UNITED STATES OF AMERICA

NUCLEAR WASTE TECHNICAL REVIEW BOARD

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FULL BOARD MEETING

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Key Bridge Marriott

Potomac Ballroom

1401 Lee Highway

Arlington, Virginia 22209

Tuesday, January 7, 1992

NWTRB:

DON U. DEERE, Chairman
CLARENCE R. ALLEN, Member
JOHN E. CANTLON, Member
PATRICK A. DOMENICO, Member
DONALD LANGMUIR, Member
D. WARNER NORTH, Member
DENNIS L. PRICE, Member
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RUSSELL McFARLAND, Senior Professional Staff
DENNIS G. CONDIE, Deputy Executive Director
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KARYN D. SEVERSON, Congressional Liaison
VICTORIA REICH, Librarian

OTHER PARTICIPANTS:

JOHN BARTLETT, Director,OCRWM

RONALD MILNER, Associate Director, Office of Storage and Transportation

CARL GERTZ, Project Director, Yucca Mountain Site Characterization Project

RUSS DYER, Director, Division of Regulatory & Site Evaluation

SAM ROUSSO, Associate Director, Office of Program & Resources

FRANK PETERS, Deputy Director, OCRWM

JOHN P. ROBERTS, Acting Associate Director, Office of Systems a

P R O C E E D I N G S

[9:00 a.m.]

DR. DEERE: Good morning, ladies and gentlemen. I'm Don U. Deere, Chairman of the Nuclear Waste Technical Review Board. On behalf of the Board, I'm very happy to welcome you to our first full board meeting for 1992.

I guess most of you know the Technical Review Board was created by Congress in 1987 to act as a source of independent review of the scientific and technical validity of activities undertaken by the Department of Energy as part of its program to manage high level radioactive waste, 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.

As the Board has conducted its review of technical and scientific activities undertaken by the Office of Civilian Radioactive Waste Management, it has become increasingly clear that OCRWM priorities for its waste management program are substantially affected by budget considerations.

This was demonstrated recently in decisions to delay

underground testing and to reduce funding for the development of an engineer barrier system in response to reductions by Congress of the OCRWM budget for Fiscal Year '92. Reduced funding for underground testing and for the development of an EBS are of considerable concern to the Board.

We have long believed that surface-based testing alone will not provide the critical information needed to determine site suitability and that early underground evaluation should be a top priority of the program.

I expressed our concern over the delay in initiation of underground excavation and testing along with suggestions for expediting underground testing in a letter to the Secretary of Energy in November of last year.

In addition, the Board believes that engineered barriers must be viewed as an integral part of the repository system and that studies of the potential contribution of engineered barriers should not be deferred. We have emphasized this concern in several Board reports and public statements.

Funding and allocation decisions affect virtually every aspect of the waste management system or the program; therefore, to adequately evaluate the technical and

scientific aspects of the OCRWM program, the Board must have a very thorough understanding of the rationale supporting OCRWM decisions about budget allocations and how these

decisions reflect and affect program priorities.

For this reason, at our July '91 Board meeting, we asked Dr. John Bartlett, Director of the OCRWM, to provide an overview of his budget allocations and priorities for Fiscal Year '92. Those discussions proved so interesting that we have invited John and some of his staff to provide a more detailed briefing on the rationale underlying budget decisions and program priorities.

We also have asked for an update on surface-based testing activities at the Yucca Mountain site and a progress report on systems integration, including a status report on the M&O contract efforts for the OCRWM and the Yucca Mountain site characterization project office. Over the next day and a half, we will hear presentations on these issues.

We begin this morning with a briefing by Dr. Bartlett on OCRWM budget allocations, including the basis for program priorities, factors that affect budget allocations and progress of the program, and contingency planning to

deal with possible future budget shortfalls.

We will then hear a presentation by Ronald Milner, OCRWM Associate Director for Storage and Transportation, on the status of the storage/transportation project and related budget priorities.

After lunch, we will be briefed by Carl Gertz,

Associate Director for Geologic Disposal, on the Yucca Mountain project office's budget and program priorities, followed by an update by Russ Dyer of the Office of Geologic Disposal on surface-based testing activities underway at the Yucca Mountain site.

At the conclusion of the presentations, I will recognize Board members, meeting participants, and members of the audience for comment on and discussion of the information presented throughout the session, and I would remind those of you who speak to identify yourself by name and organization the first time you speak, and to speak up clearly into one of the microphones provided.

Tomorrow morning, we will resume our dialogue on OCRWM budget allocations and program priorities with a presentation on systems integration, followed by an open discussion of the issues covered during this meeting.

We have a very full agenda, so at this time, I would

like to introduce Dr. John Bartlett. As most of you know, Dr. Bartlett is responsible for the development of the DOE's program for managing spent nuclear fuel and high level radioactive waste.

Previously, he directed energy and environment activities for The Analytical Sciences Corporation, TASC. He joined TASC after working with Battelle-Pacific Northwest Laboratories, where he was manager of system studies.

He 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. Dr. Bartlett will introduce the speakers who follow him.

John, we appreciate the time and the effort you and your staff have expended going through the Christmas and New Year's holidays in preparing your presentations for today and tomorrow. The Board looks forward to a very informative session on these important and timely issues, and we welcome you.

[Slide.]

DR. BARTLETT: Thank you very much, Mr. Chairman. It's a pleasure to be here, members of the Board. I really appreciate the opportunity to discuss these very important issues that Chairman Deere has raised this morning, and would like to think we are prepared to be very responsive and interactive with these issues that you have raised. We have certainly made every effort in our preparation to present the material so it really does focus on these key issues of priorities and budget allocations and the interactions between them. So we look forward very much to an opportunity to interact with you on these subjects.

With that as a very brief introduction, what I'd like to do is identify the topics that I will be addressing.

[Slide.]

DR. BARTLETT: Specifically, the program priorities and where they came from; the factors that do affect our progress and budget allocations; the budget allocation case study, the one that you have mentioned that is of concern to all of us: why was the Exploratory Studies Facility schedule delayed as a result of the budget cut for Fiscal 1992? The basic budget policy that is the foundation for that action that was taken; and then a few brief remarks on contingency planning.

[Slide.]

DR. BARTLETT: Under the subject of program priorities and their basis, I'll be talking about our program goals; the progress milestones toward meeting those goals; management actions we have taken in order to integrate the program and have it move forward to meet the milestones and the goals; and then within that framework, some of the very important constituency milestones, which of course correspond to the program milestones, but what I'm saying is, in a sense, some milestones are more important than others in a sense, because of their significance to the many constituencies that this program has.

[Slide.]

DR. BARTLETT: Very simply, the program has two basic goals: to begin spent fuel receipt in 1998 and to begin disposal in 2010. The basis for those goals is basically again very simple. It comes from the Nuclear Waste Policy Act as amended. The Secretary's plan of November 1989 in his reassessment report to Congress identified these specific goals, and we are implementing the program to meet them.

Then closely related to both of those is the fact that, of course, we have contracts with the utilities to

begin the spent fuel receipt in 1998. Of course, that is a major driver for the obligation and the goal to begin spent fuel receipt in 1998.

[Slide.]

DR. BARTLETT: A point which I cannot emphasize enough is that those two goals have equal rank, and you will see this point being made as we proceed with respect to the interactions of budgets and priorities and program activity allocations. We cannot under-allocate activities to give preference to one goal or another. In accordance with the monies available, we must distribute them such that we can do everything possible to continue to meet those goals.

[Slide.]

DR. BARTLETT: What I have done is identified for you some of the progress milestones with regard to each of

the goals. First, with respect to spent fuel receipt in 1998, this is a list of the major progress milestones along the pathway to beginning of receipt in 1998.

A key one is the very first one that's listed here: to site the MRS facility by the end of 1992. As I'm sure you are aware, the nuclear waste negotiator has in fact been recently highly successful in identifying potential candidate sites. We now have in hand seven applications

from potential hosts for feasibility study grants. We expect at least two more.

I can also state with regard to those that, at least for some of them, we know that they are on the same track we are on. In other words, it is their objective to be in the status of potential negotiation by the end of 1992.

Our objective here is to know where we're going by 1992, and we are very hopeful, of course, that we will achieve that goal, and then all of the rest of these follow from that in order to achieve our schedule with respect to beginning spent fuel receipt in 1998.

[Slide.]

DR. BARTLETT: With regard to disposal, and beginning in 2010, our key progress milestones are those I have listed here. Renewal surface-based data acquisition was, of course, started last summer as a result of the fact that we've received two of the permits that we needed to start that.

We had the goal of beginning ESF construction in November 1992. That milestone was slipped to November 1993, and that is the focus, as we all know, of your interest in the interaction between program priorities and budget allocations and things of that type.

We also have an objective to evaluate site suitability

or unsuitability as soon as possible and, if the site is found suitable, then we will proceed through the process of submitting the license application in 2001, which, according to schedule, will result in beginning construction in 2004 as a result of completion of the NRC's license application reviews, and then we would begin disposal in 2010.

I'd point out to you that within these early phase progress milestones, there is flexibility. We cannot identify a specific milestone with respect to evaluating site suitability or unsuitability. That will be determined basically by what we find. So for this schedule in this phase, we to have flexibility with respect to achievement of the milestones and the findings with respect to progress and information regarding site suitability or unsuitability. That fact, the fact that we have flexibility in there, is part of the basis for the decision that we made

with regard to the ESF facility, as you'll see in a minute.

[Slide.]

DR. BARTLETT: As I indicated, we have taken a number of management actions, first to establish the schedules and the program, and then to implement them, and what I would

like to do briefly is highlight for you some of the key actions with regard to disposal, storage and overall operation of the program.

First of all, with regard to disposal, we have focused and prioritized the site suitability evaluation activities so that we will be able to in fact meet our broad objective of identifying whether or not the site is suitable just as soon as possible.

What this amounted to is a close investigation of the activities that were inventoried in the site characterization plan to identify those which had the best shot at getting the information we need with regard to suitability.

We have also established as a baseline for implementation of those things the site suitability evaluation and a baseline performance assessment. These are reports that are in progress, and they will be issued for public review and comment in a couple of months or so, and these two reports provide the foundation for going forward.

What they do is compile and use all the

information gathered to date on site suitability, make some assessments of what we know, what we don't know, identify

opportunities to close technical issues on the site, and identify activities needed to obtain additional information to be able to close the issues which cannot yet be closed.

These reports will be a major element of progress in the program.

[Slide.]

DR. BARTLETT: With regard to the storage activities, the monitored retrievable storage, the Department adopted a policy to support the negotiator's efforts as a basis for the siting of the MRS facility, and then, in conjunction with that, we have reorganized all the activities relating to storage and transportation to assure that everything comes together for spent fuel receipt to begin in 1998.

Basically, what that involved was to reorganize the transportation program to be sure that we do have sufficient number of casks available on time to begin receipt at reasonable rates in 1998.

We have prioritized effort on the non-site specific activities associated with an MRS, and that will of course be blended with the requirements and desires of the potential host, which, as I mentioned, we now have seven under consideration, and then, of course, we have also in

addition prioritized work with the utilities to assure that we have all the logistics and the protocols of spent fuel receipt in place.

So these things are moving forward in parallel all pointing toward meeting that goal of beginning spent fuel receipt in 1998, of having the full system ready to begin, and, of course, to do that, we have to have funds allocated sufficient to the purpose.

This is, as I'm sure you can appreciate, a tight schedule. Where we have flex with respect to disposal, we have virtually no flexibility with regard to 1998. Everything has to come together in order to have the resources to meet that commitment with our contracts.

[Slide.]

DR. BARTLETT: Programmatically, some of the actions we have taken are to prepare a mission plan amendment which takes into account the Nuclear Waste Policy Amendments Act and the Secretary's reassessment report, the current foundation for the program.

We have established and are working with the NRC to develop a strategy for our pre-licensing activities, which is fundamentally aimed at closing the issues as much as we can as we go so that there are not a lot of open issues, open technical contention by the time the license

application is submitted.

The device for doing that is what we call the annotated outline. The annotated outline is being developed in conjunction with the NRC, working together to identify essentially the scope of information required, the issues to be resolved, and the application of information to the resolution of the issues.

So we're putting in place the mechanics to facilitate the licensing review process and the closure of technical issues through that effort.

We have, of course, brought on our M&O contractor under TRW with the fundamental objective and responsibility to make efficient the technical management of the program, to integrate our activities, and to point everything toward the resolution of issues, the achievement of the licenses that we need, and, of course, basically the achievement of those two major goals, beginning spent fuel receipt in 1998 and disposal in 2010.

A very important recent event -- this is one that doesn't show up externally, but I can't tell you how important it is -- we have completed the so-called ESAAB review of our Yucca Mountain project plans. ESAAB stands for Energy Secretary's Acquisition Advisory Board.

This is an independent high level board chaired by the Under Secretary within the Department that reviews and passes judgment on the foundation plans for proceeding with the program. We will have an ESAAB review for the MRS activities once we have the site and the design established. This essentially gives independent authority and approval to our basic plans to move forward with the activities at Yucca Mountain with respect to the Title II design of the ESF facility and also with respect to our other plans for the program, a vitally important imprimatur for the plans for moving forward at Yucca.

[Slide.]

DR. BARTLETT: Now, I said that among our various milestones, some of them are of more external significance than others. I mentioned, for example, ESAAB as being very important to us because it gives force to and confidence in our management plans in terms of our schedules and our budget requirements.

To the external world, some of the milestones, as I mentioned, are more important than others because they are highly symbolic of progress, and what I'd like to do is just indicate to you what we hear and what we understand, of course, are in fact these highly symbolic milestones with respect to progress.

Of course, the start of new site interrogation activities, which began last July, was a very important thing. That was the first new activity with regard to site interrogation since 1986 and it was a very significant step forward with respect to progress and characterization of the Yucca Mountain site.

Another one is this focal point of the start of underground excavation at Yucca Mountain. Also, and again keeping in mind that these two goals are of equal rank, we find the siting of the MRS facility, to identify where we're going, is a very important external milestone, as will be, of course, start of MRS construction and then eventually, getting back to the matter of disposal, the evaluation, the determination of whether or not the Yucca Mountain site is a suitable location for disposal.

[Slide.]

DR. BARTLETT: A couple more of those. After we get through those early stage milestones, actual implementation of the program with respect to starting the waste acceptance at the MRS, the 1998 goal, and submittal of the repository license application, which would indicate, assuming, of course, that the site is suitable, that we are ready to proceed toward disposal.

Those are very, very important milestones, as I said,

to the external constituencies, and they are the ones that they look for progress and accomplishment on principally. Our job internally is to get all those other milestones accomplished so that we get to those two.

[Slide.]

DR. BARTLETT: Now, among those, underground excavation is in fact a uniquely significant one. We all agree that getting underground is essential to get key data for determining whether or not the Yucca Mountain site is suitable. There's no issue there with respect to the significance of the action as a means for getting essential information, and also, our external constituencies also find, as I said, that starting underground is a very highly symbolic action with respect to progress.

Closely associated with that with regard to program operations are a couple of other very significant factors, very significant to us operationally in making progress with respect to this milestone. That is the fact that we have to have extensive interaction with the NRC with regard to the design and implementation of the design for the ESF facility. This is because the ESF, if the site is found suitable, will become part of the repository, and it has potential impact, therefore, on the safety performance of

the repository system. So it's essential as we proceed with the ESF design that we interact very strongly with the NRC to be sure that we and they are taking into account the potential impacts of the design of the ESF on the safety performance of the repository.

What this says in practice is this is not just a business of designing an excavation and going and digging

the hole. There is a process surrounding it which the NRC calls design control which is an inherent and very important part of the package of effort associated with this facility. So what that means is that the effort is burdened by these activities as an inherent part of the process and, as you will see in a few moments and Carl will elaborate later, it's a very key feature of the budgeting allocation because we have to treat this as a package, and we also have to sustain and maintain continuity of our effort with regard to all aspects of getting underground.

[Slide.]

DR. BARTLETT: Now, in practice with regard to the overall picture of evaluating the suitability of the Yucca Mountain site, we have identified what we expect to be some of the key factors, the key factors with respect to determining whether or not it's a suitable site, and for

perspective, I have indicated the sources of information that will bear on our determination of the influence of those factors on the suitability of the site.

The point I'm trying to make here is that the underground excavation is part of the big picture of gathering information on site suitability. It's a very important part, but it is only a part, and this again is part of our consideration in how we allocate our budgets to our activities and it fits in with all of the other

concerns, such as the significance of the milestones and things of that type. I hope that will become apparent as we go forward.

[Slide.]

DR. BARTLETT: Now let me talk about the factors that affect the progress and the budget allocations.

[Slide.]

DR. BARTLETT: First, let me start on the upside. There are factors that can aid progress and help assure that we meet those goals. Obviously, the first one you think of is in fact sufficient funding. Let me relate that now to this ESAAB review I mentioned.

A key part of the ESAAB review is that the program provides to these independent people and there is done

independently an estimate of the costs associated with the activities to be accomplished. That cost baseline and the schedule baseline are fundamentally important factors, and that identifies for the program funds needed to accomplish the work defined.

So what that amounts to, with that ESAAB review is that they have endorsed the program's expectation of funding requirements to accomplish the work of the program. So we have an independent approbation of our estimates of the work and the funds required. So when you ask the question "What is sufficient funding?", that is the basis. That identifies what constitutes sufficient funding. So having funds equal to that then helps, of course, achievement of our milestones and goals.

Another thing that would help obviously is if we do get, in fact, with regard to Yucca Mountain clear, distinct evidence of suitability or unsuitability. Of course, one of the key things about the exploratory studies facility is it is aimed to do that, and we'll talk a little more about that later.

If we can have expeditious institutional proceedings of all kinds and we can minimize the licensing review issues, as I mentioned, through our interactions in the prelicensing phase, these also will help assure that those

aspects of the program do not delay achievement of the goals or the milestones of the activities. We are working, as I indicated, through our interactions with the NRC on the annotated outline toward basically facilitating both of those aspects, the minimization of licensing review issues and expediting the proceedings.

[Slide.]

DR. BARTLETT: Now, there are also factors that delay progress. If national policy changes -- for example, an attitude was adopted that the program should be slowed down and we should store spent fuel indefinitely at reactors, which has been proposed as a bill before the Congress that would propose to do that -- that of course would affect everything on the program and would undoubtedly -- the objective of such would be basically to delay the program, and specifically to delay the activities at Yucca Mountain.

If there is a delay in MRS siting, if we don't manage to know where we're going by about a year from now, then that would have essentially a one to one -- there's a little bit of flex, but not much -- that would have a one to one relationship or impact with regard to our ability to begin spent fuel receipt in 1998.

If there is significant political or legal obstruction that forces the program activities to slow down, then that

could also affect the program. Of course, that has happened in the past. As a result of the state of Nevada's legal test of the program viability, there has been a slow down in comparison with the progress the program might have made.

If there is difficulty in clearly resolving site suitability issues -- in other words, if we find that the data are inevitably fuzzy and difficult to interpret with regard to whether or not the site is suitable or unsuitable -- this would have the effect of driving us toward continuing to try to get more data and stretching out the activities, the duration and the cost of moving toward that decision.

Of course, that would therefore slow down the end results of making the determination and then moving forward if the site is found suitable, and, of course, the program with regard to disposal would be highly impacted if we do have to make a finding that the Yucca Mountain site is not, in fact, suitable.

Congress calls for us to come back after such a finding and get further guidance as to what to do next, and that would be a Congressional decision.

[Slide.]

DR. BARTLETT: A few more things that could delay the

progress. You'll notice this is a much longer list than the factors that could aid progress. If there is in fact difficulty in resolving licensing issues, and again, the issue here would be technical uncertainty having to do with resolution of the issues, that, of course, would stretch out the licensing review process, would cause potentially extended data acquisition, and, again, delay the program.

If in fact we were to experience what I called here continuing evolution of regulatory requirements, that we don't have clear identification of the standards to be met and demonstration of the means for demonstrating compliance well established, then we could get into a situation where we have essentially regulatory rationing and we don't clearly and easily and readily close on the issues associated with licensing. We have to get that regulatory framework and the regulatory requirements stabilized to avoid that.

Finally, if we do not have sufficient funding to meet the goals, to meet the requirements for the work to be accomplished on schedule, then the program would be inevitably delayed.

[Slide.]

DR. BARTLETT: So moving on from that, now let me talk about the factors that affect the budget strategies and the

allocations. I've tried to do this from essentially a policy point of view.

[Slide.]

DR. BARTLETT: We have, of course, the ESF situation as a case study, and I'll be addressing that, but what I am trying to communicate to you is the policy foundation under the circumstances that we live.

There are a number of factors that do impact effective strategies and allocations: first and foremost, of course, the guidance we have from Congress, which is a very narrow, clearly defined mission, the Secretary's goals to implement the guidance from Congress and the mandates from Congress, and, of course, the fact that we do have these contracts with the utilities.

Those contracts amount to, as I'm sure you are aware, essentially an agreement of fees paid for services rendered, and the utilities and the National Association of Regulatory Utility Commissioners, and the individual PUCs are expecting the program to provide services in accord with fees paid.

Over $6 billion has been paid into the program so far. So far, $2.some billion of that has been expended and the

general consensus is that there has been no progress. We haven't sited an MRS, we haven't determined whether or not Yucca Mountain site is suitable, and, as you might imagine, we hear about this a lot.

So the very key feature of this factor is this contractual relationship and the direct relationship between fees paid, services to be rendered, failure to render services in timely fashion, and, of course, then the consequent pressure for program progress from the constituencies.

Now, closely related to that in many ways is our need to comply with regulatory requirements. Regulatory requirements for this program are extensive. I think I have mentioned to you before, we have identified already over 2,500 specific requirements that we have to be responsive to.

Later on, Carl will delineate some of that for you

in terms of agencies and other things that are involved in that, but the requirements are extensive, and they include, of course, the quality assurance activities, assurance of safety, and all other things with regard to accountability of the program.

That costs money. It costs a significant amount of

money to provide assurance of compliance with the regulatory requirements. It's a major cost factor in the program. Again, later on, you're going to see just how significant that is.

We also have to comply with the Federal Government's acquisition requirements, and this has a lot to do with process and rate of progress because the acquisition process for things such as casks and tunnel boring machines under the Federal Government is a fairly complex process to assure fairness in procurement. So there's a lot of institutional time associated with that, and we have to plan for that in our scheduling and our budgeting.

The timing of it is important, bringing together the acquisition and its results, and the program process where the product of the acquisition is going to be used. It's a tricky business and it's especially significant for this program because the things we have to acquire are expensive, and I'll come back to that, too.

We also need to service, of course, the interests

of oversight functions and the interested and affected parties. We've identified over 200 constituencies for this program, and as far as I can see, no two of them see the program the same way. Other than that, it's real simple.

But again, this is a major program activity, and, again, there are significant costs that have to be allocated to provide those services.

[Slide.]

DR. BARTLETT: I just mentioned that we have over 200 identified constituencies, and they don't always see things the same way. Let me give you a broad example.

The utilities and the regulatory commissions, of course, are very interested in achievement of progress. Intense pressures -- meet the milestones; achieve the goals.

The NRC, and just using an example, not picking on the NRC, but the NRC is very interested in cautious progress, because eventually, they have to review our license application and eventually, as a result of that, to become the program's advocates to the Commissioners in order to get the license. So they would like everything done with a maximum of acquisition of data and analysis to really get in their comfort zone.

The two are fundamentally potentially in diametric conflict, in a sense -- move forward as fast and effectively as you can; go as cautiously and thoroughly and carefully as you can.

Of course, throughout our activities, we have to

exhibit and apply principles of prudent management. Our budget strategy is affected by the actual level of funds provided and the level of funds provided is in turn affected by, in the Federal budgeting process, the competition of funds for what's made available.

I don't know how familiar you are with the budgeting process, but it's a quite complicated process. The Fiscal '92 budget which we started to implement last month, or in October, was started into motion a year and a half before then, before the nuclear waste negotiator was even appointed, before we had any progress with respect to the court actions, with respect to issuance of permits.

The foundation was established well in advance of the actual implementation. So many things happened in real time between what we set as a budget, what Congress then gave us, and then how we would allocate the activities. So there's a real-time aspect that impacts what is actually done in addition to the long range budget process itself.

In that process, which started, as I said, a year and a half ago, our funds compete with in a sense all the other requests for funds in the domestic side activities within the Department of Energy.

The Department receives guidance from OMB as to

what the total budget allocation should be at the top level for the Department, and it also gives guidance for each of the operating units within.

So, for example, in a sense, I compete with nuclear energy and Leo Duffy's environmental restoration and waste management activities for the allocation of the general budget levels that have been established by the Administration, and the adjustments and the variations between those depends on decisions made, for example, by interactions between myself and the Secretary, and then by the Secretary and interactions with OMB.

So it's a process that has many, many steps involved in it, but the important thing here is that the funds that actually are allocated in the President's budget that's sent to Congress is determined by a highly interactive process of the kind I've just outlined for you. Then, of course, we get into what Congress does to what was submitted by the President, and that's another entirely different set of affairs.

But the point I'm trying to make is that we are involved in this trade-off process which is very broad, and that the levels we finally come out with are dependent on how that process prevails. This is true at any given time for any given fiscal year.

[Slide.]

DR. BARTLETT: Okay. Let's get into the nitty-gritty. Budget allocation factors in action: Why the start of the ESF construction was delayed.

Obviously, everybody comes in and says, "My God, you've got the most symbolic milestone in the program. Why don't you throw money at it and take the cuts out of somewhere else?" Well, we did take the money out of somewhere else as much as we could. Within the framework of the things I've outlined so far, what I'd like to do now is elaborate a little bit on how the action was taken.

[Slide.]

DR. BARTLETT: The initiating factor, of course, was that the budget appropriation for Fiscal 1992 was $30 million less than we had requested and that the President's budget had requested. As a matter of history, the $305 million was alive until the House and Senate Conference Committee -- at the very last minute, the $30 million was removed by the Congress.

So that year-and-a-half process had sustained that $305 request, and then it was removed by the Conference Committee. So we found ourselves essentially with an overnight action to respond to the impacts of the action

taken by Congress.

[Slide.]

DR. BARTLETT: Now, in our decision process, we

considered quite a number of factors, and they all come into the picture, and this is why I emphasized right up front that those two goals are of equal rank, because you will see the impact of that in the decisions that we make.

First of all, as we already mentioned and we all know, the start of the ESF construction is in fact a very important progress milestone for the constituencies, it's highly symbolic of progress in site evaluation, and, closely related to that technically, is pointing at very significant information with regard to whether or not the site is suitable, specifically, identification of whether or not there are fast paths for flow in the Calico Hills formation underlying the disposal horizon. A very important milestone.

Also, keeping in mind that the goals are of equal importance, siting of the MRS and the start of spent fuel receipt in 1998 are also very important critical milestones.

[Slide.]

DR. BARTLETT: Just about the time that the budget

action was taken, the negotiator's efforts started to produce results. Within a month after the budget action was taken and we were acting on it, we had our applications starting to come in. We now have, as I said, seven applications, two of which have been funded so far. The other five were just recently received and the applications

are being processed.

