows you, when you do get on to our program, whether it's Yucca Mountain, transportation, an MRS site, or some other repository site someday, it provides you to get a running start, so that, when you do do that, hopefully you'll do it quicker, better, and cheaper, and you'll do it right the first time.

You'll learn from the mistakes of others, if nothing else, and we find -- and this will be the case, also, in Yucca Mountain, when you do get underground in facilities -- there are always surprises, and what looks like it might be a straightforward technical or experimental program is rarely that way, and instruments have to be developed, test procedures have to be developed, data-acquisition techniques have to be developed, insights into codes and model development have to be developed.

These have to be rolled up into such things as integrated performance assessments. All of that kind of thing can go on, is going on, has been going on in this program, and it goes on at a relatively modest level of funding, I might add.

The total international program budget is about $7 million, or something about two -- a little over two percent of the budget of this program.

Well, are there any other benefits that are out there for this program? I think there are. I think there's a benefit of synergism that occurs.

You know, one of the things I reflected on when the '87 Act passed was that we are now only looking at one site, and that means that you have one team, albeit a broadly-scoped team and with more independent reviews, as has been stated several times here, than you can possibly imagine.

Nonetheless, it's one team looking at Yucca Mountain and focused in.

We used to have three first repository programs, and we used to have a second repository program, and therefore, you had ologists in different programs driving toward the same kinds of understanding from independent perspectives, and when they came together, they could exchange with one another those independent perspectives and try and learn from on another, and you'd get this synergistic aspect to the program.

I think that's not as evident in the domestic program today, because we only have one site, but we do have that in the international team.

We have countries, like Sweden and Switzerland and France and Germany and many others, who are trying to do very much the same kinds of things we are, albeit in different rock types, albeit with different program priorities and so forth, but they all have remarkably the same sets of objectives, and we can learn from one another in a very productive way, and that synergism, I believe, is going to be very, very important to us.

So, I think that there is lots of possible and actual benefits from continuing the international program.

There is no single right way. I want to emphasize that, and you're going to see, in the end of my presentation, when I talk about what are the other countries doing with regard to EBS's and thermal loading and all, that there is no one, unified, accepted approach to this, and in fact, there is no reason to expect that there should be one, unified accepted approach.

There are many reasons for variability, which I will describe later. Nonetheless, there is certainly the ability there to take advantage and for each of us to chart our own course of the right way.

[Slide.]

MR. ISAACS: What are some of the mechanisms we have for participating in international activities?

Keep in mind we are indeed part of a bureaucracy, and the U.S. Government doesn't just go over willy-nilly and say well, we'd like to play with you, will you come out and play with us? We have some very sophisticated, rigorous, and bureaucratic ways that we go about trying to reach agreement with our counterparts in other countries, the most common which is called a bilateral agreement.

A bilateral agreement is a statement of common, shared interests. It's an intention to cooperate with one another. It's called an umbrella agreement. And we have these kinds of agreements, and I'll describe to you in a moment with whom, with lots of different countries that are out there. Those bilateral agreements generally allow for such things as information sharing, and people coming and communing with one another.

If you want to do some specific work under that umbrella of a bilateral agreement, now that the two countries have agreed to cooperate, then we usually cut what is known as either a subsidiary or a project agreement, which is much more specific in nature, and says we will now develop the following tenets of cooperation. In a lot of cases there are quid pro quos.

That's an important difference in the international community, as opposed to simply doing things yourself.

In an international context, you don't necessarily do absolutely everything that is for yourself. You do things that, on balance, provide benefits to both parties that make it worth the investment for both parties. So you have quid pro quos that are involved. And you develop this very specific set of tasks, and you develop a funding mechanism and a set of controls, and a management hierarchy. And then that is approved by both parties, and we go through this in quite a bit of detail.

I'm going through it with some very important ones right now, as a matter of fact. Then when they're blessed through our own State Department, and the equivalents in the other countries, we then have an official mechanism for cooperating with these other countries.

In addition, there are also multi-lateral agreements which naturally means that there are more than two countries involved. We have had some very good examples of that.

Probably the classic example of that is the Stripa project in Sweden, where, over time, anywhere between seven and nine countries cooperated in the investigation of that abandoned iron ore mine in Sweden, and developed some very, very valuable techniques for a range of countries, for what was, in retrospect, relatively modest amounts of money, compared to how it would have gone had we had to each go our own separate ways.

Finally, we have membership and participation in a number of multi-lateral, multi-national organizations; and I've listed three of them here.

The ones that we tend to focus on mostly in our program are the Nuclear Energy Agency, which is part of the energy agency OECD, in Paris; the International Atomic Energy Agency out of Vienna, much in the news now as they go out there and try and see what the Iraqis have hidden away over time here; and lastly, we have more of a monitoring relationship at the present time with the CEC, the Commission of European Communities. And we cooperate and participate in a variety of opportunities within each of these organizations; and I'm going to talk a bit about those as well.

If I could have the next slide, please.

[Slide.]

MR. ISAACS: Well, as I already mentioned, so I'm not going to repeat, the bilateral

agreements provide that umbrella opportunity for access to information, technology, and expertise and so forth.

Cooperative projects are usually done in a cost-sharing type of way, and they focus on actual technical or technology development. And often, the benefit to us is that there are unique facilities in other countries existing today or to be existing that we can, for a very small portion of the overall cost of that facility, participate in.

We can actually have our scientists go in there and do real work. We can collaborate with the scientists and the technologists and the engineering personnel from those facilities. We can take advantage and help define the test program. We can gain access from the data, and use all that information back into our Yucca Mountain site characterization planning process, and, in fact, into the general repository and OCRWM program, in very useful ways.

Then finally, there are these international working and advisory groups. And these are the kinds of groups where, for example, I sit, and I'll mention this in a minute, I am the U.S. lead delegate to the Radioactive Waste Management Committee within the NEA's organization there.

That organization has membership, that committee has membership from about 15 countries, plus all of the international organizations. They meet at least once a year as an organization to share insights and experiences about what is going on both technically, institutionally, politically, in each of the countries.

It's a very fascinating experience, because what you find is that there are common themes, and that there are insights that are developed that, even though the context in another country might be entirely different, can be very valuable to our country, both in terms of how to run our programs, where we ought to put our priorities, and, indeed, what kinds of policies we ought to do

In addition, when you have these kinds of groups, what you often find in the technical arena is that you try and drive toward some type of consensus.

I'll give you some examples of where we have been able to achieve some consensus. Those consensus statements derive out of an independent coming together of technical expertise. When the NEA puts out documents, or any of these other organizations, that say this is the collective consensus of the technical community -- and keep in mind this includes the regulators as well.