So we have potential, very significant potential for progress toward siting of the MRS in a timely fashion. Those activities must be serviced in terms of funding. As you'll see later here, we just can't drop the ball with respect to that responsibility.

We also, as you recall, back in July started drilling and trenching activity, again very symbolic of progress, visible, tangible evidence of activity at the site moving toward site evaluation.

We started those activities. We had drill rigs in action. We had bulldozers in action, and those were ongoing, and they could be sustained at relatively low cost and still maintain that visible and tangible evidence of progress.

We have ongoing at the site acquisition of data that are required as part of the regulatory baseline. That

can't be stopped. It is a continuing evolution of information that is essential, such things as operating the seismic network and gathering environmental data. So that has to be funded.

[Slide.]

DR. BARTLETT: Dr. Deere mentioned in his introduction the fact that we had already cut our activities with respect to the waste package design to the bone because of limitations in funding. We couldn't cut that or anything else any further because we have to sustain at least at minimum-critical-mass levels all of the activities in the program to maintain continuity. So we couldn't cut back on any of that activity any more than we already have.

Now, the ESF activity, as I already mentioned, is a block of effort; it's not just design and construct the ESF. Very closely related to it is this activity, the activities associated with design control, investigation as you go, the relationship between the design and the impact on a potential repository system performance. As a result, there is a package of activities, the design effort itself and the design support activities, which must be funded to get sustainability and continuity of the program.

In addition, to implement the design, we have to procure equipment and support services, and so there is

actually a very large block of funds associated with the ESF activities, and that, of course, is a consideration. I'll detail that a little more, and then Carl will really detail it for you.

Then in addition, of course, we are moving forward with regard to the program integration. We have the M&O contractor on board. He is ramping up, and we have to maintain continuity and appropriate interaction between the level and types of effort undertaken by the M&O and our

program progress. So that has to be sustained also.

[Slide.]

DR. BARTLETT: Now, here is actually what we did. In the proposed budget that went to the Congress a year and a half before Congressional action, we had indicated for this package of activities relating to ESF design a funding allocation of $35.5 million, and it's all a coherent piece, as I said. They have to go together. That's the package for the design and design-related work.

What we actually came out with after the $30 million cut was taken is an allocation of $14.5 million to that activity in this current fiscal year. So we took $21 million out of it, and that meant that also, as you'll see, that $9 million of the cut was applied to other activities

within the program.

One thing I would point out here, if you look at the dollar relationships, the monies actually spent on the ESF design are significantly cut. Relatively speaking, the activities or the costs associated with repository interface and the control systems is not cut so much.

These are like fixed overhead costs. They are relatively insensitive to the design level effort. It's like the analogy I have used for the program as a whole -- it's like running a railroad. If you're going to run a railroad, first you have to design, build and maintain the

tracks, and you have then the fixed foundation for the program. Then you can run as many trains as you have resources on those tracks as much as you want, but you still have to maintain the tracks.

We have these foundations which correspond to the railroad tracks, much of which has to do with regulatory requirements, upon which then we can build the activities of the program as they are funded. So we have to maintain this at a sufficient level, and then, as the funds are available, we can expand our activities with regard to design.

[Slide.]

DR. BARTLETT: Closely tied to that is the work and budget requirements to implement the design, and, as I mentioned, we have to comply with procurement policies and requirements in the Federal Government. So what we have is an expectation or potential for procurement of upwards of $67 million worth of equipment and support services to implement the ESF.

This was not in the budget proposed in Fiscal 1992. The basis for this acquisition would be having in place the design, and so this was to be a procurement in Fiscal '93, contingent on moving forward with design in Fiscal '92 at the level as originally planned.

In all of this, there is flexibility. As the Board pointed out in your report, there is opportunity to

consider various alternatives with regard to the tunnel boring machines. There are alternative ways that we might achieve the power. So there is flexibility in here, but the point is that there is a large block of money associated with procurement. The procurement itself is contingent on making progress with the design basis for the procurements. So these again are very closely related.

Now, another point I'd like to make at this opportunity is that $67 million, $35 million for the design

effort -- this is serious money as a fraction of the money.

Now, the point I have made in other venues and I make here again is that the increments of money essential to move the program forward are major bucks. The program elements run roughly in $50 million increments.

Now, relating that to that to the business I told you about of our program essentially competing with other programs within the Department for budget allocations, it says that every time I get $50 million, someone else is giving up $50 million, and when I come in in $50 million hunks to move the program forward, this has significant reverberations within the budgeting process.

[Slide.]

DR. BARTLETT: Now, what were our options for absorbing that $30 million shortfall? One was that we could defer cask procurement. That was a significant element of

the budget. We could slow down the ESF design, which is what we did, and we could distribute some of the cuts among other activities, which again is what we did. We exercised as we thought appropriate both of those.

[Slide.]

DR. BARTLETT: We could not defer the cask procurement

because to do so would essentially mean that we would commit ourselves to missing the 1998 goal. We would not take any action that would clearly cause us to miss our contractual commitment to begin the receipt of spent fuel in 1998. We did cut those activities to the minimum necessary, but no action -- and you'll see this in the policy basis -- we could not take action which would clearly cause us to miss our commitment to begin spent fuel receipt in 1998.

So we did then retain minimal funding needed for the storage and transportation activities to meet that goal. We deferred the ESF-related procurements, but we did retain the site preparation design activities, which would allow us to hold the potential schedule delay with respect to start of underground excavation to one year, assuming, of course, that in future years, the appropriations will meet needs -- in other words, the appropriations will catch up with the cost baseline and schedule baseline that was established in the ESAAB review as a basis for the program activities. Then we did distribute and take small cuts in the

activities where we do have a little bit of discretionary budget, but we could not lose, we did not want to lose our

minimum sustaining level of effort.

[Slide.]

DR. BARTLETT: So in a sense, to reiterate, our rationale was that we must maintain all the activities as necessary to meet that 1998 goal, and that if we took any cuts in storage and transportation that would preclude that, we would do irreparable harm and make it impossible for us to meet that goal.

This would not be very good action now that the negotiator is being successful, the potential MRS hosts are looking for us to follow through, and we already know, of course, that if we take any action that clearly says we're not trying to meet 1998, we could expect action in response from the utilities with whom we have the contracts.

[Slide.]

DR. BARTLETT: Then the other factor in the rationale was that, as I indicated earlier, there is some flexibility with regard to the activities leading toward the site suitability decision. We cannot make that decision as to whether or not the site is suitable in advance, the timing of it. We don't know what we're going to find. We will be iterating our process.

So we anticipated the possibility that the delay

could be accommodated by factors that occur after the construction actually gets underway, that we could take advantage potentially of some of the flexibility with regard to the information and its use pointing toward the evaluation of whether or not the site is suitable.

[Slide.]

DR. BARTLETT: So we were able to identify potential offsets for that delay looking ahead toward the results of all the activities -- in other words, the determination of whether or not the site is suitable.

First of all, the design itself and the basis for data acquisition, how we will use the facility, have improved substantially since the original effort associated with the site characterization plan. Now that we have ramps rather than shafts, we will begin getting data sooner.

We will have data through all of the geologic features down to the repository horizon and into the Calico Hills formation under the repository, and so we will get a broader range of data, and we'll actually start getting data sooner than we would have gotten it had we had a vertical shaft. So there is some accommodation there.

We now have a better understanding, through our performance assessment and drilling acquired activities and others, drilling acquired data, of the fact that the fast

paths are one of the critical issues with respect to

evaluating whether or not this site is suitable, and so we have a more pointed target for our excavation activities. We know what we want to do with it once we do it. So we can, once we get started, get results, significant results out, hopefully sooner.

[Slide.]

DR. BARTLETT: In addition, as potential offsets, again as a result of focusing on essential information to the suitability evaluation, there's a possibility that we may need less data than we had originally anticipated. So as a result of having focused on the critical issues and as a result of performance assessments, uncertainty evaluations and sensitivity evaluations, we may be able to get, again, results sooner even though we start later.

In addition to that, now that we have established the strategy of working with the NRC through the annotated outline to establish a prioritized and focused effort toward closing issues, we may be able again to make some accommodation and gain some advantage with respect to our progress toward the goals for the Yucca Mountain site evaluation.

So we see all these as opportunities to compensate for

the one-year delay, and, again, I have to underline, it's only a one-year delay if, in fact, future funding allows us to proceed and to meet all our other requirements

for the program.

[Slide.]

DR. BARTLETT: Let me now briefly generalize that as a basic policy.

[Slide.]

DR. BARTLETT: Very simply, we want to maximize our potential to meet the program goals, again emphasizing the goals, begin receipt in 1998, begin disposal in 2010. That also implies that we take advantage of any flexibility we have in the time frame between now and when those goals come due.

We must fund all the effort that's required in order to meet the regulatory requirements, and in terms of progress of the program, let me emphasize again the need to make sure the regulatory requirements just don't keep growing and changing as the program moves, too. Otherwise, we never get there.

Then when we are faced with any shortfalls in appropriations, we'll take two actions, basically.

[Slide.]

DR. BARTLETT: Avoid the loss of continuity of activities and resources. We just can't afford to shut down and then try to start up later in any of our activities. And then, as illustrated by the ESAAB action, apply the reduction of funding as necessary to activities where in

fact we do have some potential for schedule recovery in the future.

Now, with regard to that, let me emphasize again -- I keep coming back to this ESAAB point because it's very important -- that has identified for the Yucca Mountain activities in particular a resource requirement, dollars and time, a time/dollar integral, to get the job done. The integral has to be fulfilled.

If we run through a period where the funding is falling short, it has to be made up in order to stay on the objectives with regard to schedule on those milestones. So we have to compensate for any reductions if indeed we are going to stay on our program objectives.

If we get too much of a continuing reduction under the requirements in order to hit schedule, then you get into a position where it's simply not possible to recover. You can't ramp up. You can't get these $50 million increments,

multiples of them, in a fixed year such that you can just throw money at the program and compensate for underruns in the integral. So there is a limit to the practicality of the progress and the compensations for under-funding of activities and the rate at which you can compensate in the future.

Through all of this, we must match our M&O ramp up, and it'll be at steady state in approximately two years,

but as we ramp up and allocate their activities, they have to keep pace with the activities, and the activities, of course, are keeping pace with the budgets. So we're trying to balance all of this keeping in mind those goals.

[Slide.]

DR. BARTLETT: Pictorially, what that looks like -- I've mentioned before and I'll emphasize again, we have this foundation, the railroad tracks, which we must fund in the program in order to operate, and then we have discretionary budgets above that, and we have allocated our discretionary budgets at the minimum necessary to still achieve that goal, the beginning of spent fuel receipt in 1998.

With regard to site evaluation, we have prioritized and focused the activities pointing towards site

evaluation, taking advantage of maintaining the goal with advantage taken of the flexibility that appears to be there at this point in time.

[Slide.]

DR. BARTLETT: A few very brief words on contingency planning.

[Slide.]

DR. BARTLETT: This was a constant frequent subject in the workshops we had with interested and affected party representatives pointing toward the Draft Mission Plan

Amendment.

Continuing concern about contingency planning: What are you going to do if Yucca Mountain is not suitable? and various questions of that kind. A great deal of interest in the subject.

I assure you I assured them we do extensive contingency planning on a continuing basis at both the strategic and tactical level. It is not, however, a public process, basically. We are not going to issue public reports on our various contingency considerations. We have at present a very narrow, very focused, very specific mission assigned by Congress, and our job is to attend to the contingencies associated with achieving the mission as

assigned by Congress, but not to fool around with alternatives to the mission. So we are continually on programmatic issues doing contingency planning with regard to our activities.

I have simply indicated here basically at the strategic level, we have addressed things such as delayed Yucca Mountain access. That was done before and, of course, we now transfer from the issue of permits allowing us to proceed to essentially funding to allow us to proceed in accord with the program plan as has been established.

What are the consequence of delayed MRS siting? Well, as I have already mentioned with regard to that, right

now, there is very little flex in terms of either schedule or funds required to meet that 1998 goal, and so what we look at is essentially the one-to-one correspondence if it's delayed and the impacts on the date at which we could begin spent fuel receipt.

But I have to say there, with seven expressions of interest in hand, two more that we know of coming, I am building my confidence that we will meet that goal of siting that MRS by a year from now, and then be were on our way to meeting our goal of 1998 start of receipt.

All of our contingency planning is also interactive

with the Department's strategic planning; so some of the activities that we engage in are related to the interactions we've had with other activities in the program or in the Department and the kinds of information the Department requires for us to provide to them, too. That's family business.

[Slide.]

DR. BARTLETT: I'd like to very briefly summarize the budget with regard to Fiscal 1992, and again, let me emphasize that this number was put into motion a year and a half ago, almost two years ago now. It was sustained until the very last minute, when it came out at that.

If you look now at the distributions, you find that the funding going to the first repository, although

it's a smaller pie by $30 million, is now a larger percentage.

What we did qualitatively is to cut back the MRS and transportation, as I said, to the minimum necessary to sustain the 1998 goal, and that's also, of course, being paced by the progress achieved by the negotiator, but now our need is to follow through on the opportunities provided by these candidate hosts to maintain program management as necessary, maintain technical support as necessary, and

this is part of the railroad, of course, that has to be sustained, part of the tracks.

That concludes the remarks I wanted to present to you. We will, through Mr. Milner and Mr. Gertz' presentation, be giving you more details on some of those factors, and we are, of course, available now for questions as you see fit.

DR. DEERE: Yes. I wonder if you would like to take questions now, if the Board would like to ask questions now, or if we should get to them later in the afternoon after we have heard the other presentations.

DR. CANTLON: Well, it might be just as well to get the answers later after we have heard them.

DR. DEERE: I think, if it's okay, we might get questions now, if that's okay.

DR. BARTLETT: I'd be glad to.

DR. DEERE: Okay. Comments? Yes, Warner.

DR. NORTH: I wonder if you could tell us about the Fiscal '93 budget. If this process has a lead time of a year and a half, obviously, you can't tell us how the process is going to come out, but maybe you could give us some idea of what the plan is and what thinking you have done about the contingencies if you do not get an increase

in funds shall we say in the next $50 million increment that you'd need for the program?

DR. BARTLETT: Well, I really can't tell you anything about where it stands until the President's budget is on the table, which is fairly shortly now, and I also can't tell you about how it got there.

There are many, many steps in the process, and the situation varies as you go through the steps. There are iterations between the Department, between OMB, iterations within the Department, and then, of course, ultimately, after the President's budget is established, we have all the associated Congressional decisions.

What I can tell you is that what we sought, what we are seeking, is totally consistent with what I have described here. In my interactions with the Secretary, I made the point of progress and sustainability of the program coming in large hunks and the implications of that with regard to the program, and fundamentally, the point that if
we don't get the hunks, we don't make the progress.

It does no good to have $10 million increments because that does not meet the needs of the program, and $30 million cuts, which if you put that in perspective, if you look at that distribution, then you'll see this layer in

more detail. If you assume that all of the discretionary funds in the program were essentially to be applied to the Yucca Mountain, $30 million on that budget was 50 percent of the discretionary money to the program.

The cost to run our railroad tracks, to run the tracks to this program is very high because of the regulatory requirements, so that $30 million was a very significant number, and as we balance it with the goals and things I described, it had the impacts which I have outlined to you. As I said, you'll see more about that.

We're doing the same sort of thing, Dr. North, with respect to the future. We play the contingency game all the time. We drive poor Carl nuts. What if your funding is this, that? And the same with Ron. And we are continually responding to the possibilities, and this does go on as the numbers vary, as we go through the process leading to the present. It's a very dynamic process.

DR. DEERE: Any other questions? Clarence?

DR. ALLEN: You have emphasized time and again the equal rank of the 1998 and 2010 deadlines. It seems to me

that in terms of the 2010 deadline regarding Yucca Mountain, at least we know what has to be done given adequate funding. Volumes have been written about what has

to be done in terms of characterization to either prove the site suitable or unsuitable.

The 1998 deadline depends critically, apparently, upon this 1992 siting of the MRS. You say you're optimistic. I fail to understand why you are optimistic if only two of the study contracts have even been let to date. How can you be optimistic that by the end of 1982, we will actually have a site for an MRS chosen?

DR. BARTLETT: I said we know where we're going, and that's very important, that we have identified where we're going, who the host or hosts will be. I say I'm confident of that because every one of them is as interested as we are in knowing where they're going to be a year from now because they do not want to drag out the process, and we're not going to allow it to be dragged out and just throw money at the Federal trough handing out money.

We have established and outlined for you the process associated with this thing. What the potential hosts are responding to is what we call a Phase I application or grant opportunity, a grant to evaluate whether or not essentially they are interested in hosting an MRS. So Phase I is very short and it's limited funding --

$100,000 maximum -- and it's just for them to evaluate the

feasibility of proceeding.

Then we move into Phase II, which has two components, and Phase II is the winnowing process. If they determine that they are interested in proceeding after they have gone through Phase I, which is very short -- if Mescalero or Apache have completed it, next week, I will receive their application for Phase II, and the others are on the same kind of fast track. They are very interested in progress.

In Phase II, as I said, there are two parts. There's an initial part, where essentially they expand their determination of whether or not they want to proceed, and at the end of that, which also has a relatively limited dollar figure associated with it -- it's not fixed, but it's relatively limited -- if they want to proceed, they will be required to enter into negotiations, then they are serious, and then we start applying serious money to development, design and the details that go with it.

So we have a selection process where, first of all, they determine whether or not they are interested -- nine of them we expect so far. We have extended the opportunity for more people to come into the picture if they want. We just had a Federal Register notice extending the applications for Phase I to March 31. Then we will move

forward with those to this Phase II, this winnowing process, the first part of Phase II being this essentially determination on their part as to whether they really want to go or not, and then those that do will be moved into more significant funding, on the order of probably several million dollars, to develop the information with regard to the site, the design for the site and things of that kind. They are all interested in getting there in a relatively short time frame.

Now, one of the things that we have to accommodate now that this is moving so rapidly and effectively is we have to be able to follow up and apply the monies to follow through with those activities.

We originally had budgeted in this program $1.097 million for this purpose, and with nine applications at $100,000 a piece, the monies now to follow through on Phase II are going to have to be obtained from elsewhere in the program, and we are working on that. This will be Fiscal '92 money.

DR. CANTLON: In looking at the 1993, you're talking about $50 million increments to move ahead. To what extent is that number able to be reduced by reducing the size and scope of the ESF, or is it going from smaller diameter tunnels, not putting the very large portal development, et

cetera?

Has any thought been given to this modified design?

MR. GERTZ: Yes. This is Carl Gertz. John, I'll talk a little bit about that in detail as I go through it, and if I haven't answered your questions, we'll bring it up again. But yes, a lot of thought has gone into that.

DR. PRICE: Price here. This march to 1998 appears to me to be something that is really scuttling any hope of top-level tradeoff studies, because you're entrained toward this 1998 date.

The GAO study that I'm sure you're familiar with, raised the question or made the statement that it was highly improbably that you would be able to reach this 1998 date.

Given the consequences of marching so vigorously toward a 1998 date, which as I would see it, really has a great impact on systems engineering and making the top-level tradeoff studies that may be part of a thing when we understand you're just getting your toolbox ready for those kinds of studies, would you comment on both the GAO study and my comments about what the entrainment in this march toward 1998 is, the consequences of it?

DR. BARTLETT: First of all, the GAO study was

essentially overtaken by events. If you look at the process to produce such a study, it was started back in January of 1990, and it was produced before the negotiator had had any

results to report. The effort to complete the report was completed in June by GAO. We did not yet have any results from the negotiator.

They interviewed the Negotiator something like a month after he was confirmed, and there is on the record, available to the record, his indication that in essence he had to put what he said in context, the situation in which the information was gathered. And Senator Bryan and Senator Hollings, the originators of the GAO report, were looking for, under the circumstances, the kinds of results that they, in fact, were demonstrated in the report. We disagree with a lot of that report.

DR. PRICE: But the reversal issue of the linkage status, that's not changed at this point, is it?

DR. BARTLETT: As it stands right now, there is still a scheduled linkage. That is an issue. What is anticipated is that an agreement negotiated by the negotiator and taking to the Congress would, in fact, include as part of that a removal of the current linkage,

that that would be enacted into law with Congress ratifying the agreement.

In addition, we have initiatives before the Congress and legislation in a bill in the Senate and the House where action has been taken, which would remove the linkages independent of the agreement with the negotiator.

Let me talk about another concept and a failure to meet 1998, and that is on the part of those who are paying the fees for the services which are expected to be delivered.

Suppose you were paying these fees and have paid all that money so far, and now there was no expectation of fulfillment of the objective for which the fees were being paid. What would you do? Well, you'd sue. That's what we anticipate would happen, or a possibility.

Another possibility is to stop payment of fees, put the money in escrow, and don't provide them to the federal government.

There are enormous consequences relating to that contractual obligation which has been established for our failure to do everything we can to fulfill that obligation.

It's something we simply must do.

DR. PRICE: And could you comment on the consequences to the to-level tradeoff studies and these other things that might normally go on in an ordered systems engineering program?

DR. BARTLETT: If the funding is not sufficient to hold the 1998, to hold the ESAAB plan for Yucca, then they've got to slip, the rate of progress has to slip, and it's as simple as that.

The basis for decision-making would then proceed with the rate of progress. What we try to do is balance the M&O, the top-level studies that you're referring to, with the status of the program as it is proceeding in accordance with the funds provided.

If, in fact, now Congress steps up to the thing and says: Yes, you have a solid foundation, and all of the enablers in the budget process say: We're no longer worried about permanence and things like that that can interfere with your progress, then we can move forward and do those studies on a schedule and at a level and at a target consistent with the basic program plan.

Otherwise, it would have to fit with everything else,

consistent with the policy that I outlined earlier.

DR. VERINK: I wonder if this 10,000 metric ton capacity constraint -- I have a throat problem, too -- is complicating your business arrangements with the power companies and so on by limiting the amount that can be taken? How is that going to be handled? How are you going to avoid suits on that?

DR. DEERE: That was Dr. Verink.

DR. VERINK: Pardon me. I didn't say. I forgot to --

DR. BARTLETT: I'm sorry.

DR. DEERE: No. Go ahead. I was just getting his name into the record.

DR. BARTLETT: Oh, I'm sorry.

At present, we don't see the 10,000 ton limit as a problem. We anticipate starting taking spent fuel in 1998 at a rate of about 200 metric tons per year. But we have an escalating scale, and in the second half of the first decade, we start to bring in the advanced transportation casks which are under design now.

The reason for the duality in the transportation system is, we don't expect that we can get those advanced casks licensed and proven for service in time for 1998, so we're going to have a collection of current technology casks, a fleet that will be available for service starting

at few hundred metric tons per year, and we'll be operating at that level and ramping up, ramping up to a level where we start actually to eat into the rate of production, the rate at which the spent fuel is being generated, which is about 2500 tons per year.

Now if you look at the logistics of that, it turns out, at the end of the first decade, you are just about at 10,000 metric tons, getting close to it.

You're also, if we're on schedule with disposal, starting to be ready to move stuff through the system, and it turns out that you could, if disposal is on schedule and it matches the rate of receipts, you can maintain steady-

state at a 10,000 metric ton level.

I would like to think also if the system is operationg at that point and operating effectively, that 10,000 level is originally imposed to make darn sure that the MRS did not become the de facto repository and just piled up, that that number is adjusted, and I think a well-operating system would allow that to be adjusted as necessary.

But it is possible to live with the 10,000 limit based on what we know now in terms of these logistics we expect for operation of the system.

DR. VERINK: It seem that 2010 is coming pretty

rapidly, too.

DR. BARTLETT: Oh, yes, very much so.

DR. VERINK: And the problems of disposal are going to imply someplace getting started on the EBS stuff in a big way.

DR. BARTLETT: Amen! I talk about flex in getting to that milestone specifically, getting to whether or not the site is suitable. There's flexibility in the activities within that.

There is not flexibility in terms of this time/money interval to get there. That has to be fulfilled. There's flex in the way in you do it within, but there is not flexibility in what has to be resourced to the program

to meet that goal.

And as you say, if we don't get the resources, we don't have the resources, we will not make that schedule. If we do, I think we can. And I also think that the one-year delay, assuming that it's no more than that, is not a significant factor with regard to making progress toward the significant milestones for the progress with disposal. I think we can accommodate, but we cannot tolerate deficiencies in the total resource package in order to meet the goals.

DR. DEERE: I think we will discontinue our questions now at this time and continue later this afternoon after we've heard the other presentations.

Let's take a coffee break and be back here at about 10 minutes to 11:00.

[Brief recess.]

DR. DEERE: May we reconvene, please?

We will continue with the DOE presentation. The topic of storage and transportation and budget priorities will be addressed by Ron Milner from the Office of Storage and Transportation, DOE/OCRWM.

Ron?

[Slide.]

MR. MILNER: Thank you, Dr. Deere.

You mentioned I'll be covering what is basically

the front end of the waste management system and the MRS and transportation program.

[Slide.]

MR. MILNER: I would like to cover a little bit about the organization of the Office of Storage and Transportation, the major milestones for the MRS and transportation program, some of the '92 budget information, the program priorities for those two programs, and the

rationale for those priorities.

[Slide.]

MR. MILNER: The Office of Storage and Transportation is comprised basically of two main divisions: the Storage Division under Vic Trebules, which is responsible for the siting or support to the Negotiator in this case for the MRS, its design and development, and the Transportation and Logistics Division under Jim Carlson, which is responsible for the transportation system and the logistics, the waste logistics, and the interface with the utilities.

So between those two divisions, they really comprise the front end of the waste management system from the reactor interface to the transportation system to storage and then ultimately transportation to the repository.

[Slide.]

MR. MILNER: Some of you may have seen some of the artist's concept drawings that have been put together for the MRS, but just to cover briefly what an MRS might look like, it really looks like a modern industrial park, a series of low-rise buildings housing the admin facilities and then the storage and handling area. This particular one shows a cask storage and a simple spent fuel handling

building.

[Slide.]

MR. MILNER: This is what a concrete cask might look like.

[Slide.]

MR. MILNER: And the simple transfer facility. I might point out, that particular design showed the concrete casks, but a steel cask facility might look very much the same. Certainly if something like dual-purposes casks were used, you wouldn't see a transfer facility, perhaps, on it.

[Slide.]

MR. MILNER: This particular MRS shows the modular vault dry storage concept. No spent fuel handling building or transfer facility.

[Slide.]

MR. MILNER: Because that particular design encompasses a simple transfer facility, the transport casks are offloaded, and the fuel is stored in the fuel elements.

[Slide.]

MR. MILNER: This particular one show horizontal concrete vaults.

[Slide.]

MR. MILNER: And a closeup of what that might look

like. Fuel is loaded in canisters which are inserted in the modular vaults.

[Slide.]

MR. MILNER: Major milestones for the MRS program. We're currently in the conceptual design phase of the MRS, looking at a variety of storage concepts, as you have seen, that could be used at the MRS, doing some tradeoff studies on those concepts, and we hope to complete that effort later this spring.

As Dr. Bartlett mentioned earlier, our key date really for the MRS is identification of the host by the end of this calendar year. We think that date is achievable. We are very optimistic, at least.

The rest of the milestones for the MRS program really key off that date, all leading to a 1998 waste acceptance.

One item I wanted to point out was that the environmental assessments for the MRS, the environmental assessment must accompany the proposed agreement that's submitted to Congress for a proposed site, so that

particular item is a priority for us.

Another item I wanted to point was that in discussions with the NRC, they have agreed to accept the safety analysis report in advance of the remainder of the license

application. We plan to submit that in '94 to provide a longer time for review by the NRC. They can be reviewing the SAR design and other design aspects, begin reviewing that a full year before the license application is submitted in '95. So between submittal of the license application and the planned start of waste acceptance appears to be a relatively brief period of time, approximately an 18-month review from the time the license application is submitted.

In effect, they've been reviewing the design for a full year prior to that.

[Slide.]

MR. MILNER: On the transportation side, as Dr. Bartlett had mentioned earlier, we have revised the cask acquisition program into a two-phase program, Phase I being procurement of either existing casks or new casks that use current technology or a combination. And Phase II casks are the higher-capacity casks which we've had under development for a few years.

So our priorities in that area are to issue the RFP for the Phase I casks later this spring, and although

we've slowed the design efforts on the Phase II casks to allow us time to step back and take a look at the design of

those casks in light of the additional information that we've got and recognizing, I should say, that the RFP for those casks was issued several years ago. We've learned a lot in terms of reactor interface situations since then, and we wanted to step back and take a look at those casks relative to that new information.

So we've slowed that effort, but we still hope to complete the design of those casks by the end of the fiscal year. You would then award procurement of the Phase I casks around the time that we're identifying the MRS host; following from that, certificate of compliance of the Phase II casks in '94, concluding the procurement of the Phase I casks in '96; full-scale fabrication of the higher-capacity Phase II casks in '97; all leading to a system which would be capable of supporting the MRS operations in 1998.

[Slide.]

MR. MILNER: Just briefly the budget numbers in the MRS transportation area and related activities. Our budget request for '92 was about $61 million. What we came out with was about $40.4 million, although that really didn't put us in too bad a shape, since we had Fiscal Year '91 carryover funds. So we really have an availability of about $50.2 million for this fiscal year.

[Slide.]

MR. MILNER: I think most have seen these drawings before, the two high-capacity casks or what we're calling Phase II casks which we've had under development. This is the 100-ton rail cask, capable of carrying 21 PWR assemblies or 52 BWR assemblies nominally.

[Slide.]

MR. MILNER: Two legal weight truck casks which are under development. This one is the GA-4 for PWR assemblies, and the other is the GA-9 which would carry nine BWR assemblies.

[Slide.]

MR. MILNER: Program priorities for '92 in the MRS. The overall objective, certainly, of the MRS program is to have a facility which is operational and capable of accepting waste beginning in 1998, not only to fulfill the Secretary's commitment to begin accepting fuel in '98, but also to uphold our commitment under the contracts with the utilities to begin accepting fuel at that time.

So in '92 specifically our priorities relative to that objective is to complete our conceptual design of the MRS, provide siting support to the Negotiator and volunteer hosts, provide grants to potential volunteer hosts, and as Dr. Bartlett mentioned earlier, we've got a total of seven

applications for feasibility studies for the MRS. Two grants have been awarded, one to the Mescalero Apache in New Mexico, the other to Grant County, North Dakota. We are currently reviewing the remaining five applications and hope to act on those in the near future.

Those are all Phase I grants. We would expect several more Phase I grants in the near future, as well as several Phase II grants over the next several months.

Also since the licensing timeline is critical to the MRS work, we want to begin work on the safety analysis report and the environmental assessment to support the siting effort.

[Slide.]

MR. MILNER: Finally, we must complete the MRS project plan and project management plan and other documentation which is necessary to support the ESAAB process and gain approval to begin Title I design, which basically pretty much forms the basis for the SAR design.

[Slide.]

MR. MILNER: The rationale for those priorities, again siting is the critical near-term milestone for the MRS, so our priorities are really focused on those activities which support siting. Again, the grants support the negotiator's

environmental assessment activities. Personally, I think the conceptual design input is also a very critical factor in the MRS siting effort, so we're

placing priority on completing the conceptual design and certainly submittal of the SAR to NRC.

[Slide.]

MR. MILNER: In the transportation area, it's important not only to have the hardware in place to begin transportation operations in 1998, it's also very important that the appropriate institutional and operational climate is in effect to support those operations. So our priorities, particularly in '92, are geared towards that.

We want to issue the RFP for the complementary casks, the Phase I cask capability; complete the final designs and submit the safety analysis report for packaging for the two Phase II casks, the higher-capacity casks, to NRC; maintain our program efforts on burnup credit. Now burnup credit is important not only to design of the higher-capacity casks, but could also be important to the repository effort, as well as other technical issues that we want to work on.

Since the institutional environment is very important, we need to continue our work on the institutional planning and other issue resolution activities.

[Slide.]

MR. MILNER: Under Section 180(c) of the Nuclear Waste Policy Act, we are required provide emergency response training assistance to jurisdictions through which the waste
will be transported. We've embarked on basically an interactive reiterative public process to develop our strategy for how we're going to provide that assistance.

We very recently issued a draft of what I would call a plan for a plan on how we're going to develop that strategy, looking for public comments on that, and then begin the final stages of implementation of developing the strategy. Certainly, we have to conduct the transportation analysis to support the MRS environmental assessment, and under the transportation area, support the delivery commitment schedule process, and I'll talk a little bit about the delivery commitment schedules in a minute.

[Slide.]

MR. MILNER: The rationale for the transportation priorities, certainly the acquisition of Phase I casks is, I believe, necessary to ensure that we have an adequate transport capability in 1998, and our schedule shows that we need to proceed with that acquisition and to issue the RFP this fiscal year to allow start of waste acceptance in

'98.

Also to facilitate the waste acceptance rate ramp-up, since the Phase I would be a lower capacity, smaller capability in the early years to accept waste, we need to continue development of our higher-capacity casks to increase that acceptance rate.

Again, we must support the institutional climate

to facilitate operations and develop our 180(c) strategy to provide emergency response training assistance.

[Slide.]

MR. MILNER: Lastly, in the waste acceptance area -- and this is an area which is the direct interface between the Department and the utilities, developing the protocols and the schedules for how we will accept waste and when -- one item that is slightly different from those particular activities is the fees that the utilities pay.

As a result of a court decision, we were required to change the basis on which we charge the fee to the utilities from net generation to generated and sold. So one of our priorities for this fiscal year is to issue the final rule changing that basis. I'm happy to say that we completed that last year, or December 31st to be exact.

Our three other priorities this particular fiscal year

are really interrelated: publishing the '92 acceptance priority ranking; the '92 annual capacity report; and begin work on delivery commitment schedules.

Now these three reports or activities are really very directly interrelated. The annual capacity report, the ACR, has been published now for several years. That lists by year the capacities that the waste acceptance system, the waste management system, would accept in a given year.

The APR, the acceptance priority ranking, which

we've just recently published our first one, lists the specific utilities in priority order and the quantities from each utility that would be accepted.

So those two tied together, then, form the basis for the utilities' preparing delivery commitment schedules, which is the identification of the specific spent fuel that the utility wishes to ship to us. It's then incumbent upon the Department to review those DCSs, delivery commitment schedules, and approve or disapprove, based on the protocols that have been established.

And that concludes my remarks. I'd be happy to answer any questions.

DR. DEERE: Perhaps I'll start off the questions.

MR. MILNER: Yes, sir.

DR. DEERE: What type of flexibility do you have in the transportation and the cask program to accommodate future changes that might come about, for instance, in drift storage versus in-place storage, tripurpose cask?

MR. MILNER: I think we have a lot of flexibility, particularly given the time differential between shipment from the reactor to the MRS and subsequently approximately 12 years later shipment from the MRS to the repository. I think there is certainly enough time in there to make changes to the transportation system, should that be necessary.

DR. DEERE: Dennis, you may have more questions on that line.

DR. PRICE: But the twelve-year delay that you're describing, how does that affect if you had a universal cask as your thing? I don't quite see what advantage you gain by saying you've got twelve years at the MRS. A universal cask which would be useful to store onsite, store at the MRS, and even emplace at the repository, what does twelve years at the MRS -- I didn't understand your point.

MR. MILNER: Okay. I was speaking simply for transportation from the MRS to the repository. I think Dr. Deere's question was that if there were some specifics of

the repository that might change the transportation system, we might want to change the from the MRS to the repository casks, using different casks than you use to the MRS.

Now universal casks, certainly that is still be looked at as a potential for the system in general. Whether or not it's used for early stages of the system, if it should be decided to go to a universal cask, you could, beginning at whatever point in time that occurred, start utilizing universal casks for any waste that had already been shipped to the MRS, could be loaded into a universal cask at the MRS.

To some extent, what type of storage and so forth is going to be used at the MRS is not up to -- it certainly has got volunteer host input involved in that.

DR. PRICE: But you say if you should decide to go to a universal cask, but really the way in which the 1998 date is set and you're moving toward it, that pretty well dictates conventional casks at least being very thoroughly accommodated by this system and diminishes the possibility of a real fair look at all cask options, does it not? I should form that as a question rather than a statement.

MR. MILNER: No, I don't think it does actually.

DR. PRICE: I'm surprised at your answer.

[Laughter.]

MR. MILNER: I think there's been a pretty fair look at casks at this point in time. But one thing I think we have to recognize is that not all reactors could handle a large universal cask, which would likely be a rail cask. There would still have to be some accommodation for many, many reactors unless you use the very small, very inefficient universal cask to load those reactors that aren't real capable. So you would still need some marshalling yard, if you will, to make a transfer to universal casks.

DR. PRICE: But I haven't seen the tradeoff studies really that support the statement you just made.

MR. ROBERTS: I think there's a -- John Roberts --I think there's a more fundamental question here, though,

and that is, we have to get ultimately a license to dispose, and I think Carl could, of course, go into great detail on the technical issues and so forth. But it is difficult in melding, if you will, various activities and various regulatory requirements a la Part 71, Part 72, Part 60, particulary when Part 60 still has some work to go on it, to bring these together.

And indeed back in, I guess it's about '88, the Commission itself when it was pushing along this line for

compatibility recognized that and basically settled for, in terms of compatibility, the ability to get fuel directly out of dry storage off of reactor sites as a phased objective which vendors are trying to accommodate through various strategies of design.

But I think my point being that until we have some idea of what will be acceptable, and indeed NRC itself cannot yet define that, I think -- until we have gone through the process of excavation and determined what the circumstances are and what will be acceptable for a repository, I don't think we have a good prospect of development of such universal casks.

Now that's not to say that in subsequent times as we have defined these things, you would not say, well, improvement can be made to the existing system, and it would be much more efficient and so forth. But from where we sit
now trying to get to our objectives of getting the system into operation and the large set of unknowns involved, it's just, I don't think, really optimistic to say that I can, from where I'm sitting now and at this time in 1992, get, you know -- do a study and do it competently, if you will, to get to a result, end result, when I have not yet defined what my repository is and what the impact is on my

universal cask.

DR. PRICE: From what you're saying, it sounds like timeliness is greatly of issue and very perplexing with respect to what is going on. And with respect to these top-level types of studies that we're talking about, as was described at the last meeting of the Transportation System Panel, I think the DOE person said you're behind the power curve.

Now to a person who's been a pilot, that's not a very desirable place to be, behind the power curve, because the next consequence is a crash.

[Laughter.]

MR. ROBERTS: What I say is, you have to know what the power curve is before you can even begin to design to meet that. We are not, I think, at a mature enough stage, and one can well argue that until we get a license for a repository and have fully defined what is available to us and perhaps even some performance data within that,

repository to project ahead in the absence of such knowledge is kind of intellectually arrogant, if you will, in the sense that we just don't have, you know -- these are not activities, at least in the repository sense, where we have the experience and the base of information to make a

leap.

As I say, there are vendors that are attempting to do things. There is at least one dual-purpose transportation storage cask in development, and NRC has an application under both 71 and 72. But the leap to Part 60, given that we have never had a repository, and we are still in the process, as Dr. Deere has pointed out, haven't gotten down there, to make that plan ahead of time is going to be risking a lot, if you want to be serious about it.

I think your point is taken, that the timeliness of this is at issue. As I said, the Commission itself looked at this idea in '88 and backed away, because they recognized that the timeliness was just not there, and I don't think it will be there, as I say, for years to come.

DR. PRICE: But you are proceeding on a plan and a design, and it's pretty well just determined by date. It sounds to me like the design is determined by regulations, and the design is determined by the fear of lawsuits and lawyers. And I would suggest that that isn't the right basis for a design.

MR. ROBERTS: Well, we have -- number one, I think the basis of the regulations is the public health and safety and Part 60 isolation of waste for the required time. So I think those are not non-germane.

But I think the point is that what we're saying also is that we are trying, given the funds that we have and the limitations we're operating under, to gain the information that we can get to a design basis. If we don't have the information, if we don't develop that, we are not in a position to make the design assumptions that would be necessarily correct.

MR. PETERS: Dr. Price, if I may -- Frank Peters -- part of what you say I agree with, that many of the decisions that have been made to this point vis-a-vis cask technology are, in fact, driven by the 1998 contractual commitment. There's no question about that.

In our view, from the analyses that have been done so far, we don't believe that there's any capability, other than currently available, certifiable cask technology, to meet at least the initial starting requirements for the MRS in the transportation mode.

What I would point out, and I think you're certainly aware of it, is that the MRS will not be filled in the first year nor the second year nor the tenth year. Basically you have a long period of time during which transportation activity will be moving into the MRS, and

then ultimately when the repository opens, moving out to

the repository.

I think more importantly we're probably dealing with -- Carl, check me on the numbers here -- but as I recall, we're dealing with about a 30-year period during which the repository will be filled at the current design levels, assuming that we are able to accept fuel into the repository in the 2010 timeframe.

I think there is sufficient time to deal with the potential of three-way casks or other kinds of technology that may emerge in the future considering the regulatory uncertainty here. And even though we may have somewhat of, let's say, an uncertain startup in the context of an overall systems capability running at its optimum, at least under our current thinking be able to get started and also have the time to be able to develop any additional technology and capability that may, in fact, be better for us, better for the system over the long haul.

DR. PRICE: I would just like to make a point of clarification. I don't think that we, as a Board, are recommending any of these alternatives. What we're really concerned about is that the alternatives get a good look and that the schedules don't determine the loss of viable alternatives if they exist.

MR. MILNER: And I think we're proceeding on that

course. We haven't, that I'm aware of anyway, taken any actions which would scrub any alternatives that we might want to look at.

One thing we have to recognize, though, is that one of the key drivers of the system really is the reactor interface. What are the physical constraints at the rector site in terms of loading a cask or in terms of casks it can handle?

So we proceeded with that sort of information in mind, and, in fact, one of the main reasons we've stepped back a ways on the Phase II casks was to review those designs in light of additional information in that regard.

Certainly the MRS facility can be engineered to accommodate not only that front-end part of the system, but also the back end, the repository. And we have to proceed on a basis as to what we think the repository may or may not be, and as additional information is gained here, I think we can adjust.

DR. DOMENICO: Dr. Domenico, Board member.

In view of the tight schedule, do you anticipate or have you seen any signs of any difficulties between a given entity such as an Indian Nation or a county that may want to act as a host for the MRS and the state in which that entity may reside?

Has anything -- I mean, we have some experience

with WIPP and the State of New Mexico, and I would anticipate there may be similar problems down the line for this project.

MR. MILNER: I guess we've seen press reports coming out of New Mexico relative to the Mescalero Apaches. I don't know exactly what the situation is there. Certainly in the case of Mescaleros, they are a sovereign nation and would react accordingly.

DR. DOMENICO: What does that mean? Did you answer my question?

[Laughter.]

MR. MILNER: That means lands under their jurisdiction are not necessarily subject to state jurisdiction.

DR. DOMENICO: I see.

MR. MILNER: Obviously there has to be a very close working relationship and coordination for such a project to work. But I'm certainly not an expert on Indian law or the laws governing a reservation.

DR. LANGMUIR: In one of your overheads, you discuss the waste acceptance priority ranking schedule which is to be published this year. In that context, we're all interested in thermal loading issues. And my question has

to do with what the priority says about the age of spent fuel being taken from the different power plants.

MR. MILNER: That priority is based purely on the provisions of the contract, which say we would accept the oldest fuel first.

DR. LANGMUIR: The oldest first.

MR. MILNER: Yes.

MR. GERTZ: If I could elaborate a little further on the subject of universal casks, et cetera, and try to put things into perspective from a repository point of view.

Certainly we have not closed out any alternatives, whether it's drift disposal, emplacement in boreholes. Those are still alternatives that we're looking at, although we have reference cases.

But I can see a system, perhaps, that received 7000 or 10,000 metric tons early in the life cycle to meet our contractual needs and utility needs, and then the other 90 percent of the repository could be transported by universal casks, if a system study shows that universal casks is the way to go.

Obviously as Ron pointed out, you have to make that change then at the MRS. What went to the MRS in a standard transportation cask would then be transferred to a

universal cask to a repository.

So I don't think we're precluding that option by the initial acceptance. But it's not a perfect world; 100 percent of it wouldn't get there in a universal cask. But

maybe 90 percent would, and maybe that would be an effective systems answer to it.

DR. PRICE: Well, looking at either end of the system, first of all at the repository, the type of emplacement and the type of cask may have some implications about the size of the tunnel and some other things, and will these tunnels already have been accomplished?

I'm not sure what that tunneling schedule would be and determination would be with respect to something like that.

And the other side of the thing would be, how does this work with the utilities where maybe the cask selection in their dry storage, in their designs and so forth, if they had knowledge, timely knowledge, about the system, they could help to optimize the system to some extent?

MR. GERTZ: I'll let Ron answer the second part of that. But for the first part, I think, as John Roberts points out, we do have to get underground, develop some information, and then proceed with a license application, a designed and engineered barrier system in concert with the

geologic system.

At that point in time, we would then make some conclusions about what type of emplacement we'd have. Although we'll have 14 miles of exploratory drifts, it still take about 100 miles of emplacement drifts to handle 70,000

tons.

So I think the idea is to get underground, develop a licensing concept, a system that a regulator will accept and then move on with what makes the most sense, be it borehole or drift emplacement or whatever. But I think we need to gather some information underground before we come to that conclusion.

MR. MILNER: The second part of the question, given the successes of the negotiator thus far, it looks highly likely that waste acceptance will begin several years before we've even identified the repository site, selected it, that is. So I think we have to proceed with at least the front end of the system, given the best knowledge we have as to what a repository may be, but recognizing that that system would start operation before we have a repository site selected.

Secondly, on the oldest fuel first basis of waste

acceptance, the majority of reactors in the early years that we would be accepting waste from probably would not be capable of handling universal casks, so we would still need to make a transfer at some point should we go to a universal cask later.

DR. PRICE: And by the way, the oldest fuel first, as I understand it, does not mean the oldest fuel first as shipped.

MR. MILNER: That's correct. That's correct.

DR. PRICE: So that's kind of a misnomer.

MR. MILNER: Yes, that's correct. The oldest fuel first is simply allocating a place in the queue; that's right.

DR. PRICE: Yes, that's right. So with respect to the heat load and mixing, the answer you gave to Dr. Langmuir does not mean that what the utility will ship will be the oldest fuel first.

MR. MILNER: That's right. That's right. That purely gives their place in the queue, and the delivery commitment schedules that I mentioned, which conceivably we could start getting delivery commitment schedules from the utilities as early as this month, would then start to identify that specific fuel that they want to ship in those

given years. At that point, we'll start to know what fuel we're going to be seeing.

DR. DEERE: Dr. Allen?

DR. ALLEN: But isn't it true, Carl, in a more general way that the more we allow the schedule to slip at the front end -- it's already slipped on the ESF; it's my hunch that it's going to slip on the MRS -- but we adamantly maintain we're going to meet the eventual deadlines, we thereby simply reduce our flexibility to make changes down the line. We start our tunneling on a fast-track basis, as
John Bartlett suggested.

Doesn't that imply that it's going to be more difficult to give careful consideration to many of the things that this Board has felt is important, such as thermal loading problems, engineered barriers?

All we're doing is, we're essentially reducing that flexibility and making it much easier in the long run to say: Well, let's just do things the way we planned five years ago.

MR. GERTZ: I don't necessarily agree with you, Dr. Allen. I think our initial excavation, our initial site characterization activities, are just that, trying to gather information. And because we would have a 25-foot,

let's just say, diameter drift in the exploratory studies facility does not necessarily mean that the 100 miles of tunnels that would follow on that would be 25-foot diameter. If in-drift emplacement is appropriate, it would be whatever diameter would be appropriate for in-drift emplacement.

If we can determine that from the studies in the exploratory studies facility, then I don't think anything we do in the exploratory studies facility locks us into our final design. We have to consider it to make sure it doesn't impact waste isolation, and we have to assure that before we start that. But I don't view it as an irrevocable commitment as you may have implied. I think we have a lot

of flexibility after we get underground and determine what's there.

DR. ALLEN: But you would agree, though, that the shorter we make this whole thing, the less flexibility we have.

MR. GERTZ: The less time we have to look at options. Yes, sir, I will agree with that.

I'll also just -- and I'll talk about it in my presentation -- but certainly you come to a point where if

it's a 1000 man-hours job, you can't do it sometimes with 1000 men in one hour.

[Laughter.]

DR. DEERE: I guess what prompted my question, you have Phase I and Phase II. They all seem very definite, and you have dates with them, and that's the end of it. So you sort of wonder where the flexibility is.

We might feel better if you had an analysis, if it's starting in 1999 or something like that, of a need for a Phase III, which is really what we're saying. It's going to be related to what the final configuration is at the repository, and that is not known at this time and won't be for many years.

But I don't think it should be a sudden change: Oh, we've got to go to a new cask. But it should be something that is in everyone's mind and in the program,

that it will be an analysis of the desirability or the need.

MR. MILNER: In effect, that's been our program plan for some time.

DR. DEERE: Yes.

MR. MILNER: We have focused certainly on the front end of the system, from reactor to MRS, but it has been the

program plan to look at yet another generation of casks that would be really the long-term basis for the system. And while there are no dates that have been given on the schedule, that certainly is a part of the program plan.

DR. DEERE: It should be somewhere on the list.

MR. MILNER: I am guilty of focusing on 1998.

DR. DEERE: I'm very sure. Additional questions from the Board?

[No response.]

DR. DEERE: Staff?

[No response.]

DR. DEERE: We will now open to any questions, I think not only for your presentation, but also Dr. Bartlett's, if that's okay. We have about another 20 minutes available. So it's open to -- yes, Bill?

DR. BARNARD: I have a question for Dr. Bartlett. On your last viewgraph, you have a piechart comparing the requested funding and the actual funding for 1992, and if

you compare the slices of the pie for first repository, the money that you actually got is $6.5 million less than what you requested. But in an earlier viewgraph, you said that $20 million of the ESF money was lost because of the $30 million budget cut.

So can you explain the difference between the $20 million and why the 6.5 isn't 20?

DR. BARTLETT: Let me offer you an opportunity to write down some numbers.

[Laughter.]

DR. BARTLETT: And there's one short answer also which affects this, and it's not reflected in these numbers, and it's still evolving, and that is the opportunity to use carryover.

But what we're working here with is the appropriations, okay. There are four categories. I'll give you a small table, and I'm sorry we don't have this visually, but it can tell you -- the four categories are the first repository, the MRS, transportation, program management and technical support -- in other words, the items that are identified in the pie.

The allocations that went into the requested fiscal '92 budget, the first repository, 172.2 -- these are in millions -- the MRS, 32.2; transportation, 38.8; program management and support, 61.7.

What we came out with on the basis of the $30 million cut is: for the repository, 165.6; for the MRS, 16.2; for transportation, 33.7; and for management and support, 59.6.

And the differential there in round numbers is the $30 million.

Now there is an addition, a still possible opportunity, to apply carryover funds, and Sam can speak more directly to this. But these funds have been sequestered, and they're not necessarily available to us, and we're still early in the fiscal year, so we don't know firmly yet whether they're available and how they will be applied.

DR. BARNARD: Yes, I agree with your numbers. They pretty much match up with the ones that I did based on your piechart. But the actual funding for the first repository is $6.5 million less than what you thought you were going to get; is that right?

DR. BARTLETT: Yes.

DR. BARNARD: But in a previous viewgraph, you indicated that the $35 million for the ESF work was now 14.5. Well, that's $21 million difference. Why isn't the $6.5 million $21 million?

MR. ROUSSO: Can I try and answer some of that? Sam Rousso.

Part of it, Bill, is really a -- it's not just of the immediate numbers, but of the view, as John had explained earlier, of the large block of funding, this $50

million block that you need to proceed and continue to proceed with major tunnel boring, machine support structures, the design effort for the ESF.

With the cut and with the change in events that took place once the budget was received, namely that we had some identified MRS interest shown. We had permits to do new surface-based work, which we proceeded to do in the summer.

That drained funds, so that there was a change in emphasis within the repository work as a result of that and as a result of trying to adjust that cut to support the effort that Ron was going to do in the MRS.

So it's not just that those dollars can be looked at in a closed package, shift for shift. Your numbers are exactly right, but it's that the structure of the program had to be adjusted with the totality of the numbers available, the carryover available, and what we see coming down for the next few years.

If that $50 million block is not sustainable in '92, '93, '94, then all these other factors come into play to adjust the program to proceed as best we can and maintain that balance between the MRS and the repository.

DR. DEERE: Any questions from the audience?

MR. FRISHMAN: Steve Frishman, State of Nevada.

Thank you, Don. I knew we'd meet like this again.

[Laughter.]

MR. FRISHMAN: In listening to John's presentation, first of all I'm compelled to, at least one more time, point out that there is a tremendous amount of inaccuracy in the statements that are made about the causes of delay in the past and how it has now shifted to another.

The current perception, as laid out by John even today, which is an incorrect one, is that the program was permit-limited up until this time, and now all of a sudden it has become budget-limited instead.

Well, I think it's fairly clear that there's a GAO report out there that talks about when the Department of Energy was ready to begin any work at Yucca Mountain. That report says not until at least February 1991.

We now have an indication that the Department is finally through, four years after the approval of the '87 amendment, the Department finally has acceptance of its quality assurance program, and that's been the holdup all this time.

The Department could not go forward without that, and they only had limited permission to do the little bit of work that they did last summer. And I think it's time to get over this nonsense of passing blame around when, in

fact, the Department was not ready to go to work, and they, themselves, even know that.

Now there are a few other things that I think need to be pointed out, and that's that if you continue to look at the program and where the limitations appear to be, where the promises are, the fact that it's schedule-driven, from John's presentation I think you can see that most of the factors that would keep the program from going forward are still factors that are out of the Department's own control. And this is somewhat by design.

The Department can't afford for it to be its own fault that it's not making progress. Just start looking at the factors involved. They're saying: we need all of the funding we asked for, or else we can't do all these good things that we said we want to do and that you have, in some part -- you, the Board, have in some part been responsible for at least suggesting they be looked into -- saying, as Carl Gertz put it lately: we need the insurance of preempting the state, so maybe in the future we won't delay the program.