On that Radioactive Waste Management Committee, which I head as the U.S. lead delegate, we also have the NRC participate, Bob Bernero participates, we have the EPA participating, Floyd Galpin on occasion participates. And that's true of all countries. So it's both the developer and the regulator sitting on these committees.

It's a very strong force when consensus can be built, both in terms of the technical confidence that each individual country can have, and importantly, I believe, for the larger public community that's out there, to recognize that it's not the DOE or not simply the U.S. who is coming to some of these conclusions.

It also allows us to have focused expertise come together, where we bring people to look at issues that are going to be of common interest across countries in a technical way.

Right now, we have ongoing working groups, international working groups through that auspices, on human intrusion, and on scenario development. These are issues that are of great concern and relevance to the United States.

Obviously, we have to understand what are the potential scenarios that we have to worry about at Yucca Mountain. It will help us in terms of developing a credible degree of understanding of what scenarios are out there, a credible approach of what human intrusion

ought to mean to our program, if indeed we can do it in the context of seeing what other countries are doing, work together, and reach, if not an absolute agreement, at least some kind of consensus as to the scope of activities that need to be considered.

If I can have the next slide, please.

[Slide.]

MR. ISAACS: So what are some of our bilateral agreements?

Right now, we have three major bilateral agreements where we actually have subsidiary or project agreements, where we're doing specific work.

The first one is with the Canadians. And I want to hasten to add here a little piece of history that some of you may be aware of, but perhaps not all.

When the Amendments Act was passed in 1987, there was a provision. We had active, ongoing participation in a number of different countries in granite. We also had active participation in salt with the Germans. And as you probably are aware, when the second repository program was cancelled, they not only cancelled it and told us to stop, they kind of put their thumb and went like this to DOE, and said we don't want you doing any work that's designed to determine the suitability of crystal and rock as geologic media. It's in the law, Section 161(c), Paragraph 161(c) of the Nuclear Waste Policy Amendments Act.

And when people talk about politicization, and accuse DOE of it, I refer you to Section 161(c), and see how much leverage there is, and how much maneuverability there is on the part of the Department to do certain kinds of things.

Well, many of our bilateral agreements were with countries working in crystal and rock. In fact, I got lots of requests from those countries to please write letters back to these countries to let them use these letters to say that the U.S. did not abandon crystal and rock because it had determined it was an unsuitable geologic media, but that it was simply a political expediency. And we did that.

But, nonetheless, we had to take a look at all of our existing bilateral agreements with these countries, and see whether or not we could legitimately continue to cooperate with each of these countries, because the work was being done in many cases, because of our second repository program, in crystal and rock.

In many cases, we had to modify or drop tasks that were in those agreements; and with regard to the Canadian agreement, which was the largest one we had on tap, we literally scrapped Subsidiary Agreement Number 1 and said we will re-formulate Subsidiary Agreement Number 2 with the Canadians to make sure we are in compliance with 161(c).

That was, incidentally, reviewed by the GAO and our compliance was found to be satisfactory in that regard, and I was heavily involved in making sure, because that was a threat to international cooperation after the '87 Act. It was not intended that way, but they certainly cast a suspicious eye on our doing work with the Canadians at the time. It's awfully close to the U.S. Border. And the Canadian shield, of course, comes down.

So, where are we with regard to bilateral agreements?

We have finally come to closure on the set of tasks that we would like to have as part of Subsidiary Agreement Number 2 with the Canadians. That has been formulated; it has been agreed to in substance by both sides. All of the workings, including the financial arrangements, the management arrangements, the technical content, are all agreed to.

That agreement is now under the bureaucratic, if you will, review process. We've put together a cost-benefit analysis, a fairly extensive one, which is required for us to go. We've briefed the OMB. These are all required actions that have to go on in order for us to get

approval to implement that subsidiary agreement.

With regard to the Swiss, we've had a relatively modest, about $600,000.00 a year, program with the Swiss, that's been very successful, in the Grimsel facility. And we are simply, we have a set of tasks to continue to do that modest level of work there, and we simply need to get an extension of the agreement, and we are putting the package -- I just signed the package yesterday -- into the bureaucratic chain to try and get approval from our own international affairs people, from the front office, and from the OMB and the State Department, to extend that agreement.

And finally, we finished up a very successful program, which took approximately 10 years, in that Stripa abandoned iron ore mine I mentioned in Sweden. And the Swedes have just dedicated -- I was there in May as a matter of fact to give a dedication talk for the opening of their Aspo hard rock laboratory, which will off on an island of Aspo, off the coast there, near Oskarshamn, where they have a number of their facilities, including their MRS equivalent facility, where they will do an underground research laboratory that is meant is a dress rehearsal for the ultimate site characterization work, when they select a site for characterization.

So those are the major, ongoing bilateral activities where we actually have project agreements.

We also have bilateral agreements, as you can see here, more at the information exchange level, with a number of other countries who have ongoing and active high-level waste repository programs, but where the interest in terms of spending large amounts of money and/or manpower to have some kind of a technical cooperation has not shown itself to be fairly evident.

However, we continue to look for opportunities where such a bilateral exchange might make sense.

I was approached last year by the Spanish, who became quite interested -- for a variety of reasons that I won't go into at this moment -- in having a bilateral agreement. And I had the pleasure of visiting Spain last month so that they could show me their operations and we could discuss potential areas of cooperation.

They are, for example, very interested in the implementation of a dual-purpose cask program, which I know is of some interest here, and is of interest to us as well. And so we are right now evaluating whether there's enough there to make it worth our while to go the step beyond information exchange, sign a bilateral agreement, and actually look at that.

It's also interesting to mention -- I'm going to diverge for just a minute -- how you can learn from the experiences in other countries.

I thought it was fascinating. We went to visit their El Cabrille facility, which is in the southern part of Spain, where they are building a low and intermediate-level waste facility. It's well under construction. It kind of brings a tear to my eye to see this facility going along so well in Spain. It's a very sophisticated facility, very well run, QA inspectors running around the site. Work is underway.

[Slide.]

MR. ISAACS: Three years ago, the mayor of the town -- it kind of looks like the Blue Ridge Mountains, the area where they're building this thing. It's kind of sparse with low mountains, green. The mayor of the local town in that area led a demonstration of 4,000 people against the facility. Today he is the leading proponent of the facility three years later. How did they do it?