Also, as John indicated, I think you indicated very clearly, John, in your presentation to the NRC a couple weeks ago, the idea that you're going to essentially get

everything that you want from the regulator. And what I see as one of the major pieces that you were hanging on this

morning and I've seen in the past is this idea that the annotated outline is going to lead to what is referred to as early resolution of issues.

Well, early resolution of issues is right now not accommodated in the licensing process, and what I'd like to know, at least in this instance from you, John, what indication do you have that the NRC is willing to engage in some type of alteration of the licensing process that would, in fact, allow closure of technical issues prior to license application? I don't believe it's there right now.

MR. ROBERTS: John Roberts. We're not talking closure of issues. Obviously issues don't get closed until you get a license and perhaps in some cases contingent later.

I think this is a mischaracterization of the annotated outline which was originally suggested by the NRC. The annotated outline is a process -- and it's been used in industrial licensing before NRC before -- for development of the safety analysis report in an attempt to frame and hopefully resolve issues on a technical basis with the

staff in order not to simply hit, if you will, a cold welcome at the door. It certainly, as many people -- if there are any people who have been involved with regulatory and utilities before know that you communicate with the regulator. You do not walk in and say -- hand him a large set of volumes and

say this is my application. I've been working on it for the last X years.

No, the annotated outline is an orderly process of presenting to the technical staff of the NRC what we are doing and keeping them informed and seeking their guidance.

MR. FRISHMAN: Well, I appreciate the patronizing answer, but there's a lot more to it.

One is, the annotated outline is, at least in part, intended to lead to topical reports. Topical reports have been indicated by the Department all along as being what they expect to be the vehicle for early closure of issues, and then with the hope that there would be some administrative mechanism to keep those issues from being opened, reopened on a technical basis, within a licensing process.

Now we have been trying to find out ever since the words "early closure of issues" came up, in fact in about

1983, trying to find out what the concept is that the NRC and the Department as applicant may agree upon as the meaning of the closure of issues.

What do you think closure of issues means when you say it.

MR. ROBERTS: I'm not saying closure of issues.

MR. FRISHMAN: Well, everybody else in the program is.

MR. ROBERTS: Well, I think that the ultimate closure of issues can only come, as I said, basically as a result of the completion of a licensing process. I think, you know, colloquial use perhaps has been done. But the fact is that the NRC does review topical reports. They have done this in NRR and NMSS, and those documents are used extensively. But they do not, as you seem to be trying to -- or maybe you don't grasp it -- are not a legal closure of an issue. They are not the issuance of a license, and any NRC Staff member, I think, would tell you that straight out.

MR. FRISHMAN: Okay. And you never intend that it be?

MR. ROBERTS: They do, however -- they do, however, lead typically to some kind of letter of approval from the NRC, which is usually caveated with a statement that the staff has examined these issues and finds, you know, the

presentation an acceptable means and doesn't plan to reexamine this issue unless -- and then usually there is a series of caveats, like the regulation changes, circumstances change, or some other factors of significance change.

However, the point I made is simply this, that any responsible applicant is going to try and address things, particularly in a complex issue like this where this is the first time both NRC and we are viewing a repository

application. It is years in the making, and for us not to aggressively seek to engage the NRC and for them not to, as they suggested an annotated outline originally with respect to development of the format and content Reg Guide on their part, for them not to engage us would not be, I think, an appropriate set of behavior for either of us.

MR. FRISHMAN: Well, this discussion on that relationship will continue at another time and another place, I'm sure.

Another observation that I think some of us were well aware of, but I think it needs to be pointed out, that while the Board is rather intense in its suggestion that budget priorities should be changed and the underground facility started immediately, what this deferral really has

done is it's deferred Title II design of the ESF for a year. That's the major action that has tilted everything else.

Now if we start looking at the reason for that, it's relatively simple. A year and a half ago when the Department laid out its budget proposal for FY '92, it didn't know it was going to have to do that. It didn't know it was going to have to redesign the ESF.

What we're dealing with is the deferral of something that was not contemplated at the time. And there was contingency money that would have been eaten up by procurements to implement this new plan.

So I think the lesson that's to be learned here --and I think there is reason for maybe some caution in talking about how fast it ought to get going -- the fact is, there was a design out there for an ESF that was not satisfactory to the Board, at least in the explanation of its basis. There was a design out there that other people were questioning, had been questioned in at least two DOE documents, one of which had to be redone because it did not yet describe an adequate design basis.

So what we're looking at is, in simplest terms, an original ESF that the Department now has backed away from,

walked away from officially in lieu of a better design, when a year and a half ago, they didn't even think they were getting into this.

So to rush now and be concerned about not immediately implementing that, if you look at the budgeting process, it's essentially impossible anyway. The Department could have twisted everything around and said: Uncle, okay, we're going to pour all our money into doing that. But they don't gain anything by doing that.

If they are really serious about determination of site suitability, there's an awful lot of surface work that can be done, still should be done, and is being totally ignored in the program.

And I would like to just suggest to the Board that you may want to at least spend some effort in listening very carefully to the later presentation of the status of surface-based activity, the thinking that is behind that, what are the real questions that are trying to be addressed, and whether it really serves you or anyone else to be so adamant about getting underground and leave the major questions that can be addressed from a surface evaluation, even of existing data, maybe directing where some new data ought to be collected or even looking very hard at existing data.

It may serve the whole program better, because it's clear the Department is going to proceed in that way, at least for a year, and they certainly could use the benefit of your thinking about what they've got right in front of them right now, rather than continuing this sort of wrestling match over when you get underground.

I have one final point. John, I heard your statement about contingency planning and your explanation of it not being a public process, and maybe by your own definition of "public process", that may be correct. But it certainly does not serve any of the 200-some constituents that you say that you've counted up for you to make contingency planning essentially a secret process.

Now I think this is one of the things that came out very clearly in your meetings prior to developing the

mission plan amendment. People want to know about contingency planning. The constituents want to at least know whether what they have said about contingency planning is even affecting your thinking. And I don't think hiding behind the fact that the Act does not require contingency planning is sufficient. I think all of the constituents want to understand at least what your thinking about in the way of contingency planning, including some things that are

not authorized in the Act at present but you may, in fact, discover you're going to have to deal with anyway.

That will be all for now.

DR. DEERE: Thank you. Additional comments?

MR. HAYES: Larry Hayes, Technical Project Officer, USGS.

I feel compelled to express my at least personal belief as to why the project was permit-limited in '91.

It's my position that the Survey could have done considerably more work in '91 in the field activities than we did do. We had resources. We had money, and we had a QA program that would have allowed that work. We could not do the work because we did not have air quality permits to do our drilling or our trenching, and I'll give you a few examples.

We had some instrument calibration holes that we needed to drill out at our hydrologic research facility in

order to develop and calibrate instruments that will be put into some of our deep holes. We could not drill those holes when planned, because we didn't have the air quality permits.

We had the resources and the QA program to deepen Trench 14. We could not do that because of permits.

We did a lot of prototype testing out at Apache Leap in Arizona. We did it there because we didn't have permits.

Thank you.

DR. DEERE: Thank you. Additional questions or comments?

[No response.]

DR. DEERE: There are now available additional copies of Dr. Bartlett's presentation, and as you leave for the lunch break, why you're welcome to pick them up.

We will then adjourn and come back at 1:00 o'clock.

[Whereupon, at 11:50 o'clock, a.m., the meeting was recessed, to reconvene at 1:00 o'clock, p.m., this same day.]

AFTERNOON SESSION

[1:05 p.m.]

DR. DEERE: Good afternoon. I'd like to introduce the first afternoon speaker, Carl Gertz, the Project Manager for the Yucca Mountain site characterization project.

Carl will speak to us today about their work and about their budgeting requirements.

[Slide.]

MR. GERTZ: Thanks very much, Don. I appreciate this opportunity to talk to you today. It's going to be a couple hours, so we're going to go through a lot of detail. Certainly feel free to jot down some questions, and we'll answer them as long as it takes. We're here today and tomorrow to do that.

[Slide.]

MR. GERTZ: The first thing I would like to do is point out a couple of things that you've already told us in your report, and I want to just emphasize that I certainly concur with some of your thoughts.

If we're going to meet our present schedule, we're going to need substantial funding for ESF and other things in '93, and if we don't get that funding, as John pointed out, the development schedule will slip. I mean, I think

that's a given. We agree with you. There's no doubt in that conclusion.

We're funding-limited now, as Steve appropriately points out, and we need to get on with the program.

[Slide.]

MR. GERTZ: This, in effect, says the same thing on page 15 of your report. The $30 million budget cut certainly did cause us to refocus this year, but even at that point, we were on the limit of doing what we could do, of getting more done. So we need the funds.

[Slide.]

MR. GERTZ: And said another way, if we're going to demonstrate federal resolve towards moving this country forward in addressing a pressing environmental issue, we're going to need three checkmarks.

We're going to need litigation, and we're pursuing successful litigation. Eventually, I believe we'll need legislation to separate science from political posturing. We want the science to go on for ten years without being subjected to any political posturing that may occur. We want to get on with the job.

But once we have those things, we then need, as John pointed out, OMB and Departmental support. We compete

across the Department for funds. We need their support to obtain adequate resources. And then the third step will be the Congressional support of full funding.

All those things are necessary, because without

all of the above, this program will become stalled. And right now, we believe there is a Congressional mandate to get on with the studies.

[Slide.]

MR. GERTZ: Here is the way I'm going to structure today's presentation.

First I'm going to talk a little bit about the regulatory requirements, not just NRC requirements. They're only a small part of what causes us to expend resources. There is a multitude of regulatory requirements that we're subjected to as we carry on our site characterization studies. So I'll talk to you a little bit about that.

I'll talk to you about our view of a balanced site characterization program, talk to you about the question you asked: what is the cost to do this whole job, to do site charactezation to 2001. I'll talk to you about the baseline that we've got approved by the Energy Secretary's Advisory Acquisition Board.

Then we'll talk about some of the considerations. We've looked at a couple ways. A year or six months ago, I talked to you about our traditional work breakdown structure. Today I'll start the discussions based on fixed costs versus test and design cost to try to present to you a little bit different perspective. But we will go through some of what we're doing across the WBS, so you'll

understand what we're doing at Yucca Mountain this year.

We'll talk about funding impacts. And John, here we'll answer some of your questions of what do we do if we get limited funds, or if we get more funds, or if we stay level. And we have some ideas that are being discussed. I wouldn't classify them as contingency yet, but there are certainly ideas being discussed as to what to do and where we go, and then I'll try to draw some conclusions over it all.

[Slide.]

MR. GERTZ: Let's now talk about regulatory requirements. You've heard about them. You'll hear more about them. Here's just some of the key ones.

Our program is driven by complying with regulatory requirements. We know about the Waste Policy Act as amended. We have NEPA, the National Environmental

Protection Act, the Clean Air Act, the Mining Safety and Health Act, OSHA. We have to operate in accordance with all of the OSHA rules. RCRA, the Resource Conservation Recovery Act. We have to be careful what we do with diesel fuel oil, with other used hazardous materials. We have the American Indian Religious Freedom Act, the Historic Preservation Act, the Nevada revised statutes and on and on and on, a multitude of regulatory requirements, statutory requirements. We consider this part of the regulatory

framework.

[Slide.]

MR. GERTZ: In the more pure regulatory sense, we have the NRC regulations, the EPA regulations, DOE's 960, NRC's quality assurance, and codified MSHA and OSHA and the 40 CFR other environmental regulations from EPA.

[Slide.]

MR. GERTZ: We have, in addition to that, some key DOE orders, DOE orders on project management, on design criteria. In addition to complying with all of the regulatory requirements of the NRC and the other federal regulations, we have a multitude of DOE orders that we must comply with. It's very extensive. There's been lots of

activity at the DOE sites, looking at what DOE has been doing over the last 20 or 30 years. They've come up with a multitude of observations that DOE needs to get on with the job of complying with these orders.

John points out there are 2500 requirements in some of the regulatory statutes. My colleagues running some of the other DOE programs tell me there are about 27,000 requirements in some of these DOE orders.

Some are very small, very inconsequential, but some of them cost time and resources. We must meet those requirements.

As a result of reviewing what's happening at DOE

sites with the Tiger Team investigations for health, safety, OSHA, et cetera, we have to make sure that we're complying with the DOE activities, with the DOE orders. It's not a small consideration at all in carrying out the program.

A simple thing like this, occurrence reporting. We have to make sure we have a 24-hour reporting system to report any occurrence that goes on on the site where we dovetail with the Nevada Operations Test Program, but it's still an activity that requires resources.

[Slide.]

MR. GERTZ: Just the example of some of them, the Endangered Species Act, I didn't have on the slide. You're recognize Trench 14. It's been deepened, but this fence around it is not an OSHA requirement for safety; it's a requirement for Endangered Species, so a desert tortoise can't get into the trench. Not only do we have to slope trenches, so if they get in and fall upright, they could get out, but we're trying to prevent them from going in and falling upside down and thus, in effect, create an incidental take.

Another area of desert tortoise protection is, when we put the new power lines in, we have to use special power poles, so ravens can't nest on them. That's a requirement that we've made with the Endangered Species people. That's what we have to do. It's part of our

biological opinion. These are all little costs that add up and add up and add up.

[Slide.]

MR. GERTZ: A simple thing, in days gone by if you had equipment that you needed to steam clean, you just went out there steam cleaned it, and the residue would go into the desert or wherever; it would go into your street. But now due to RCRA, you've got to collect it; you've got to treat

it; if it becomes hazardous, you've got to dispose of it at an appropriate hazardous place.

An example is Oak Ridge, Nevada -- excuse me -- Oak Ridge, Tennessee. In Oak Ridge, Tennessee, they're having to collect water off their parking lots, because as it rains, it picks up the drippings from the vehicles, and they have to treat that water out of the parking lots. We don't have quite that issue yet in Nevada, but it's part of what this country has set up in a regulatory framework. It's part of doing business in this country.

[Slide.]

MR. GERTZ: I will go through more of the regulations, but I just wanted to set the stage a little bit of the multitude of regulations that we have to comply with, and we're observed by the GAO, by the IG, by many other entities as to how we're doing with these regulations.

[Slide.]

MR. GERTZ: Let me switch now to a little bit about how we're trying to carry out a balanced program while we meet the regulations. Certainly the site characterization plan is our baseline. It was completed in accordance with the Waste Policy Act. It's been reviewed by the public and external oversight groups, the NRC, the EPA, USGS

independently of those people working on the project and have the program to be adequate.

Detailed study plans are being prepared. Many have already been accepted, approximately almost 20 by the NRC, and we have controls in place to change the plans. Should we not need some tests, we can change the baseline; should we need additional tests, we can change the baseline.

[Slide.]

MR. GERTZ: This has set up a balanced program that the Secretary has emphasized in '89, because we are committed to an early evaluation of the suitability of Yucca Mountain. In the '89 report, he envisioned two years of surface-based testing perhaps before we start ESF. Unfortunately for many reasons -- and I will take issue with Steve, like Larry did -- individual participants could have begun work sooner at Yucca Mountain. Comprehensively, we couldn't have done at, as the GAO said, but individual participants could have started work.

But we weren't able to. But that's gone past us

now. Now the fact is, we are resource-limited, and we want to look at some of these activities related to suitability. John talked about the unsaturated zone, hydrology, fast flow paths, if you will, volcanism, tectonic impacts on

isolation, potential repository horizon. Do we have the right horizon; can we move it up?

These are areas that we need to look at as part of our early surface-based testing.

[Slide.]

MR. GERTZ: The Secretary also noted -- and I am absolutely committed to it -- that an effective evaluation of the site is going to require both. We have to have the surface-based tests; you have to have the underground.

Being a civil engineer, I'm probably as eager to get underground as many of you are. I think that's kind of the test, to be underground.

So we're committed to that, surface and underground tests. But limited budgets and the need for the program to show demonstrated progress towards addressing scientific issues -- as John pointed out, we have many constituencies. Some of them don't believe we're making progress. I think we've been making progress all along, but we have to have some kind of demonstration of that towards addressing scientific issues.

One course of action, which is the one we've

chosen for '92, is to focus on surface-based testing, not to the exclusion of the underground test program, but

because of limited resources, these packages are discrete. The costs are smaller. We can get specific things done.

If we need to change the test program, it's certainly less severe if we're in a surface-based mode. We can add drillholes, subtract drillholes, add trenches, subtract trenches, do those kind of things a little more economically than to change the underground exploratory studies facility.

[Slide.]

MR. GERTZ: Now I'm going to address the big picture. John alluded to it, and we think it was a major milestone, to get the ESAAB approval for not only start of Title II design, for not only start of the broadbased surface-based testing, but an endorsement of our baseline, cost and schedule.

[Slide.]

MR. GERTZ: The schedule baseline is 2001, and this is what they approved. I'll show you a working schedule a little later. This schedule was based on the facts in hand in August and September. But that was 2001 with the critical path through ESF, main test level drifting, in situ testing, waste package design starting up here, and performance assessment of the system and

eventually license application in 2001.

[Slide.]

MR. GERTZ: That schedule represents this kind of a funding profile. That number on the right hand side as you look at it is $6.3 billion total project cost. That includes all the things funded by the Yucca Mountain site characterization project. It includes substantial monies, about a billion dollars, to the state and affected parties for oversight and potential benefits, about $100 million a year when we get up to speed to the state.

You can extrapolate, and you can see it's four or five hundred million a year to keep on this schedule once we get going. It's not a small amount of money. It's a major commitment of resources. But the Secretary of Energy said, yes, I understand the program, or his Board did; I understand what needs to be done. You've laid out a plan.

The costs have been independently estimated by people outside the program. Stone & Webster did an independent estimate. They spent six months on it. They did a bottoms-up on the new ESF ramps. We know the ramps cost more than the shafts; however, should Yucca Mountain be suitable, they would be incorporated into the repository probably.

That independent estimate was within 4 percent of our

TPC. We didn't look in depth but only sampled the

scientific studies. So they will be continuing their estimates of the scientific studies, and they'll be reporting to Department management on how the scientific part of the program, studies part of the program, if it's still online with 6.3.

But in the meantime, that's our endorsement. That's our baseline program. That's the kind of funding profile we'll need to proceed forward.

[Slide.]

MR. GERTZ: Even at this time in 1992, we've started to be concerned about our critical path in 2001, because some of the milestones that were on the other schedule had to be changed. We didn't start the ESF, or we won't start it this year, as we thought we would.

So things do have to be changed, and it's going to go through a controlled change process. That's what change control and baseline is all about.

[Slide.]

MR. GERTZ: Let me point out a couple of other things. The project is different from other DOE projects. We all know it's the first project DOE has ever licensed. It's also the first repository that the NRC has licensed.

There are necessary costs for working an environment created by the Waste Policy Act and other laws in the country, and I don't want to at all just pick on the

regulatory requirements of the NRC, because I believe costs of regulatory compliance with the other suite of laws probably are as cumbersome, if not more cumbersome. Maybe "cumbersome" isn't the right word, but it just costs money to do business.

Certainly we're working with NRC compliance and licensing activities. We have an unprecedented 10,000-year timeframe, to prove something for 10,000 years, even though it's just reasonable assurance, not absolute assurance, is a unique undertaking. Intensive public outreach activities. The law provides for that. It's specific. It says: Make sure the public is informed and involved.

We have interactions with oversight boards, not o only with boards like yourself, but state, counties, GAO, if you would like to call them an oversight board, the IG.

The state, as noted, is adamantly opposed to the scientific studies and the repository development itself. We've had to go a through a cumbersome permit and litigation process. It is expensive to do business that way. We're working our way through that system.

The activity we're doing onsite, drilling holes, excavating trenches, collecting samples, is the kind of quality assurance construction control that's done during building a plant. We're doing it during site characterization. Many plants had to do investigations like this before their license was docketed. They had a different program to follow. We're following a process after a plant would be docketed.

And it's appropriate, and the scientists and engineers have bought into the system. You know, years ago people were saying, gee, we don't know if we can do it, or what about it, but I'm really proud of the people that have got their programs approved. They're working in the field, and they're complying with the quality assurance requirements. That's a thing of the past, I think. It costs money, but we're doing it.

We have a mandated socioeconomic environmental monitoring program. We've given grants to affected parties to participate in the program, and we have multiple, diverse contractors to ensure scientific credibility. We're trying to find the best suite of scientists and engineers to accomplish our goal.

That will all be integrated by the M&O. Robby will talk to you more about that tomorrow. But we're out there

trying to see if Yucca Mountain is safe, if it's suitable, with the best scientists that we can find.

[Slide.]

MR. GERTZ: Let me now kind of jump a little bit to funding allocation considerations. John touched on some of it, and I'm going to present it in a couple ways.

First, I'm going to show you about allocations that emphasize characterization and design and then other fixed costs. Fixed costs we'll examine in a little bit of detail.

Then later I'll go back to allocations emphasizing our project management accounting practice, our WBS. I'm not going to go through all ten third-level elements, but I'm going to emphasize about three of them, and I'm going to do that pretty fast.

So before I do that, I thought I might get you to just get ready for a fast-moving activity by telling you a little story about my avocation. I know you have to hear a sports story when I give a presentation.

I was fortunate enough to officiate the state high school football championship in Nevada, and it was on TV and all that kind of stuff, and I was the referee with the hand signals and everything. And about in the midst of the second quarter, I thought everything was moving pretty

good, and they had a roughing the passer, and sure enough, I threw my flag; after the play was over, stopped play, went over, put on the microphone, you know, and said we had roughing the passer against the defense, first down, went down the field, got set up for the play. There's about 6000 people in the stands, and as I said, statewide TV. The quarterback gets up under center. I mark it ready for play, and he gets
up under center, 42-35, and I'm watching it, and all of a sudden over the loudspeaker comes: "there's still a flag on the field." Well, I forgot to pick up my flag.

[Laughter.]

MR. GERTZ: Well, I had another flag, because you do that every once in awhile, so I don't pay much attention. The quarterback looks at me, and he goes 43-42. Here comes the public address announcer again: "there's still a flag on the field."

So I stop play, trotted back, picked up my flag, put it my pocket and got on with the game.

I'm going to move a little fast through here, so if I drop my flag, you've never hesitated to stop me before. So please do.

[Slide.]

MR. GERTZ: One of the most important points I want to

make is our design and test program has to be based on a firm foundation. You can't get on with the test program, with the design program, unless you have a firm foundation. A firm foundation is indispensable to carrying out the activities above this line.

A firm foundation includes support facilities and equipment. I'll go into some of the details of that.

It includes compliance and regulatory support, and that's not limited to just NRC compliance. There's lot of other compliance involved here.

It includes management and administration and financial and technical assistance.

Now we've broken these down into broad categories, so you can get a feel for it. It's a little different than our WBS accounting, but we thought maybe this would help you understand how we're doing business.

That supports this kind of discretionary activity. Drilling and trenching and the activities associated with it this year will be about $21 million. Non-surface-disturbing tests, the ongoing studies, be it seismic information collection, rainfall collection, whatever, about $23 million. And waste package, ESF, and repository design all lumped together, about $16 million.

That's one of the ways that we're spreading that money, and I'll go through these in detail to help you understand how we look at it and what's included in those numbers.

[Slide.]

MR. GERTZ: Let me talk about some analogous cost situations.

If you're operating a nuclear plant today, less than 10 percent, maybe 10 percent of the personnel or so, are directly involved in operating the plant, the operators as they're called. INPO puts out a survey that says here's

how many operators are involved in a plant. In normal plant operation, even they're running and producing power, less than 10 percent of the people are operators. The rest of them are support personnel -- scientists, engineers, maintenance, whatever it takes to keep the plant online.

Another analogy -- and I certainly encourage you all to go over to Sellafield in Europe if you haven't been there, because they've started their repository investigation program -- they brought some North Sea drilling equipment; they brought some North Sea crews in. But operating in a regulatory environment, it's costing them $10 million for a deep drillhole.

I was surprised at that number, but in order to operate in a regulatory environment, not just nuclear regulatory, but environmental regulatory, before they constructed their drillpad, they had to clear the entire area and put a membrane underneath, whatever it looks like, 12 acres or so to make sure that diesel fuel oil or whatever wouldn't find its way to the watertable. It's part of doing business.

Their entire program -- I talked about $6.5 billion for our site investigations -- their program -- and keep in mind, it's only for low and intermediate-level; it's not for high-level waste -- their entire program looks to be about $3 billion, as I understand it, before they start

putting waste underground. And that's for low and intermediate-level.

So there are some analogies. We're kind of, I like to think, in the ballpark of what it takes to do business in this kind of framework.

And John, of course, pointed out -- and I certainly think it's one of the best analogies -- is railroad support. No matter how many trains you run -- whether it's one, five, ten -- you still need a signal network, appropriate safety, roadbed, right-of-way, safety costs,

personnel costs for all those people. If you can run six or eight trains, your cost per train certainly goes down. You just run a few trains, the cost per train is a little higher. But if you intend to run trains, you've got to keep that up.

And we certainly intend to get on with the site characterization program, so we need to keep up our base support.

DR. PRICE: Carl, on the previous slide you showed, I think you showed 70 percent of your costs were fixed. You've got required and discretionary, and I'm not sure about the terminology.

Is 70 percent of your cost in this program defined as fixed?

MR. GERTZ: "Fixed" may be one word. You know, we call them "required". If you're going to do this kind of work, you need to run an environmental program. If you're not going to drill, I don't have to run an environmental program, but if I'm going to drill or disturb earth, I have to spend $6, $8 million on the areas I'm going to disturb to get environmental background information.

So I guess I think that that's probably appropriate to call them fixed.

DR. PRICE: It seems like a very high number.

MR. GERTZ: Like I say, let's go back to the analogy chart. I've talked to the -- I was over at Sellafield, talked to the investigators there. They only have one drill working over there, and I don't know how many people they have on the rig. It's a 24-hour rig, not too many, but they have a lot of people supporting that one drilling operation going on simultaneously, I think probably not unlike the 75 percent/25 percent that we were showing.

That nuclear power plant, if it's not producing power, those 90 percent of people, those other 90 percent, still have to stay around to keep the plant in order, unless they're going to go for a shutdown. If they're going to start up again, they have to keep it in shape. And much like the railroad, if you're going to shut the train down, you don't need any fixed costs or minimal fixed costs, but if you intend to run a train, you have a certain amount of

fixed costs.

And I'm going to go through each of those categories, so you get an idea of what's in there.

DR. PRICE: Does the railroad industry operate on a 70 percent fixed cost basis?

MR. GERTZ: I don't now whether its fixed or required costs, but they may, you know. I'd be it doesn't cost too

much to run one train, but I bet it does cost a lot to keep the infrastructure to support that train.

And I think -- I don't know about exact numbers, so therefore I'm not conversant enough to get into a debate on 70 percent or 50 percent. But I want to give you the concept of required costs.

[Slide.]

MR. GERTZ: Let's go through the categories. We're going to go through support facilities and equipment. That's about $16 million.

That includes the sample management facility. We have to take care of the samples we have, have to be able to operate as new samples are coming in.

A field operations center. We have to support what's going on in the field with OSHA-type support, with coordination, with nurses, with whatever safety responsibilities you need, with buildings, warehouses, providing information in areas, and as we go to information,

information resources management, records, document control. You've got to have a well-documented history of the documents you're using.