All right, it was very interesting. To give you the short version of it, what the Spanish have decided to do was to hire their own negotiator and they hired negotiators, depending on the

subject that was at issue in the town and in the other towns. They hired people who had very high credibility with the local community. In fact, they hired the retired parliamentary representative from that region to be the go-between.

They had an extensive and extended period of negotiations and, voila, three years later, a bit of money is going there, some new roads are going there and the mayor is now the leading proponent of the facility. I'm not trying to give you too much in depth there, but it's an interesting example of how one can gain some insights and unleash creative ideas in the international community about what works and what doesn't work.

It's not necessarily theoretical in nature, a la the approach that Todd LaPorte is suggesting, but it does suggest that there are things out there that just might work and whether we know why they work or not, is less important than that they work. Okay, if I could have the next slide, please?

[Slide.]

MR. ISAACS: What are some of the other cooperative projects that we have underway? For a long period of time now, we have had a very successful program called INTRAVAL. This is also under a Nuclear Energy Agency auspices under the Radioactive Waste Management Committee of the Nuclear Energy Agency that I mentioned a couple of times already.

This is a group of international collaboration, including participation by the OCRWM Program on looking at how does one go about both determining and validating performance assessment models. Everybody's got to have a performance assessment model. Everybody's got to validate performance assessment. While we might have different challenges, we all have a unique common grounding there.

A perfect example of the cooperation value is INTRAVAL where we are actually there using test cases, working together, taking natural analogues and running them in test cases and seeing if we can validate some of the models that are out there. Hopefully what will come out of this is some common understanding.

Each country may still have its own codes and models, which is perfectly legitimate and understandable, but there will be more of a sense of confidence, presumably, as a result of these exercises. Another example is the Thermochemical Database Project which is an ongoing one. Here's a classic example of international cooperation.

Everybody needs thermochemical data. You need it for geochemical comparisons. In fact, one of the largest discrepancies when you look at why codes come out differently is inconsistency in the database that are used in thermochemical data.

Everybody needs that information. Why should everybody go out there and develop the same information. So, we have a cooperative venture where the different elements are of interest to countries and we've picked out the five elements that were most interested in early, which are uranium, neptunium, plutonium, americium, and technetium. We've spread them out and we've said to each country, bring -- with a degree of international peer review, I might add, extensive and involved in this process -- let's bring this data together into a unified database and let's all take advantage of it. It's cost sharing, it's information sharing. There's a synergism and it makes a lot of sense.

Let me go on to the next one.

[Slide.]

MR. ISAACS: What about some in situ actual laboratory work? I already mentioned the Stripa project. This is coming to a close at the end of this year. In the early 1980's, there were no underground research laboratories that had been developed at that point in time, specifically with

the purpose of learning how to characterize a site. But here was this abandoned iron ore mine, the Swedes offered it up, countries said, yes, it makes a lot of sense, and so it gave everybody a very early access to underground -- it was in granite -- underground conditions.

I can remember visiting that facility shortly after I joined this program and them showing me all the different tracers that they had injected into the rock and all the places where they had expected the tracers to come out. Low and behold, 200 meters down and one level down, here was coming out the tracers, totally unanticipated.

They worked on it and developed tremendous advances in technical experimental techniques and in codes and in the models of fracture flow and so forth that came out of the opportunity to work with this abandoned iron ore mine. Was it a perfect analogue? Absolutely not. Is it going to directly lead to licensing Yucca Mountain or determining its suitability? Absolutely not.

Does it develop a framework and a foundation of expertise and of instrumentation and of capabilities? You bet it does. It's the kind of thing that we absolutely need to continue in this program and it's relatively a bargain.

The NAGRA Program, I've also mentioned briefly in the Grimsel Pass there in the Alps. It's a tough road to go there in the middle of the Alps, but somebody's got to do it, as they say. It's this very pristine facility. It looks like the -- just like Switzerland looks kind of like Disneyland, I mean, this looks like the way Disneyland would build an underground research facility. It is pristine, it is really crisp. Every wall is bored just beautifully. They even found an occlusion of opal -- not opal, amethyst, yes. They have made that now into a little mini-museum where they bring in the school kids to see it. I mean, it's really done very, very well.

We have an ongoing program there looking largely at such things as two-phase flow and seismic imaging techniques. That's another good example. I want to go back, incidentally -- well, let me -- I'll pick it up in just a minute.

The Canadian situation, I just mentioned to you that we have an extensive program perched and getting ready to start. We're going to be looking at a number of different activities, some of them in their underground research laboratory, most of them actually in their laboratory facilities on the surface where they have some unique capabilities where we'll be able to use them in terms of instrumentation development and doing other kinds of calibrations of a probe.

There's a good example of international collaboration. There's a hydrochemical probe that was developed for the Stripa project which is now going to be calibrated in this Canadian calibration test facility which will then be available for use in Yucca Mountain. It's a classic example of how we can do things early and cooperatively that will help.

Then lastly, there's this Swedish hard rock laboratory. As I mentioned to you, I was just there for the dedication. They're several hundred meters down. It's a ramp from the surface down under the Baltic to an island where they will corkscrew down. Well, again, this is an interesting perspective.

Why a ramp from the mainland when there is a small road that hops over these islands out to the island of Aspo? The local people are very environmentally sensitive. They were very concerned that if there was too much equipment and too big a road, that they would upset the ecological balance of this island. The project made a decision that if they had made it strictly on technical grounds, they would have sunk two shafts down from the island, straight down, and they would have built a wide road for all the construction equipment.

Instead, they made a compromise for, shall we say, sociological or socio-economic reasons or institutional reasons, to do a ramp from the mainland underneath the Baltic to this

facility site so that they could minimize the disruption at the surface of the island. It's another example of perspective of how one can learn how to deal with problems like this.

The other interesting thing about that is; what do you think was the first thing that they built at Aspo at the breakout there? A public information center underground. Very sophisticated. That Spanish El Cabrille facility in the middle of the mountains -- very sophisticated public information. They had 2,000 visitors to that facility, and it's a very remote site itself, the one in Spain.

Both of them -- high emphasis on public information capability. Both of them -- interactive capability. You can go down underneath the ground there in Sweden and kids can start pushing buttons and seeing things on closed circuit t.v. It's a very interesting perspective, again, on some of the benefits that come along with the technical cooperation program.

As I mentioned to you, we're in negotiation right now. Carl's people, my staff, and the Swedes, to see, is there a place for cooperation on this hard rock laboratory. One of the interesting possibilities is, since it's under construction right now, we might learn a lot if we get involved soon, in what it takes to have the interaction between the engineers who are building the facility and the testers, the people who want to come in and test, how that interaction works and how to best cooperate between those two groups of people; one, those who want to build the facility, and the others who want to do geophysical and other kinds of testing there.