You have to have office facilities. We're in the Valley Bank Center right now with about 700 people.

And you have to have vehicles. And that's just kind of one group of activities that I've alluded to. It doesn't include some facilities like the hydrologic research lab. We consider that part of the scientific investigation. That's not even a fixed cost.

So there's discretion as to where you put them. We've decided to show this particular category this way.

And I guess now might be an appropriate, Don -- I know you're having a meeting in October out in Las Vegas, and I certainly encourage you all to visit the site. It's been almost three years, or it will be three years by that time since you've been out as a board. I know some of you individually have been there. And we'd sure like to take you to the site and show you some of those facilities and what's going on, and so you can get a hands-on view by walking around and seeing it. So we'd sure like you to plan a day or two of touring the site and the facilities to get a feel for what we're doing.

[Slide.]

MR. GERTZ: The next category below the line in the firm foundation -- and, you know, we had a sample management facility before, but it wasn't very good in the early '70s, late '70s, so we had to upgrade it.

Compliance and regulatory support. I'm going to go

through this list. $76 million.

You've got to have a sound quality assurance program. You've got to be ready to go to work. There's no doubt about it. We're there. We've accomplished it. But it does cost money to get on with it.

Systems engineering. We have to develop requirements. We have to do the top-level systems studies as well as the project-type system studies.

Configuration management. You've got to have change control. You have to understand what your baseline is and how you change the baseline. That includes document control and other things. These are fairly simple definitions of some very complex subjects or at least detailed subjects.

Technical database management. All the data we're collecting out there we're putting in a database, whether it's a geographic information system, a GIS run by EG&G, whether it's a systems engineering and properties database that originally had been run Sandia, will now be run by the M&O. We've got to keep track of the database.

We have to continue to do performance assessment. Shortly this month, we'll be producing our first total systems performance assessment, or next month. It's in internal review right now.

Performance assessment also dictates how we do other activities. It supports ESF drilling and other design activities.

Site characterization planning and reporting. We have to produce semi-annual progress reports as to what we're doing in the program. That's part of the law.

We have to have a detailed planning package when we go out to work. Russ will talk to you some more about that.

Certainly we have interactions with the NRC, with you all, for regulatory review, not an extensive amount of money but absolutely necessary, necessary to get on with the job.

And environmental compliance and studies. We have to meet certain environmental requirements for background information in order to comply with the Clean Air Act, the Clean Water Act, eventually NEPA. We're eventually going to have to develop an EIS, should Yucca Mountain be suitable.

[Slide.]

MR. GERTZ: There are some more of these things in this category.

I lumped transportation in here. Last year, we

spent about $1 million on transportation. This year we're only spending $100,000 on transportation. We'd like to look at another rail route. We will in outyears, but we only concentrated on one in the last year. We just didn't have enough money to do more on that.

We have to maintain the socioeconomics and Payments Equal to Taxes. We have to work with the counties and calculate what payment they should receive.

Public outreach program as mandated. We'll talk more about that. The tours, the information offices, other information activities.

Land acquisition. Well, we don't have to buy any land, but we do put seismic stations and other monitoring stations on BLM land and Forest Service land. We have to make sure that's coordinated appropriately outside of our current right-of-way.

Managing records. We have a local records center. We have a central records center. We're trying to figure out a better way to do it. This reflects a consolidation of some of them, three of them into one, but it is a costly activity to keep track of the paper. Somebody told me we processed a million pieces of paper last year at the project level and kept track of them, a million pieces of paper.

Everybody has to be trained, and you have to be trained in everything from general site orientation, when you go out to the site that you know what to do when you see a desert tortoise, do you know the appropriate OSHA responsibilities before you walk in a trench. You have to be trained. You have to have objective evidence that you've accomplished that training for those kinds of things and also for the regulatory aspects of the program. If you're going to do quality-affecting work, do you have appropriate procedures in place? Have you read the procedures? Have you either gone to classroom training on them?

And project control. Project control, cost schedule control system, call it what you want. We spend a lot of money, $180 million or so, probably close to a million dollars a workday. We have lots of people concerned about how we're spending that money.

You have to have an accounting system, a cost schedule control system that can document that.

You all probably have heard about Inspector Generals or IGs. The IG looked at some of our activities. They spent 18 or 16 months looking at our activities, and I'll read from a letter that they sent to John here.

They reviewed $227 million expended across the program, which was 74 percent of what was spent in 1990. This assessment consisted of tracing costs through the accounting systems, identifying organizational controls over cost centers, as well as reviewing the controls, procedures,

and practices relevant to these internal controls, and the best line that I think out of this is, quote: "Our review did not disclose any material internal control deficiencies."

It costs money to keep track of what we're doing. It doesn't come for nothing, but it's essential in the way we do business. It's just absolutely essential.

And as a sidelight, our technical people are now starting to use the process for management, for making tradeoffs, for assessing contractor process. We're just starting to use this as an everyday management tool, and we're improving on that.

[Slide.]

MR. GERTZ: We are still in the area of required or fixed infrastructure costs. Choose your words, so to speak. Let's talk a little bit about management and

administration.

This is called participants' general management. That's where the staffs that are the top-level management at the laboratories working on a program, such as Larry Hayes, such as Tom Blejwas, are charged their time. They're not principal investigators, but they're coordinating the principal investors' work across their particular laboratory or federal agencies, as well as some of the DOE management and contractor management. General management charges to

there.

And then we have the normal administrative services. When you're employing 1100 people full-time equivalents, you certainly have personnel costs, contract administration, reprographics, clerical support, mail distribution. Some contractors include them in overhead; some are direct charge. But that's the basis that we're using for this presentation is about $14 million in that area.

[Slide.]

MR. GERTZ: And Congress appropriated these particular dollars for financial and technical assistance. This year, they said state and local governments will get $9 million.

There are ten counties now involved as affected local governments.

We've estimated that our Payments Equal to Taxes to Nye County and the State of Nevada will be about $3 million. Our procedures are now in place to start making those payments. We may have even issued our first preliminary check, or we're very close to that, to Nye County. And Congress did say university funding, make sure they're participating to the extent of about $3.5 million.

Yes.

DR. CANTLON: John Cantlon. To what extent are those purchases of services as opposed to financial

assistance?

MR. GERTZ: Okay. These, in effect, are not purchases of services. This is, here's $5 million to the State of Nevada for oversight. We don't watch what you do anymore. You just provide a certification at the end of the year that you spent that number in compliance with the Waste Policy Act. The same thing to the counties. Here is your money, Nye County; make sure you're oversight-certified at the end of the year, that your oversight program is in compliance with the law.

So it's almost kind of hands-off, and I think that's appropriate, because we're looking for independent oversight from these activities.

As we get to the university funding, some of that, in effect, is services for us. Some of it is just money that we're providing them to get onboard, so they can provide services in the future.

Congress just appropriated this money the last two years in that kind of a way, so we're working our way through that. Much of it is going to the University of Nevada for transportation, the University of Nevada-Las Vegas for transportation. Other activities are included in that.

So if I understood your question, some of this might be services. The rest of it is just payment for

oversight.

[Slide.]

MR. GERTZ: Let me talk -- and I'll present this just in a little bit different way. You can present numbers. You can break them down. You can do lots of things. But that's our budget for 1992.

That's a little different from what you see in the

piecharts, from what Bill was asked about, because it includes a small amount of unfunded work that we carried over at the project, and John allocated some additional carryover from other parts of the program, so we could carry out the program we have in place this year.

So that's where we're at, is $182 million to spend this year.

You just start ticking them off, and I went through these things, and you come up with about $60 million left for testing and design. That's kind of the firm foundation that you need to do testing and design. And I could separate these into smaller categories, and we just put it together this way to try to present an example of how we view it.

Now you might say, gee, why don't you just cut all these 10 percent? Then you'll have some money to do this.

Let me tell you, of about $4 million of project carryover I had available to put across the program, I had asked my Division Directors -- Russ Dyer, Wendy Dixon, Ted Petrie -- how they might want to spend it. Did they have any requests for that $4 million? Keep it in mind that we're only going to do limited drilling and limited ESF, but do you need to bolster these programs to be more solid in these programs?

They came up with about $26 million of requests for that $4 million. And that's not expanding anything. That's just trying to be a little more hardhitting in some of these areas.

In my view as the Project Manager, these are minimal. Transportation is an example. We're down to one person just keeping track of the inquiries we get about it. Hopefully in future years, we'll continue what I thought was a very good program of rail access conceptual designs.

But with the funding that we had to go around, that's how we thought it was appropriate to spend it, and they have been scrutinized many, many times. We've spent long hours at the Project Office and with our Technical Project Officers going back and forth about what it costs to do this, why, and where we're going to allocate the money

[Slide.]

MR. GERTZ: After you get the firm foundation, then you get to do things that are a little more visible. Drilling and trenching, $21 million; non-surface-disturbing,

that's the activities of collecting existing data, be it seismic, be it climatological, be it rainfall.

Existing holes. Keep in mind, we have 200 drillholes out there existing. We have 100 existing trenches. This

is before we started our new work. And we had 600 different types of monitoring stations. So there's lots of stuff that continued to go on, even though we couldn't get on the mountain with new work. This represents new work.

[Slide.]

MR. GERTZ: In the design area, we certainly were focusing on the ESF. I'll talk more about that a little bit later.

About $5 million, a little bit more than that, on the waste package.

And repository, in effect, is just the interface drawings where the repository interfaces with the ESF. Our regulatory requirements require that we continue to do that. It also includes some rock mechanics studies. I was at Colorado School of Mines last Thursday looking at some of the work they're doing, and that's where that happens to be funded, is out of repository.

So that's our major design activities.

[Slide.]

MR. GERTZ: You might wonder where are your

priorities and why did you decide to do this and that?

This is going to be my list of priorities, how we're spending the $182 million. John, of course, has concurred

in this. It's part of his guidance to us.

One thing, we're looking at the initial site suitability. Let's review the data in hand. Let's develop some procedures for determining suitability. Let's get that peer reviewed. We have 14 independent peer reviewers, and totally only one of them had ever worked on any part of the project before looking at that, so that's an activity that's continuing this year.

We're going to initiate and continue surface-disturbing activities, be it drilling, be it trenching or whatever. Russ will talk to you more about the stuff we're doing in '92, so I won't dwell on it, but it's those kind of type things.

We'll continue our surface-based site characterization that's not disturbing, be it the monitoring type activities.

[Slide.]

MR. GERTZ: We are working on ESF Title II design. It began in October 1991.

We'll continue to maintain a sound quality assurance program. Now is not the time to back off. Now that we've worked on it and educated everybody and have them following procedures and documenting what they do appropriately, we want to continue emphasis there.

We have to maintain a sound environmental program. The laws require that we collect a certain amount of data and do certain things, be it the Historic Preservation Act, the American Indian Religious Freedom Act, whatever.

And we're going to continue to conduct performance assessment. That's going to set the stage for the program. That, in effect, revolves around a term that John used. It's called "the engine of evolution", what you do with data and how you assess that data.

We will continue a project control system. With all the oversight I have, that we have in the project from the GAO, from the IG, as I said a 16-month IG report. The GAO has almost full-time people looking at the program, lots of time in Las Vegas. We need to make sure we know what's happening to our costs, who's doing what, are they on schedule, are they doing what they said they were going to do.

[Slide.]

MR. GERTZ: In addition to that, we're not going to zero out, but we're going to conduct a minimal waste package, EBS, near-field environment waste form characterization program. We would like to do more. At one time, we thought before we got the $30 million cut we were

going to put some more money in it, not to get it exactly where we wanted, but certainly get it above where it is now.

But we're going to continue that program. We have to maintain the roads and the buildings. The Yucca Mountain site characterization program is now responsible for maintaining a lot of roads on the NTS, roads that only we use, in essence, that are ours -- buildings, records centers, and whatever.

We will continue to conduct the institutional outreach programs. We've found that's been very successful. The citizens of Nevada who have come tour the mountain have interesting thoughts about the study. They, in essence, support it.

And we will work at the transition of the M&O into project activities. Some activities, they have -- Robby will talk more about that tomorrow. They're right on line, going full-bore in such as performance assessment. They're integrating and providing technical direction in that area right now.

That's kind of our priorities for '92, and that's kind of how we spread them through the firm foundation, as I'll call it.

[Slide.]

MR. GERTZ: And as I said, this is kind of an accounting system that we just put together for this

presentation to give you a view of it.

What I'd like to do now is to go through not the entire WBS on every fourth level. I did that for you in June. You've got that for reference, if you want. But I'd like to go through a couple of the things in more detail, what we're doing in site (indicating), and that will be represented by some clear viewgraphs, what we're doing in regulatory and institutional, and what we're doing in ESF.

Many of the things in project management I just covered when we talked about fixed costs or when we talked about required costs.

Certainly in the backup, you have backup material for all these work breakdown structure elements, if you'd like to see what's in there at your convenience. Or if you want me to go through it, I'll do that, too.

And also in the backup, there's a list of activities. As an example, I just used the USGS, of a list of activities that they did last year in typed form that you might want to flip through at your convenience.

But with that, I'm going to go through site, and I'm

going to do it a little bit different. I'm going to talk about the regulatory framework, why we're doing it We're not just -- you know, some people might accuse us of doing science for science's sake. Absolutely not true. What we're trying to do is meet the mission of studying

Yucca Mountain in accordance with the regulatory framework that we've been given in which to operate.

[Slide.]

MR. GERTZ: You saw my 182 before here. Here's the 182 broken down this time by the accounting system, by the WBS. This is what we manage to; this is what we plan to; it's what we track to. You recognize the categories. Some of them really are not as explanatory as they could be. That's really site characterization.

Test facilities, in effect is the operations centers and other things out in Area 25 and maintaining the buildings.

Project management we broke down into subcategories, and that's the financial and technical assistance.

Bill, you were out of the room, but in partial answer to your question, this 182 includes a minor amount of project carryover and some other program carryover that John applied to the program, so we could at least get these

things done this year, and we didn't have to further cut that.

But John will tell you, I think he's -- and Sam will tell you, I think they're out of discretionary carryover about right now. They sure don't have much left.

And if you do, John, I'm willing to talk to you

more about it.

DR. BARTLETT: I know, John.

MR. DYER: It is not in the discretionary category.

[Laughter.]

MR. GERTZ: It's not in the discretionary category, okay.

[Slide.]

MR. GERTZ: Let me talk a little bit about site, some of the site activities right now.

[Slide.]

MR. GERTZ: Before I do that, though, I want to set the stage about how our program was derived, just a little bit of background, is that we looked at the regulatory requirements, be it the NRC requirements, the EPA requirements, the DOE requirements, developed guidelines, looked at the technical criteria and the standards.

As a result we asked ourselves some questions. What

do we need to know? How do we have to answer these questions? They were called issues, both performance of the geologic barriers and design issues for the engineering barriers.

And from those two, we then developed a characterization program of what data do we need in order to answer these questions to meet these regulatory

requirements. That's fairly simplistic, but that's kind of how the program was developed when we put together the SCP years ago, and that SCP has kind of withstood the test of time. It's kind of been reviewed by everybody, and it says this is a sound program.

There are some things in there we hope to reduce. Erosion happens to be one area that I'll talk about there. Maybe we don't need to do the erosion tests. We think we may have enough data. Some areas we may have to expand.

[Slide.]

MR. GERTZ: Just a little different perspective of it. This lists some of the regulations, emphasizing on 960, Part 60, and 40 CFR 191, and it lists some of the regulations such as subsystem performance objectives, and it says: here's the issue. Will the waste package have

appropriate containment? What's the engineered barrier system release rate? What's groundwater travel time? And then what programs -- geohydrology, geochemistry -- will try to answer that issue? What will answer that question?

That's the way we put together the program. But once again, what we're doing is based upon regulatory requirements.

[Slide.]

MR. GERTZ: There are a couple requirements that I have to highlight right now, and I'll go this just once, but certainly 10 CFR 60.15 requires that the characterization activity impacts, they be limited and that the excavation be coordinated with the repository. We just can't go out and excavate. We have to make sure it's coordinated with whatever the future repository design might look like.

Then 60.21 requires an evaluation of alternative repository design features, alternative ways of doing things in the context of limiting the impacts to the site in the context of limiting waste isolation. You have to look at alternatives to study the site, and you have to look at them to see how they would affect waste isolation.

That's kind of a simplistic statement about what we need to do, but that requires lots of analysis, lots of

work.

Both surface-based testing and ESF excavations must be included. It doesn't matter. It's not just underground. But if we're using water to control dust, we have to have a performance assessment on our use of water to assure it doesn't affect waste isolation. We have to have that documented. We have to have objective evidence of it, so that we can assure that we're not affecting waste isolation by putting water on the site to control dust.

Because of these and other requirements, we need to do careful planning. We need to do the evaluations prior to doing any testing or excavating. It's just part of doing business.

[Slide.]

MR. GERTZ: These are the two I highlighted, 10 CFR 60.15, 60.21.

Here's the others that are just up here for your perusal. In essence, it lays the framework for our test program. And that's what we are in, the 1.2.3 Site now, the site investigations program.

[Slide.]

MR. GERTZ: Here is just another list of it, and it goes on and on about performance of particular barriers after closure, about criteria, about what you have to do

for the geologic repository operations area. Even though we're just studying the site, we have to determine what effect that may have on the geologic repository operations area. So we have to have a conceptual design of that.

General requirements for performance confirmation, you have to keep in mind, after we characterize the site and should it be suitable, can we do some confirmation tests beyond license application and all the time maintaining a quality assurance program within the requirements.

[Slide.]

MR. GERTZ: Let me just briefly talk about -- now I'm going to switch and go right to the WBS categories. This happens to be what we call 1.2.3.1. We call it

management and integration. It's an accounting place where we put what I'd call miscellaneous activities -- the early site suitability study, the costs involved with that are placed here. Surface-based testing prioritization. Calico Hills was done in there to support some of these things.

It's where when a principal investigator has to go off and do project control, he charges it to here. When he has to do some management activities, he charges it to here. So a PI normally is charging to the scientific, work he's doing, but there are certain things he needs to do to be a

manager besides being a PI. This is the category they charge, including developing the test planning and job packages.

[Slide.]

MR. GERTZ: With that, though, I'll now move on and provide you some pictures. As I said, you haven't been to the site for awhile, and I really encourage you to come to the site in October, if you could. But I'm going to go through some of the things in 1.2.3, and actually we'll start with 1.2.3.2, which is geology. Certainly we're working on the structural and stratigraphic non-disturbing work. We're trying to computer model what's happening out there, what's the stratigraphy, what do the faults look like. It's activities ongoing by the USGS.

[Slide.]

MR. GERTZ: We are continuing surface-disturbing activities at Midway Valley and Trench 14. There's Dr. Stuckless doing some sampling last summer at Trench 14, and we'll talk more about that a little bit later.

[Slide.]

MR. GERTZ: We move on. We will be doing new surface-based testing activities for the ESF. But we've got a systematic drilling program. It's just meant to point out

that we have to integrate the drillholes to make sure they don't interfere with the proposed ESF design. The ESF is the red areas in the main drifts at the repository level.

Also if you get a chance at the break, you might look at these two pictures. You can't see them now, I know that, but one is an aerial straight-down view, and the other is a perspective, and overlaid on that we have the new ESF design, so you can get a feel for how it underlies the topography out there. And they're really kind of interesting pictures, and they'll provide you a little bit of vision as to what the ESF, which is in red there, looks like.

Also we have a model outside for those of you who haven't seen our ramp concept in model form.

[Slide.]

MR. GERTZ: We have a 53-station seismic network. We need to understand seismic events and what effect they

may have on the repository. USGS is upgrading that network right now. We'll essentially have everything in place here this year that we're hoping for, and then we hope to work out something with the University of Nevada system and Jim Brune where they will do the monitoring for us of this system and contribute to the project in that way.

[Slide.]

MR. GERTZ: And we support issue resolution, and I heard the debate about issue closure. This is not issue closure. Issue closure is a licensing term, but we'd like to at least get a technical consensus.

Have we learned about all we can about certain issues, and can we set it aside for awhile, not continuing gathering data just for data's sake. And this happens to the vein deposits in Trench 14 after we've deepened it. A little later on, I'll even show you another view of that after we've deepened it more than that. That was our first July deepening activity.

[Slide.]

MR. GERTZ: And Dr. Crow is working on volcanism, which isn't on this chart, but it's certainly an ongoing activity.

[Slide.]

MR. GERTZ: I have it. 1.2.3.3, we go from geology to hydrology. We have lots of holes out there that

I told you about. We continue to monitor that unsaturated zone, neutron, logging neutron measurements. We also monitor stream flow, debris, other things that are happening.

[Slide.]

MR. GERTZ: Certainly, we're looking at the saturated zone hydrology. We know there's a hydraulic gradient north of Yucca Mountain. We need to understand that better. Not our first drill hole, not our second, but maybe our third will be up in that area to help further understand the hydraulic gradient north of the proposed repository area.

So, that's continuing. We have lots of wells that we're continuing to monitor water levels in.

[Slide.]

MR. GERTZ: This is the saturated zone. We're trying to develop models for the regional flow system. This happens to be one model depicted here. John Czarnecki is one of the PI's that's working on that, but that's ongoing activity, absolutely necessary when it comes to predicting waste transport and the capability of Yucca Mountain for waste isolation.

We're doing ground water geochemistry. We're sampling water and making sure we understand the geochemistry of that particular water, water in the water

table. As I said, I'm just going to highlight some of these.

[Slide.]

MR. GERTZ: We continue in the hydrology area. This is even further deepening. Where you saw Emily standing at this level, IV, well, we've deepened that trench even further, and it appears to us that these banks seem to be decreasing or almost becoming eliminated in that area.

We believe the Trench 14 issue should be proceeding towards issue resolution. That's not to say the theory about upwelling water is heading towards issue resolution. That will need a lot more investigation, but we'd like to at least address issue resolution at Trench 14.

Russell will talk more about it, but he'll show you some drilling pictures in Alan Flint's program. I guess I need to talk at this a little bit about -- if you haven't heard Alan Flint talk since he's been out drilling, you've really missed something, because his enthusiasm and his dedication to the work, I think, speaks well for the whole project.

We move from preparing and planning now into implementation. Lots of things are going on and people are gathering data and doing things and I think the morale of the scientists is the best it's been in the four years that

I've been on the project right now. This happens to be handling some of the cores from the infiltration holes that

we've just been drilling at the hydrologic research facility which is across from the sample management facility is a very nice facility.

[Slide.]

MR. GERTZ: Geochemistry, I don't have any viewgraphs for you, but at Los Alamos, we're continuing to keep track of the geochemistry and the zeolites and the activities in the area of interest, in the area between the repository and the water table and the upper areas of the water table.

They're doing laboratory experiments, modeling. I know you all participated with us in a workshop last September on that, developing computer codes for the effects of both vulcanism, tectonics and radionuclide transport. That's part of the geochemistry program, about $4 million.

[Slide.]

MR. GERTZ: Let me now talk about the drilling itself. The scientific investigators like Alan Flint happen to, the way we do business, charged to 1.2.3, but the drilling done by the drillers, by the REECOs' and by the Raytheon geologists' supporting them, charges to 1.2.5.

This year, we're going to spend about $14 million in that area. Now, you remember that I said drilling and

trenching was going to be $20 million, well, that's because it includes the scientific investigation people. But $14 million here in drilling, that's some of the ongoing things, not new drilling, but ongoing borehole monitoring.

We're doing some geophysical measurements in some existing boreholes. We're working on reworking some the holes in the C-well complex. We're maintaining instrumentation, relining some boreholes. We want to make as much use as we can out of the existing boreholes.

[Slide.]

MR. GERTZ: We're also doing architect engineer activities for drilling. You have to design a pad, you have to assure the pad doesn't compromise waste isolation. This happens be a pit and we're getting ready for what we call Well JF-3, which will be wet-drilled. It's off the repository block and it's our monitoring well for our water permit with the state.

As part of our water permit negotiations, the National Park Service required we add an additional well between Yucca Mountain and Amargosa Valley and we monitored the level in that well. We just started drilling on that hole right now.

[Slide.]

MR. GERTZ: We will operate the sample management facility. That's going to support core analysis. That just goes on and on. We support drilling with the LM-300. That's our new drill rig. We hauled it down from Salt Lake City. It's just coming on to the Nevada Test Site, on its way to Yucca Mountain. It's in here, suspended over the road carrier.

It does operate by itself, once we get it onsite. Russ will show you the schedule on that, but we'll be drilling March or April, or first deep, dry core holes. We're pleased to be moving on with that operation.

[Slide.]

MR. GERTZ: Climatology, we're doing several things in keeping abreast of what's happening in the field there. That's a little difficult to see, but that's some rat middens, the principal investigator, I think, is John Whitney from the USGS looking at rat middens, trying to find out the debris in the middens so they can determine what previous climatological regime was.

This is just close to Yucca Mountain. It's been age-dated and it's about 12,000 years old, so here we have a fairly substantial rat midden, pack of rat middens, so to

speak, and it's lasted about 12,000 years in that environment without deteriorating too much. It has provided some interesting past climate data.

[Slide.]

MR. GERTZ: Russ will talk to you more about this, but in essence, we're -- this is our surface-disturbing activities, drilling and things. As I said, we're doing the unsaturated zone. We'll be doing some trenching in pits. We'll be doing, eventually, some geophysics, and I'll just let Russ fill you in more about that. That kind of summarizes the drilling program.

[Slide.]

MR. GERTZ: Let me now talk just a little bit about the ESF. I've moved from the drilling program. There's one more viewgraph I wanted to show you, if I have it here.

[Pause.]

MR. GERTZ: It's probably in the regulatory one.

Let's talk about the ESF.

This I do a little different. We've had lots of discussions about the ESF. So, I'll just kind of highlight the things we're doing this year for the money that's being spent.

[Slide.]

MR. GERTZ: Once again, design control is kind of the term John uses to make sure we're compliant. It's the term the NRC uses.

We've got to assure, we have to assure we're

complying with all their requirements, and these are just some of the same things you saw for surface-based testing, but it underlies our performing activities.

These are general design criteria, underground facility design criteria. It's all right out of the regs.

[Slide.]

MR. GERTZ: Back to performance confirmation, design testing, and the quality assurance program. I guess what I'm trying to point out to you is that there are regulatory bases for what we're doing.

[Slide.]

MR. GERTZ: We have to assure the regulator we're compliant with that basis.

Once again, in management integration, 1.2.6.1, this is completing requirements, it's doing some studies, it's finalizing the number of TBMs for use in the ESF. We've talked to you about the ESF. This is one of the studies

we're doing, both diameter and number of TBMs.

If we had a perfect world and all our resources, what is the right number? I'll talk to you later on about some ideas if we don't have full resources, what may be some options, completing the appropriate plans that go along with this design.

[Slide.]

MR. GERTZ: Along with that, we have to complete

our safety analysis report of designated items. We have to do value-engineering in compliance with the DOE order. We have to support performance assessment.

We have to do our shallow drill holes at the portal site and design support for our portal mapping and testing.

[Slide.]