It's a real opportunity so we're trying to see whether there's common ground for a cooperative agreement on the hard rock laboratory. Again, money will be an issue there as well, as to whether we can afford it. If I could have the next slide, please?

[Slide.]

MR. ISAACS: Natural Analogues is something that I hold near and dear to my heart, as most people know. I know that the Board has some interest in this as well. I think we are involved in a number of different natural analogues. Natural analogues are places around the world. You don't get to pick where they happen; they just happen where they happen where there are usually very high concentrations of either uranium or thorium or something which was the equivalent of a natural reactor, long, long periods of time ago.

It's the one way to interpolate data, rather than extrapolate data over geologic time. If you have something that was laid down over 2 billion years ago and you look at the radioactive materials, it may not be a perfect analogue, again, of a repository, but it provides you with at least some sense of whether processes, which might occur over geologic periods of time, haven't been missed. It gives you that one possibility.

Secondly, it's a wonderful way, I believe, to communicate with the external world about what this facility is all about and what it's likely to do over geologic time. You're not going to reach the public with codes and models. They're not going to understand it. They're not going to believe it, they're not going to have confidence in it.

But Sten Bjurstrom, the head of the Swedish program, starts many of his presentations by showing slides of them bringing up a copper canon that was lost off the coast of Sweden some three or four hundred years ago and saying, here it is; it looks just like when we stuck it in the ground. Natural analogues -- and we can be much more creative than we have been, I believe, in this area.

We can provide a great insight into the program in lots of confidence-building ways. I'm not going to talk in great detail here, but I do want to mention that in several places, I believe that given the Board's interests here, we'd be delighted to get involved in some more detail on any of these aspects in some further briefings at your convenience. I think there are a number of

subjects that I'm going to touch on today that, really, we ought to get some of the experts in here and we ought to have a more extensive discussion with you.

We are involved in several natural analogues studies. We have brought to a successful close, our cooperation in Pocos De Caldas which is a natural analogue in Brazil. The US DOE has just now decided to begin participating in a funding sense in Alligator River in Australia. The NRC has been involved in this for a period fo time.

In the Cigar Lake in Canada, we are also -- that is one of the elements of the cooperative agreement that I mentioned, the subsidiary agreement that I mentioned earlier, so when that gets signed, we'll be cooperating there as well. These will also give us an opportunity to test out some of our geochemistry codes like EQ36 which will be very helpful to us.

If I could have the next slide?

Incidentally, the data coming out from the Alligator Rivers project will be used as one of the INTRAVAL test cases, to try and see if we can validate some of the codes.

[Slide.]

MR. ISAACS: Okay. Well, I mentioned already the NEA Radioactive Waste Management Committee, that's the group that I have been, for about the last six years now, the head for the U.S. DOE. Bob Bernero, from NRC; Floyd Galpin, on occasion, from EPA.

Under that, there are a number of activities, but the most interesting, I think, for this group, is that there are two major technical exchange forums for that group. We think that they're two of the most important foundations for a program like this. One is the Performance Assessment Advisory Group. Everybody has got to do performance assessment, as I said. That group is very active. We have heavy U.S. participation. There have been a number of very important activities. They have been the forcing function for putting out reports, for example, on state-of-the-art of safety assessment.

The RWMC, in general, has now put out two collective opinions. These are consensus statements. They're sitting there on my table, if any of you are interested. Very important documents. The first one says that there is an international consensus that geologic disposal is a very viable, preferred, doable way of disposing of wastes permanently, that's the main theme there.

The second one, which was just put out recently says, in essence, that given sufficient site characterization data acquisition, techniques exist that will enable you to characterize the performance of a site through modeling and code application, to determine -- so that a country can then determine whether any particular site is suitable or not. The techniques are available. These are the kinds of consensus collective opinions that come out of these things.

The second group that we have are the experimenters. The first group looks at performance assessment, the second group, called SEDE, is a group that says, okay, can we get together and try and figure out what does it take, in terms of data acquisition, in terms of test programs, in order to gather that information that's necessary in order to make a determination. It offers an important opportunity, incidentally, for the folks who are doing site characterization and the folks that are doing performance assessment to come together. As you know, that's usually two different communities of people in any one country. It allows for us to bring those two kinds of people together. It's been very useful, and hopefully will continue to be so.

[Slide.]

MR. ISAACS: We also participate in a number of other international working and advisory groups. I am going to go over these quickly. We do have a public outreach group, under NEA auspices, that puts out lots of public information brochures that are of use for

countries in terms of describing other countries' programs. We do have the Natural Analog Working Group that has come out of that natural analog work, and we have our own draft natural analog strategy, to see what we should be doing, in order to gain the most information, the most value out of natural analogs.

IAEA groups on safeguards. Very important. The repository, the MRS, will be made eligible for IAEA safeguards, and they'll be picked, you can count on it, when they finally get chosen. I'm not going to go into great detail. But suffice it to say that IAEA inspectors are going to have to have the opportunity to come into our facilities and verify that we have the materials that we say we have and we have them in the condition that we say we have then in. That's very important, because that needs to be taken into account right upfront in design -- right upfront, because you cannot -- experience has shown us time and time again, that if you wait until the end to try and figure out how you're going to get those IAEA inspectors in there and think about a repository, in particular -- how you're going to get them in there to verify stuff, when you're sticking it in the ground and backfilling? You better think about it early and often.

That brings up the philosophical, almost religious question of what are you going to finally do someday, when you decide to close a repository? Suppose Hussein said, by the way, I've closed down my weapons program. I've got a repository, I've put all this material in it, I've closed it up, that's it. Who would believe him? Nobody.

So, there has to be a mechanism, and we have to make our facilities be the example of how that's going to get handled in the future. It's not a problem for today, it's not a problem for tomorrow; but, at some point in time, there is the question of how are closed repositories going to be safeguarded, when their entire objective is to isolate the waste from mankind's attention, and the entire objective of IAEA safeguards is to make sure you can continue to monitor that waste. These are the kinds of issues that we get involved in on these international working group meetings.

NWAC is another broader-based group, sponsored by IAEA, that looks at all kinds of radioactive waste problems, not just high-level waste, but other ones. It's purpose in life is generally to develop standards and guidelines, usually for Third World countries, on what it takes to handle spent fuel, either in storage, transportation or disposal, in acceptable ways.

[Slide.]

MR. ISAACS: In order to make sure that our international program was well-focused, internally, I created what was known as the International Program Working Group this past year. We brought together representatives from all of the key parts of the program, particularly from the repository and the MRS Program, to systematically look at what opportunities are out there, what are we doing, and to make sure that what we're going makes sense, and to look for some new initiatives in the international area that might make some sense.

So, right now, we have a review of the OCRWM International Program underway, and we'll have a report on that this fall. This fall we will also begin to publish a journal which will highlight some key areas of interest and development in the international area, that should be given broad distribution to people so that they see what's going on in the international community and how it might be of value to us.

We started to put together a running list of international nuclear waste meetings. One of problems we find with a problem as large as ours -- it's much easier in other countries, who have small programs -- is there are meetings. What often happens is the U.S. either sends nobody or 20 people. It's awfully difficult to calibrate this monstrous program and get the right people sitting in the room at the right time and get the right number of people. So, we're trying to do a

more systematic view of the future of what's out there, in terms of meetings, who ought to be going, and try and coordinate that so that we do it in the most effective way possible.

We're also looking, and we'd be delighted to hear from anyone else on any opportunities for new bilateral agreements that make sense. I mentioned the one with the Spanish, for example, that we're looking at.

We're also taking up the suggestion that was in the National Academy of Science Study, and we're looking at ways of including international peer review into the process of preparation of some of our materials here. There are some pluses and minuses there. We're trying to do that in a very careful way; but nonetheless, we see the benefits, both substantively and image-wise from international peer review, and we're going to see whether there's something that can be done there.

Keep in mind, most of the countries that we deal with have programs -- their entire program is much smaller than our programs. I won't even give numbers, but they're much smaller, and it's very difficult for them to allow people to go off -- to do things at the United States' request. There's only so many of them out there, and they have their own program to run. Nonetheless, we're going to see what we can do in that regard.

[Slide.]

MR. ISAACS: That's sort of the conclusion of my overview -- part one of my presentation. Now, I want to talk a little bit about what's actually going on in these other countries.

The first thing I want to say is that there is a lot of diversity in what's going on in other countries. There is no one single, unified cookie-cutter approach. But, that doesn't mean that what's going on is not appropriate for each country. In fact, there is a lot of common view in what ought to go on in each country.

Each country that has looked at this problem and has decided to pursue it has decided to pursue deep geologic disposal. They've all decided that the concept of multiple barriers is essential to the ultimate success of their solution. They want to use nature and the benefits that nature has to the maximum extent possible, while recognizing that they need, in addition, engineered barrier systems in order for the combination to provide the appropriate amount of protection that's there.

There are quite a few differences. Most countries -- I would virtually say every country, with the exception of the United States, has a very different relationship between the developer and the regulator. There are very few subsystem requirements in most other countries.

They look for total system performance, number one. Number two, there is much more of a collegial relationship between the developer and the regulator in most other countries. They work hand-in-hand, with the idea being that, at the end, the regulator will then take this independent view and will not necessarily assess the adequacy or inadequacy of a particular system against a designated set of numbers, but will make a societal judgment and will have to involve society in a way that says, when I've done this and developed this system, and looked at the engineered performance and looked at the natural performance, I have some residual uncertainties, I have some residual risks; are those acceptable? That will be a societal decision that gets made, not one based necessarily on whether the groundwater travel time is 988 years or 1,012.

That's a very different approach than we have in those countries -- those things -- and that's a reality of life in this country. We have to learn to take advantage of the experiences we see on how other countries are able to move forward without ever losing sight of the fact that

we're a little bit different.

I have listed five countries here, and that is for the convenience of time. There are many other countries that also have high-level waste programs, but these are the countries that have well-developed waste-management programs in which we have a rather long history of cooperative effort.

So, I decided to focus on them, but don't lose sight of the fact that, while these are the countries I'm going to talk about for the rest of the presentation here, there are many other programs out there who are moving along very well, and if you were to lay down a bet in Las Vegas on who is going to have the first deep geologic repository for high-level waste, while I might pick Sweden, there is a dark horse candidate who isn't even on this list.

Anybody know who that is? Finland. The Fins are moving ahead very, very nicely, comfortably. They have an operating low- and intermediate-level waste facility.

They have identified five -- count them -- five sites for potential deep geologic repositories. They are doing surface-based testing on all five right now. They just keep moving right along. They have a good cooperative program. There's no telling.

And we keep an eye on these other countries that are doing well, as well, because there's things to be learned in all of these situations.

[Slide.]

MR. ISAACS: The next thing I'm going to do is put up three slides that are more -- I'm going to go through them rather briefly, but they're more for your relaxed viewing pleasure later -- that give you some sense of the scope of activities in these five countries, and let me just call your attention to a few things.

First of all, all the programs plan on storing spent fuel for short periods of time, at least, at the reactors, and then, after that, most of them plan on having the equivalent of an MRS for rather lengthy away-from-reactor storage.

The exception to that is the Canadians, who right now are looking at continuing at-reactor storage, and the French, of course, do not need extended spent-fuel storage, since they put them into the front end of their reprocessing plant and reprocess the fuel.

You'll notice that some countries are planning on reprocessing, some countries are planning on not reprocessing, and some countries aren't sure, and that's going to continue to be the case.

One of the things in the international community -- you know, we tend to think, sitting here in the United States, of it as they, as if there is this monolith out there and they are much more stable and predictable.

They have the same elements of uncertainty and changes in policy that we do, and within each country, you will find the same variety of viewpoints on subjects like thermal loading and engineered barriers that you'll find in this country.

So, many of these countries are undergoing radical changes in their policies. In particular, the Germans and the French, over the last few years, have been doing somersaults, and I'll talk about that in a minute.

The other thing you'll notice about this slide, of course, is that almost all countries, even the countries that aren't on this list, are planning on storing spent fuel before disposal for rather protracted periods of time, at least for 20 years.

Canadian fuel, of course, is natural uranium, it's low burn-up, and it's a different story for this, but they're planning on storing spent fuel for long periods of time. In many cases, they say it's to reduce the thermal heat. In a lot of cases, it's politically expedient.

[Slide.]

MR. ISAACS: Here are some general cryptic information on what they're planning in terms of their repository and waste-package designs. The major things I want to point out to you here is that they're in different stages of confidence in what they're going to do.

So, you see words like "conceptual" and "pre-conceptual" and "reference design." That's just to try and give a reflection that some people seem to be a little more confident of what they're going to have than others, but they're still in a very early stage of development.

Keep in mind that, other than the Germans, we're the only ones who have picked a candidate repository site today, and the Finns, but I'm talking about on this chart. Nobody else has even picked a site yet. So, they're at a very early stage there.