MR. GERTZ: That leads to a site preparation package, which would be some trade-off studies, 17 drawings and 10 specs, and surface utilities, which will be some trade-off studies, 37 drawings and 58 specs.

We're getting ready so that, come November, we can start some road and pad work. That site prep includes soil storage design, waste water disposal, electrical substation work, things that you normally expect to do in surface -- in site prep.

[Slide.]

MR. GERTZ: In addition to that, we're going to have to do some surface facility work. Surface and portal facility deliverables include many analyses, some drawings, and some specs.

We have to design the portal high wall sufficiently for blasting -- so, our site prep will include the portal high wall; complete our pad design sufficient for blasting and grading -- come November, we want to get on

there; design of our first access facility layouts, what kind of buildings we're going to have, and the envelopes within the buildings.

[Slide.]

MR. GERTZ: Some of you have seen this before, but certainly, in '92, we will be working on the first access site prep. That's our design activities which soil and rock surveys and shallow drill holes feed into that. We'll be doing a number of TBM studies.

We'll now be starting our electrical upgrade. In '93, we hope to then be getting on with the major Title II design and finishing the electrical upgrades and doing the construction here, first access construction.

[Slide.]

MR. GERTZ: You've seen these before. That's our major concept. I just want to remind you we're still looking at 14 miles of tunnels. Our reference design is still a 20-foot, 5-foot diameter ramp and drift and 16- or 18-foot diameter at the Calico Hills level.

[Slide.]

MR. GERTZ: Typical support facility with the portal entrance -- when I talk about roads and pads, what we're kind of designing is all this, including whatever cutout we need there.

We're not penetrating the hill. This was the

north one. This would be Exile Hill. The south one would be Boundary Ridge. We're not penetrating it, but we will be constructing that pad and starting that in November.

[Slide.]

MR. GERTZ: That pad, of course, will be the entry point to a ramp, and off that ramp will be another ramp down to the Calico Hills. That happens to be the cross-section of the north area.

It certainly provides an opportunity for the scientists, geologists, engineers to get underground, look at in situ structures in place.

[Slide.]

MR. GERTZ: That happens to be the south one, less of a grade, also taking off down to the Calico Hills.

If you come to Yucca Mountain now, as you drive up the road, you can see the place. As the road goes up to the mountain, it crosses right under where the south ramp would be, and we now have that marked with a spot, so you can even see that the ramp is X feet below here, proposed ramp.

[Slide.]

MR. GERTZ: These are just the drawings that are on the board. So, you can look at those. You can't see much off this view, but that's a perspective looking to the southwest.

This would be the north portal here, Exile Hill

there

[Slide.]

MR. GERTZ: This is looking down on it with the north ramp here, the south ramp here. In red is below -- is the Calico Hills ramps. In black is the proposed repository drift area.

[Slide.]

MR. GERTZ: Let me move on now to the third WBS item, and then I'll move on to the rest of the presentation. This is regulatory, institutional, environment.

[Slide.]

MR. GERTZ: In this area, we're really looking to the Waste Policy Act. It's created a structure for us to work within. It's created lots of requirements. It's created the Nuclear Waste Technical Review Board, participation of states, consultation.

So, in this particular funding category, there's lots of requirements, Nevada revised statutes, lots of things that are driving the program.

[Slide.]

MR. GERTZ: Just to set the framework, Congress did create the Waste Policy Act. It did create a system of regulators, a system of oversight and also an opportunity for benefits should a state cooperate with the scientific investigation.

It also creates the opportunity for a waste negotiator, as you heard Ron and John talking about with the MRS, but that's the major elements of the repository part of the program.

Regulatory-driven: that's the framework for the program.

[Slide.]

MR. GERTZ: 1.2.5.1, that's our management and

integration account. That's where the people charge for special studies, special projects or when they're doing the non-scientific work.

[Slide.]

MR. GERTZ: 5.2 is licensing. That's support for technical regulatory meetings with the NRC, National Academy of Science, ACNW, NWTRB -- many, many meetings. I'll show you how many in a second.

We also conduct study plans, reviews here.

We support issue resolution process, support site suitability study and prepare -- that means licensing input into the site suitability study, not the site suitability evaluations -- and prepare our progress reports. Comes out of this account and their statutory requirement.

[Slide.]

MR. GERTZ: In '91 we chartered about this many meetings with the Technical Review Board, 14 with the NRC, 22 with the ACNW and we expect similar or increased level as time goes on.

[Slide.]

MR. GERTZ: I'm going to show you some more pictures now about some of our environmental compliance activities.

We have to have annual reports, be it for programmatic agreement on historical properties or environmental

protection implementation plan.

We have to continue to get permits, whether it's injection, well permits, for each drill hole or for a suite of drill holes.

We have to continue to work with the state on that.

We have to implement a hazardous waste management program to assure that we are meeting regulatory requirements of RCRA, tracking systems -- just support other activities.

[Slide.]

MR. GERTZ: Anywhere we're going to build a road, drill a hole, dig a trench, we have to do a pre-activity survey. That includes an archeological survey, a terrestrial ecosystem survey and a radiological survey. It's required, we can't do anything until we do that.

This is just staking out some areas before we

started to do some surface-based testing so the proper surveys can be done.

[Slide.]

MR. GERTZ: We have to meet the requirements of our biological opinion that is an agreed to document with the Fish & Wildlife, or else they can stop us from working out

there. We're working with a little desert tortoise there.

[Slide.]

MR. GERTZ: We need to do our reclamation studies. Should we disturb an area, we have a commitment to replace it so before we disturb an area we study the flora, fauna in the area so that we can replace it appropriately.

[Slide.]

MR. GERTZ: We do far field radiological samples and monitoring. That's one of our monitoring stations, one of several monitoring stations in the area.

[Slide.]

MR. GERTZ: We keep track of the climate with our 60 meter tower. I assume we'll probably have a second 60 meter tower in the area, have some 10 meter towers. We maintain our meteorological monitoring.

[Slide.]

MR. GERTZ: That's just another view of the tower. That's our commitment for air quality, particulate control,

the things we have to do to comply with the permit that the state has given us for surface disturbance.

[Slide.]

MR. GERTZ: Other activities include working with the Native Americans. We have 16 tribes in the area that we

consult with. This is a "rock ring" as they call it; we have asked the Native Americans what it is. They are not real sure.

It could have been a foundation for one of their early dwellings. It could have been a circle for some kind of ceremonial fire but we even moved a road to avoid that. It's part of the process we have to go through.

[Slide.]

MR. GERTZ: We do other things, have different environmental plans, water resources network, monitor reports per our EFAP and environmental field activity plans, reclamation plans. We keep track of those.

[Slide.]

MR. GERTZ: We do archeological data gathering, have an extensive program, over $500,000 a year, half a million dollars a year looking at the archeological aspects of the region, taking artifacts, doing whatever is necessary to implement data recovery, doing mitigation analysis including artifact inventory storage, et cetera, to comply with this federal regulation.

[Slide.]

MR. GERTZ: I have already alluded in this accounting system we have transportation as 1.2.5.5. We are not doing

much this year. We did do a comprehensive design, conceptual design of this route. In the future we'll look at that route and this route and other routes should they become viable candidates for transportation to Yucca Mountain.

[Slide.]

MR. GERTZ: By statute we have to keep track of what's happened in socio-economics in the area including a monitoring plan, doing profiles, keeping track of our payment equal to taxes program and continue to support a radiological monitoring program in the area.

Just for what it's worth, right now 95, 96 percent of the people working at Yucca Mountain live in Clark County, 4 percent in Nye.

[Slide.]

MR. GERTZ: The last area of 1.2.5 is communications and liaison -- provide support for state of Nevada interactions, be it with the state legislature, state office or whatever.

We operate an information office, one in Beatty, one in Las Vegas, perhaps one in the near future in Pahrump.

[Slide.]

MR. GERTZ: We support update meetings. Once again we

had 22 of these meetings around the state. We have six a year or so. Every six months we have a series of three. We involved the public. At the last meeting we had 500 people showed up in Las Vegas.

We spent the first hour and a half or two of the meeting with the people talking to the scientists. There were problem 30 scientists working on the program around the room, for them to one on one interact with.

Second part of the meeting was spent in an open question and answer session, moderated by an independent moderator and we are going to continue to do that every six months.

[Slide.]

MR. GERTZ: We have a tour program that's been extremely successful.

We put an ad in the paper; we ran it one day and we had 1200 people call up within 10 days. We have been talking 400-500 people a month out to the mountain, usually on a Saturday, usually eight or ten buses. They have a chance to talk to the scientists and see the facilities, see the sample management facility, see the hydrological research facility, see the field operations center.

[Slide.]

MR. GERTZ: Of course we're working with different

civic communities, Boy Scouts, Girl Scouts, what have you, as requested and we have other special request tours including Monday the Chairman of the NRC, Chairman Selin, is going to be out to the site and just another normal day in the week, Thursday, we have a group of 40 to 50 Congressional representatives coming out to the site.

We keep busy in this area too.

[Slide.]

MR. GERTZ: You have probably seen this before, if you have heard me talk, but this is my view, not a scientific sampling at all but it is a sampling of those people who went to Yucca Mountain.

Over 2,000 people have responded to this survey; 90 percent of the people believe DOE should study Yucca Mountain after they have seen the mountain and after they have talked to the staff; 7 are undecided; and 4 percent said don't conduct the studies.

Many were undecided or opposed to the study prior to taking the trip and we'll continue to keep track of what's happening as the tours continue.

[Slide.]

MR. GERTZ: Let me talk a little bit now about funding impacts.

[Slide.]

MR. GERTZ: We have alluded to it but let's answer the question straight out: why are we emphasizing surface-based testing in the near term?

Well, one, funding's inadequate to sustain a full ESF program. We can only partially do it and we have to do that at the expense of a surface-based testing program so even if the design were completed in '92, we might not have '93 funds to do what we wanted to do.

Surface-based testing provides continuity. We have crews that have learned to work in a regulatory environment. They are moving from one hole to the next.

It's provided an opportunity for the scientists and engineers to work in the requirements and regulatory framework.

Certainly many people are concerned about insufficient visible progress towards addressing technical issues, scientific issues. The surface-based program provides us progress towards addressing the issues.

Russ will show you a videotape of Alan Flint. You know you all would like us to get underground. Well, we're not getting underground with a real big hole but Alan Flint's tape will be interesting.

If we don't demonstrate some progress we might reduce our support for further funding, so we feel it's essential

to get on to solve some technical issues.

Hopefully that will build the base so that we can move forward in the future.

[Slide.]

MR. GERTZ: As I alluded to, diversion funds to the ESF could delay acquisition of surface data and without some visible progress our constituencies may not be very supportive.

[Slide.]

MR. GERTZ: Let's talk about future funding, where we're going.

We talked to you about the baseline. It's an approved cost baseline. It approves the suite of tests that we need to determine site suitability and prepare a license application.

I told you it was verified with four percent by the cost estimating team and that was bottoms up on the ESF sampling on the scientific program and they are going to do more scientific program, independent cost estimating, for this budget year.

Reductions in fundings will delay scheduled activities. There's no doubt about that. If you reduce funding, the scheduled activities will be delayed.

Whether it will affect 2001, 2010 is yet to be

determined but some activities will be delayed.

Early favorable findings could result in reduced work.

As I pointed to in one area, on erosion, we think perhaps we don't have to do some of the tests that we thought based on the analysis we have and we're working on an issue report on that.

So if we have some favorable findings perhaps we can reduce some of the work and make up some of the time.

[Slide.]

MR. GERTZ: Let me talk to just general funding impacts. What if we had 180 or 200 million a year? What kind of program would you run with that?

There's lots of options. Bottom line is, one, you'd have significant schedule delay. There's no doubt about that. I'll show you this a little bit later.

What if we had increased funding? Well, you have heard John and I concur, a majority of it would go to ESF, not all of it but a majority would go to ESP.

We would concentrate on waste package development and repository design activities would be expanded to meet our regulatory requirements for a geologic repository operations area and the support activities would have minor growth.

You'd only need to do environmental activities for the areas you are going to do surface disturbing. You don't need to develop a desert tortoise programs or new flora and fauna programs but you have do your pre-activity surveys.

Decreased funding? We'd probably further defer the ESF waste package repository activities.

We'd reduce surface-based activities significantly and we might have to begin reduction in support facilities.

That is the bracketing, you know, how much is increased, how much is decreased. Who knows? There's all kinds of options but let me just talk to you.

[Slide.]

MR. GERTZ: If funding were diminished, the technical progress would be delayed. There's just no doubt about it.

Site suitability determination, because we're convinced you have to be underground to do site suitability determination, would be delayed. Couldn't do both, and perhaps license application would be delayed -- in fact, not perhaps, it would be significantly diminished over the years. That's a certainty.

If it was significantly diminished, we think we'd lose some key scientific personnel. Contributors would go on and do other things. They would work in other areas.

Perhaps they would come back but right now we have a strong scientific consensus across the program of people working on the program who understand it, have created a wealth of knowledge the scientific program. We wouldn't want to lose that.

If we are not able to comply with the federal or state law, we're just not going to do the work. It's just that simple. There is no -- this department in this day and age you comply with laws, regulations and orders, or else you don't do the work and you can look across to the Department of Energy, be it Rocky Flats, Savannah River or whatever, there aren't too many facilities operating.

I think this program had a sound basis to start with, that we laid a lot of framework, some of it due to being regulated by the NRC, some of it due to starting over and looking at what's needed, so we have a sound program and we don't want to diminish that at all.

If we are not doing work, if we are not out there doing day to day work, gathering data in accordance with the QA plans, then perhaps NRC's acceptance would be withdrawn because there would be a lack of implementation.

Their initial letter said your plan's okay but we want to see implementation before we give you the green light.

Well, they did see implementation. They have given us the green light in many areas, so with reduced funding we wouldn't want to get a red light or have to go redo that.

[Slide.]

MR. GERTZ: Let me talk a little bit about this.

$200 to $300 million a year simply will not support a license application by the year 2001. There is an approved baseline. Here's what we'll get in '92. It's less than our approved baseline, the approved baseline that we just got taken care of. We're going to have to perform a change control analysis and see if we can get back on schedule and get our activities done or defer some dates.

If that continues, we just won't have the time. We just won't have the money to do it. If it continues this way, you can't go vertical too much and get over there. I alluded to it. A thousand manhour job sometimes can be done by one man in a thousand hours, sometimes by a thousand men in one hour, but not all the time. So we need to pay attention to what's going on.

[Slide.]

MR. GERTZ: Let me switch a little bit to ideas being

discussed for the Yucca Mountain project. I wouldn't classify them as contingencies per se. You might want to describe them as that. But there are certainly ideas that we are thinking about.

What if we don't get the funds we need? What are we going to do?

[Slide.]

MR. GERTZ: Here are four concepts I'm going to talk about. First of all, if we have limited funds, maybe

we put off the ESF for a while and look at a prototype test and engineering facility. We can get underground. It'll be in perhaps Busted Butte area. But maybe we can afford that, or maybe we can do just a limited underground pilot program. Would that help? Can we even do it? Or could we emphasize the full ESF scope but take a little longer, or could we address the sequenced ESF approach, not unlike what you all discussed with us in our last meeting in Las Vegas.

[Slide.]

MR. GERTZ: But before I go through these concepts, let me talk about some programmatic concerns. First of all, we need to be consistent with existing commitments. We have committed to a certain program with the regulator,

with the oversight communities, with the affected parties, and in effect, that program has been accepted. We have to make sure we comply with the requirements for evaluation of impacts. If we do any of these alternatives, we need to do our impacts analysis.

We have to have consistency with existing land access agreements. We don't want to negate anything we have in the air quality permit area, or whatever along those lines. Monitoring program -- the same way.

All of them probably are increased total costs because it'll be interfaced with, or parallel to, or a replacement of the existing test program, but we're still

committed to do the existing program at this time, and we want to make sure we have all our design control in place. We want to make sure what we did in the ESF alternative study is not negated by doing some alternative that hasn't been properly analyzed.

[Slide.]

MR. GERTZ: First of all, though, before I go through these four, I want to say I think we have a sound program. I think we have a fine ESF design. It needs to be looked

at as far as diameters, number of TBMs and things like that. But I think we're generating support, and I hope the program we have is the one we'll implement.

These are just some ideas that we're thinking about, just to let you know that we're thinking about ideas, and I don't want them at all to be accepted or thought of as we're rushing down this area, or that area, or that. It's just almost brainstorming is how I talk about them, in case something happens in the future that we're not happy with.

First of all, we could do a test and engineering facility. It would be multipurpose underground. It would also be a visitor orientation facility. One area would be at Busted Butte. It would be outside the potential repository block, so we wouldn't have so many regulatory concerns. The geologic conditions would be similar to the repository horizon -- densely welded, devitrified tuff. It would be a nice area to do some prototype testing. I'd like to make this part of the program no matter what we do, even if we continue with our program.

The data obtained would complement data later obtained in the ESF, but it wouldn't replace doing an ESF. This concept involves -- there is the repository block, and Busted Butte is down here. Here is the access road to the mountain, and it would be right in this area. There is

some interesting geologic interface, and perhaps we'll do it as part of the program, not as an alternative.

[Slide.]

MR. GERTZ: Another idea is early access via small diameter tunnels, very small diameter tunnels below the contact of the bedded tuff and upper Topopah Spring, above the lower Topopah Spring, Calico Hills, take a look at the Ghost Dance fault, take a look at some other north/south structures. It's another way of doing business.

[Slide.]

MR. GERTZ: We haven't done a lot of engineering on it, but in section, it would come in from Solitario Canyon site and it would go right under the bedded tuff, and it also looked at the interface just above the Calico Hills, and it'd go over the Ghost Dance fault. Certainly, you'd have to have some ramps for safety concerns for two accesses, and you probably still, under our current plan, would have to do an ESF too because -- this is not meant to be a replacement of ESF, but it might be an easy, early way to get underground. It might not be, too, but it's something that we're looking at.

[Slide.]

MR. GERTZ: Another way would be what if we have some assumptions. We're never going to get more than $200

million a year. That's all the country can afford for this program. What if that's an assumption? Well, we would fund ESF at about $70 million a year. Surface-base testing would be funded about $7 million a year after ESF. Where is the rest of the money going? It's to maintain the fixed cost or the foundation. Potential consequences. Fourteen years to complete the ESF, ten years to complete the surface-based testing, and, as I said, it would be a serial approach.

It would be this kind of simple diagram: Do all your ESF work, finish in 2007, and then get back on the surface-based testing program. If you only had $200 million a year and you knew that's all you were going to get forever and ever, that's one approach.

[Slide.]

MR. GERTZ: Another approach is what we call the sequenced ESF approach that our staff is looking at right now. First of all, sequenced construction has always been a part of our ESF program. Even though it had four TBMs, we were going to sequence the different construction packages. But we're also examining the sequence that you all talked about in some detail in Las Vegas. The Ghost Dance fault would be an early target of exploration. It would be above the repository horizon.

We'd also then get to the Topopah Springs in Calico Hills. The North Ramp would be a form of a "J" tunnel to the Topopah Springs, south "J" to the Calico Hills, and the upper drift would have a potential -- we would drift from the North Ramp to the Ghost Dance.

[Slide.]

MR. GERTZ: Schematically, it would be something like this with a modified "J" ramp to the Calico Hills, "J" ramp to the repository level, and a drift off this access into the Ghost Dance fault area and into the interface of the upper Topopah Spring. That's certainly one ESF configuration that if we had limited funds and only had one or two TBMs, we could start out on this way.

It would then still take longer to get the job done because you would have to finish the work. But as I said, some of the studies say maybe, you know, two TBMs might get it done almost as quick as four TBMs. If that's the case, we'll implement something like that.

[Slide.]

MR. GERTZ: I have a couple of conclusions. I've spent a lot of time going over the program. It's a complicated program. There's lots going on every day, so I want to once again invite you out to see what's going on.

[Slide.]

MR. GERTZ: Present funding level, what we have today, is just not sufficient to implement a comprehensive site characterization program, one that works on surface-based testing aggressively and ESF aggressively. We just don't have that funding today, so we had to make some calls in 1992.

That's what we've tried to explain to you, the calls we've made in '92, not only for John's program over-all but for the calls we've made within the Yucca Mountain project.

[Slide.]

MR. GERTZ: If the present funding trends continues there is no doubt, and that's just repeating what you have said in your report, the date for a license application could be delayed. It depends how long this trend continues. If it starts turning around, perhaps we wouldn't have a delay.

We are going to continue to evaluate options. We'll actively look at sequenced ESF approach. We're going to look at many other things. We want to keep working on our options. We don't want to close out any options but we have a baseline program that we are trying to get done and we want to make sure it meets all the regulatory requirements and it accomplishes the need of the program but requires a strong foundation, lots of railroad track

bed, lots of railroad infrastructure.

With that, I'll sure take some questions but before I take some questions, I need to show you one thing.

John Bartlett talked about the train and infrastructure and I have here a little train and I want to emphasize in your mind that even though I am going to move the train back to here and it just costs a little bit for this part of the engine, there's a lot of costs in the infrastructure or in the foundation.

[Sounds of train whistles and chugging.]

MR. GERTZ: So I'll move it back and as the train goes along the track we need to keep a sound foundation for it.

[Laughter.]

MR. GERTZ: With that, I'll take any questions that you might have.

DR. BARNARD: How much did that cost?

[Laughter.]

MR. GERTZ: That's in the fixed costs.

[Laughter.]

DR. DEERE: Thank you, Carl. Don Deere here.

I think one of the reasons that we wanted this discussion on the presentations that you made today was that we had this cut in $30 million and it seemed to us like a major part of the program suddenly stopped and yet

there was $175 million spent and yet what we really wanted done wasn't being done, and you sort of wonder how long can this go on?

There has to be progress moving forward and the difference between the situation we're in and your train track, you make the capital investment and it's high but from then on all you have is a little maintenance work. You don't keep that and fund it every year.

Well, this is being funded every year. Unless progress is being made, I think in one of your last viewgraphs you did show where if the funding is not coming forward you are going to have to cut.

MR. GERTZ: We'll have to do something if it's not going to come.

DR. DEERE: There is no use maintaining a big capability for all of the things that have to be done --

MR. GERTZ: If the nation is going to make a decision that they don't want to fund this program sufficient to carry it out, we're going to have to do something different to carry it out the way it was set. You're right.

But if the program is still viable in its present form, you're right, there's yearly QA costs, yearly project control costs, yearly sample management facility costs and they do all mount up. In some ways it's still similar to a

railroad. You've still got to keep up your signals and you've got to keep up all those things yearly even if you are not running the train.

It costs money to put them in in the first place but it still costs money to keep them up -- not as much though, once you get them there. This is pretty costly to keep up, this kind of program.

MR. ROBERTS: There are some other implications I just might add. This has bounced back and forth here and you have raised it yourself -- John Roberts.

In the Nuclear Regulatory Commission -- there are a couple of people in the audience from the Commission here today -- but I've worked on waste confidence, both issues, when I was there and it is the Nuclear Regulatory Commission that expanded the original condition and subsequent Court of Appeals ruling that said that the real issue was not storage but was disposal and the failure to dispose, the change in national policy, is one of those implications that would raise questions obviously in the NRC's mind as to its waste confidence conclusions and that would directly impact the licensing and operation of all civilian nuclear power reactors.

The Commission I think would be forced if there were a

national policy change or some implication that funding was not going to be supplied in some timely fashion that, for example, as Carl noted, if you draw this out, the license application could potentially not go in until 2017 and that automatically kicks out the last confidence conclusions of the Commission that a repository would be available within the first quarter of the 21st century and that was a assumption that Yucca Mountain might not be a suitable site.

So there are some severe implications to a change in national policy that would really have to be addressed by both Congress and the Nuclear Regulatory Commission, I think. This is where we are.

MR. GERTZ: Don, I want to emphasize, you know, that as we do the day-to-day management of the project with my staff we look at these things very closely.

We have worked hard to get money into Russ's program to do the drilling that we are doing out there because we think that is just essential is make some progress towards these technical issues in the field.

In fact, not all the time do we work night and day, but at JF-3 we even started working in the evening, trying to finish that hole -- get it back on schedule, so literally and figurative we're working night and day to try

to solve some technical issues.

DR. DEERE: That wasn't the date of the eclipse?

[Laughter.]

MR. GERTZ: Pretty good! Thank you. No, it wasn't.

DR. LANGMUIR: Carl, on one of your overheads you showed that, suggested that with further funding cuts you might be forced to lose some key scientific contributors, in your words, and discontinue some work, some key work.

From what I understand about what is going on now, that's already happened. This year you've made some cuts which did just exactly that, so that in areas which include geochemistry of the engineered barrier system and modelling, thermodynamics of radionuclides and near field geochemistry, you aren't doing much of anything this year.

That's already happened. I just wonder how you decided those priorities relative to other work that you have chosen to fund.

MR. GERTZ: In a word it is very difficult to decide those priorities because there's a lot of good work going on out there by a lot of people and we in effect sat down with my technical staff and went over some pro's and con's and what would ensure progress in the future and what areas

could we try and maybe catch up on a little later.

DR. LANGMUIR: Can you catch up if the staff, if

the persons involved are no longer involved in the program? Can they go elsewhere and get other kinds of funding?

MR. GERTZ: Not as efficiently as you could if you had them on the program and I guess it comes down -- and you hit the heart of some of the discussions we had because that's just the discussions we had.

You know at Livermore what we have done to that staff with the engineered barriers. Los Alamos, we've reduced that staff.

I mean the fact of the matter is this year -- I am trying to paint an optimistic picture that we're doing things, but we also laid off between 100 and 200 scientific and support personnel across the project, even in the light that we are doing some things.

The reasons we did that I guess is it became a discussion as what's best to ensure we can get the program moving in the future?

DR. LANGMUIR: But if these folks were needed to get you a license ultimately because of their activities, doesn't that extend the time required for licensing?

MR. GERTZ: Yes, it may and our judgment there was we hope we could re-acquire some of them. If not, we're going to have to train some others. We hope that we can attract in the future some world class scientists into those areas and if we don't we will suffer some delays.

You do appropriately point out that what I said actually has occurred in some areas. My implication there, it occurred in -- more widespread across the project but I don't dispute at all what you said.

That has occurred. We hope that we'll be able to recover those people.

Our waste package program, for those of you who know the history, went from $20 million to $16 million, and now it is down to $5 million right now.

DR. DEERE: We have noted that.

DR. PRICE: Carl, Dennis Price.

MR. GERTZ: Yes, Dennis.

DR. PRICE: Maybe you can straighten me out a little bit. When you showed me $182 million and I asked you the question about fixed versus discretionary costs, it was about two-thirds fixed or required and one-third discretionary, and then when you had the slide where you had $200 million a year, then you had $70 million ESF, SBT

$70 million, and then you said the rest went to fixed, that sounds like you've completed reversed. Now you have a little less than one-third fixed and about two-thirds or a little less than two-thirds any other way. Do you understand what I'm saying?

MR. GERTZ: No, I don't.

MR. DYER: Carl, this is Russ Dyer. Carl, what he's talking about is there was a period of time where we put all of the discretionary funds into ESF, put all of the surface-based testing on hold until we finished ESF. So it would be $70 million to ESF, zero to surface-based testing until ESF was finished, and then you would fund surface-based testing.

DR. PRICE: But having put them all on hold, your fixed costs still are two-thirds then as compared to the total amount of funding.

MR. GERTZ: Yes.

DR. PRICE: And then on this, your fixed costs are about one-third with respect to the total amount of funding. MR. GERTZ: I think they are still two-third. On the $200 million a year program, we take $70 million and put it on something, either surface-based or ESF. The other $130 million support that $70 million.

Maybe I didn't articulate that very well. It's not

doing $70 million of ESF and $70 million of surface-based testing at the same time; it's doing one focus and doing all that for 14 years and then doing the other one. So I think that's relatively consistent, then. $70 million out of $200 million is about one-third. Did that --

DR. PRICE: That clarifies.

MR. GERTZ: Okay. Great. Yes. I wish I could spend $140 million and do $70 on ESF and $70 on surface-based testing, but we couldn't find a way to do that.

DR. DEERE: Bill Barnard.

DR. BARNARD: Carl, getting the program to the point where it is today, you have made certain assumptions about future funding requirements, and it's now clear that perhaps some of those assumptions might not prove to be true. How are you going to gauge the intent of Congress over the next ten years in determining what you're going to do with the program over the short term?

MR. GERTZ: I can only hope that -- you know, I only assume that Congress passed a law and amendments act that said study Yucca Mountain and they meant for us to do that, and they meant for us to do it in the regulatory regime that they also set up by passing other laws.

Now that some of the hurdles or obstacles to our progress have been removed, be it permits through

litigation or perhaps legislation, be it assuring our QA plan is in place, land access, endangered species, now that those obstacles have been removed, and this is the first year that they're going to see something with most of the obstacles removed, perhaps they will then make the third checkmark and support the funding.

If they don't, we'll have ot look at some alternative programs in the future. As John said, it's just about that simple. This program costs what that profile

shows for the work that we have estimated doing. If we don't get that kind of funding, we have to look at some other way to get the work done, which will affect the end dates. If you can predict Congress more than a month, that would help us.

DR. BARNARD: No, I can't.

MR. GERTZ: In fact, we would maybe solicit your support. I thought your fourth report was excellent in pinpointing some of our problems, and we have not been maybe very successful in getting funds from Congress, and perhaps with your support, we can be a little more successful. Hopefully, some of our demonstrated progress will lead us to success, too. We're looking for all the help we can get, and that's why I have that checkmark that

says, "DOE needs help," and we need it in three areas.

DR. BARTLETT: John Bartlett. I might comment on the means. We now have, I think, I hope, a means and a content for communicating the status and the issues of the program, and they are very significantly different than they were even just a year ago, because we do have the permits that have allowed us to restart the surface-based activities; we have progress through the Office of the Nuclear Waste Negotiator with respect to the MRS. So we go to the appropriation hearings before the Congressional subcommittees this year in a very different posture than we

have before. So our opportunity to present that as a basis now for getting the sustained support from the Congress, atleast making the case for it, is substantially more solid than it has been in the past, and we will be, of course, taking that opportunity, as we go into the hearings season coming up in March, and providing, I hope, then the foundation.

Now, whether that can or will be sustained as the Congress goes through its annual machinations under this system, of course, remains to be seen, but at least we have a more solid foundation for the future that we will be presenting to them this year.

DR. CANTLON: John Cantlon. In looking at the funding system, you have a dedicated source of funds here which comes off of the ratepayer. Those funds actually are accumulated larger than your annual expenditure, so that there is an actual existing pool of unexpended funds.

To what extent do you get full support from the utility industries behind your program of looking ahead with a little more alacrity?

DR. BARTLETT: The utilities are very cognizant of the issues. Currently, the fund has accumulated over $3.7 billion. The revenues to the fund annually are on the order of $600 million. So under immediate past practice, the Congress essentially has allowed us to spend only about half of what the revenues are, and, of course, there is a great deal of criticism that the program isn't making progress. Utilities are very cognizant of this issue, as you might imagine.

They are also cognizant of the fact that, as a matter of fact, as Steve Frishman said, this is one of the issues that is beyond our control, and it's controlled by external parties in this case.

What it will take to sustain the progress of the program now that we have a solid foundation is the sustained support of all the parties who are in fact

interested in assuring that the program proceeds to fulfill the mission that Congress has set for it.

MR. GERTZ: Yes. I would just add one other note to what John says along those lines. We are almost to the point where the fund is earning more money in interest per year than we're spending on teh studies. Sam, is that about --

MR. ROUSSO: Not quite.

MR. GERTZ: Not quite. Okay.

DR. BARTLETT: Well, if I might add an addendum -- still John Bartlett -- the Act, the Nuclear Waste Policy Act as amended has set up through the contracts as the mechanism a classic fee for services rendered situation. What fundamentally happens is the Federal budgeting process

intercepts that, and so the implementation of the agreement is subject to the vagaries of that process and everything else that affects it as it stands right now.

MR. GERTZ: I was going to answer your question.

DR. CANTLON: I would appreciate that. I thought it went into the general fund.

MR. GERTZ: No. It goes into the nuclear waste fund, and it's audited and we have to invest it, and Congress can't use it for anything else except to offset the

deficit, and that's an important use in this day and age.

DR. DEERE: Warner, you had a question.

DR. NORTH: Carl, you've given us a lot of detail about the Fiscal Year '92 numbers. I wonder if you have some material you could share with us that would show us the next level of breakdown of what I'll call the $5 billion here to the end cost for the total project. You've given us the ramp over time, and I am inferring that the order of $120-plus million a year go for the equivalent of maintaining the railroad tracks. I'm wondering if you have a breakdown, though, that would allow us to see in general where the rest of the $5 billion goes in broad categories.

MR. GERTZ: Yes. In fact, part of the independent cost estimate included much more detailed estimates of that. But we can provide to you our third-level breakdown through the year 2001, and you can see how much we're spending like

in site. We may even -- Vince, do we have it at the fourth level, too, through 2001? The third level is all we have right now. But that is broad categories, and --

DR. NORTH: And if you have along with that some indication about how those costs might change, I presume, in the upward direction if one were to look at some of the

exercises you've been through, that you stop short of labelling contingency plans.

MR. GERTZ: Yes. We haven't addressed that other than the fact that ideas or contingency plans appear all -- as long as you have the baseline program, whatever you do in that contingency plan is added to the base program, and other than the one that says $200 million a year for 30 years, or whatever it is, we do have some rough order of estimates of what the added cost would be.

DR. NORTH: Would it be fair to say that an awful lot of these costs are dictated by the need to get to certain locations? In other words, not so much the cost of running the test to the margin; but rather, you've got to get so many miles of drift excavated and so forth.

MR. GERTZ: Maybe not as emphatic as you say because the cost of testing is not inexpensive either. The testing cost are expensive. But, you're right, 14 miles of tunnels -- the only reason we're doing 14 miles of tunnels is to get some tests done in that area. And that's a

smaller proportion -- the 14 miles of tunnels.

On the other hand, more than half the program is based on surface-based testing. And that, essentially, is just getting a rig to a site and drilling a hole and then

analyzing the core and whatever geophysical logging you're going to do after that. And the holes are all laid out and they've all been agreed to.

DR. NORTH: So, if you could determine that certain tests are not necessary, translating that into implication for cost is not all that difficult?

MR. GERTZ: It's very easy. That's because our cost basis is based on 243 drill holes and what's the cost to each one of those holes, and 14 miles of tunnels, and what's the cost of that entire construction process. So, that's right. That's one of our goals. As I said, the one area that's coming to light right now is erosion, where there's a couple of tests we won't have to do.

We have, in our cost baseline, the price for those tests.

DR. NORTH: So, if you could look at performance assessment that might be in place hopefully in the next couple of years, perhaps you might conclude that some other areas of testing -- you were being overly conservative and you might be able to scale back and save money?

MR. GERTZ: Certainly, that's one of the goals of

early site suitability evaluation and our prioritization, and eventually of tying that in with the Performance

Assessment Program.

John, you're very close to that subject.

DR. BARTLETT: That's absolutely right. What we're hoping for, as part of this flex I was talking about, is that, in fact, the interaction between performance assessment and iterative progress will make the process somewhat more efficient as we go along, as we learn, and apply our learning to the definition of what work we think we need to do to get to resolution of some of the information needs of the programs. So, we're anticipating that. And you'll see some of that now when Robby Robertson talks to you about how the M&O is going to exercise their responsibilities.

DR. CANTLON: Let me raise a question. As an old budget manipulator myself, I am sort of struck with this kind of thought, that as you look at the "competition" between surface-base testing and getting underground, you, as managers, are caught with the dilemma that your current staff and so on is really much more supportive of a surface-based approach. If you go underground, you've got big equipment acquisition costs, you've got a largely non-staff group of people that will be the big money consumers, and you've got an internal tough management problem that

actually influences that choice. It isn't just a cold look at underground -- how much information can you get per unit of invested dollar? But, you also have the tough personnel management problem. Is there any truth to that?

MR. GERTZ: As the Project Manager, I guess, John, I'll have to disagree with you. Because I'm probably more interested in getting underground than most anybody on my staff. Because I think that's absolutely essential. But, I'm also interested in providing and keeping up with John's guidance and making sure we have continuity of the program. I don't want to focus everything underground -- and if the program dies because we didn't get there. And I'm not saying that would happen.

But, I think what we're looking after is a comprehensive program, as laid out in our baseline. It includes a sound scientific program surface base that we have going and, in parallel, a sound underground program that includes the resources necessary to procure those things. It only becomes a trade-off because there's limited budget. There's not a trade-off when we get up there.

DR. CANTLON: But limited budgets are real, and they're the real world.

MR. GERTZ: Yes.

DR. CANTLON: The ideal -- obviously, you'd protect parallel thrust. And all I'm asking is, as you look at those parallel thrusts, and you now have to make a tough choice, budget-constrained choice, as to what extent are you truly free? To what extent do you have the typical management problem of sustaining people?

MR. ROBERTS: John Roberts. I think Carl and John can probably answer this better, but I'd just like to switch the emphasis again, that was pointed out I think by Carl. If you start cutting back and you start limiting implementation, and you start dissolving teams, you jeopardize QA programs, you jeopardize regulatory compliance, you lose your corporate memory, if you will, of activities, because you introduced at this juncture. You're now betting that, at some point along the line, you will start over. Well, the costs of staring over are, as we all know from practical experience, likely to be as high or higher than what you thought you saved.

DR. CANTLON: But the real question is is Yucca Mountain suitable or not? Can you get there quicker by getting underground, as opposed to staying on the surface?

MR. ROBERTS: I think Russ is going to make some points here that would tend to negate that hypothesis.

MR. GERTZ: I think you need to get both places, above

ground and underground. You can't make that conclusion without having both of them.

DR. LANGMUIR: Back in March of '91, you

transmitted a memo, transmittal of Phase I report of Test Prioritization Task Force. And all of us got a copy of the Task Force report in which it was shown -- they suggested that three items, in particular, were very high on the list of items that would show if the site was going to be licensable or not, where they investigated. Now, these included gas transport and aqueous transport of radionuclides.

I appreciate that at least some of this is embedded in your hydrology set for this year activities. Would your answer be where these are -- be that many of them are going to have to wait till you get underground? Is that the way you're going to have to deal with these? Have you got them in your program currently going in some fashion?

MR. GERTZ: They're all going in our program. The question is, what do you do first? I mean, even if they're in the underground test, they're in our program, they're just deferred a little bit. Now, Russ was one of the chief reviewers and responsible for that document. Now, Russ, why don't you answer that?

MR. DYER: This is Russ Dyer. As I hope to show you in my talk, those are the things that are driving the test that we're fielding this year; at least, some of the tests we're fielding.

MR. GERTZ: John, you're right. As the Project

Manager, I have to make lots of tough decisions, much like John does, as the Program Manager. And both Russ and Ted Petrie and Wendy and Winn Wilson, who runs the site office, come to me with all kinds of stories and concerns as to why they need money for this or that or this. And we have to try those balances. What you pointed out is very real in the area of waste package and geochemistry. We've lost some people there. But we had to make a call just right there, whether we'd do some drilling or do some more paper studies. And, in our view, some field work toward solving technical issues was in the best interest of the project.

DR. DEERE: Don Deere, again. Obviously, we've been emphasizing the need for underground exploration and underground testing. And our board's position has been that we think it should remain a high priority. We have never stated that it should be done to the exclusion of surface testing. And we prefer that you would have a few months or a year of surface testing, followed by the

beginning of your -- of your construction planning and go on in; more or less as it was perhaps three years ago in the plan.

But when it comes to the point where we're now into the surface based testing, and if there's another cut, will it mean another year's delay, and another year's delay in starting the underground work? And this is the concern we have. Because we really felt that early site suitability was important to the country. And yet we also felt you were not going to be able to determine whether you had a suitable site until you got underground. Therefore, this is the reason that we really want to get underground fast. We don't think some of the questions are going to be answered. But there are other areas that relate to site suitability and site unsuitability. And these are not going to be answered by going underground, as you know: The volcanic and part of the groundwater, the high gradients and things such as this. So, you obviously have to carry on both of the programs simultaneously.

Our point is we hope that there's not another year of delay in getting underground. Because we really feel that some of the questions on geohydrology, perhaps on geochemistry, on the combination, on purged water, and these flows will be better answered after we have an

examination of the -- of the subsurface; particularly, the characteristics of the faults and how they change and what their true characteristics are throughout the site.

But in addition to this, from the scientist, you are doing studies, maybe in geochemistry, in a laboratory, where we really don't have the site data that we need. Therefore, we're doing this, but when we get something else, we'll do that. You have the feeling that some of the work that's going on, is not as well directed as it would be if

you had the subsurface information from direct testing and sampling.

So, there are a couple of good reasons, we think, to get underground. Some of the modeling tests that have been going on in geohydrology have been making assumptions. We just feel some of these assumptions would be considerably different, had they had the opportunity to visualize the ground and do some underground tests. So, I would hope that if the budget is cut, that you're able to start one J-tunnel.

MR. GERTZ: We hope the budget isn't cut, I guess, Don, is what we're saying, but I want to start one J-tunnel; I'd like to start one J-tunnel.

DR. DEERE: I guess our last terminology is not a J-tunnel, but we feel once you're down there, you just as well continue through and bring it back up.

MR. GERTZ: A U-tunnel.

DR. DEERE: I think we ought to take a 10-minute break now before we start the next one.

[Brief recess.]

DR. DEERE: Good afternoon. I will ask out last speaker, Carl Gertz, to please introduce the next speaker of the afternoon.

[Slide.]

MR. GERTZ: Before I introduce Russ, I just wanted to go over one thing that Don brought up and Warner also. I just wanted to go over one thing that was brought up from the previous discussion. I probably didn't emphasize it strong enough, but I know Warner seemed to be on the right track.

Should we get additional funding in this area, it's not proportional as to fixed costs versus discretionary cost. The majority of additional funding would go on top of this. We have a firm foundation and we've done lots of studies, so I'm not talking off the top of my head.

As long as you have this foundation, you can gets lots of things done above the line, so to speak, on that firm

foundation. You can put a lot of weight on that foundation. Certainly, they increase a little. I don't want to tell you that they don't increase at all. They'll increase a little, but not at all proportionally. It's not one third all the time. Pretty soon it gets down to what I would call a more reasonable balance between real work and required work. I wanted to make sure that you got that point.

Now, as I say, I want to introduce Dr. Russ Dyer. He's on my staff. We certain debate what we're going to do, surface based testing prerequisites, environmental things, and my staff comes to me with stories. I'll just tell you one more football story. I've got to tell you this before I leave:

The same football championship game, middle of the third quarter, the team is behind by a touchdown or so and they're starting to drive down the field, and they're pushing the ball down about five or six first downs right away. And this is the big time state football championship. All of a sudden, the coach calls time out on the sideline and I see him yelling at his defensive coordinator and here comes the defensive coordinator out on the field. But he doesn't head for the defensive huddle,

he heads for the referee, and he says, Gertz, he says, I'm going to get fired.

I looked at him. He says, they're moving that ball against my defense and it's your fault I'm going to get fired because you're letting them hold and you're letting them clip. I said, no, coach, no, get back to your huddle, and he turned around and went back to his huddle. Well, Russ hasn't said he's going to get fired if he doesn't do surface based testing, but he certainly has a lot of interest in it.

With that, Russ, I'll let you go.

DR. CANTLON: Who won the game?

MR. GERTZ: Actually, Las Vegas team won the state championship, beating South Tahoe 27:6, something like that. It was pretty close to the fourth quarter. It was the first time for a Las Vegas team to win, or second time in ten years, so it was quite an upset.

[Slide.]

MR. DYER: Good afternoon.

Continuing the precedent that was set a little earlier, we have a multimedia presentation for you this afternoon, with graphics, videos, stills, and if we get to the laser light show, I'll pass out sunglasses to those in the front row.

I would like to run you through an update of the surface-based testing program from the Yucca Mountain site characterization program today.

[Slide.]

MR. DYER: As we have discussed earlier, site characterization consists of surface, underground, and laboratory testing.

Because of some constraints that are a little beyond our control right now, it's not possible for us to pursue an aggressive ESF program in fiscal year '92, but we feel we can achieve demonstrable progress through selective surface-based testing.

Now, to go to the heart of this is Dr. Langmuir's question: What drives the selection of surface-based testing?

[Slide.]

MR. DYER: Well, we'll come back and visit this later on, but I wanted to make the point fairly early on what our fiscal year '92 program is focusing on. You'll see, at the top of the list, suitability issues, liquid and gaseous flow model testing.

This falls out of the test prioritization study, which identified three categories of studies as being those

things that we needed to put the most emphasis on, and that was to reduce the uncertainty associated with Carbon 14 issues, with gaseous flow and transport, and with aqueous flow and transport.

I'll show you the testing that we have in mind that will allow us to address those issues.

Environmental prerequisites is another thing that we're having to focus on this year, because it is a prerequisite to follow-on testing.

Issue resolution: There is a suite of activities that we will be pursuing to try to achieve progress on understanding what the technical basis for some of the various issues are.

ESF prerequisites: Before we do -- before we really make major progress on the ESF, there is a limited suite of surface-based testing that's required to support the ESF facility, and I'll show you some of that that we have on our plate for this year, and things that I will call logical precursor activities, things that we need to do because they need to get done before something else gets done, and I'll show you some examples of some of those.

[Slide.]

MR. DYER: This is an outline of my presentation.

First off, we'll run through the entire surface-based

testing program through fiscal year 2001. This is the program that's outlined in considerable detail in the SCP and in the accompanying 106 study plans. This is the program that was baselined through the ESAAB process.

Then we'll talk about, specifically, the fiscal year '92 testing activities, a little bit about the test planning process in general, and finally, conclusion.

[Slide.]

MR. DYER: I'll start off with -- let's look at the total surface-based program. This is the same slide Carl used, but I have highlighted things a little differently here.

[Slide.]

MR. DYER: This the surface-based part of the program, surface-based drilling and testing highlighted in the blue bar up here. You will note that the green denotes critical path for our project. Most of the critical path falls down in the ESF category.

Some of the in situ testing in the ESF is also

critical path, but surface-based activity, per se, is not a critical path activity. We recognize that.

The two major milestones associated with surface-based drilling and testing: One was initiation of new activity,

of new surface-based drilling, which we started October of '91 with N-55, UZ-55, the first neutron bore holes.

According to this schedule, completion of the hydrologicals, the H-hole drilling, is currently scheduled for August of '95.

[Slide.]

MR. DYER: The program has some interesting challenges to it. We have gone through some interesting development procurement exercises associated with acquiring testing equipment, drilling equipment for this project. The LM-300 is now on-site, as Carl showed you.

We are developing the equipment for monitoring conditions within the unsaturated zone, and of course, we're working under a regulatory QA environment.

[Slide.]

MR. DYER: The LM-300, of course, now on-site. We affectionately call this Big Uel. Uel is very proud of that.

[Slide.]

MR. DYER: This is the drilling program associated

with the neutron bore holes. This was Alan Flint's first rig, N-55 rig.

[Slide.]

MR. DYER: This just gives you a short summary of the total scope of the program.

As I mentioned earlier, this is the total program called for in the SCP; 280 shallow drill holes, 150 deep drill holes, 95 trenches, associated test pits, 44 different geophysical surveys, seismic lines, et cetera, and accompanying geologic mapping and laboratory studies.

Some of these activities are underway now, I'm very pleased to report.

[Slide.]

MR. DYER: Now let me talk about the fiscal year '92 testing activities, what's going on right now.

[Slide.]

MR. DYER: I'm going to leave this one up on the right side for a while and walk you through what we're doing in each of these categories in this fiscal year.

[Slide.]

MR. DYER: First, under the general category of suitability issues, these are studies that are driven by the test prioritization study, and there are generally three major suites of tests that we are going to be concentrating on in fiscal year '92.

Unsaturated zone infiltration -- this is Alan Flint's

neutron holes: we have about a dozen holes scheduled. We'll probably accomplish six to nine of them in fiscal year '92. We have two completed to date. We should be spreading the third hole tomorrow, I believe.

We have the -- let me go to this one next. This will be the first deep hole with the LM-300 at Yucca Mountain. This is UZ-16, has two major purposes for this. This will be a hole with 100 percent core.

We'll use this to test some of our models regarding fluid flow and transport in the unsaturated zone.

After the hole is completed, this will be the hole in which we install some vertical seismic instrumentation to allow us to monitor activities during the rest of the site characterization program.

A little later in the year, we'll be putting in UZ-9. This is the first of a three-hole complex to look at gaseous movement between holes. We can do hole-to-hole testing in UZ-9. This will be the first of a three-hole complex.

[Slide.]

MR. DYER: This was the drilling rig used for N-54, the second of our neutron holes, and at this time, I'd like to show you about two minutes of video from down-hole in the first neutron hole. This was a hole that we had a

casing failure on. We had to pull the casing out and it was serendipitous that we did that. We also ran a down-hole televiewer log of the hole and I think you'll enjoy seeing at least a couple of minutes of a walk through Yucca Mountain.

[Whereupon, a video presentation was made.]

MR. DYER: This down-hole view in the -- you can see we intersected some fractures in the hole. We're in the welded section of the Tiva Canyon unit. This is in the upper part of the Paintbrush Tuft.

In a little while, I'll show you some of the data that Alan acquired through both neutron hole and evaluation of the core that he recovered out of the hole.

DR. ALLEN: Was this a wet drill or a dry drill?

MR. DYER: This was dry drill, and this was one of the -- this was the first hole that we did 100 percent coring on. This would be depths in meters, I believe. There's Alan.

DR. LANGMUIR: Do you get complete recovery on the unwelded as well as the welded tufts?

MR. DYER: I'll show you the recovery log in a minute. I think, altogether, we got around 95 percent recovery in the whole hole.

I think you've seen enough. We've seen a little bit of Yucca Mountain now, subsurface.

DR. CANTLON: What was the diameter of that hole?

MR. DYER: Nominally, it was six inches. In places, it was a little bit bigger, but --

[Slide.]

MR. DYER: N-55 was a very important hole for us because it allowed us to do calibration which will allow validation of volumetric water content data that we've acquired since 1985 in 75 existing neutron bore holes. Because we were also able to pull the casing out, we could run the instrument down and sample an uncased hole. We can also use this calibration to go back and look at data from uncased bore holes such as the UZ series.

As I said, we've got 12 holes sited in the current phase of the neutron program. We've got two completed to approximately 250 feet. This is the data that came out of N-55. This is Alan Flint's data.

There are two things that show up on here. Red is we're plotting volumetric water content on the vertical axis on the left. This is depth of the bore hole in meters on the horizontal axis, going from zero meters down to about 250 meters here.

Essentially, we're looking at two units. The blue

shading on the right is the top of the Topopah Springs unit. Most of the rocks to the left are the Tiva Canyon, welded

and nonwelded units. You can see -- well, the red dots are the measured volumetric water content obtained from core. The green is that obtained from calibration of the neutron logs, so we're looking at correlation between a geophysical instrument and the actual laboratory measurements here.

You see a general increase in the volumetric water content at the base of the Tiva Canyon, nonwelded, right in here, and a dropoff. Now, let me show you another slide.

DR. ALLEN: What's the significance of the fact that the scatter is greater on the core data?

MR. DYER: I'm sorry?

DR. ALLEN: What's the significance of the fact that the scatter is greater on the core data?

MR. DYER: I'm not sure. Alan just put this in my hand last Thursday afternoon. I must beg off and say this is very preliminary data. I don't think we've done much in the way of statistical analysis on this. I'm not sure whether this is meaningful or not.

But, in general, it looks like the geophysical data is tracking the core data pretty well. Larry Hayes of the

USGS is talking.

MR. HAYES: You might see more scatter in the core data because it is a point data. The geophysical logs are integrating.

MR. DYER: Right, right.

DR. ALLEN: That may have some significance, itself.

[Slide.]

MR. DYER: A little different way at looking at this information is, this is saturation. Let me go to my other slide or preliminary results here. Saturation, total saturation coming from about 70 percent in the top of the Tiva welded, approaching a hundred percent, almost saturated, at the base of the Tiva nonwelded, and then in the lower part of the Tiva nonwelded where the porosity increases considerably, you see the saturation drop off dramatically from, oh, about 97 percent here, down to around 30 percent at the base of the Tiva nonwelded, then start building up again in the Topopah.

Now, what this -- at least in our preliminary evaluation, what this suggests is what you see here in this sentence. Let me draw your attention to the last parenthetical phrase here. It argues against a conceptual model involving through-going fracture pathways, at least in these units, in the Tiva and the top of the Topopah.

Other things that we found out just from these two bore holes: down in this part of the Tiva nonwelded where we have high saturations, we're also seeing a lot of clay in this unit. This may or may not have implications for underground excavation activities, if we come into units

that have a high saturation, a relatively high clay content.

Detailed core analysis at close spacing which we were able to obtain because of continuous coring, has allowed for a major improvement in water flow -- in modeling water flow at the site.

DR. DEMENICO: Determining the water content, is that a destructive test? By that, I mean, do you weigh it and then boil it off and then weigh it again, or is the water preserved?

MR. DYER: I know it's weighed, Pat. I don't know the details of the test that he did. Larry, do you happen to know what test procedure Alan used to acquire the volumetric water content?

MR. HAYES: He has a couple of methods he's looking at. But, I think on this method, he put it in an oven and weighed it after he dried it out.

DR. DOMENICO: My next question is -- I don't know if

the budget permits, or if it's part of the surface-based program, but it seems to be a good idea to collect some of that water for the continued tritium and chlorine 36 studies.

MR. DYER: Absolutely. In fact, June Fabrica-Martin, as part of this test, was sampling the chips that came up. She'll be done chlorine analysis on those. Alan, as part of a follow-on on this will be doing tritium

analysis.

DR. DOMENICO: So, this is part of the budget?

MR. DYER: Yes. We just don't have any data on that yet.

DR. DOMENICO: Okay. Very good.

DR. LANGMUIR: You've had since Thursday, right?

[Slide.]