You'll also notice that all of them plan on having some kind of a robust container, that they'd want to have corrosion-resistant materials, and that there are backfills involved.

You'll notice that in most countries granite seems to be the most common rock type under consideration, but there are certainly other rock types, as well.

Salt is well known and is being pursued in Germany, and clay is being pursued in countries like Belgium, France, and Switzerland. And you'll also notice, very importantly, that all the other countries are in the saturated zone.

The United States is the only one that's in the unsaturated zone. This is no surprise to any of you, but when it comes to talking about the issues of engineered barriers and thermal loading and all, it becomes a crucial determining factor.

There are some great advantages. Some of the people in these other countries look with great affection and jealousy over the fact that we're in the unsaturated zone. Sometimes we tend to think, "Oh my God, we've got this complicated thing, and why are we different?" The fact of the matter is a lot of countries would like the luxury of having looked in an unsaturated zone.

Lastly, you'll notice that most of these countries do have or will have underground research laboratories. Many of them will have underground research laboratories prior to characterizing their sites.

Some of them will have underground research laboratories similar to what we will, namely as a precursor to site characterization or as part of site characterization.

[Slide.]

MR. ISAACS: This gives you an idea of the timeframes involved. Most countries are planning on selecting their final candidate sites in the mid-'90s.

In the case of the Canadians, for example, they're not even going to look for sites until their conceptual approach to ultimate waste disposal is approved, and that won't happen until '94.

In the other countries, the French -- many of you may be aware the French identified four sites initially in four different geologic media which they wanted to characterize.

Ten thousand protestors and one fatality later, they decided to think the better of it, and they went back and had two commissions do extensive studies. Those commissions, the most important one being the Bataille Commission, have now issued their reports.

They are suggesting that they go forward and characterize two sites and so in situ laboratories at those sites, much like we'll do with our ESF design, and that is now under debate in the Parliament as we speak.

The Germans, as you know, have selected a site. They have been underway. They're drilling their exploratory shafts in salt right now.

The German history is very checkered, as you are probably aware. They had a construction fatality a few years ago that caused them to stop drilling for a year.

That program was then reevaluated and was restarted, and here is how the interesting -- you know, the fickle fate comes into play.

Those of you that have been to Gorleben know that it's about a mile from the Elba River, which is the borderline between what used to be East and West Germany, and in fact, if you went on the river, which I did and others have done, at that point in time, the East German gunboats would come out, and they would have machine guns, but they wouldn't point the guns at you.

They'd point these long-lens cameras at you and take your picture. It was a pretty intimidating thing, and this was only three years ago, perhaps. With the MRS Commission, I remember I went out there and experienced that.

Well, what happens with the reunification is that now, instead of being two separate countries, now they have one country, and the people who are now part of East Germany are not happy having a repository so close to them, and now that they're part of Germany, they're making a lot of political trouble for the progress of this program.

So, the reunification had this very interesting, unanticipated effect.

That, plus the fact that, in the local regional elections recently, the Greens came into party and now have a party platform to stop this program shows you how, indeed, progress on these kinds of programs is anything but a given for any country, and it will continue to be difficult, and the German program is certainly in a state of flux right now and will have to wait.

Meanwhile, the Swedes and the Swiss kind of go on with their programs. They both have underground research laboratory programs. They are both planning on selecting sites in the mid-1990s, and they will plan on moving forward.

It's very interesting. You probably are aware, recently in Sweden, there was a community who volunteered for the repository. That's a first that I'm aware of.

It's not in a particularly conducive place, as far as the Swedes are concerned, to put a repository, but it does show you that the institutional framework is there, and if there is a lesson, incidentally, a generalized lesson -- I can give you exceptions to this myself, and I know you can, too.

If you wanted a generalized perception, in those countries where the equivalent to the Federal Governments can deal directly with the locals, they can usually make progress.

It's when you have the equivalent of state in the middle that you usually run into problems, and that's what's happened in Germany, for example.

In Sweden, the governor, the regional governor, is appointed by the party in power. It's as if Bush could appoint the Governor of Nevada, not a bad thought, and you can see how that would change dramatically the political landscape immediately in the country.

So, the point I'm trying to make is that, when looking at how to get the success -- and I wish Todd La Porte were here -- I think there are insights that are out there.

I'm not sure they're necessary and sufficient, but there are insights out there about how to deal with some of these problems and what kinds of things might actually work in the long term.

There is no way we're going to get rid of our state government, but perhaps we can learn that by -- and this is no, necessarily, surprise, but it is kind of a rule of thumb, that if we can get to the place where we're working cooperatively and intensively and extensively with the local governments, we can probably have a good chance of some success.

[Slide.]

MR. ISAACS: I know you have been waiting with baited breath as to what has been going on in these other countries with respect to engineered barriers and thermal loading and

siting activities. If I could just turn to the next slide, please, on engineered and natural barriers.

[Slide.]

MR. ISAACS: Let me start by saying that it is indeed a variety of approaches out there, that all countries are looking at some kind of engineered barriers but the Germans, for example, told me that they are not counting on the engineered barrier whatsoever. All of their performance is expected to come from the natural barrier system. The engineered barrier will be a waste handling device essentially and one to keep the waste contained until it is placed in the repository. Given that it's salt, that's not necessarily a bad solution.

The Swedes in particular, as is well-known, have considered putting high priority on long-term waste package, in particular copper canister. They believe that they can isolate the waste predominantly with a waste package and that the natural barrier will provide an appropriate environmental condition and an additional margin of safety against dispersal of the waste should for any reason the waste package not work. They believe that both are necessary. In other words, you can't just stick it anywhere, but the principal reliance will come from the waste package.

The Swiss, on the other hand, while also putting heavy reliance on the engineered barrier, tend to look more to the buffer material, the bentonite clay, as the principle mechanism for retardation. They don't have as a reference a million year waste package or what we would call a long-life waste package but they do believe that the bentonite clay can provide extensive -- they will not have quick groundwater travel times, incidentally, in Switzerland. It's expected they'll be very long. They can take advantage of that and they believe therefore that the bentonite clay in the package can provide adequate protection and that the geosphere will retard and dilute any materials that come out of that package.

They also believe that performing conclusive testing in the far field might be somewhat difficult and so they would like to minimize in their case the requirements for ensuring far field performance and instead concentrate on near field performance.