MR. DYER: Just to show a little of what we can --how we can take this initial data and feed it back in to reexamine some of our existing data. This is applying the same calibration model from neutron log to one of our existing holes, UZ-7, an open borehole. And we see the same trend. This is volumetric water content, again, plotted on the vertical axis. You see an increase in volumetric water content from about five percent up to

around 35 percent, again, coinciding with the top of the base of the Tiva non-welded unit, dropping off into the bottom of the Tiva non-welded, and dropping off again in Topopah Spring, and then rising up again in the Topopah Spring. So, we're seeing possibly some kind of systematic response here within the hydrologic system.

DR. DEERE: Don Deere here with a question. It doesn't rise up very much in the Topopah Spring though. It's quite low.

MR. DYER: Not much here, no.

DR. DEERE: Yes. And the other one that you pointed out, I didn't quite agree with what you said. This is the USN-55.

MR. DYER: This one?

DR. DEERE: Yes.

MR. DYER: Okay.

DR. DEERE: It went up again at the Topopah Springs. But, it went up in the caprock primarily.

MR. DYER: Right. Right here in the caprock. That's right.

DR. DEERE: Then it's certainly headed down in the Topopah?

MR. DYER: Yes. Down here. And, of course, we

haven't sampled -- we only sampled about five or eight meters into the Topopah.

DR. LANGMUIR: Tom Buscheck has been doing a lot of modeling, based upon assumed moisture contents in these sequences.

MR. DYER: That's right.

DR. LANGMUIR: How do these measurements compare to his assumptions and his models?

MR. DYER: I'm not sure Alan has fed this information to Tom yet. But, certainly, this information allows a test of Tom's model. His model would predict some responses. And this now is data against which we can test

Tom's modeling.

[Slide.]

MR. DYER: Another category of testing that we're currently -- in fact, it's drilling right now, it is not night back at the test site. But, JF-3, the environmental monitoring well, which Carl talked about earlier, which was not previously in our program, but which was added to our program as the result of an agreement with the National Park Service, we're currently drilling that hole. We should finish the hole by the end of January, beginning of February. And, of course, the purpose of this hole is to

provide a monitoring hole to look at draw down, as we use water during the site characterization program.

[Slide.]

MR. DYER: I don't want to really get into a semantic argument here about what issue resolution or issue closure is. But there are a series of questions that we have to address. We need to be able to address the question relatively early on of how much is enough? When can we, in fact, reprogram some of the assets in the program to shift our focus from one set of activities to another set of activities? And we're actively pursuing dialogue on this, through the mechanism of the annotated outline, to reach agreement on the -- the scope and content of -- that needs to be addressed to resolve these technical issues. These

are three issues that we're actively pursuing in fiscal year '92.

Volcanism studies. I'd point out that, in the performance assessment, that you'll be hearing about in a couple of months, we were able to put in volcanism, look at the impact on system performance of volcanism. We think we have a strong basis for proceeding on some reallocation of resources for the volcanism studies, as a result of being able to quantify some of the effects of volcanism on

performance.

We think that we can, if not close, at least make a lot of progress toward resolving the erosion issue, as long as we reach some kind of understanding as to exactly what is required toward addressing this technical issue.

And, finally, excuse me, the Trench 14 calcite/silica issue is another one that we think we can make considerable progress on, at least being able to demonstrate that we should be able to reallocate resources that are currently focused on this particular issue.

[Slide.]

MR. DYER: ESF Prerequisites. There's a considerable amount of the program which would be considered surface-based testing, which is, in fact, a logical precursor to siting and construction of the ESF.

[Slide.]

MR. DYER: One part of this. This hole has not been drilled yet. But, this was the N-55 hole; but we'll probably use approximately the same rig to drill the shallow boreholes at the north and south portal to get information to support the design of the portal area, which Carl was talking about earlier.

The southern environmental monitoring station, I'm

going to talk about in a little while. Right now, we have a suite of background information, environmental information that we have acquired over the past several years, in the vicinity of the north portal, in the vicinity of Exile Hill. That, of course, was also close to where we had the old ES-1/ES-2. But, at the south portal, we do not currently have a suite of environmental information currently archived.

We are in the process of installing that environmental monitoring station, and will acquire some amount of information over the next 12 months or so on air quality, mineralogical monitoring and radiological background.

[Slide.]

MR. DYER: The final category of activities for fiscal year '92 are what I'll call logical precursors to other activities.

[Slide.]

MR. DYER: This is a picture of the Midway Valley

trench. This was a trench across the northern extension of the Bow Ridge fault, just north northwest of Exile Hill, which trenched through some of the basin fill material, alluvium and colluvium.

[Slide.]

MR. DYER: I'm going to use an old photograph here, but the point I want to make -- disregard ES-1 and ES-2. This is Exile Hill. This is the approximate location of the north portal. The pad to support the north portal is in this area.

This is, in our current basis anyway, the location of the surface handling facility. Part of the logic for doing the Midway Valley study was to look at possible seismic hazards to the surface handling facility.

We need to put a trench in in this area, probably this spring, underneath the potential -- the pad for the north portal, before we get the -- that pad built, which may ultimately become a pad for the surface handling facility.

So, this is just a logical precursor activity.

Another example I would give you are the -- a suite of geophysical surveys, primarily reflection surveys, state-of-the-art reflection surveys, being done, contracted by the USGS out to industry, using state-of-the-art acquisition and interpretation methods, to try to, if you will, optimize the location of G-5, a deep continuous core

geologic hole which will be in the vicinity of the steep hydraulic gradient to the north.

[Slide.]

MR. DYER: If I summarize, the -- let me use this one. It's a little more visible.

If I summarize on a bar chart the fiscal year '92 surface-disturbing activities, we've been through the unsaturated zone infiltration. That's the neutron holes. We'll be drilling those most of the year.

We'll be doing trenching and test pits associated with the north and south portals and also with some of the quaternary faulting studies both in the site and the regional area.

We have the environmental monitoring hole, JF-3, should finish up by the end of this month.

For the deep drilling program, these are LM-300-based holes. We only had one LM-300. So, we have to be very judicious about the scheduling of that particular rig.

We've got that schedule for UZ-16 and UZ-9 throughout the rest of the year.

This just shows going from one crew a day, two crews a day, and finally initiating 24-hour-a-day operations on the LM-300.

We have geophysic -- a geophysic acquisition program, acquisition and interpretation, that I talked about.

Here's one ramp bore hole. We'll probably do two and

possibly three ramp bore holes this year.

We've already completed instrumentation holes at the hydrologic research facility this year. This was for some prototype instrumentation tests.

Then we have, down here, a large suite of ongoing activities. These are the things like the seismology program, the climatology, basic geologic mapping, those things that don't require a large reallocation of expensive equipment.

[Slide.]

MR. DYER: Another way to look at the site characterization program, specifically the surface-based part of it, is to break it down by study plans, and the next five pages in your book have a list of 41 study plans that are active at the current time, and what I have tried to do here is break out -- this is the WBS number which Carl talked about a little bit.

If you wish to go back, you can go back into Carl's presentation and cross-correlate this to see what kind of funding levels were -- at what level we were funding these studies for this year.

This is the study plan number, which of course ties this particular activity to the SCP, our baseline characterization program.

This is a brief description of the study here, and this is the total work to be done during the course of the study. That's not just fiscal year '92 work. This is a total program inventory here.

The ones that I put asterisks by are those programs that we think we're making significant progress on this year. The G-hole is the one where we're doing the preparatory geophysics for it.

The SD holes -- they'll be acquiring information out of, probably, UZ-16 and maybe UZ-9 to provide information on site-specific sub-surface information.

Let me skip one for a minute.

Characterization of volcanic features: Dr. Crowe has been very active not with drilling but, rather, in soil test pits, sampling, and mapping this year, will continue to be.

There is one here I have annotated with a little different symbol, a delta. That's the -- essentially the erosion study. This is one that we would hope that we can reach some kind of resolution on this year as to whether or not this activity merits a continuation of support.

Soil and rock properties in the ESF: Of course, we have the exploratory drill holes along the ESF ramp alignments. It's a long list. If you have any questions

about anything on there, I'll be happy to address your questions.

I don't see much sense in going through it item by item with you.

DR. DEERE: Don Deere. I have a question. On these shallow holes with the ODEX, how much sampling do you do in terms of drive samples or core samples, any at all?

MR. DYER: We're looking at 100 percent core recover on all the ODEX rigs. It seems to add very little to the drilling time and at least at this stage, it provides us with information that we've not previously had. We have a system in place that we can get the core, archive it, feel very comfortable about the pedigree of the core, and it provides us a body of information that we just haven't had to this point.

DR. DEERE: It is a rotary cored sample?

MR. DYER: Yes, it is.

DR. DEERE: And not a drive sample?

MR. DYER: That's right, it's rotary cored. It's dry-drilled, but rotary cored.

[Slide.]

MR. DYER: In fact, talking about those holes, these are the -- I've got three holes on the schedule for this

year and perhaps early fiscal year '93, support of ESF. Let's look at the North Ramp facility first. Here's the -- Exile Hill is located in this area. This would be one potential ramp alignment, coming essentially straight down here. Other options would be something curving out to decrease the ramp grade, but I know in fiscal year '92, I need to put one hole in here to support the north portal design.

I need one hole in here, a deep hole, about a thousand feet deep, to tag the TSW-1 Topopah Spring welded one, Topapah welded two contact which would essentially peg the repository horizon. So, these are two holes associated with support for the north ramp that we are carrying as part of our program for this year.

[Slide.]

MR. DYER: On the south portal, I have one hole that I know needs to be drilled. That's the one at the south portal access area, right down here. The other thing that needs to be done down here is to install and start -- install the environmental monitoring facility and start acquiring a suite of information from this environmental facility.

[Slide.]

MR. DYER: This would be the southern bore hole at the

south ramp portal. I know this is a busy diagram, but what I wanted to put up was just a schematic of the test and evaluation process. Whenever we decide to modify, change a test, there is a fairly stringent process that we need to go through to ensure ourselves that we are not missing something along the path. This lays out an iterative process by which we can modify, change, add to, delete from, over time, the characterization program as more information is acquired.

There are three general phases to it: test planning, test implementation, test evaluation. We've done a lot of planning. We're beginning to do some implementation and I think the next phase that we're really getting into right now is test evaluation and the feedback loop. Those will be the things that I hope we'll be able to talk to you in great detail about in the next year or so.

[Slide.]

MR. DYER: In conclusion, we believe, as you do, a complete evaluation of the site will require both surface and underground testing. Focusing on surface-based testing is one course of action at this time. It has some positive attributes to it. Progress towards technical solutions can be demonstrated.

We are able to make progress on the essential

precursor activities to an ESF, and we think we can acquire a considerable body of information, of data, to support the ongoing evaluations of site suitability. That concludes my presentation. Do we have any questions from the Board?

DR. DEERE: Don Deere here. In your last conclusion that much data can be obtained to support ongoing evaluation of site suitability, I failed to mention when we were discussing the ESF studies half an hour ago, that a number of the activities that were discussed in the early site suitability report, the one I think is under evaluation now --

MR. DYER: Yes, it is.

DR. DEERE: -- by a peer review group, a number of those recommendations state, this awaits underground access and testing, in quite a number of places. I simply meant to bring that out at this time in my last presentation. It's --

MR. DYER: We agree completely, Don. We're going to have to have the underground program.

DR. DEERE: What would you say are the early results with respect to your coring methods, your drilling procedures and how it's going along? Is it better than you expected or is it worse than you expected?

MR. DYER: Things were a little ragged in the beginning. We had some trouble with some of our drilling. We were learning how to drill dry. It's been quite a while, been five or six years since crews have been out on the test site drilling with that equipment. It took us a while to get the first hole in. We were making two feet a day for a

while.

We've switched bits and I'm trying to remember what the drilling rates were for the last series on the N-54. I'm thinking around 20 feet a day. I mean, we were making reasonable progress and that was continuous coring, so we would have three or four core trips a day and then ream out afterwards.

DR. DEERE: And the materials were primarily this colluvian or were you getting through just 10, 20, 30 meters of that and then into rock?

MR. DYER: That's right. We went through a colluvium section, relatively thin veneer in the neutron holes, and then most of the hole was made in pretty solid rock which was both welded and nonwelded. I mean, some of it was pretty punky stuff whenever it came up.

DR. DEERE: You didn't have to case down in the rock?

MR. DYER: The ODEX system cases automatically. It pulls a casing behind it.

DR. DEERE: But you brought it back out when you got through?

MR. DYER: No, we left the casing in. Now, the JF-3 hole, we've been drilling without casing. We put a surface casing in, about 90 feet of surface casing. We're at 450 feet on that. We just tagged the top of the volcanic units. We're through the colluvium on that. That's out in the valley though. That's out in southern, southwestern Jackass Flats.

DR. DEERE: Bill Barnard.

DR. BARNARD: Russ, what is the status of the state permits? Do you have all that you will need for future base testing?

MR. DYER: No. Right now, for instance, for dry drilling, let me give you a for instance. Our plan has used tracers in the fluid, the air that's injected with the -- as part of the drilling process, whenever we're close to the block.

Right now it appears that we need to go, hole-by-hole, to the state, acquire a permit on a hole-by-hole basis for using an injectant -- some tracer, some gaseous tracer injected into the air stream. So, if we do this hole-by-

hole, that's a long -- that's a considerable permitting process to go through. We don't have the water permit either yet.

DR. BARNARD: You don't have the water permit yet?

MR. GERTZ: Let me summarize, from a broader perspective maybe, Bill.

We weren't sure how the underground injection is going to go because the state had not issued underground injections to anybody before. So, we weren't real sure for

this kind of tracer-type activity. So, we weren't sure how that's going to go. And we're working with the professional staff in the state to maybe try to do a group of holes rather than one individual hole. And that discussion is ongoing. But, until we get it resolved, we can only do one hole at a time, or whatever hole we have approval for. The first set of approval happens to be the holes we're working on, it's was the C well complex for some tracers.

Secondly, the water issue. Our major water appropriation permit underwent nine days of hearings in front of the state engineer. And he's evaluating those particular proceedings. In the meantime, he allowed us to use an older well that we had called VH-1 until he makes a

final decision on this particular permit application or appropriation application.

Should he issue us the permit application for the water -- that's for the site characterization activities, we would, in effect, have then all the permits we needed or surface-based testing, after we went through the process for underground injection, whether it's hole-by-hole, groups of holes, tracer by tracer or whatever. But, essesntially, we have the air quality permit, which allows us to drill, build roads, and do other things. We'll have water, so we can control the dust through the water appropriations and we'll have the underground injection well. And those are the
major permits that we'll need for the surface-based program. Other things we can work around, if need be. We need a few different permits, once we start ESF.

DR. BARNARD: What is the status of the permits that you're going to need for the ESF?

MR. GERTZ: Many of those we can't apply for till we design the facility; much like the sewage treatment, the water treatment. We have work around, of course. You can always use portable sanitary facilities. You can always haul drinking water in. But, if you're going to have a long-term facility, you need to get your state permit for

drinking water and sanitary facilities.

One major permit that we'll have to be dealing with is the ventilation. Once we get about a hundred feet into the portal, we have to have a ventilation system. And that's under the air quality permit aspects. So, that's our major work.

But, unfortunately, as you're well aware, we're a ways off before that particular permit. But, in essence, assuming the permits we have stay in good standing, and once the water issue is addressed by the state engineer, we'll have enough permits to continue broad based, surface based program, and do all the preparation, up to about a hundred feet into the portal.

DR. DOMENICO: Carl, Domenico. In the appropriation doctrine, you have to specify either a volume or a rate. What have you requested from the state?

MR. GERTZ: Well, our application included a rate and number of acre feet. They didn't coincide, because one was an engineering estimate and one was the state engineer rule that we had to stay with the volume and not the rate at this time.

DR. DOMENICO: So, how many acre feet did you --

MR. GERTZ: I think we're at 437 acre feet, over seven

years or something like that. To put it in perspective, I think I've talked to you about before about one local gold mine near us, just one gold mine, uses more water in three months than we'd use in 10 years. And that's one of a dozen gold mines.

DR. DOMENICO: But the 400 acre feet is adequate for a few years?

MR. GERTZ: Certainly for a few years. We need to update our estimates and we would have preferred to have the two-tenths per cubic -- gallons per cubic minute or something like that. We would have preferred to have that.

DR. DOMENICO: Gallons per cubic minute?

MR. GERTZ: CFS. CFS, right. Per second.

DR. DOMENICO: That's called a Broccoli unit.

DR. ALLEN: Clarence Allen. Russ, I presume that no matter how encouraging or positive are the results of the individual tests from the surface based testing program the site could not be declared suitable without getting underground testing. Can you imagine some scenarios in which the site could be declared unsuitable solely on the basis of the surface-based testing program?

MR. DYER: It's difficult for me to imagine a scenario. Sort of like the Mayan Princess. You almost have to go down there and excavate it to find the Mayan

Princess. We may get tantalizing hints along the way. But, I think until we really get underground, it will be just that, hints.

DR. LANGMUIR: Russ, Langmuir. You mentioned that gaseous as well as liquid traces are going to be used. I was involved in that program years ago. Just curious. Which tracers have been selected at this point, for such purposes?

MR. DYER: We have a list of seven that we've asked the state for permission for, and we're trying to expand that list to around 20. And I think it's about the same list that you were involved in.

DR. LANGMUIR: Can you name the seven? I know that 20 gets kind of tough. SF6?

MR. DYER: Yes. SF6 is definitely on it. Freon 12 and 13 is on it. There's one I can't pronounce. It's

methane with ditritium, was one that was talked about. There were some different variants of -- no, I better quit here while I'm ahead. Those are the ones I can remember off the top of my head.

DR. DOMENICO: Russ, Domenico. When was the test plan

for the unsaturated zone finally formalized? What year was it? The test plans for the unsaturated zone -- surface-based testing for the unsaturated zone? As I recall, those plans are -- were formalized maybe eight years ago.

MR. DYER: That's probably about right. If you're talking about what's in the SCP, that probably was pretty well firmed up, as of about 1986-'87, I guess. Of course, we have the opportunity to modify and update those programs.

DR. DOMENICO: That was my question. I just wondered, in eight years, it seems like you do have an opportunity to go back into them and see if everything that you thought of then may be necessary today, eight years later down the pike. I just was concerned.

MR. DYER: That's absolutely right.

DR. DOMENICO: They're not cast in concrete then?

MR. DYER: That's correct. We had a peer review on part of the hydrology program last year. And we're trying to incorporate some of the comments they made into modifications in the hydrology program, both in strategies,

in instrumentation tests for the hydrology program.

DR. DOMENICO: It seems like it's an awful lot of tracer tests for the little amount of tracer that you can

find in those rocks, assuming you could find your tracer in those rocks.

MR. DYER: That's right.

DR. DEERE: Russ, could you go into a little bit more detail on what's going on in the volcanic studies? Are they in the field now or were they only there for a week or two and took your samples and are in the lab now?

MR. DYER: No. Bruce has pretty much an ongoing program. He has test pits that he opens, goes out and samples, acquires samples. He has two or three different laboratories that are doing -- we're applying several different dating techniques to his sampling program.

So, I know he has been out on at least two excursions so far, acquiring samples, doing mapping. It's an ongoing project. I mean it doesn't take a great deal of time to go out and scoop something out and acquire a sample.

But there is a delay while he's trying to get some results back, some interim results back, to kind of steer where he wants to go for the next pit or the next series of pits.

DR. DEERE: In his pits, is he able to see this stratigraphic sequence in the little, small desert

weathering profile at various buried depths?

MR. DYER: I hesitate to speak for Bruce, but I haven't heard anything -- haven't heard him say anything that would contradict his earlier finding of cyclic eruptions associated with the volcanics we have there, polycyclic I guess I should say.

DR. DEERE: He feels that some of the discrepancy in dates may well be that they were taken from different positions without being controlled stratigraphically. Isn't that correct?

MR. DYER: I think I'm going to beg off on that. I'd much rather have Bruce answer that.

DR. ALLEN: I think it must be. At least on the ACNW workshop, it certainly must be more than just sampling. There's still some major difference of opinion.

DR. DEERE: I see.

DR. CANTLON: Is there any plan to look at thermal modification of the tuffs related to those volcanic plumes?

MR. DYER: Well, we have already done some work on that. Dave Bish at Los Alamos presented some data at the natural analog workshop looking at essentially -- I don't want to call it metamorphism but thermal effects associated with the original latent heat in the volcanics.

I am not aware of any proposal to go out to, say, Lathrop Wells or some of the black cone/red cone and apply

the same technology there.

DR. DEERE: Are there questions from staff?

[No response.]

DR. DEERE: Questions from the audience or comments?

MR. FRISHMAN: I just have one for you, Russ, and one for Carl.

Steve Frishman, State of Nevada.

Russ, you say you can't imagine a scenario where the site could be found unsuitable without underground excavation. I guess what that means is that you haven't decided yet how you're going to first interpret and then analyze ground water travel time. Is that the case?

What are you going to find out underground that you can't find out from drilling and running an analysis program from the surface trying to evaluate the hydrology?

MR. DYER: I think we can get some -- of course, most of the basis of the hydrology program is based on the surface-based testing.

So far, I'm not aware of anything that would suggest that -- based on, certainly, what Alan has come up with recently -- that suggests that we have active fast paths, and I think that's what we would need to demonstrate to make a finding of unsuitability, is not only the presence but also the potential activation of a fast path network.

MR. FRISHMAN: Have you done anything that is specifically aimed at trying to determine an active fast path, once you have decided what it is you're looking for, what you think an active fast path might be?

MR. DYER: Oh, absolutely. We've done a considerable amount of modeling trying to determine what kind of parameters we would search for in the field, what kind of indicators you would have associated with a fast path network.

That's much of the work that Tom Buscheck of Livermore has been involved in, and I think we have a model that we can test now.

MR. FRISHMAN: Okay. A model that you can test. And can that model be tested with an applied surface-based drilling program?

MR. DYER: It can be tested up to a certain degree of confidence. Again, we come to the question, how much is enough? I guess, in my personal feeling, I am not sure we can get -- I personally can get enough confidence in the results just based from the surface-based program.

MR. FRISHMAN: I guess what I am curious about is whether you have defined the groundwater travel time

requirement in a way that you, in fact, could test it. You've had a couple wells in the past that have had very rapid communication between the two of them. You haven't done any of the tests so far that are laid out for communications, well communications that's -- the three-well communication, anyway. Don't you think any of this would tell you something about a requirement that you have laid on yourself in the guidelines for groundwater travel time?

MR. DYER: Certainly, and I think those tests are part of the testing program that we have laid out.

MR. FRISHMAN: Well, I guess what I'm taking exception to is -- with you on is, the certainty with which you say you can't imagine a scenario that would lead to an unsuitability determination when, in fact, you have a particular requirement out there right now, that unless you're going to rewrite it or change it, should be testable from solely surface-based, unless you have decided that you're not going to look for it.

MR. DYER: No, I disagree with you, Steve. I think we are testing that hypothesis. To date, I don't think we've found testing that I've looked at; I don't think we've found anything that would suggest that we're close to breaking that specific criteria.

MR. FRISHMAN: Okay, and to date, means just what you've done in the last few months, or looking back at everything you know about all the wells you've drilled over the years?

MR. DYER: Well, I'm talking about what we've done during the last few months and what we project during the coming years.

MR. FRISHMAN: So you're discounting anything that you might have discovered in the past?

MR. DYER: We're trying to gather enough data that we have confidence in that we can confidently interpret these confusing results we have from the past.

MR. FRISHMAN: Okay, I guess I just want to leave out there, that it concerns me greatly, the level of confidence that you expressed that you could not find the site unsuitable, considering your discounting everything from the past and saying that it is not -- that it doesn't mean anything until we do more testing.

It is of concern to me that that level of confidence is still expressed.

MR. DYER: Okay, that data exists. It's not straightforward, I think you would be the first to admit.

MR. FRISHMAN: All right, I'll leave that. Carl, I just wanted to ask you and your -- in your presentation,

you made a fairly strong issue of a condition that would rely on an assumption of a long term commitment of about $200 million to the Yucca Mountain project, and you said what -- at least an option for what you would do there would be to spend about 70 on ESF for a fairly extended period of time, and then in sequence beyond that, go to a surface

based program of about 70, stretching out for a lot of years.

Well, I think that that's sort of a false scenario to be working on because you can't really get any more assurance that you're going to be at a level 200 than you can that you're going to get less or more any given year. So, they idea that if you had a level 200 -- and what you would do there doesn't really say anything because you can never get any assurance of a level 200 anyway, for a long period of time.

So, I guess my question is, not knowing each year where you're going to be, how are you going to decide, year to year, whether you're going to put a full committment into underground or a full committment into surface based or continue along, in your planning anyway, on this split where it's really difficult to get very much done on

either?

MR. GERTZ: First of all, I'd like to agree with you, Steve. I hope that 200 is not a reality, because that's not enough to get out.

MR. FRISHMAN: My question is, how do you ever know whether you're going to get 200 for even two years?

MR. GERTZ: You never know. Things are not that certain in the Federal budgeting process, but I think as we develop a basis for moving forward, we'll get indications from both the Administration and Congress of increased

funding and we can just predict, estimate, that the program is heading in the right track. If it's not, maybe we have to make some assumptions on different numbers, but that's purely what that was, an assumption. It was just a "what if" think tank exercise.

I could have easily used 250, I could have used 150.

MR. FRISHMAN: The point that I'm making, though, is that any flat "what if" is not relevant.

MR. GERTZ: I don't know anything that's relevant in future budgeting. You just make your best guess. Here's my resource requirements. If you don't make it, you have to replan.

MR. FRISHMAN: And also, you're always at this sort of

year and a half thing, so you never really know what they're going to do to you next year, when you're projecting for the year beyond. I think to talk about flat and then lay out a scenario of an all or nothing sequential doesn't really tell anybody anything that we need to know, and I'm not sure it tells you anything you need to know.

MR. GERTZ: It's simply a "what if" exercise if you wanted to do it that way. I personally don't subscribe to doing it that way.

MR. FRISHMAN: Then the question comes down to -- and you know, maybe it just needs to be faced head on, and

that is; if you get 200 next year, similar to what you have this year, are you going to put the major emphasis on doing the Title II design work for ESF so you can get going on that, are you going to be in a situation similar to where you are today?

MR. GERTZ: It's certainly a hypothetical question I hope I don't have to wrestle with a year from now or so, or nine months from now.

MR. FRISHMAN: A wonderful answer, thank you. By the way, Russ, one other question: how about if you find way more metallic mineralization than you think you're going to? Wouldn't that be enough to tell you something about

where you ought to be?

MR. DYER: At the very least, I suspect we would reprogram the drilling program and see if that's local, what the significance of that is.

DR. LANGMUIR: But it could never tell you enough.

DR. DEMENICO: Get some gold out of there to pay for the program.

[Laughter.]

DR. DEERE: Are there any other questions?

[No response.]

DR. DEERE: If not, I wish to thank all those who participated today, and remind you that tomorrow, we will start earlier, at 8:30 tomorrow morning.

[Whereupon, at 4:45 p.m., the Board meeting was recessed, to be reconvened on Wednesday, January 8, 1992, at 8:30 a.m.]