They also believe that by going with a robust engineered barrier they can probably ease site selection. When you look at Switzerland, the density of people is not a criteria for site selection. You can't go anywhere in Switzerland and find a remote site and they recognize that and therefore once again in order to deal with reality, that can't be a problem, so by using a robust engineered barrier system, they believe they can relieve themselves of the need to put in such factors as density of population.

It is also interesting -- and they also believe therefore that any benefits that therefore accrue from the natural barrier system will simply be a redundancy to their engineered barrier system.

So both the Swedes and the Swiss are putting heavy reliance on the engineered barrier system.

It is also interesting to note that the Swiss also believe that they would -- well, I think I'll save that one for the thermal loading -- it's a more interesting point with the thermal loading -- on their philosophy of demonstrating compliance.

Virtually all the other countries and the French you have to put a little asterisk next to, since they are still looking at four different types of rock type and it is unclear where they will wind up.

The other countries, even though this tends to show something in the middle it's really not. The French, the Canadians, and the Germans and the U.S. are putting principal reliance on natural barriers at this point in time. All of them are consisting of putting together waste

packages, including the Germans incidentally, that they believe will last 500 to 1000 years or so. That makes sense when you look at the fact that the fission products are most active during the 500 to 1000 year period. That provides an additional barrier during the period of time that the waste tends to have those higher degrees of activity and then after that period of time all of these countries tend to be relying most on the natural barrier system.

I should hasten to say that there is a recognition that in all countries you need both, that they do provide a degree of diversity, that most countries believe that some degree of robustness is necessary, robustness meaning the feeling of confidence that if you are wrong about any one little component of your system, the whole thing doesn't fall apart. That seems to make sense.

Certainly in the United States we have a continuing discussion on whether or not we are going to move in the direction of a long-life waste package. I think that's an issue where resolution is yet to be determined. I think that we can, if we can demonstrate that the natural barrier system indeed adequately isolates the waste, then we have high confidence in that and we have low degrees of risk associated with that. That's a telling point.

On the other hand, if we need the diversity and the robustness, whether it is for technical reasons, licensing reasons or public acceptance reasons, we ought to understand that and we ought to just face it straight-forwardly and decide whether or not we've got a program in place so that we don't stub our toe and not be able to do what's necessary to be successful. So that's the context, I think, for that.

If I could have the next slide, please.

[Slide.]

MR. ISAACS: The other thing to keep in mind, of course, is that the other countries, as I mentioned earlier, are emplacing their waste in the saturated zone, so they have to worry about lithostatic and hydrostatic pressures and corrosion. Whereas in our unsaturated zone, as you are well aware, we would like to take advantage of the inherent strengths of the unsaturated zone by keeping an air annulus around the waste package and by using the heat productively to keep the moisture away from the waste package, thereby simplifying in many senses the performance assessment if we can demonstrate that this concept is indeed feasible and providing the extra degree of assurance that comes with that kind of an assessment. So the story on engineered barriers and natural barriers is there is a common view of the need for both. There is a variety of views on the combinations that are required to provide adequate assurance.

Next slide, please.

[Slide.]

MR. ISAACS: What about thermal loading?

Once again I think you will see a variety of approaches here to thermal loading, depending on the geologic media and the conditions. Those countries that are going to place fairly high reliance on the engineered barrier systems, particularly the bentonite clays, want to keep their temperatures below 100 degrees C., particularly because they are worried about demonstrating long-term satisfactory performance of the buffer material in those temperature regimes about 100 degrees C., so you will see them spacing packages, looking at the burn-ups of fuel and designs of packages and the thermal properties of the hot rock in a way that will allow them to feel confident that their engineered barrier systems are going to perform well.

Of course the Canadians with low burn-up, natural uranium fuel, would have trouble getting above 100 degrees C. in any event.

The French have this moderate temperature range and I really think it's more a question of uncertainty over geologic rock type than anything else but they also tend to want to keep their

temperatures rather low and then you see of course that the higher temperature regimes, the U.S. and the Germans.

If I could have the next slide, please.

[Slide.]

MR. ISAACS: Well, as I mentioned, the Canadians, the Swedes and the Swiss want to maximize their engineered barrier.

The other interesting thing -- this is the thing I wanted to delay a moment to tell you about here -- is that the Swiss made an interesting comment to me about this, which is that they would be willing to sacrifice some performance if it reduced uncertainty. They believe, the Swiss believe for example, that higher thermal loading, even in their saturated rock, might provide increased performance, increased performance with higher thermal loading but they are concerned that because of the two-phase flow they may have more difficulty modelling and demonstrating that and therefore they tend to want to keep the temperatures low.

That's an interesting philosophical point -- are you willing to go with a system that is actually still adequate but less robust but more certain of performance? That is an interesting question to be discussed in situations like this.

The French, as I mentioned, have more of a moderate. They are concerned about potential micro-fracturing in the granite and in the buffer changes as well.

The Germans because they are in salt have a very different set of criteria. The Germans want to maximize the loading of their repository but they also want to minimize the effect. They are worried about such things as quicker creep of the salt -- as you are all aware, this is a potential problem -- buckling of the repository roof can also be a consideration.

As is only too well-known to folks in this room, the U.S. concept right now is to take advantage of the inherent strengths of the Yucca Mountain unsaturated zone to keep the water away from the waste package while also recognizing that nicely enough while that heat keeps the water away from the waste package in the near field, it is still not enough heat to affect the zeolitic barriers in the Calico Hills, and so you still have the primary natural barrier intact, so you get the benefits of maximum performance of near field, maximum performance of the far field.

Next slide.

[Slide.]

MR. ISAACS: I already mentioned that the Canadians have said that they're not going to start any site characterization work until they have their concept approved and that's in 1994. They're concentrating right now on their underground research laboratory and they believe, and I think they're probably right, that they have a large number of potentially suitable sites in the Canadian shield and we can expect their repository some time around the 2020 timeframe.

The French, I've also mentioned, are still looking at four sites. They're going to -- if they implement the Bataille Commission recommendations, they will pick two sites and try and build two in situ verification laboratories, as they call them ISVLs. And that will come after a period of surface investigations and then they would like to do detailed investigations of those two sites. We have to see what the Parliament will say; we have to see what the local communities will say.

Some of those sites are very close to Brittany and that's a political problem because the Bretons consider themselves independent, kind of like the Basques in Spain. So, there's a political overlay that's greater than normal in the siting selection. We're just going to have to stay tuned to see how the French do in that regard. In the meantime, of course, they're

reprocessing, vitrifying their wastes.

Next slide, please.

[Slide.]

MR. ISAACS: I've already talked about the Gorleben site. They would, in essence, if they stayed on schedule, be the first ones with a repository in 2008. They are indeed -- have two shafts well down at this point in time and are drilling. But as I mentioned, there are some political and institutional problems facing the Germans that make it highly uncertain as to where they're going to go. They're also reviewing themselves now whether or not they're going to go with reprocessing or no reprocessing. They're likely to wind up with a mixture since they have been reprocessing. And so, it's not clear what impacts that's going to have on their program or timing.

[Slide.]

With regard to the Swedes, I've mentioned already that the hard rock laboratory at Aspo Island is, in their words, going to be a "dress rehearsal" to learn how to characterize sites. They hope to pick sites in the mid-1990s and characterize 3, leading to a selection for license application, I believe, around the year 2003.

The Swiss have been looking at a number of different rock types. Interesting sidelight on the Swiss program: If you look at their crystalline rock siting program -- they say they have a national siting program, and when I looked at the places that they were considering for locating their repository, it's about the size of Yucca Mountain in the repository program. In other words, while the Swiss have a national siting program, if you took that and transported it to our country, what they'd be deciding is where to put the shaft on Yucca mountain. It's a very different context in terms of size and what it means for countries.

So they have a crystalline siting program, it's all up near the German border which, of course, thrills the Germans and will also cause them some potential political problem. Recently, they had earlier looked at clays and sedimentary rocks and said, we think crystalline is preferred.

Recently, political forces said, go back and look once again at the clays so once again the Swiss are looking at clay formations as well as crystalline rocks. They'll be doing some surface characterization and they'll be identifying sites in the mid-1990s, as well. They'll continue with their site and the Grimsel Pass and they have a repository schedule also for the 2020 time frame. If I could have the last slide, please.

[Slide.]

MR. ISAACS: So in conclusion, I've tried to give you a very quick run-through on the broad scope of activities that we have that are of a policy nature or of a cooperative, of a technical nature. We think that those international cooperations are very important. We never lose sight of the fact that they're not the program. They're only a help to the program, but we think they're vital -- I think they're vital -- to the ultimate program. They have provided significant benefits to date, I suspect, particularly with budget constraints and potential site access constraints that we will look -- and we will be delighted with any insights from this Board on opportunities for cost-effective use of international programs again.

We will continue to do everything we can to look at the international community and see if there are any new initiatives that make sense for the program to pursue. Thank you.

DR. DEERE: Thank you very much, Tom, for that overview. Questions?

DR. CANTLON: Tom, let me ask you, I notice that you didn't mention at all the U.K., Japan, or the U.S.S.R. I just wonder if you'd --

MR. ISAACS: Yes, I did that on purpose because of the criteria I used. I thought it would be better to go into a little more depth on the countries that we've been dealing with. The U.K. have fell on their fanny in a big way and have put off any development of high-level waste activities for 50 years. They seem to be able -- at least, so far -- to get away with it. I don't think that would wash in this country. So, the U.K. has no extensive high-level radioactive waste program to speak of at this point in time.

The Japanese are an interesting case. We have lots of information exchanged with the Japanese. They come and visit us in very regular order all the time from various components of the Japanese government. The Japanese literally -- not figuratively -- literally sit on a hard rock. They have huge population problems. They don't have a lot of potentially good sites. They have a repository program. In fact, they were the only ones who were, at one point in time, actually looking in tuff. That was kind of interesting.

But their program was very low-key. When they've tried to look for sites for underground research laboratories, they've run into big political and public problems. They're searching for a mechanism and they have a lot of research facilities that may be doing some work that might be of some interest to us. We haven't really explored it in extensive detail, but it's basically a very measured long-term program.

Only recently have we been open to what the Soviets are up to and we're beginning to learn -- and I have not visited the Soviet Union, but I've had extensive discussions. The National Academy has been to the Soviet Union on several occasions. I've had extensive discussions with some of the people who have been over there and the general feeling is that while we may be able to help the Soviets greatly, to a first-order effect, there's not an awful lot of value to our program for a high priority activity to go out there and search for cooperation. We'll probably want to learn a little more about it and there are conditions under which we try and help other countries.

It certainly makes sense to help them if it becomes a potential environmental problem because, as I said at the beginning of my talk, when it comes to nuclear one country's problem is everybody's problem in perception if not in reality and therefore we might do it in that context. But that's the only reason why, Mel.

DR. DEERE: Other comments or questions by the Board?

[No response.]

DR. DEERE: Are there comments from the audience?

[No response.]

DR. DEERE: I would like to make the statement -- Don Deere here. I would like to point out that the Board did visit the Canadian facilities and five different organizations there to find out a little bit more about the program. And I think that we felt in many areas that U.S. participants could gain information that is being developed and methodology that is being developed.

Particularly, I think it would be valuable for the USGS that are involved in the hydrologic testing to have a chance to see the very recent measurements that they have got from of a number of their deep wells and particularly the very sophisticated instrumentation which is both commercial and has undergone further developments by their own people. I certainly think it would be a worthwhile trip. It's easy to get to, as you know, and in a couple days I think they could get some ideas that could help in our program here, in a couple years' time.

MR. ISAACS: You're certainly right. I think that we have had those kind of exchanges. If we sign the subsidiary agreement you will see a very -- for the international program you'll

see a very extensive cooperation building. That program will be by far the largest in terms of dollar expenditure of cooperation between us and there will be ample opportunities for the USGS and others to be part of that process. I would wholeheartedly endorse your recommendation.

MR. GERTZ: This is Carl Gertz, Don. In fact, our principal investigators have been working with Tom's people to try to work out some of the words of this agreement so that when it is signed, they will be involved in, particularly, instrumentation, which is one of the areas we've asked to focus on.

DR. DEERE: Thank you. After two announcements, the meeting will be adjourned.

The first announcement is that tomorrow, we will start at 9:00. We have a full program, we think a very interesting program dealing with regulations and standards and also the site suitability studies.

The second announcement is, I'd like to see if the Board and the professional staff can get together for a short debriefing in the Monticello Room on the first floor. That is very close to the Jamestown Room where we met yesterday. So, first floor, Monticello Room for perhaps 20 to 30 minutes if possible.

MR. GERTZ: Don, can I close out one action item I had that Bill Barnard asked me?

The issue was how much water we'd be using at the repository during construction. A maximum of 40-acre feet per year. During 25 years of operation, we would then be using about 35-acre feet per year and during 25 years of monitoring, we'd be using about 8-acre feet per year.

[Whereupon the meeting was adjourned at 5:12 o'clock p.m., to reconvene at 9:00 o'clock a.m. on Wednesday, July 17, 1991.]